Business Model Innovation and Renewable Energy Application: Scalability of SMEs in sub-Saharan Africa

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DEDICATION

I would like to dedicate this thesis to my father – Lt.Col Tyem Ojo Miri-Dashe (rtd)

25th June 1952 - 8th November 2021

You lived, you loved, you fought, and now you rest.

Thank you for everything.

Sleep on Baba.

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To my family, especially my mother Mrs Emily Miri-Dashe, my brothers PJ, Nanzin, Lafim, and other extended members too numerous to count. Your unwavering support, enthusiasm, encouragement and care throughout my PhD journey have been indubitably cherished.

ABSTRACT

Business Model Innovation (BMI) has become a dominant phenomenon of discourse in management literature. Particularly in explaining value identification, value creation and value capture, BMI provides a contemporary perspective into understanding how businesses innovatively apply strategies in order to maintain sustainable competitive advantage. The need to have an extra competitive has increased in importance due to a number of salient factors such as a higher number of players within markets, sectors and industries around the world. A heightened accessibility to resources hinging on the fourth and fifth industrial revolutionary advancements also provides another reason for the emergence of more businesses. Be that as it may, the manner in which BMI effectively captures valuable competitive advantage may vary due to influences of internal capability and their reactions to external influences. Understanding these influences demands capturing the full spectrum of BMI as extant literature identifies that there are still limitations in BMI knowledge to provide more construct clarity.

For this reason, this research aims firstly to contribute to understanding the spectrum of BMI application. Particularly, we look at exploring BMI through the lenses of small and medium scale enterprises (SMEs). SMEs represent a vibrant sector in many economies across the globe, however, their individual limitations in capacity and efforts to navigate the respective business environments prompt the need to be inventive when deploying their strategies. This provides fertile grounds to explore and capture the innovative intricacies which contribute to their BMI capabilities. The second aim of this research is to capture the manner in which these SMEs operate and interact with the environmental business factors surrounding them, and how such factors affect their BMI process. The study adopts a qualitative multiple-case study approach in order to explore the phenomena of SMEs' innovative capabilities (IC) and the interactions of those capabilities with the business environment. The case study approach presents the best opportunity in exploring BMI to unearth the unknown nuances and contribute to the limited clarity of BMI application. We specifically looked into ten cases situated in the renewable energy industry in Nigeria. The industry is still in its infancy and the companies are within the SME development phase. The research also adopts the interpretivist philosophy and inductive approach by observing, analysing and contributing to the concept of BMI. Specifically, while there has been research exploring the concept of BMI there is still limited knowledge in perspectives of SMEs in the renewable energy industry in sub-Saharan Africa. Our research contributes to that specific and is limited in scope.

Through the study we have been able to derive valuable insights in terms of SME innovative capability. The first major finding is in the form the identifying the Innovative Capability development framework for SME-BMI. This entails the starting point of the IC process through gumptious, which are personnel level traits (PLTs). These PLTs provide influencing building blocks which are enterprise-level-traits (ELT) of dynamic capabilities into the ELT stage. And the final stage of the process is the core innovative capability prisms (CICP), which are the major pathways through which SMEs channel their IC. The second major contribution provides an insightful framework for understanding SME interrelationships with external factors. This framework is the stakeholder value co-creation swivel which captures the salient necessity of important stakeholder relationships and ensures mutual value is created and managed with all stakeholders for the benefit of the SME. These findings have valuable theoretical and practical implications. Theoretical implications include the enriching discussions of the nuanced nature of BMI application for growth and the instrumental value of stakeholders in relation to SME literature. Practical implications are the multidimensional nature with which the aforementioned frameworks can be adopted in understanding the peculiar capabilities available to them when considering contemporary strategies for maintaining innovativeness and extracting the most out of their stakeholder relationships. Investigating this within the renewable energy industry also contributes to the originality of this research.

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LIST OF ABBREVIATIONS

AfDB ……... African Development Bank

AMGA ……..... Africa Mini-grid Association

BEST …….. Battery Energy Storage Technologies

BM ……. Business Model

BMI ……. Business Model Innovation

CAPEX …… Capital Expenditure

CHP ……. Combined Heating and Power

CICP ……..... Core Innovative Capability Prisms

DeC(s) ……. Developing Country

DC ……..…. Dynamic Capabilities

EC ……... Entrepreneurial Competency

ELT …….. Enterprise Level Traits

EPP …….. Energy Production Payments

ETS …….. Emissions Trading Scheme

GA ……... Gumptious Aptitudes

GIZ …….. Deutsche Gesellschaft fur Internationale Zusammenarbeit

IC ……. Innovative Capabilities

MAN …… Manufacturing Association of Nigeria

MCI …….. Ministry of Commerce and Industry

MoU ……. Memorandum of Understanding

MW …….. Megawatt

NASME ……... National Association of Small Medium Scale Enterprises

NEMSA ……... National Electricity Management Service Agency

NGO …… Non-Governmental Organization

OEM …… Original Equipment Manufacturers(s)

OPEX …….. Operating Expenditure

PLT ……. Personnel level Traits

RE ……... Renewable Energy

REA …… Rural Electrification Agency

REAN ……. Renewable Energy Association of Nigeria

REB …… Renewable Energy Business

REC …… Renewable Energy Certificate

RE-BM ……... Renewable Energy Business Model

RE-SME ……. Renewable Energy Small and Medium Scale Enterprise

SBMI …….. Sustainable Business Model Innovation

SCDU ……. State Cooperative Divisions and Units

SEPAN ……... Sustainable Energy Practitioners Association of Nigeria

SME …… Small and Medium Scale Enterprise

SMEDAN ……... Small Medium scale Enterprise Development Agency of Nigeria

SON …… Standard Organization of Nigeria

TGC …… Tradeable Green Certificates

USADF ……... United States Africa Development Fund

USAID …… United States Agency for International Development

WAPP ……. West Africa Power Pool

WHO ……... World Health Organization

RESEARCH DECLARATION

I declare that this research is the result of my own work and does not include any work conducted in collaboration except where specifically indicated in text. There are no substantial similarities with any other work that has been submitted for a degree, diploma or any other qualification at the University of Kent or any other University except as declared in the following conference proceeding specified in text.

This is an outline of the major contributions made by this research. This comprises of a developmental paper submission at the British Academy of Management (BAM) 2020 conference.

Conference

Miri-Dashe, S., Al-Tabbaa, O. and Amankwah-Amoah, J., 2020 *Business model innovation, renewable energy application and the scalability of SME's in sub-Saharan Africa.* In: BAM 2020 Proceedings. British Academy of Management. (In press)

CHAPTER ONE

INTRODUCTION

In the pursuit of relevance, it is customary for businesses to create key objectives and strategies for meeting these objectives. Drawing from previous literature in management, there has been a constant evolutionary process in exploring the undercurrents towards achieving business objectives through concepts of value chain framework (Porter, 1985; Inigo et al., 2017; Geissdoerfer et al., 2020) value creation (Amit and Zott, 2001; Baden-Fuller and Morgan, 2010), and more recently the concept of business models (Zott et al., 2011; McDonald and Eisenhardt, 2020). Gaining prominence from the early 90s, the business model has been considered to be the standard unit of analysis in determining value identification, creation and capture for businesses in management research (Teece, 2010; Casadesus-Masanell and Ricart, 2010; Amit and Zott, 2015; Hennart et al., 2021). Although the business model (BM) as a concept seeks to explain value creation objective, the ever-changing conditions of the business environment prompt a need for the BM to possess dynamic characteristics, as the environmental changes will increase threats of uncertainty and obsolescence of the BM (Sosna et al., 2010; Teece, 2018; Velter et al., 2020). This demand to make constant alterations to a firm requires finding new ideas to further complement an existing BM, thus giving rise to the conceptual phenomenon of business model innovation (Demil and Lecocq, 2010; Foss and Saebi, 2016). An evident example of the need for constant BMI alterations such as the recent pandemic consequently jolted the global business environment (Bradly et al., 2021). In assessing the COVID-19 phenomenon, studies eluded to the fact that businesses with digitally oriented BMs functioning prior to the pandemic were better prepared to adapt, while those who were not were extremely affected, dramatically widening the gap in terms of capabilities (Bradly et al., 2021; Mostaghel et al., 2022). Business model innovation (BMI) in itself examines the process through which businesses re-evaluate and adjust their value creation logic in response to imminent changes within a given business environment (Laudien and Daxbock, 2016; Palmie et al., 2022). Besides alleviating the effects of extant threats, the BMI concept is adopted for businesses to exploit forthcoming opportunities and create a sustainable competitive advantage (Saebi et al., 2017; Du et al., 2022). A notable management theory which resonates with the search for competitive is the resource based view (RBV). The RBV is frequently featured in BMI literature (Da Silva and Trkman, 2005; Kraaijenbrink et al. 2010). This is because it highlights that businesses are heterogeneous in terms of resources which are

available to them (Barney 1991). This therefore plays a determinant in the strategic trajectory a business opts to follow and how that would lead towards achieving a sustainable competitive advantage (Chesbrough 2007). With a focus on SMEs, understanding the causal relationships between strategy (Cosenz and Bivona, 2021) and competitive advantage, provides feasible insight into what resources are available and they can competently manage them to lead towards growth (Rehman et al., 2022). This research rests on the RBV to investigate the BMI process with respect to SMEs. In view of this, understanding how enterprises develop innovative capabilities are harnessed within their business models can be viewed as a necessary aspect of gaining more knowledge within the BMI narrative (Inigo et al., 2017; Schoemaker et al., 2018; Bocken et al., 2020). Also, understanding how they can achieve that with respect to the particular environment in which the businesses are situated is beneficial to contributing to BMI literature (Oskam et al., 2017). However, efforts in researching this phenomenon within small and medium-sized businesses are limited and provide a potential avenue for research in the business management literature (Lamanen, 2017; Andersen et al., 2021).

There have been attempts at understanding how BMI could unfold. For instance, the notion of trial and error (Sosna et al., 2010) exemplifies attempts at conceptually examining BMI occurring as a result of undergoing extensive experimentation by a business (Kim and Min, 2015; Paiola et al., 2022). Smith et al. (2010) also examine the concept of organisational ambidexterity, whereby a business seeks to possess explorative and exploitative characteristics in advancing its business models (Markides, 2013; Mao et al., 2020).On the other hand, BMI has been examined from the application perspective. In this respect, two main approaches can be recognised; the incremental approach (gradual partial BM adjustment) and radical approach (aggressive holistic BM change), where the decision for selecting any of these approaches depends primarily on the resource configuration available to a business (Voelpel et al., 2004; Osiyevskyy and Dewald, 2008; Inigo et al., 2017; Bocken and Geradts, 2020; Kraus et al., 2021).

Despite identifying these traits, we recognise there is a lack of clarity regarding how firms adopt BMI to scale up their businesses (Inigo et al., 2017; Teece, 2018). In other words, although earlier mentioned notions have been established on a generic conceptual level, there is limited insight as to what factors contribute to the transformational process of existing BMs to new business models (Hacklin et al., 2018). This is further complicated due to the fact that a combined scenario of salient differences in industrial and contextual influencing factors creates a wide spectrum of plausible BMI capabilities available to a firm (Cosenz and Noto,

2018; Schoemaker et al., 2018). An example of this manifests on the basis that the varying levels of challenges faced by an enterprise in an environment depends on the level of intensity the contextual factors possess within a said environment and the enterprise's capacity to positively manipulate such factors (Linder and Williander, 2017). Ultimately, the higher the resource limitations experienced by an enterprise, the lower its capability to individually mitigate the adverse contextual factors, thereby prompting the need for innovative inclusion and strategic alliances (through stakeholders) in their BM structure (Mitchell et al., 1997; Hobday 2005; Islam et al., 2018; Velter et al., 2022). These characteristics are consistent with small and medium enterprises (SMEs) as they are more susceptible to adverse external pressures and have limited resource capacity (Achtenhagen et al., 2013; Siebold; 2021). Consequently, SMEs are more prone to actively seek innovative capability enhancement, and understanding the innovative capabilities of BMI would prove beneficial to SME business development in practical and theoretical standings.

Therefore, two major gaps are identified in this research. Firstly, the limited knowledge of the effect of BMI capabilities on firm scalability, and the limited knowledge of contextual triggers that moderate the BMI process. Extant studies have however highlighted that business models are often developed as a result of reacting to an environment (McGrath, 2010; Heikila et al., 2018). Secondly, in ensuring scalability from a BMI standpoint, it is customary for firms to engage in a learning process via experiential development while actively applying the development through experimentation (Hacklin et al., 2018). Experiential learning is viewed as important especially due to the relative uncertainty of effectiveness the new BMI would bring (Berends et al., 2016). In addition, the hands-on effect of learning through experience can assist in creating a more accurate BMI suited for the business in a particular business ecosystem. The outcomes of these learning curves for BMI capabilities however are often influenced by different factors and the levels to which they affect the businesses (Martins et al., 2016; Bojovic et al. 2018). Scalability is akin to growth, which business entities such as SMEs strive to maintain particularly at lower levels which are predominantly more challenging (van de Vrande et al., 2009; Trimi and Berbegal-Mirabent, 2012). This research outlines objectives of exploring the potential capabilities SMEs harness when making attempts to be innovate and re-invent their business models, observing how that leads to growth and survival of their enterprise. A second fundamental objective of this research lies in investigating what business environment elements are present and the role they potentially play in the BMI development process.

The main purpose of this thesis is to examine how entrepreneurs adopt BMI towards scaling up their businesses. Accordingly, and to address these gaps, two research questions are posited:

1. Which capabilities do SMEs use in their BMI process in order to scale up their business activity?
2. How do contextual conditions influence the transformation process of business model innovation?

To answer these questions, the study adopts a qualitative case study approach, within the context of ten renewable energy companies located in Nigeria, a country situated within sub-Saharan Africa. The renewable energy industry presents an avenue through which an inherently innovative industry still at its early stages of development can be examined with regard to relevant factors, key players and stakeholders existing within the industry (Gabriel, 2016; Freudenreich et al., 2020). Also, the pool of prospective data sources consisting of 10 identified renewable energy companies is predominantly within the category of SMEs in terms of capacity, which will be suited for investigating intricacies regarding BMI capabilities in SMEs.

By executing this research three fundamental theoretical contributions are expected to be made. Firstly, although a number of studies have examined constraints to scaling up small and medium-sized energy enterprises (Berg and Fuchs, 2013; Haselip, Desgain and Mackenzie, 2015; Muller et al., 2018) and capabilities development (Andreu and Ciborra, 1996; Gavetti, 2005; Andersen et al., 2021), their analysis thus far has been unable to fully integrate the two lines of research examining how SMEs use their BMI process in order to scale up their business activity. This thesis seeks to contribute toward addressing the gap in the literature by developing more knowledgeable insight into the interrelationship between BMI and scalability. The research addresses this by providing empirical evidence gleaned from 10 SMEs within the renewable energy industry. Exploring what creative strategies they adopt that leads to growth. Our investigation highlights the importance of developing internally driven characteristics which lead to innovative capability development. The investigation begins from an individual level, and how such individual traits influence the innovative traits of the enterprise as an entity and then ends at how the innovative configuration best leads to growth, thereby offering vital important theoretical and practical implications for BMI in an SME context.

Secondly, literature has explored to a certain extent the means through which opportunities are identified and exploited through BMI (Chesbrough 2007; Inigo et al. 2017),

as well as the antecedents and consequences of the transformational effect of BMI (Achtenhagen et al., 2013; Teece, 2018; Hameed et al., 2022). However, since business ecosystems are inherently heterogeneous (Cosenz and Noto, 2018; Colovic and Schrouffeneger., 2021), the intended research identifies potential furtherance in understanding BMI opportunity and re-configuration capabilities unique to a particular business ecosystem of a developing country (de Silva et al., 2019; Abu Rumman et al., 2021). We respond to the clamour for research in BMI intricacies (Foss and Saebi, 2017) by exploring the concept of dynamic capabilities (DCs) as a part of the BMI process, and what role it plays within the SME innovative capability development process. Specifically, the concept of dynamic capability features exhibits its elements of sensing, seizing and reconfiguring specifically at the enterprise level characteristics.

Thirdly, the research is conducted in response to the increasing demand to enrich the business literature on renewable energy application, as the demand for energy alternatives (Gullberg et al., 2014; Burger and Luke, 2017; Overholm, 2017; Tomala et al., 2021), and the heightened interest in business aspects of renewable energy development (Richter, 2013; Gabriel and Kirkwood, 2016; Karakaya et al., 2016; Tongsopit et al., 2016; Bocken et al., 2020) begin to coincide more often in research. We lean into exploring this point of convergence by highlighting the salient value of understanding stakeholder identification, networks and their role in the value systems of enterprises (Park et al., 2017; Frishammar and Parida, 2019; Yi, Chen and Li, 2022). As extant literature describes a shifting locus of value capture from a singular enterprise entity to the business ecosystem outlook (Lai et al., 2012; Amit and Zott, 2015; Palmie et al., 2022). Therefore, as strong stakeholder ties continuously become a more mainstream aspect of business survival, it is important to maintain and manage instrumental relationships. With the growing focus on the renewable energy industry, exploring the relevant players within a developing economy context unlocks value in understanding the business networks specific to that particular environment. Theoretical contribution resides in the effects of contextual considerations in BMI literature. From a practical standpoint, the study will provide contributions including creating a feasible BMI framework for SMEs within the contexts of sub-Saharan Africa, as well as the rigorous research for policy development of the renewable energy industry in Nigeria.

The research is organised as follows. Chapter two looks into the literature review, introducing the theoretical background and analytical discourse of the main research blocks which are Business Model Innovation, scalability, innovative capabilities, and Stakeholder

inclusion in BMI. The renewable energy industry in general and the existing literature on business models within renewable energy are also discussed in chapter two. The third chapter discusses the formative theoretical framework which is gleaned from the literature review. Chapter four looks into the methodological review, the chosen inductive multiple case study methodology, contextual elements in terms of SMEs and renewable energy in sub-Saharan Africa. The cases which have been identified for this study are also described in detail in chapter four. Chapter five covers the first findings which answer research question one of understanding innovative capabilities the harnessed by SMEs. Chapter six discusses the findings for the second research question investigating the contextual factors influencing the transformative process to their BMI. The final chapter contains the discussions gleaned from the findings and overall research. The research limitations and concluding statements to this study are also outlined chapter seven.

CHAPTER TWO

LITERATURE REVIEW

In the course of this chapter, the key concepts are discussed beginning with the interrelationships between the business model literature and the business model innovation literature. This is followed by discussions of scalability. Followed by the concept of innovative capabilities and the identified elements of entrepreneurial competence and dynamic capabilities in relation to their significance in SMEs within developing countries. Stakeholders and their relevance in this chapter as well as literature on renewable energy, the existing business models and the nature of the industry within sub-Saharan Africa.

2.1. Business Model and Business Model Innovation; Review of the concepts

From various literature studied, it is understood that the 'Business Model' (BM) is vital to the adaptability, flexibility and sustainability of a business (Zott and Amit, 2013; Wirtz et al. 2016). It is commonly perceived as a devised structure through which the business strategy, ideology and value proposition are conceptualised and outlined (Osterwalder et al, 2005; Zott, Amit and Massa, 2011; Arbussa et al., 2017). The objective of a BM is ultimately aimed at aiding a prospective/existing business venture in connecting necessary factors (partners, value proposition, forms of finance), and seeing how a uniquely designed synergy can be devised in such a way that it promotes the overall competitive advantage of the firm (Casadesus-Masanell and Ricart, 2010). Furthermore, existing literature gives the impression that the concept of creating a business model is vital to the identification of value propositions of both the business and its prospective customers (Saebi and Foss, 2015). And this is done while taking mindful cognisance of surrounding external (economic, socio-political) features and partakers within the environment as well as internal features within the business, in order to find the right balance in strategy which enables its sustainability and consistency in value creation (Schaltegger et al., 2012; Aagaard et al., 2021). Hence, it is rational to state that BMs are created as a result of necessity, and the nature of the times significantly affects the type of BM that would be adopted. Furthermore, the BM is also a byproduct of a consequent change in business trends and practices. The aptitude to maintain the competitive advantage of a business requires an innate ability of a firm to sustain a continuum in harnessing novel idea generation

capabilities which keep its survival prospects in the fore (Chesbrough, 2010; Sosna et al, 2010; Arbussa et al., 2017). It is at this juncture that innovation is identified as a viable process through which the unique business value capture is preserved, and an infusion of business models and innovation takes place (Teece,2010; Gambardella and McGahan, 2010; Foss and Saebi, 2016; Poudineh, Sen and Fattouh, 2018).

2.1.1. Business Model Innovation

BMI is often perceived as a business model evolution (Demil and Lecocq, 2010; Inigo et al, 2017; De Silva et al., 2021). Although the term is relatively new to management literature, it has been increasing in its prominence in recent years (Chesbrough 2010; Colovic and Schruoffeneger., 2021). This stems from the steady growth of the consideration of the business model as a vital unit of analysis in management (Wirtz et al. 2016).

As illustrated in Table 1, it can be observed that there are varied perspectives in defining the term BMI, thereby purporting limited construct clarity in literature (Foss and Saebi, 2017). However, a commonality shared amongst all perspectives is the fact that the current business environments are dynamic in nature and existing businesses and the models they adopt, cannot afford to be static. A combination of technology-based advancements, shifting trends in globalisation and heightened competition increases the demand for businesses to infuse resourceful strategies for value creation in their business models (Mitchell and Bruckner, 2004; Silvestri et al. 2018; Heikkila et al., 2018; Mostaghel et al., 2022). The BMI represents this transformational process that firms/businesses undertake in response to these unexpected shifts in trends (Demil and Lecocq, 2010; Kim and Min., 2015). And as stated earlier, the factors responsible for influencing the resource configurations available to a business are of varying levels most especially looking through the perspectives of contextual nuances (Putra and Santoso, 2020).

Aspects such as the capacity of the firm, and the immediate resources available to a business often determine the level of pressure to innovate new business models (Bucherer et al, 2012). In more challenging environments, a higher degree of resource strain is experienced, thereby also increasing the pressure for BMI inclusion into firm strategies (Cosenz and Noto, 2018). Following this, businesses of a lower capacity require more strategic ingenuity in order to compete against business firms of higher capacity to further gain advantage and ensure survival (Silvestri et al. 2018; Bradley et al., 2021). This can be typified by looking into the predicament

faced by small and medium-scale enterprises (SMEs), where efforts in maintaining a competitive edge require a higher degree of innovative strategies (Trimi and Berbegal-Mirabent, 2012; Arbusa et al., 2017). Therefore, for the purpose of this research, we define business model innovation as the process through which a business identifies, enhances and re-adjusts its value creation process to maintain competitive advantage and ensure long-term survival.

Author	Definition	Key assumptions
Amit and Zott 2012	*"An alternative for general managers to create value new value in times of economic change".* (pp, 39)	Amidst economic change, BMI can be adopted to mitigate adverse effects, and a modified value metric can be created
Aspara, Hietanen, and Tikkanen, 2010	*"A continuous potential strategic orientation of a firm's innovative corporate culture or capacity to create valuable benefits and advantages while keenly considering costs, risk and trade-offs".*(pp, 41)	BMI is characteristically a continuum of the cultural state of mind by a firm to keep assessing the efficiency of the value strategy to create a favourable balance between the positive and negative aspects of its SWOT
Chesbrough, 2010	*"A process of formulating a structure through which firms create strategies for enhancing competitive advantage"* (pp, 354-355)	BMI is systematic and calculated irrespective of how radical of incremental manner with which it manifests
Gambardella and McGahan, 2010	*''When a firm adopts a novel approach to commercializing its underlying assets''*(pp,263)	Novelty is a key aspect of the BMI approach, and feasible commercialization of BMI is vital to validate itself.
Casadesus-Masanell and Zhu, 2012	*"The search for new logics of the firm and new means of capturing and creating values for its stakeholders; primarily focusing on finding new ways to generate revenues and define value propositions for customers, suppliers and partners''* (pp, 464)	Highlight New logic, value capture, and value propositions as focal objectives for BMI

Velu, 2015	*''The systematic change involving alterations and adjustments in customer proposition, creation and capture of value in order to positively affect firm survivability''*(pp, 1)	Suggests BMI is a 'process' of systematic change regarding how a business captures value to ensure survival.
Bolton and Hannon, 2016	*''An appropriately designed model process which creates important opportunities in overcoming key barriers to seamless market diffusion''*(pp, 1732)	Through BMI, opportunities for overcoming threats while moving with market trends are explored
Sorescu, 2017	*''Business Model Innovation is a change in the value creation, value appropriation or value delivery function of a firm which consequently results in a momentous change to the firm's value proposition''* (pp, 692)	BMI is a significant change in the value-chain process of a firm which ultimately changes the value proposition of the firm
Wirtz and Daiser, 2017	*''Management tool which supports companies in navigating above the intense global competition and dynamic market conditions''* (pp, 15)	BMI is a management tool, through which dynamic capabilities are explored to navigate changing market conditions
Ammar and Chereau, 2018	*''a co-specialised interactive effort between business model enhancement and a predetermined strategic posture to promote competitive sustainability of a business model and firm at large''* (pp, 40)	It is a complementary process of merging new strategic ideas with the existing BM structure in order to maintain a competitive advantage.
Hacklin, Bjorkdahl and Wallin, 2018	*''The inherent ability to adjust/change the primary business model to be at par with shifting demands''* (pp, 83)	BMI ensures the firm's ability to adjust to changing business trends

Table 1. Compiled BMI Definitions

2.2. Approaches to BMI

Within the current literature on general innovation literature, the traditional approaches to innovation fall within two streams of incremental and radical innovation. The basic distinction between both lies in the scale of innovation applied to the business model structure. While incremental innovation presents a process where marginal systemic changes to the BM structure, radical innovation typifies a more aggressive stance in applying innovation (Lee et al. 2010). Radical innovation seemingly entails more instantaneous changes to pre-existing practices, and incremental innovation being a gradual process is a more methodical approach to innovation (Jugend et al, 2018).

2.2.1. Incremental vs. radical BMI

Incremental Business Model Innovations are built upon a systemic method of knowledge application to an existing Business Model in order to augment the business model and exploit prospective opportunities in a manner unique to that business model (Souto, 2015). Based on these characteristics, incremental BMI is suggested to be practised within firms with already established (incumbent) business models and are also of a larger functional capacity such as MNCs (Multinational Companies), where there is less pressure on the novelty of the innovation and more focus on the additive innovation as opposed to total adoption of a new BMI (Kim and Min, 2015; Gorissen et al., 2016; Mao et al., 2020). Established large firms also adopt this method in a bid to consolidate their already existing market positions as incumbents (Jugend et al, 2018; Kraus et al., 2022). By implication, firms undergoing incremental business model innovation processes do not necessarily experience a drastic shift in the continuum regarding their products/services, processes and/or general organisational methods (Suoto, 2015).

An instance exhibiting incremental BMI can be seen in the case of the oil company Shell where they begin their keen observation of the global clamour for carbon footprint reduction compels them to begin explorative clean energy initiatives for RE application, as well as also initiate low carbon dioxide (CO2) objectives. Such objectives include natural gas promotion over fossil fuel-based energy production (Shell 2018). Due to the substantial capacity of the century-old energy company, a collective set of factors in terms of expertise, accumulated assets as well as the financial buoyancy of the company are fully taken advantage of, giving Shell Oil company the ability to maintain the core value proposition of energy production,

whilst executing a gradual energy source alteration process at the same time (Kim and Min, 2015; Shell, 2018). Executing such a task by a small-scale company within the same field would be ominously daunting, implicitly coercing such a company to identify a more innovative approach which feasibly ensures its survivability (Dahan et al. 2010; Cosenz, 2018). From an incumbent perspective, the incremental BMI process ensures the competitive advantage is maintained and potentially mitigates the threat of daring innovations undertaken by competitors (Casadesus-Masanell and Ricart, 2011; Markides and Sosa, 2013).

Radical innovation (also commonly referred to as disruptive innovation) as the name implies takes a more aggressive stance towards approaching business model innovation (Kraus et al., 2022). It is a form of innovation describing the situation whereby a firm instantaneously alters multiple essential components of its business model, creating a scenario in which experimentation with new components largely differs from the incumbent configuration (Andries et al, 2013; Ammar and Chereau, 2018). The occurrence of this gives an impression of a total overhaul of a business model, thereby potentially altering the value creation and capture trajectory for both the firm and its prospective customer base (Fores and Camison, 2016; Jugend et al, 2018). Contrary to the sequential long-term incremental BMI strategy, Radical BMI is more abrupt and its short-term effects are more visible, especially in terms of opening up new frontiers for applications and markets (Apanasovich et al., 2016; Bradley et al, 2021).

Recent research suggests radical BMI to be a practice more pertinent to new entrants as the perceived desire to infiltrate the market and create significant market value among existing competitors instigates a pressure novelty in the BMI approach (Apanasovich et al. 2016; Jugend et al, 2018). Examples of firms applying a radical approach to BMI include the Netflix phenomenon which revolutionised television programmes and movie retailing and the more recent Uber taxi service which both notably applied a combined effort of innovative radical business modelling and novel technological concepts. These efforts have evidently caused a shift in service/customer value proposition mainly to online platform taxi service provision, which prior to their inception mainly involved more physical transactions by incumbent companies within both respective industries (Kraus et al., 2022). That being said, it is important to note that while radical BMI may seem quicker and more intrusive, it also requires substantial investment in knowledge acquisition before developing and implementing radical BMIs (Gambradella and McGahan, 2010; Souto, 2015). Hence, radical innovation presents a paradoxical notion whereby while it has considerably higher risk and uncertainty of its failure,

it also presents higher returns in value and novelty if applied and undergone successfully (Velu, 2015).

With the increasing interest of the BMI in perspectives of radical and incremental nature, a major distinction which pervades the discussion lies in the scale of the innovation and the process with which the BMI is executed. The radical BMI being the more aggressive stance of the two is characterised by a high degree of novelty, focusing on developing a highly unique BMI regarding value identification, capture and delivery (Teece; 2010; Suoto, 2015). This agile notion pervades throughout the entire structure, procedures and activities of the BM in its entirety, thereby depicting an entirely new outlook on an existing BM (Velu, 2015; Jugend et al. 2018). In recent times, characteristics of radical BMI have been typified in the likes of new entrants in business as the intent to establish a substantial market against existing competition drives new entrants to be more inventive in the BM process (e.g. Netflix vs Blockbuster) (Osiyevskyy and Dewald, 2015). This does not however imply that radical BMI is exclusive to new entrants, or that already existing firms do not partake in a radical process of BMI. But from the perspective of a new firm, the pressure to survive combined with the limited capacity and the relative infancy in strategic positioning can inform the managerial decision to adopt a more daring approach towards developing BMI (Osiyevskyy and Dewald, 2015; Priem et al. 2018). Hence, on the basis of new entrants leaning towards adopting a radical approach to BMI, being at the early stages of business growth effectively places the capacity of the business within the SME bracket.

With a more incremental approach to BMI, there is a lesser degree of pressure on novelty and more focus on methodical changes over time. The changes undertaken follow an evolutionary manner whereby a business carries out a gradual innovative alteration in an aspect of its business model (Velu, 2015). For this reason, it is often not as visible as radical BMIs, although still effective. Contrary to the radical BMI, the incremental/evolutionary process is often attributed to being practised within larger, more established firms, as the higher availability of resources and market presence situates the business in a more viable position for survival than that of new entrants. However, arguments have also emerged purporting that major antecedents in adopting an incremental BMI by established firms lie within them taking defensive steps to consolidate against threats from emerging innovations as well as competition (Bocken et al. 2013; Velu, 2015). From an SME standpoint, despite the looming pressure of novelty faced, the reality of resource limitation can also serve as a viable reason for which a gradual innovative process may be preferred (Velu, 2015; Berends et al. 2016). Nonetheless,

with the context of this study focusing on innovative capabilities for the scalability of SMEs, observing the nature of radical/incremental innovativeness to business model evolution would be further clarified through understanding the nature of interactions between contextual factors, key stakeholders and their configurations in relation to the business. More so, in considering the research intent is to observe the BMI phenomenon within renewable energy (RE) based SMEs, understanding what BMI approaches are adopted by RE-based companies would provide more insight into the existing trends and practices of RE businesses.

2.2.2. Business Model Innovation for Sustainability

With increasing emphasis on BMI as a means to ensure competitive advantage and survival, establishing a basis for such claims is dependent on ensuring the BMI which is adopted enables prospects for sustainability (Inigo et al. 2017; Bocken and Geradts., 2020). The shifting trends in business practice regarding sustainability also emphasise the importance of considering the triple bottom line requirements on ensuring economic, social and environmental sustainability while executing the business objective (Bocken et al. 2014; Du and Yalcinkaya., 2022). As earlier mentioned, this depicts the ever-changing scenario of business practice for strategic planning becoming necessary via business model innovation. This permeates through core aspects of the business strategy most especially the core value system, comprised of the value network/chain (external aspects), and the value proposition (internal aspects) (Stubbs and Cocklin, 2008; Abdelkafi and Tauscher, 2015). This is further supported by Bocken et al. (2014) who suggest that ensuring sustainability through BMI provides a means through which adverse impacts on the triple bottom line can be substantially reduced while making the necessary changes in organisational structure in a timely fashion. Despite the business experiencing a wider scope of factors to consider, an opportunity also presents itself in that an avenue is created to develop stronger relationships with the entire business environment, thus increasing its ability to accurately guide the BMI towards long-term sustainability (Inigo et al. 2017).

Hence, harnessing the attributes mentioned above can be beneficial to prospective SMEs. The complex activity system of modern business requires a wholesome consideration of triple bottom factors for business development, as against the singular objective focus on economic sustainability. On a long-term basis, the salient overlapping relationships between the economic, social and environmental narratives are likely to be more apparent which enables effective incorporation in the BMI strategies (Bocken et al. 2014). Extant literature has looked

into devising strategies for infusing sustainability in BMI. Evidence of this stems from the three strategies derived by Schaltegger et al (2012) which include; the *defensive strategy* (slight adjustments to protect existing business models which have a limited impact), the *accommodative strategy* (derived from adjustments from experimental tactics which are more visible than the defensive strategy), and the *proactive strategy* (which is the most aggressive in terms of redesigning business models consistently to achieve sustainable value orientation). Irrespective of the strategy adopted, the inclusion of sustainability in BMI remains an increasing narrative that extant literature actively infuses into BMI. In view of this, understanding the specific factors which ensure innovative capabilities would aid in building the correlation between BMI, sustainability and innovative capabilities within management literature (Laamanen, 2017; Teece, 2018). More so, recent studies are looking into BMI and sustainability as a means of enhancing development prospects for merging business models of SMEs with current advancements in the business ecosystem (Abdelkafi and Tauscher. 2015; Schaltegger et al. 2016).

More extant literature on sustainable business model innovation (SBMI) which aims to capture the increasing pursuit of the triple-bottom-line perspective, argues that the value creation process must exceed beyond the confines of the conventional customer (Bocken et al. 2015; Schaltegger et al. 2015). Another emerging paradigm in SBMI argues that in developing new value propositions, delivery and networks (Teece, 2010) businesses must begin to consider a broader scope of actors and network perspectives which are available to them (Boons and Ludeke-Freund, 2013; Geissdoerfer et al., 2018). Further investigation also eludes to not just conducting changes within their businesses, but also conducting a re-alignment with their stakeholders and value relationships (Freudenreich et al, 2019). Therefore, as businesses and their practices are being steered towards making the requisite sustainable transitions and the clamour for building feasible value networks continues to increase, the combined task of not just achieving the aforementioned objectives, but also ensuring that it is undertaken in such as manner which is reflective of their set business objectives (Gorissen et al., 2016; Derks et al., 2022). In addition, the ability to achieve these identify these factors brings the business up to speed with contemporary practices, essentially increasing its prospects for growth in the ever-changing business environment (Aagaard et al., 2021). Growth is a concept which is ever present behind all business objectives and businesses must move in tandem with the changing, especially as they are heavily impacted by policies, regulations and parameters which typically shape the business environment in which they operate (Wilson and Post, 2013; Wry and Haugh,

2018). The research will attempt to explore the concept of growth, often referred to as scalability in the next section.

2.3. Scalability

Scalability as a term emanates from technology-based literature and refers to the ability of a system to accommodate an increased level of workload (Hill 1990; Yeganeh et al., 2013). Looking at it from both perspectives of scalability in technology and scalability in business, there is a similarity in the purpose of use of 'scalability' which is the expression of an apparent upgrade in the growth potential of a particular entity.

Studies have shown the increasing importance of growth in modern business, not only at face value but with an emphasis on discovering the intricacies involved in achieving such growth in an ever-evolving global market (Bjorkdahl and Holmen, 2013; Stampfl et al. 2013; Georgallis and Durand. 2017). Incidentally, similar traits are also visible within BMI as 'strategic re-invention to maintain value and competitive advantage' is its objective in summary (Chesbrough 2010). In essence, increasing prospects for scalability is integral to justifying a successful BMI. This is evidence indicative of a close relationship between BMI and scalability, and in order to understand BMI better, there must be a deeper probe into aspects directly affecting the process, as well as the derivative factors attached to implementing such a process (Stampfl et al. 2013). It is on this basis that scalability is increasing in its relevance in the field of management.

It is an implicit notion that increasing the potential of a business is vital to creating a more attractive impression on all stakeholders directly involved in the business. And the nature of the environment (external) in which it is situated, combined with the relative capacity in terms of bargaining power, market strength and resource accessibility of the business (internal) could determine the ability to grow (Linder and Williander, 2015). To achieve this, certain literature opines that the business in question should possess flexible characteristics (structural agility) which creates an avenue to make adjustments in the inward value capture strategy (business model) relative to external pressures (Boden, 2004; Nielsen and Lund, 2015). Thus, environments such as developing countries would require a business to possess structural agility in order to 'bob and weave' against the extant external pressures within its contextual confines. This is especially pertinent to the business' pursuit of assured growth (scalability).

To this end, entrepreneurs face considerable levels of pressure in developing countries (Acheampong and Esposito, 2014). And being that they must possess versatility in dealing with all aspects of the business, the need to scale up must be within their sights, and structural agility by way of flexible characteristics should be considered in the BMI process. There have been efforts towards identifying generic patterns towards scalability in business. Nielsen and Lund (2015), identify some of these as follows; Scalability via new distribution channels, Scalability via release from capacity constraints, Scalability via outsourcing of investments, scalability through leveraging on free working partners, and scalability via implementation of platform models. Although this helps provide a base knowledge of how scalability could be achieved, it still remains to be determined whether such patterns could be achievable within all business environments, most especially considering SMEs in developing countries.

In an ironic twist, with the current dynamic world of business, businesses must permanently possess traits of adaptability. In the event of ensuring adaptability that scalability can be more achievable (Jablonski, 2014). Studies depict a scenario whereby limited attention is given to understanding how harnessing adaptable features, combined with institutional support systems operates toward high-growth firms (Krasniqi and Desai, 2016; van Waes et al. 2018). In their argument, they establish that institutional quality has a significant effect on promoting incentives for value-adding behaviour in businesses, especially for SMEs. The term institutional quality implies it is not just about the introduction of it, but also ensuring the outcomes of policies and incentives have high reliability and less volatility, as uncertainty would be interpreted negatively by the businesses it is designed to assist (Autio and Fu, 2015). Though theoretically plausible, the reality faced by SMEs in developing countries eludes to impediments in rendering institutional assistance, as also argued by (Bruton et al. 2013; Andersen et al., 2021). An absence or volatility within the institutional environment creates a scenario where the business applies resources towards manoeuvring under a hostile environment, rather than channelling resources towards increasing scalability (Krazniqi and Desai, 2016).

2.3.1. Scalability through BMI

With the increasing prominence of BMI in management literature, the BMI serves as a valuable concept through which inventive strategy implementation can be theoretically explained and practically applied, amidst contemporary business practices. Furthermore, where the business model (BM) acts as a structure depicting the central meeting point through which

the internal capabilities of a business merge with the relevant external business environment (Zott, Amit and Massa 2011), BMI draws attention to the evolutionary process of the BM in order to sustain the value creation, mitigate adverse challenges faced by the business and ensure survival (Abraham, 2013; Inigo et al. 2017). This is an integral characteristic attributed to an entrepreneurial mindset, which SME owners and practitioners seek to achieve (Lee et al. 2010; Trimi and Berbegal-Mirabent, 2012). In spite of this, there still exists limited extant studies looking into the BMI concept within the spheres of SMEs, for reasons stemming from the lack of construct clarity on account of the relative newness of BMI literature, to which we also aim to contribute to (Lee et al. 2010; Foss and Saebi, 2016).

Another line of literature which has been closely linked to BMI literature is the concept of sustainability in business development. Schaltegger et al. (2016) propagate the notion that contemporary business value chains have largely focused more on a singular aspect of economic sustainability as against the wholesome triple bottom-line agenda (social, economic and environmental) in achieving sustainability. Other literature also posits these new standards of sustainability must be considered and infused into contemporary business practices, global value chains, networks and logistics (Bocken et al, 2013; Abdelkafi and Tauscher, 2015). This exhibits proof of the active change in business trends which instigates the need for innovative inclusion via BMI, most especially as the limited resource base experienced in smaller and medium-scale enterprises is juxtaposed with the increasing complexities in achieving wholesome sustainability. In addition to this, achieving such in an environment experiencing inadequacies in both institutional and infrastructural development (such as developing economies) further compounds the challenges SMEs face within such contexts (Hobday, 2005; Trimi and Berbegal-Mirabent, 2012). Therefore, in order to augment these inefficiencies, SMEs are tasked with developing a grounded knowledge of their current resource base, what requisite external resources must be harnessed, and what stakeholder configurations might best assist in achieving the value objectives of the business (Mitchell et al. 1997; van de Vrande et al. 2009).

2.3.2. Scalability of SMEs in developing countries

Being an entrepreneurial venture, a considerable amount of responsibility is placed on an entrepreneur with respect to developing strategies for establishing, operating and ensuring the growth of a business (Simsek et al. 2015)**.** And with a theoretical assertion of institutional support assisting in business growth (Georgallis and Durand, 2017), its implementation, in

reality, is less effective or non-existent in developing countries. In spite of this, an entrepreneur must devise means for strategic manoeuvrability to ensure survival and potential growth. In pursuit of this objective, entrepreneurial businesses may tilt towards leaning on informal institutional means which include; lobbying, and bribery with government officials which in most cases produce short-term effects of scalability (Estrin et al. 2013; Belitski et al. 2016). Even if these methods are effective, adopting them in a wholesome manner would lead to them becoming deeply engrained in the business model as a self-protective coping mechanism (Krazniqi and Desai, 2016). The implication of this has been hinted at earlier which is the diversion of resources towards maintaining these informal arrangements, causing a shift from attentively channelling resources for growth (Desi et al. 2013). Understanding this from a developing country context implies that even if there are established incentives and formal institutions, they may not capture the actual picture of how SMEs operate, especially in relation to informal institutions and arrangements (Xheneti and Bartlett, 2012). In essence, prospects for scalability are much lower in developing countries, and SMEs must also pay attention to the effectiveness of formal institutions, and the adverse effects of over-dependence on informal institutions.

With scalability put into perspective, the means through which firms achieve it through BMI is a focus of this research. This prompts the need to look into the innovative processes by way of capabilities in BMI and what elements constitute such innovative capabilities.

2.4. Innovative Capabilities in BMI

While business ventures are in focus, it is understood that innovation plays an increasingly important role in the conduct of business ventures. By implication, innovative traits must be imbibed and utilised to the benefit of a business. Therefore, knowing ‘how’ and ‘why’ these capabilities are developed is not only important in practical terms but also vital in advancing theoretical backing (Subramaniam and Youndt, 2005; Mezger, 2014). Leaning on the theory of resource-based view which summarily posits that resources are vital to firm performance and competitive advantage (Barney, 1991), the concept of innovative capabilities (IC) refers to the unique manner in which a business leverages the internal (organic) and external resources, channelling it towards achieving its firm objectives (Brush et al, 2001; Gilbert, 2006; Schaller and Vatananan-Thesenvitz., 2022). It has been explored in various spectra, with a consensus in

attempting to understand how innovative capabilities are developed, which requires exploring all aspects of the business (Chen et al. 2009; Swink, 2015; Ibrahim, 2017). To this effect, the technological, financial and networking capabilities have been mapped out as vital routes toward innovative capabilities (Shelton, 2005; Gilbert, 2006). The purported guiding principle is that the manner in which these capabilities are combined defines the resource base and developmental trajectories available to the business (Chen et al. 2009). It must be noted that this process is also undergone while being mindful of the internal capacity of a firm and the external features and pressures surrounding said business (Linder and Williander, 2015). Especially as context plays a crucial role in facilitating or constraining the pool of resources available to businesses at all stages of development.

By technological capabilities, we refer to the process which promotes firm growth and competitive advantage via direct inventive developments in product/service delivery or an entirely new product/ service (Shelton, 2005; Mostaghel et al., 2022). This has been gaining increasing recognition as a core competence for developing businesses (Chen et al. 2009). The financial capabilities of a business venture are the monetary-related abilities available to a firm. While networking capabilities refer to the abilities of said venture to identify, establish and manage relationships with potential stakeholders in a business environment (Ibrahim, 2017).

It is illogical to assume a homogenous level of resource distribution is experienced in all business types and every environment. Therefore, the technological, financial and networking capabilities are bound to differ based on the conditions set before each business (Hagedoorn and Duysters, 2002; Chen et al, 2009). Also, neither capabilities are solely sufficient in ensuring innovative capabilities (IC). Where technological capability may well propel product/service efficiency, without financial backing the application will be constrained or outright impossible. Also, in a scenario where there is absolute reliance on networking capabilities, this may indeed lead to strong beneficial strategic alliances (Arbussa et al., 2017; Jin and Ji, 2018). However this limits its individual technological capacity, also a reliance on networking without protecting its individual capacity poses a potential risk of unchecked knowledge transfer and over-dependence on its partner(s) (Hagedoorn and Duysters, 2002; Park et al., 2017). It is for this reason that there must be a conscious leveraging of all capabilities both internally and externally, which knowledge management dynamics are vital in helping achieve (Fores and Camison, 2016). External resources might lead to an enterprise actualising financial ‘slack’, but balancing the resource reliance internally will ensure organic growth is maintained as well as a level of strategic independence and intellectual capital

(Subramaniam and Youndt, 2005; Gilbert, 2006). This is essential, especially in the scenario where the business has significant constraints in bargaining power, which SMEs experience especially in developing countries.

With considerable challenges faced by entrepreneurs, SMEs are saddled with wrestling out the best resource formula (Bjorkdahl and Holmen, 2013; Simsek et al, 2015; Schaller et al., 2022). Considering where its IC strengths lie, as well as identifying blind spots, and how to augment the formula within the given environment. Recent literature has eluded to the increasing relevance of developing collaborative approaches toward achieving innovative capabilities within firms (Swink, 2015; Ibrahim, 2017). While this may be an important process for SMEs to consider, there should also be a balance created through which internal capacity building can be maintained. Bringing it into perspectives of BMI and scalability, it can be posited that the IC of a business serves as a catalyst through which a business model is designed in order to bring about scalability. This is represented by the diagram below;

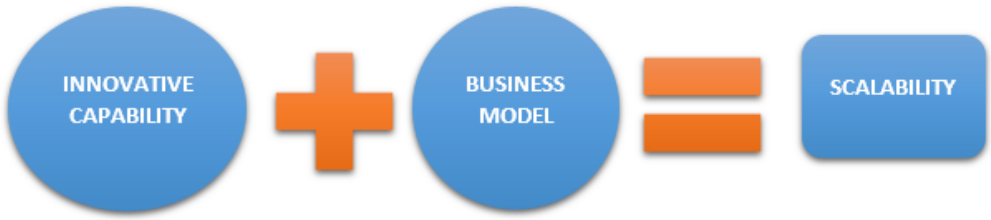

Figure 1. An interconnectedness between innovative capabilities, business model and scalability.

2.4.1. Innovative Capabilities and SME perspectives

As SMEs experience, a higher rate of hindrances and external pressures, the manner in which they would overcome such challenges is dependent on the characteristics specific to that environment (Agburu et al. 2017; Kyprianou, 2018). As supportive infrastructure is limited in developing countries, especially within sub-Saharan Africa, the onus rests on SMEs to develop strategies to channel their resources towards achieving their objectives, which requires a sense of ingenuity through innovation (Kapurubandara and Lawson, 2008; Boons and Ludenke-Freund, 2013). To this effect, BMI has been viewed as a process through which this can be achieved. But the active ingredient to ensure a business model is indeed innovative is the ability

to apply innovative capabilities (IC). In light of the technological, financial and networking capabilities which have been identified as the core paradigms in which IC could manifest, the need for SMEs to manage them effectively to survive becomes more paramount when situated in a developing country (Chen et al. 2009; Pandya, 2012). An option for achieving this as espoused by Agburu et al. 2017 comes in form of outsourcing. It is suggested that through outsourcing the aspects where the business is lacking in expertise, an avenue is created for SMEs to focus more on their strengths to achieve an objective.

These forms of outsourcing as classified by Harward (2019) could be through business process outsourcing (BPO) or the out-tasking model (OTM). These are further broken down into 4, where comprehensive BPO (strategic, complex, long term and holistic outsourcing) and selective BPO (also complex and long-term, but within one functional area e.g. administration, marketing). The second group under the OTM is contracting (short-term in instances like consulting) and Licensing agreements (engagements specific to sourcing tangible assets such as real estate, software services etc.). An updated classification of Giley and Rasheed (2000) by Isaksson and Lantz (2015) builds towards a simplified quartet of SME-specific outsourcing classifications which are; *Back office activities* (Book-keeping and general administration), *Primary activities* (manufacturing, purchasing, warehousing, customers service), *Accounting activities* (Financial Reporting, Tax processing) and *Support activities* (Shipping, I.T. services, Training, advertising, Legal, Transport and Public relations services).

Though outsourcing can provide an avenue for focusing on the strengths, the fact that SMEs have typically limited bargaining power sets a scenario where they will be seeking to complement their resource lapses through partnering with entities which are more experienced in their weak spots (Kapurubandara, 2008; Hennart et al., 2021). This is not ultimately detrimental, but the reality of a limited SME capacity, and its reliance on a more experienced firm, or firms larger in capacity, therefore, presents a scenario ripe for asymmetric information, if left unchecked (Subramaniam and Youndt, 2005). Also known as information failure, asymmetric information describes a scenario between two entities whereby one party possesses greater knowledge than another, thereby creating an imbalance of power during a transaction (Hart and Holmstrom, 1987). In this, the party with the higher capacity could exhibit opportunistic tendencies such as knowledge monopoly, power play and moral hazards which would be at the detriment of the party with the lower capacity (Hart and Holmstrom, 1987). While information asymmetry cannot be completely eradicated, measures must be in place to keep its adverse effects to the barest minimum (Akinbola et al. 2019). Hence, a dilemma of

managing a trade-off between resource mitigation and cost efficiency ensues, and should be managed in order to ensure firm survival (Agburu et al. 2017).

Also, For SMEs to be visible in the grand scheme of an economy, they must stand out from competitors. This requires innovation and also creates the possibility of being more attractive to the regulatory bodies and other relevant institutions responsible for providing support (Obi et al. 2018). As BMI represents a process through which the value proposition of a business can maintain capabilities in flexibility and agility to produce competitive advantage, it accounts for most of the structural adjustment process of the business as an entity. However, it does not account for the human factor upon which these ideologies for observing, identifying and exploiting the need to initiate the BMI process. Therefore, the close links and increasing relevance observed by both entrepreneurship and business present an emerging need to consider the phenomenon termed 'entrepreneurial competency' (Pukkinen, 2018; Wang et al. 2019).

2.4.2. Entrepreneurial Competency

The concept has been growing in relevance as literature has increasingly established links between entrepreneurial competence, and its role in developing new business models (Santandreu-Mascarell et al. 2013; Heikkila and Heikkila, 2017; Pukkinen, 2018). It also goes in tandem with the gap identified by Foss and Saebi (2017) which is the current insufficiency in understanding the internal drivers of BMI. Though it has been in discussion since the turn of the century (Schmit-Rodermund, 2004; Xiangang et al. 2005; Muzychenko, 2008), attempts have been made only recently in linking entrepreneurial competency and business models. This is especially due to the entrepreneurs characterised as having high levels of independence, tolerance of ambiguity, risk-taking, innovativeness and leadership attributes (Wagener et al. 2010; Eriksson et al. 2019). In addition, Bird (1995) highlights temporal tension, strategic focus and an intentional posture as characteristics of entrepreneurship. Temporal tension refers to the ability of the entrepreneur to maintain situational awareness with regard to time and foresight. Strategic focus refers to the development of strong goal-oriented approaches in conducting business. These are representative of core values which are necessary to manage internal capabilities in response to external pressures in an erratic and challenging environment (Pandya, 2012). Hence, entrepreneurial competence refers to the ability with which an individual harnesses underlying traits of knowledge and skills in an entrepreneurial manner for the purpose of achieving a business objective competently.

Being that entrepreneurship is also typically linked with smaller firms, management irrespective of the structure must exhibit strong entrepreneurial competence traits especially in developing country settings (Eriksson et al. 2019). The need is ever so apparent as strategic agility essential to establishing a successful BMI process (Pandya, 2012). The manner however in which agility is applied also needs to be flexible, and literature pertinent to BMI refers to this as dynamism. This is because having a dynamic posture affects the manner in which an entrepreneur designs, refines and transforms their organisational routines to bring about a higher output (Teece, 2018). Through inculcating dynamism, the ordinary activities of the firm are fine-tuned to achieve the utmost efficiency in terms of cost, operations and service delivery (Inigo et al. 2017). These serve as building blocks upon which the innovative capabilities in the forms of a financial, technological or networking nature maintain sharpness and a high reactionary rate (Teece, 2007; Chen et al. 2009; Teece 2012).

2.4.3. Dynamic capabilities in BMI

In order to evolve with the ever-changing nature of the current business environment, firms must imbibe characteristics which enhance fluidity towards change, adaptation and re-invention of their business model, hence the advent of concepts such as BMI (Chesbrough, 2010; Bocken and Geradts, 2020). However, merely outlining the need for BMI is insufficient (Ammar and Chereau, 2018). Ensuring the BMI is genuinely effective requires developing the necessary foundations for innovation, drawing from observations from pertinent external factors in order to strengthen its internal building blocks for innovation (Doz and Kosonen, 2010; Mateu and March-Chorda, 2016). These innovative processes are engaged on the premise of partly or completely transforming the existing business model structure (Demil and Lecocq 2010). A concept which seeks to shed more light on the process through which innovative dynamism can be maintained has been deduced by Teece, (2007; 2010) as the notion of dynamic capabilities. These dynamic capabilities for innovation are primarily grouped into three which are ; (a) *Sensing* - and identifying opportunities and threats (b) *Seizing* - by actively designing, refining and committing requisite resources, and (c) Reconfiguring – by transforming the firm's structure and culture to re-align it with maintaining a competitive advantage (Teece, 2018; Hameed et al., 2022).

Sensing

This is regarded as the first step to developing dynamic innovative capabilities. It refers to the ability to perceive external opportunities as well as potential threats (Teece, 2007).

Recognising these paradigm shifts which are relevant to the environment or industry of a given business is essential to accurately identifying and developing exploitable prospects, especially against existing impediments (Inigo 2018). For instance, despite the established correlation between technological advancement and business development (Hu, 2014; Bojovic et al. 2018; Islam et al. 2018), the need to devise the requisite business model to exploit such advancements is necessary to effectively commercialise the technological advancements (Chesbrough, 2010; Schoemaker et al., 2018). Achieving this for SMEs, though considerably daunting, remains a vital attribute for entrepreneurial-based businesses and as such, would stand to benefit from harnessing effective sensing abilities toward innovative development (Lee et al. 2010; Achtenhagen et al. 2013).

Seizing

Following the identification of pertinent opportunities and threats, necessary steps are to be undertaken towards actively harnessing exploitative or defensive attributes for the firm, leading to the development of the existing BM (incremental) or creating an entirely new BM (radical) (Mezger, 2014; Suoto, 2015). *Seizing* naturally inherits the development process from the *Sensing phase by* way of applying the knowledge acquired to the BMI process. The knowledge acquired from the previous phase enables the firm in embedding itself within the business ecosystem in order to assist in increasing the accuracy of coordinating the requisite resources which would complement the BMI process (Chesbrough, 2007; Svejenova et al. 2010; Islam et al. 2018). This is essential to SMEs as the extant resource limitations experienced demand for balancing innovation and resource efficiency (Trimi and Berbegal-Mirabent, 2012; Diaz Lopez et al. 2018).

Re-configuring

This represents the final set of capabilities through which the knowledge acquired from the identification and operational setup phases are utilised towards enhancing the transformational tendencies of the business model (Mezger, 2014). At this phase, efforts to internally develop the culture and structure of the firms towards BMI is intensified further (Teece, 2018). This can be achieved through the active involvement of internal stakeholders (employees and management) with the BMI process in order to ease the level of friction experienced during the transition from one business model to another (Achtenhagen et al. 2013). It is understood that harnessing such forms of capabilities increases the proactive stance of business strategies as well as the flexibility and adaptability of firms, to which BMI presents viable means for achieving both objectives (Inigo et al. 2017; Huikkola et al., 2022).

Exploring the three phases mentioned above aids in giving a clearer picture of how firms can often methodically go through a dynamic process when innovating. However, a narrative which has been consistent in the course of this research has been; (a) the need to explore all external and internal factors pertinent to BMI development and scalability (Cosenz and Noto, 2018; Silvestri et al. 2018), as well as (b) considering the contextual nuances pervading the immediate business environment (Laudien and Daxbock, 2016; Linder and Williander, 2017). These present important aspects which must be considered by SMEs in order to mitigate the cost and maximise their prospects for development. However, the reality beset by these challenges pressurizes SMEs towards finding solutions in consolidating the necessary resources. To this end, we argue that the consideration of stakeholders by SMEs is essential to mitigating resource challenges in difficult business environments.

Also, exploring these capabilities specifically within the confines of SMEs is limited, more so exploring such capabilities in developing countries. Though these dynamic capabilities outlined by Teece (2007) give a general idea of a conceptual pathway towards achieving BMI, factoring in the issues of contextual nuances (Dewi et al. 2018) and the erratic nature of developing countries (Hobday, 2005) presents questions on the practical applicability of these capabilities within such environments. With this in mind, exploring SME-specific capabilities towards BMI could partly provide answers regarding the generalisability of these capabilities within developing countries, as well as grounds for further theoretical expansion.

2.5. BMI and Stakeholders

Considering stakeholders is essential as the limitations in resource availability instigate the need for firms to involve external participants in their value-creation process (Freeman et al. 2004; Bocken and Geradts, 2020). More importantly, having a grounded understanding of what stakeholders are to be considered enables businesses to design the configuration of stakeholders most efficiently to maximise resource proficiency while minimising cost (Mitchell et al. 1997; Siebold, 2021). Factoring in the heterogeneity of business environments on the basis of context, considering the stakeholder identification and arrangement by extension can bring further insight into the feasibility of stakeholders' role in BMI application by SMEs. To this effect, the Stakeholder theory is also adopted into the conceptual framework of this study.

In linking this to BMI, the pursuance of efficient value creation via resource efficiency is also a critical determinant of BMI success (Aspara et al. 2010). And in order to enable efficiency in resource utilisation for the welfare enhancement of a firm, it must maintain a salient objective of knowing its key stakeholders and establishing mutual value between itself and its respective key stakeholders (Harrison et al. 2010; Yi, Chen and Li, 2022). By so doing, firms are provided with a broadened support system for managing their resource base. With an emphasis on the instrumental perspectives of the stakeholder theory, it purports that the ability of firms to manage their stakeholders should effectively result in achieving the firm's objectives which usually fall within the confines of growth, profitability and sustainability (Mitchell et al. 1997; Jones et al. 2018). As SMEs experience significant limitations in resources, their need to augment such limitations brings them in contact with prospective stakeholders which in turn contribute to the BM (Harrison et al. 2010; Svejenova et al. 2010). Also, in pursuing competitive advantage through BMI, it would be valuable for SMEs to evaluate potential stakeholders which would enhance the implementation of adopted BMI strategies (Jones et al. 2018; Silvestri et al. 2018). Furthermore, resource constraints in SMEs further indicate a limited bargaining power held by such firms through which stakeholders could also assist. Therefore, executing BMI within SMEs may provide grounds for stakeholder consideration and the potential roles they play within the process.

While establishing an argument for BMI inclusion in SME development, it is necessary to identify what pertinent factors contribute to the growth potential (scalability) of businesses. How such factors influence the BMI capabilities within a given ecosystem is unique to the capacity of the business, prospective stakeholders and other external factors (Amit and Zott, 2012, Kitchen, 2020).

2.6. Renewable Energy in Perspective

As the world drives toward more sustainable methods of living, it steadily pervades all works of life. None is more so evident of this than in the energy sector, as the clamour to mitigate the effects of climate change in conjunction with the finite nature of contemporary fossil fuel-based sources of energy, creates a need to look towards alternative sources of energy (Burger and Gochfeld, 2012; Cubasch and Kadow, 2019). By renewable energy (RE) we refer to energy harnessed from sources which are naturally replenished. Examples of such major sources are sunlight, wind, tidal wave, biomass and geothermal.

Renewable energy (RE) has been gaining increasing ground both in academic and practical fields (Gabriel and Kirkwood, 2016; Zhang et al. 2017; Jin and Ji, 2018). Ideologies such as the social clamour for cleaner 'greener' sources of energy have contributed immensely to propagating this RE narrative. However, in spite of the substantial presence of literature discussing RE from social and technical perspectives (Panwar et al. 2011; Marif et al. 2018; Lei et al. 2018), research investigating the RE field in the perspectives of managing renewable energy from a business perspective is limited (Tongsopit et al. 2016; Engelken et al. 2017; van Waes et al. 2018). From a technical perspective, the application process in RE is significantly reliant on technological feasibility (Overholm, 2017). Conversely, having the technical know-how alone does not guarantee a successful proliferation of such technology. This is owing to the basic fact that technology, irrespective of its novelty, would be limited in value to the originator if it cannot be commercially proliferated (Chesbrough, 2010; Teece, 2010). It is upon this basis that technology can be legitimised as valuable innovation. This, therefore, implies that a management concept which possesses characteristics geared towards creating value for ideas (Chesbrough and Rosenbloom, 2002), would assist in amplifying the commercial justification for RE technologies (Richter, 2013).

With that consideration, certain impediments to commercialising renewable energy nonetheless abound. The high upfront cost which is involved through the various sources (solar, wind, biogas, thermal, hydro) in renewable energy applications (RE) also compounds the demand for BMI implications (Richter, 2013). This scenario personifies an integral challenge which universally affects companies within the RE industry (Gabriel, 2016; Kim, Park and Kim, 2017). However, the regional differences where the RE companies are located, combined with how their philosophy towards addressing such issues has a significant effect on what renewable source is adopted, what value logic is propositioned and how they intend to create such value for themselves and prospective customers in the process (Gambradella and McGahan, 2010**;** Geem and Kim, 2016). Achieving this in turn also subscribes to the innovativeness required in developing business models due to the heterogeneous dynamics of RE business development.

2.6.1. Business Models in Renewable Energy

A significant amount of current literature eludes to renewable energy (RE) businesses showing a common interest in the need to identify business opportunities and how to develop feasible blueprints for their exploitation (Richter, 2012; Engelken et al. 2016; Rossignoli and

Lionzo, 2018). This has assisted in building a framework of business models in the renewable energy industry. The first outstanding attempt to investigate the nature of BMs was by Richter (2012), where two major generic classifications of business models were initially outlined, these were the Utility side-based BMs and the customer side-based BMs. Before delving into the BM classifications, it is important to get an understanding of the value chain of electricity. There might be slight alterations in various economic contexts, but by large the value chain begins from generation, transmission, distribution, retail and consumption.

Figure 2. Electricity value chain adapted from Richter, 2012

The generation of electricity refers to the initial transformation of an energy source into electricity. This is primarily the beginning of the value chain and is usually on a large-scale basis. In essence, large-scale power plants convert raw material resources to energy which is further transmitted down the value chain. At the moment, a larger portion of the energy is produced from fossil fuel-based resources (oil, coal, gas) and nuclear energy (World Energy Council, 2016). Richter (2012) suggests that power generation assets are mostly owned by a small group of energy utility companies, mainly owing to the extreme difficulties in harnessing the necessary resources for producing power in large quantities. Although ambitious economies industrial and developing alike are acknowledging the value of energy diversification via renewable energy resources.

The transmission phase entails the conveying of high-voltage electricity to other parts of the value chain through a transmission grid (Fang et al. 2018). At this stage, the transmission of electricity is usually funnelled out from central points of production to a larger number of customers, making it a very crucial aspect of the value chain. Often handled by transmission system operators (TSOs), the transmission phase is characteristically a monopolised system where one body implements the transmission, this in most cases is government-affiliated, which the Transmission Company of Nigeria (TCN) serves as an example (Richter, 2013; NERC, 2019). Being the first medium of transfer, the technicalities at this stage require due diligence in conducting load analysis, thorough regulation and supervision in order to ensure a

seamless transfer from generation to the final consumer (Fang et al. 2018; Rio et al. 2019). With regard to renewable energy, the fluctuating nature of renewable energy would also require a flexible network transmission system (Overholm, 2017; Astaneh et al. 2018; Fang et al. 2018).

The third stage refers to the distribution networks which are designed to acquire the high-voltage power transmitted from the generation phase, stepped down to a lower voltage and transmitted further down the value chain. At this stage, there are few points of connection to the transmission grid from which other networks are interconnected among themselves (Richter, 2012). In cases where there is a direct connection from generation, the distribution network operator (DSO) controls such operations. The DSOs are also tasked with handling matters pertaining to the end users.

Retail will be largely considered as the front office end of the value chain. At this stage, retailers acquire power from producers and sell it to the end customers. At this stage, the administrative tasks such as the purchase of electricity, metering and billing. The consumer which is the end of the chain occurs refers to the point at which the power is received and consumed by the customers.

Through the analysis of the value chain, we are able to understand the general pattern and deduce possible business opportunities. To this end, the starting literature on renewable energy business models (RE-BMs) outlined two major sections of the value chain to be of utmost importance which are generation and consumption. This is because while the generating side entails the contemporary process of converting conventional resources from resource to power, the same process can be adopted at the consumption stage but on a smaller scale. This is commonly referred to as stand-alone off-grid systems (Meijer et al. 2019). Therefore the customer-side renewable business model and the utility-side business model have been outlined.

2.6.1.1. Customer-side renewable energy business model

Under this form of BM, the renewable energy systems are located within the premises of the customer, thereby simultaneously becoming the customer and producer. Examples of RE sources through which this can be achieved are photovoltaic (PV), combined heat and power microsystems (CHP), geothermal heat pumps and micro wind turbines (Richter 2013). The capacity of such systems ranges up to and under 1 megawatt (MW). Under this customer-based

BM, the value proposition offered is centred around the front and back office services including general consulting, financing, ownership and operation of the assets (Richter, 2012; Eder et al. 2015). Typically more participants can be found partaking in small-scale projects, and revenue emanates from the return on the assets combined with service charges. Costs emanate from the administration, installation and operation of the RE systems.

2.6.1.2. Utility-side renewable energy business model

Projects at his stage are of a much larger capacity ranging from 1MW upwards, which is equivalent to powering 1,000 homes (Richter, 2012). These BMs could take the form of large-scale wind farms, PV projects, biomass power plants as well as large thermal solar power plants (Bryant et al. 2018). The major value proposition leverages grid-fed bulk power generation (Leisen et al. 2019). As such, customers comprise of policies level interfaces such as power purchase agreements (PPA), as opposed to establishing end-user relationships. Projects of this scale are more synonymous with the contemporary centralised on-grid systems and power plants (Fang et al. 2018). Where costs usually arise from capital-intensive construction and operation of the project, and revenues are from policy-induced feed-in-tariff or taxed and investment credits (Wall et al. 2019).

	Utility-side business model	**Customer-side business model**
Value proposition	-Bulk-based power generation fed into the national grid	Customised small-scale solutions and services
Customer interface	-Majorly commodity is electricity. -Customer receives a per-unit billing system	Customers can be involved in the power generation process as well as the consumption of power. -Creates prospects for customer retention through maintaining customer relationships.

Infrastructure	-Run by a small number of centralised large-scale assets	-A large number of small-scale assets and companies
Revenue model	-Policy-based such as feed-in systems. Leverages on economies of scale from large-scale projects and portfolios	-Revenue from the direct use, also feed-in systems and services. -Economies of scale by volume of customers. - Also hinges on high transaction costs where customers can afford such services

Table 2. Tabular comparison of Utility-side based business models and Customer side-based business models from Richter, 2013.

2.6.2. Developing extensions of RE business models

As renewable energy gains further traction in popularity, the demand for the exploration and exploitation of these resources also increases (Bryant et al. 2018). A derivative implication to this is that an additional array of services need to be discovered, to which innovative capabilities would need to be employed in order to establish new business models (Ferreira et al. 2018; Rossignoli and Lionzo, 2018). Also, the constant technological push has created avenues for the transformation of analogue-based systems towards digitisation, creating further possibilities for innovative business models (Teece, 2010; Rio et al. 2019). Therefore, evolving business models have also emerged not only due to digitisation but also to inculcate current business trends of sustainability and innovativeness (Bocken et al. 2014; Liesen et al. 2019). Also, the pursuit of RE adoption fuels the drive to identify business opportunities separate from the pre-existing duo of the generation utility side as well as the customer side business models respectively. Examples of these business models include smart grid infrastructures such as *virtual power plants, direct marketing of renewable energy source (RES) integration, large-scale battery frequency regulation, energy performance monitoring, battery storage for photovoltaic self-consumption and Tenant PV electricity* are given in table 3.

BM Type	Direct Marketing from Renewable energy sources (RES)	Virtual Power plants	Large-scale battery frequency regulation	Energy Performance Monitoring	Photovoltaic (PV) battery storage for self-consumption	Tenant provision
Value proposition	-Optimized price and demand-driven production and marketing -Market delivery processing for forecasting, group management and legal requirements	-Improving the stability of systems through flexible frequency regulation and reserve energy -Commercialising distribution generation units and balancing flexible demands	-Contributes to system stability via frequency regulation - Matching between demand and supply, regulating high demand with high renewable energy feed-in and vice versa to create a seamless energy balance	-Ensuring transparency of energy consumption -Enhancing energy saving and efficiency potentials	- Limiting dependence on conventional grid electricity systems. -Creates independence in the power supply	- Create returns on feed-in -Provision of independent off-grid systems -Create cost-saving mechanisms via feed-in tariffs
Customer interface	-Direct contracts with asset owners -Energy Trading	-Direct mid-term contract with asset owners -Direct marketing -Pre-day and intraday electricity exchange (EPEX)	-Standardised energy lender process (balancing energy demand and supply)	-Via customer contracts from energy monitoring software -Operates in large industry players and SMEs.	-Direct sales organisation with customers -Focus on technical support and provision for PV delivery systems. -Small scale household level installations	-Contract with tenants in a certain vicinity - Tenants, long-term contracts and short-term PV systems

Infrastructure	-Large-scale assets, -Energy exchange market	-Sales Infrastructure - ICT optimisation infrastructure	Large-scale and efficient batteries -ICT optimisation infrastructure	- Analysis software -Interface between measuring devices and software	- Battery storage devices - PV panels, - Energy management systems	- Contracts with the estate owner - RE installation management equipment
Revenue model	-Leverages on regulatory requirements -Service charges	-Energy price provision -Arbitrage at pre-day and intraday market	- Price provision -Charges from balancing supply with demand - Arbitrage at pre-day and intraday market	- Sale/lease of measuring devices -Licensing software -Cross-selling of electricity sources.	-Sale of battery storage equipment -Sale of energy management equipment	-Fee Inclusion in estate service charge -Remuneration via feed-in tariff policies
Cost model	Investment, capital expenditure (CAPEX) and operations expenditure (OPEX)	-Investment in CAPEX, OPEX and marketing	-Investment in CAPEX, OPEX and marketing	-CAPEX, OPEX, measuring analysis equipment and software	-CAPEX, OPEX and management systems	-CAPEX, OPEX and management systems

Table 3. Emerging renewable energy business models from Leisen et al. 2019.

By giving a holistic picture of business models, we give gain better insight into the business structure of the renewable energy industry. However, it must be stated that these renewable energy business model structures are exhibited more within the contexts of industrialised countries and developed countries (Richter, 2013; Engelken et al. 2016; Meijer, 2019). These are countries characterised by high levels of industrialisation and per capita income such as Germany, the United Kingdom, Canada, Japan, and the United States of America, among others. This eludes to there being limitations in the applicability of these discovered business models within developing country contexts (Gabriel, 2016; Budzianowski et al. 2018). In most cases, this is in large part due to the heightened challenges of renewable energy development highlighted by Gabriel (2016) in the seven-point manifestations of *inadequacies of government policy support, inadequacies in local demand, a high cost of renewable energy technologies, underdeveloped physical logistics and infrastructure and logistics, inadequate access to institutional finance, lack of skilled labour and the power of incumbent energy suppliers*. A combination of these issues creates an effect whereby renewable energy businesses existing in these environments are predominantly within the retail and consumer section of the value chain of renewable energy (Gabriel and Kirkwood, 2016).

This is further supported by the analysis of Gabriel and Kirkwood (2016) in which RE businesses were classified into three main categories of Consultants, Distributors, Integrators and a sub-category of Own technology inventors (OTI) respectively. In the course of their research, it is also categorically outlined that the disparity in terms of the three categories is largely in terms of the capacity of their product/service provision.

Consulting renewable energy businesses (REBs) are characterised by the smallest amount of employees and the shortest life span in the business (average 6 years). This typically depicts REBs still in the early stages of development due to the lower running costs, largely focusing their value proposition on leveraging knowledge and extant networks towards service application. This could range from consulting services on estimated load analysis to system design and analysis for quality control. While they may not possess the capacity to physically install RE systems, they can rely on their existing networking platform to locate the requisite technicians to carry out installations. While the consulting REB performs the role of technical supervision over the installation process.

With Distributor RE business models, their value proposition is focused on acquiring, selling and delivering RE products. Distributors operate on a higher scale than consulting BMs

in the sense that they create channels for customer engagement through means of retail-style shops where RE products are housed, and prospective customers come in to browse RE products and systems in order to make their preferred choice. The other means under this form is to reserve stocks and supply to customers on demand. This puts the distributive business model under the distribution and retail sections of the energy value chain (Richter, 2012). Also, another difference would be in a capacity where they possess the ability to acquire RE hardware and systems, in addition to their existing expertise and networks.

Integrators characteristically possess a larger scale of capacities than the distributor model. This is primarily because companies at this stage have gone through the evolutionary process of first having a consultative approach, then moving to a distributive approach, before becoming integrators. Integrators design and implement large-scale projects such as community-based microgrids. Gabriel and Kirkwood (2016) opine at this stage that access to finance is easier due to the fact they are more visible to investors, and also engage in projects which affect larger groups of individuals or organisations.

As the major difference between these three classifications manifests in terms of size and capacity afforded by the businesses, the factors which influence the scalability of these businesses from consulting to Integrating is the ease of access to requisite resources in terms of financing, network and expertise in the technological application. Therefore creating an enabling environment where such resources are easily accessible enhances the possibilities for growth (Zhang et al. 2017). A major tool for creating such an environment is in form of supportive government participation through laws, incentives and policies. This is evident as Gabriel and Kirkwood (2016) highlight that there are strong relationships established between Integrator based REBs and the governments under which they operate. Several studies on renewable energy elude to a correlation between government participation and renewable energy development (Richter, 2012; Karakaya et al. 2016; Tongsospit et al. 2016; Burger and Luke, 2017; Meijer et al. 2019). These participations have mainly been in the form of policy development and favourable regulations geared towards RE exploitation throughout the energy value chain. Although not the only stakeholders in the RE industry, government and governing bodies are crucial in making RE growth more tolerable for prospective businesses. However where there is little or no involvement of the government or governing bodies contributes to the highly challenging scenario for REBs (Gabriel and Kirkwood, 2016). In this scenario, REBs are more limited in their bargaining power, which serves as an impetus for the innovative drive towards managing their resources, and also having to identify stakeholders which would

contribute to their resource base (Liesen et al. 2019). In any case, the relevance of governmental policies and policies cannot be ignored and will be discussed in the following section.

2.6.3. Policy support and Renewable Energy

The policies and instruments which are employed are dependent on the country's resources, the maturity of the market and the political interest within a given context (Kitzing et al. 2012). However, the common instruments for renewable energy can be in the forms of regulatory, market-based, fiscal and public policies, and are highlighted as follows (Wall et al. 2019);

Regulatory-based policies are policies which are put in place to compel individuals or entities towards adopting a particular form of behaviour. With regards to RE, a foremost policy is the Renewable Portfolio Standards (RPS) which is set to place obligations on entities in the public and private electricity supply companies to produce a given percentage of electricity from renewable energy sources (Zhang et al; 2017; Wall et al.2019). In their compliance, the power supply companies earn a certificate based on the unit of electricity produced which can be presented to the regulatory bodies as proof of compliance (Prasad, 2011; Bolkesjo et al. 2014) The second form of regulatory policy is the net metering which gives room for consumers to independently provide and utilise their electricity at any point in time, as opposed to when it is generated. This is especially important in the field of RE as sources such as wind and solar are considered non-dispatchable (have a high tendency to fluctuate when there is limited storage equipment) as opposed to more controllable sources such as hydroelectricity, biomass and geothermal (Ellabban et al, 2014; Fang et al. 2018).

Market-based renewable energy policies are instruments which use price, cost and other economic variables to generate incentives in order to mitigate practices which negatively affect the environment (Wall et al. 2019). These can be implemented through renewable energy certificates (REC) and tradable green certificates (TGCs) which can be traded between companies and countries in the RE market (Zhang et al. 2017). Emissions trading scheme (ETS) also poses another form of market instrument which aims to put a cap on the level of emissions and also create a market for tradable emission allowances.

Fiscal policies are policies directly focused on government spending and tax-based policies which could influence the economic climate of the renewable energy sector. These

include tax reduction measures on renewable energy investments and imposing a carbon tax on carbon-based fossil fuel sources of energy. Through energy production payments (EPPs), the government directly pays per unit of RE produced by potential participants. The most common form of such and arguably the most adopted RE policy is known as the feed-In-tariff (FiT) through which long-term contracts are offered to RE producers (Tongsopit et al. 2016). In such contracts, the RE producers are offered a 'cash-back' scheme whereby they either pay a lower unit price p/kWh or are directly paid by the government for contributing to the national grid through RE sources (Zhang et al. 2017).

Lastly, exemplary public policies such as *tendering* and *public investment* encompass the forms of funding which have been set aside for renewable energy projects which have been proposed by members of the public (Wall et al. 2018)

In examining the various forms of policies, it is certain that the drive behind establishing them is to increase the prospects for the development of RE growth. Through them, an avenue for the diffusion of RE practices and projects into a given environment can occur (Eder et al. 2015). As policies serve as instruments for government participation, they become vital in creating a positive multiplier effect in creating an enabling environment for all stakeholders. However, the introduction of such policies without thoroughly following through in their implementation will render the policies ineffective (Mohammed et al. 2013). This is a contributing factor to the identified inadequacies of renewable energy policies experienced in developing countries (Gabriel and Kirkwood, 2016). It is also in part responsible for creating a negative effect of inertia on the scalability of RE businesses within developing country contexts. It is on this premise that RE businesses are further discussed in relation to the context considered for this research in the next chapter.

CHAPTER THREE

TOWARDS A THEORETICAL FRAMEWORK

With an established objective of the research to investigate BMI capabilities within SMEs, conceptual components have been deduced which constitute the foundations for the designed theoretical framework as seen in Figure.2. This revolves around making the leap from an existing BM to a new and improved BM through BMI. It has been understood in the course of this research that factors (both internal and external) collectively influence the BM development process (Bucherer et al. 2012; Mateu and March-Chorda, 2016; Freudenreich et al., 2020). Focusing on the external factors which are less easily controlled by businesses (Linder and Williander, 2015), the level of influence with which they affect an SME's BMI process is dependent on how these factors are operating within varying contexts (Silvestri et al. 2018).

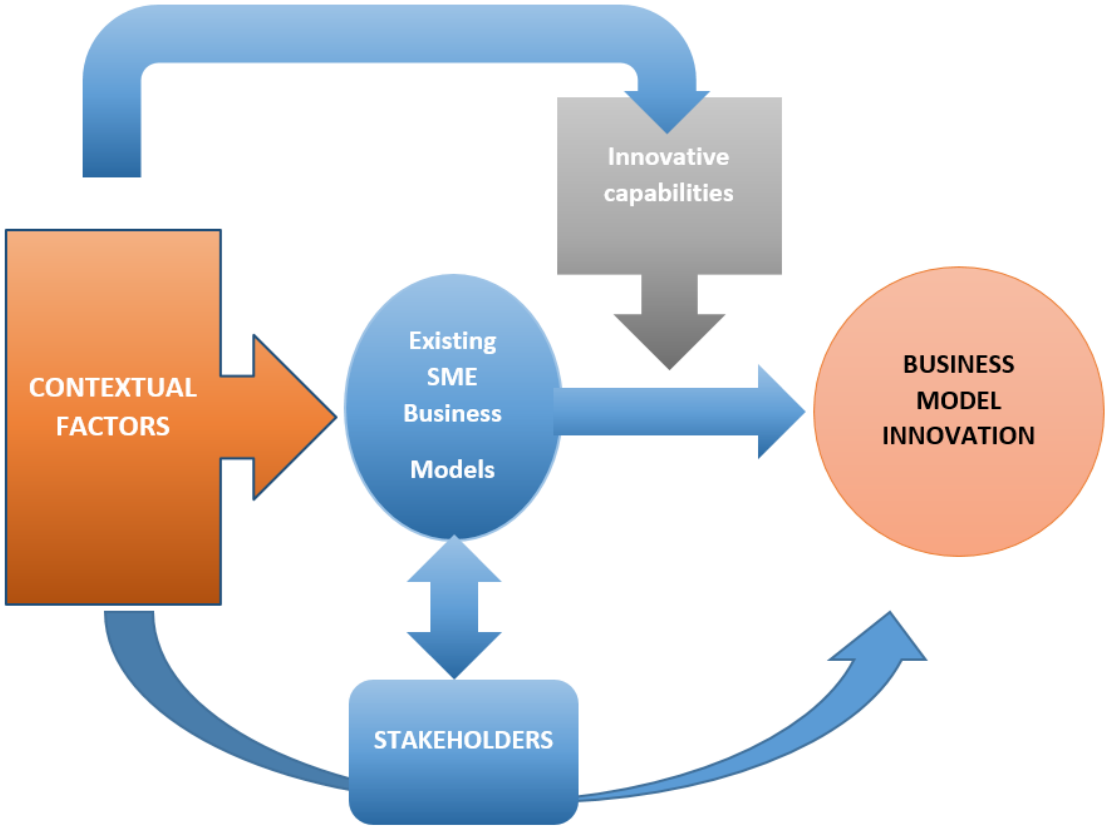

Figure 4. Proposed Conceptual Framework

A second aspect which potentially influences the level of external factor influence is the firm's ability to alleviate its resource constraint by identifying vital stakeholders and maintaining effective stakeholder configurations with respect to their particular business ecosystems (Fores and Camison, 2016; Freudenreich et al., 2020). With contextual factors and stakeholder involvement, the research further acknowledges that in the process of creating new BMs, a continuous process of taking note of the two external blocks by businesses (and SMEs by extension) is essential to understanding the innovative capabilities which can be developed via the BMI process (Foss and Saebi, 2016; Silvestri et al. 2018). It is upon this basis that the theoretical framework guides the focus of this research.

Theoretical underpinnings for this research have been discussed in the likes of BMI, SMEs, stakeholders and stakeholder value co-creation are discussed further. These have all been discussed with the perspective of exploring BMI capabilities within SMEs. The notion of value co-creation also provides a basis for Stakeholder consideration in the BMI process in SMEs which is further explained in the following sections.

3.1. Importance of stakeholder consideration in BMI

As businesses within growing economies need to be more resourceful to maintain growth and long-term impacts (Linder and Williander, 2017). This creates the need for consistent dynamism & re-evaluation of the BM structure, thereby relying on the employ of garnering innovative tactics to maintain feasibility in achieving the outlined objectives (Antikainen and Valkokari, 2016; Barth et al, 2017). For reasons of cost reduction and efficiency in the use of resources, firms have begun tilting towards less individualistic dependence and adopting an open-minded perspective towards leveraging on potential partnerships to counter environmental and survival risks (Mitchell et al. 1997). This is evidenced by the increasing focus on management literature on sharing economy, value co-creation and industrial convergence (Reischauer, 2018). Examples of these practices in contemporary focus include the merging of physical retail stores and information technology with amazon, eBay, Netflix, and Just Eat amongst others. A commonality which pervades all these examples is the merging of varied industries (from general retail to food delivery) with the information technology industry. While a shared value brings these entities together, opportunities also arise where more participants are included in the value delivery system (i.e. payment platforms and

transportation logistics) and potential new markets are created. With this in mind, the issue of stakeholder identification and management cannot be over-emphasized in the contemporary management discourse (Marti, 2018; Silvestri et al. 2018). And in the same light, BMI as an emerging field of management would need to actively examine the stakeholder phenomena in environments with high risk and uncertainty, which applies to developing countries (Hobday 2005; Marti, 2018).

Investigating stakeholder involvement in the scalability of SMEs through BMI within the RE industry also provides an opportunity to get a better understanding of how creating strategic alliances can assist developing firms in navigating less favourable environments, ultimately staying afloat and ensuring company sustainability (Mateu and March-Chorda, 2016; Schaltegger et al. 2016; Lei et al. 2018). For one, the high upfront cost of setting up renewable energy (RE) systems (the industrial scope considered for this research), coupled with the significantly lower technological diffusion makes it an unavoidable ordeal in ensuring RE companies establish cost-efficient partnerships with relevant stakeholders, one of which is the government (Dewi et al. 2018; Gabriel et al. 2016). Identifying the stakeholders gives further insight into how they can influence and can be influenced by firm actions. It also provides a means through which RE firms can classify what stakeholders are most important, dormant or dangerous to the business (Mitchell et al. 1997).

In addition to this, borrowing from the instrumental approach to the stakeholder theory (Jones and Harrison, 2018), the responsibility rests upon the businesses to establish useful stakeholder relationships towards achieving a sustainable competitive advantage (Harrison et al. 2010). This comes up as a result of the practical reality of limited resources experienced by the firm which breeds the need to create strategic alliances for survival (Mitchell et al. 1997). Another causal premise particular to this research lies in the capacity of the firms to be considered SMEs. Individual entrepreneurial prowess is vital as within the scope of SMEs is insufficient in ensuring long-term survival. This is due to the limited bargaining power the firms possess individually, prompting a need to create leverage via relationships with stakeholders within a given business environment. Evidence of this is exemplified in the renewable energy industry, where the high cost of establishing the necessary structures poses a significant challenge to renewable energy (RE) companies (Gabriel and Kirkwood, 2016). With the regional context of interest being sub-Saharan Africa, the majority of the RE companies fall within the SME bracket and experience significant growth impediments due to limited resources and insufficient infrastructural support (Gabriel, 2016). Extant literature

eluding to an obvious correlation between structural support from key stakeholders such as government/ multinationals and renewable energy development (Richter, 2013; Burger and Luke, 2017), signifies the relevance of stakeholders in business development. Factoring in the issue of context to the discussion, the level of stakeholder participation, as well as the configuration, is heterogeneous, varying from one region to another (Poudineh et al. 2018). In essence, knowledge of what stakeholders are available to RE firms and what roles such entities play in the innovative development process of RE firms is still unclear, especially within the sub-Saharan African region (Budzianowski et al. 2018). Therefore including the perspectives of stakeholder participation in the BMI process for SMEs provides a unique opportunity in contributing to the leverage tactics of SMEs in challenging environments (developing countries).

However, in order to establish sustainable relationships with stakeholders, businesses are tasked with exhibiting the significant value that they create and what prospective stakeholders stand to gain in affiliating themselves with said businesses (Freeman et al. 2004). Amidst the relationship lies a core sense of value which must be shared amongst both parties, regardless of the economic, social or environmental antecedents of their partnership (Harrison et al. 2010; Schaltegger et al. 2012). In doing so, firms effectively forego absolute individualistic characteristics towards value creation to a certain degree, giving rise to the possibility of value co-creation.

3.2. Importance of Value co-creation within Stakeholders in BMI

Value plays a crucial role in which businesses achieve their functional purpose. For reasons that it serves as an embodiment of the firm's business objectives in relation to acquiring revenue while delivering an identified product/ service to an existing customer (Pedersen, 2018). Hence, ensuring a level of consistency is maintained between the execution strategy and value proposition objective is of utmost importance to firm growth and survival (Casadesus-Masanell and Ricart, 2010). Achieving these values, however, is dependent on acquiring the necessary resources required in executing the value delivery process. Extant literature identifies the roles that internal (organisational style, structure and mode of management), as well as external factors (stakeholder interests, environmental uncertainty and contextual nuances), have on affecting the value proposition of firms (Pedersen, 2018; Poudineh et al. 2018). These

factors have significant importance on the availability of the resources needed in sustaining the business. As self-sufficiency in business practice becomes less feasible concerning resource acquisition, sustainable-centric businesses lean toward a collaborative value-creating mechanism whereby these businesses' value co-creation can occur (Antikainen and Valkokari, 2016; Bucher et al. 2018). By its nature, BMI literature possesses traits in explaining value propositioning and its importance in avoiding business redundancy (Osterwalder and Pignuer, 2010; Bucherer et al. 2012). Within the context of RE application, the value co-creation becomes a necessary feature when the combined initial high cost, technological dependence and environmental uncertainty demand the need for establishing strategic alliances and collaborative value creation with external entities such as the government, its regulatory bodies and potential private investors (Richter, 2013; Cosenz and Noto, 2018).

The concept of value and value co-creation are discussed in the research to assist in establishing a basis for stakeholder consideration towards BMI, as well as a rationale for maintaining established relationships between SMEs and key stakeholders within the context of developing countries.

Also, as SMEs experience higher resource constraints, it is essential that they develop ways to innovate, and this can be achieved through BMI (Foss and Saebi, 2016; Bach et al. 2018). Not only must SMEs innovate to create value, but being able to do so in an efficient manner increases prospects for long-term survival (Bucherer et al. 2012; Rizos et al. 2015). Therefore a move towards efficiency in resource management creates avenues for SMEs to consider resource efficiency concepts such as the circular economy and the sharing economy which are further discussed below.

3.3. Towards the circular-sharing concepts and the opportunity for SMEs in Developing countries

As the world of business evolves, it is natural to observe certain generic traits being adopted which although might start from a single firm, eventually becomes pervasive enough to spread throughout other firms. Such traits, most especially if they lead to positive outcomes could be adopted by competition, and partners and can eventually transcend the industry (Antikainen and Valkokari, 2016; Cosenz and Noto, 2018; Geissdoerfer et al., 2020). One concept which is gaining such traction is the circular economy. The developing argument to

harness more sustainable practices (Schaltegger et al. 2012; Frishammar and Parida, 2019) in order to ensure a more sustainable world has led to a push for deriving maximum value from resources for as long as possible while creating a means to re-generate such resources to be reused where possible (Pieroni et al. 2019). This is essentially what the circular economy entails.

Also, in cases where resources and/or access to resources is very limited or non-existent, the concept of the 'Sharing economy' acknowledges such an economic reality of scarcity. The sharing economy describes a scenario where resources are acquired but made accessible to all respective stakeholders (Reischauer and Mair, 2018). Although on the surface this appears benevolent, the fact that stakeholders are business inclined implies the need for all parties to ensure whatever sharing relationship has been established is inherently beneficial to their interests (Bocken et al, 2013). This requires developing a strategy which achieves such objectives and also does so in a unique manner which is exclusive to the business (Aspara, Hietanen and Tikkanen, 2010). For this, business model innovation could serve as a catalyst through which it can be achieved.

Traits in the RE industry

While the 'Sharing' and 'Circular' economy are stand-alone notions, there are instances whereby both concepts are experienced within a particular industry; where the push for sustainable practices demands more resource efficiency, yet access to the resource base available to businesses of the said industry is challenging and very limited. To this end, the renewable energy industry presents one such scenario where this is experienced. Where on the one hand, it was conceived out of the clamour for more re-usable sources of energy (Kichou et al.2019), but the process of deriving energy from such resources is hampered mainly by limitations in cost, expertise, infrastructure and other factor driven causes (Deichmann et al. 2011; Gabriel 2016). This is more apparent within developing economies since the majority of renewable energy companies within such economies are classified within SME capacity levels (Gabriel and Kirkwood 2016). As such, individual attempts at acquiring requisite resources with little or no support is greatly limited, and scalability, therefore, is nigh impossible (Gabriel and Kirkwood, 2016).

In view of this, the question arises as to how renewable energy businesses can overcome the glaring challenges existing within the context of developing countries. With this in mind, could the sharing economy concept provide a more feasible option within such a specified

scenario? On the basis that a shared system of management could equally lead to a shared load on the value chain.

Renewable energy companies in sub-Saharan Africa are predominantly restricted to small-scale consulting and application services (Gabriel and Kirkwood, 2016). This is due to the fact that factor-driven characteristics exhibited by African-based SMEs depict a scenario whereby the entrepreneurial activities carried out by businesses are largely driven by the necessity to survive, rather than conducting business due to identifying exploiting an opportunity (Chineke and Ezike, 2010; Gabriel et al, 2016). This is especially so when the cocktail of contextual factors which include; inadequacies in infrastructure, incentives, and government interest remain salient challenges which are faced by these SMEs (Budzianowski et al. 2018). On first look, businesses within such an environment are less likely to venture into prospective opportunities which although visible, require a much higher resource capacity than subsistent levels the existing businesses may possess (Boons and Ludeke-Freund, 2013; Geissdoerfer et al. 2018). With renewable energy being in the high resource demand category, the chances of African SMEs venturing into the renewable energy sector are restricted (Bugaje, 2006; Deichmann et al.2011). And the chances of already existing SMEs within the renewable energy sector successfully executing a scale-up process are also less likely to occur (Winkler 2005; Budzianowski et al.2018; Tomala et al., 2021).

Though prospects seem ominous on the surface, it may not be total 'doom and gloom' for African-based renewable energy (RE) SMEs. Indeed, the apparent lack of structure existing within the sub-Saharan African RE industry serves as proof that it is still in its infancy (Gabriel, 2016). However, where the volatile nature of the environment poses a real threat to RE-SMEs, an opportunity to initiate a workable structure through engaging the tenets of entrepreneurship is also embedded within such a setting (Bojovic et al.2018; Diaz Lopaz et al. 2019). With this in mind, RE-SMEs must look into innovating strategies which simultaneously maximise their prospects for development, while minimising the effects of resource constraints specific to the sub-Saharan African business environment (Pieroni et al. 2019; Wang, 2019). It is for this purpose that the research attempts to explore the prospects of finding a silver lining between the emerging management concepts of the circular economy, and the sharing economy and harnessing their valuable traits through the process of business model innovation.

From the perspective of SMEs, it has been established that they experience higher levels of resource constraint, especially when situated in developing economies (Trimi and Berbegal-

Mirabent, 2012). With this in mind, the need to create valuable partnerships presents an opportunity through which constraints can be mitigated is of great importance (Pedersen, 2018). An increased prospect of scalability by renewable energy companies in sub-Saharan Africa requires devising feasible strategies which would enable partnerships which would be of value to all parties involved (Lee et al, 2019). From SME perspectives, the limited bargaining power possessed by them can be curbed through the term attributed as 'stakeholder inclusion. For the purpose of this research, this is defined as the '*conscious identification of potential stakeholders and the establishment of valuable partnerships in order to mitigate existing resource constraints within a particular business environmen*t'.

The idea of stakeholder relevance can be traced to the stakeholder theory, particularly the instrumental stakeholder theory, which is one of the three main arms of stakeholder theory (Donaldson and Preston, 1995). The instrumental stakeholder theory (IST) opines that stakeholders should be acknowledged and managed in such a manner that they assist in the achievement of business objectives as well as sustained growth (Jones, 1995). The IST embodies the practicality involved in a business engaging pertinent stakeholders. This is further explained as follows. The 'descriptive' arm of stakeholder theory deals with the explanation of terms and concepts pertinent to the theory, and the 'normative' arm focuses on the intrinsic value that stakeholders possess within a firm (Donaldson and Preston, 1995). The instrumental arm of the stakeholder theory emphasizes the feasible connections which exist between the active inclusion of stakeholders and their respective influences on achieving the aims and objectives of a business (Jones, 1995).

Stakeholders, RE-SMEs and Business Model innovation

In view of the core argument of RE-SME perspectives, the contextual nuances posed by the developing countries limit their bargaining power and by so doing increase the potential relevance of creating business relationships in order to assist businesses in navigating the business environment (Deichmann et al, 2010; Wang, 2019). Managing stakeholders in most businesses is pivotal to the resources and overall capacities of the firm (Geissdoerfer 2018). Typically, governmental influencing factors also play a vital role in the growth and development of a business (Dewi et al. 2018). Similar notions are also expressed particularly within the renewable energy literature (Pegels, 2010; Chineke and Ezike, 2010). However, the notion is rarely applied especially within developing countries as studies have shown (Bugaje 2006; Bamisile et al. 2017). In view of such a scenario, the argument for establishing valuable

business relationships with stakeholders becomes more potent. While the conventional narrative on business model innovation opines that businesses must develop strategies to re-invent value propositions and ensure competitive advantage (Foss and Saebi, 2017), an additional narrative from SME perspectives delves deeper to indicate that the strategies must take cognizance of the influence of establishing stakeholder relationships in order to increase their prospects in achieving overall BMI objectives (Evans et al. 2017).

CHAPTER FOUR

RESEARCH DESIGN AND METHODOLOGY

In a bid to provide a concrete empirical understanding of the innovative capabilities of business model innovation, it becomes logical to investigate such a phenomenon from a practical standpoint, drawing from SMEs in business. To this end, the intended research would be investigating the methodological approach of an inductive multiple case study research. Gaining prominence over the years, multiple case study research has garnered a reputation as a viable form of methodology for investigating complex phenomena within the confines of real-life settings (Harrison et al. 2017). This is applicable to the intended research objective of looking into the factors affecting the BMI capabilities of SMEs in developing countries. The case study approach for the intended research adopts an interpretivist paradigm which is qualitative by its nature (Cresswell, 2014). Owing to the search for an integrative methodical approach aimed at theoretical development and testing, the case study approach adopts an integrative process of empirical analysis with the use of case selection and causal implications (Bennett and Elman, 2007; Harrison et al. 2017). The keyword of a 'case' is outlined in the case study definition given by Stake (1995) as the study of the peculiarity and complexity of a particular contemporary phenomenon in order to understand activities and implications surrounding the identified phenomenon. By implication, this methodology espouses an understanding that to investigate an issue, surrounding factors influencing the issue must be taken into account, and such factors differ as a result of contextual variations, hence the inclusion of 'real life settings and an interpretivist perspective (Yin, 1994; Stake 2013). The case study further iterates that knowledge generated is relatively bound to time and context, therefore a feasible methodology should include participating in active observation and combined data collection processes such as observations, interviews and triangulation to get a holistic perspective (Stake, 2013; Yin, 2014; Harrison et al. 2017).

Bringing the research objective into perspective, exploring innovative capabilities of BMI in the perspectives of SMEs, and adopting an inductive multiple case study approach of investigation would be looking into the phenomenon of innovative capabilities within SMEs. The ability of triangulation using numerous data collection sources provides the potential into gaining more insight into the phenomenon of interest, capitalizing on knowledge acquired from various perspectives (Eisenhardt, 1989). The cases to be selected will be within the renewable energy sector, which is currently still in the early stages of development in the Energy industry

within sub-Saharan Africa (Gabriel, 2016; Budzianowski et al. 2018). As renewable energy companies in sub-Saharan Africa predominantly fall within the SME business category, the case study methodology presents a viable option through which the real-life factors influencing innovative capabilities can be understood in-depth within the identified context.

A pre-collated database consisting of renewable energy companies was identified and collated. This presents the preliminary sampling frame through which contact will be established with top-level management of the prospective firms regarding the research. The possibility of a limited response from the firms is also taken into consideration. Limitations in costs and scheduling interviews are considered. For this reason, the research is aimed at researching until the saturation point is achieved (Eisenhardt, 1989). This will be from the identified RE businesses upon which semi-structured interviews can be conducted within each of the firms. An initial interview guide will be drafted using combined literature from BMI, SMEs, innovative capabilities and stakeholder consideration. Data will be collected mainly through interviews, focus groups, questionnaires from potential stakeholders, observations and archived data (reports, articles, and websites). These will be used to triangulate results and will be analysed using the NVivo software.

The research also adopts the interpretivist philosophy and inductive approach by observing, analysing and contributing to the concept of BMI. When it comes to investigating the research questions, the knowledge of SMEs innovative capabilities is very limited. The study adopted a careful observation process to glean patterns which could be analysed and outlined as a formative basis for SME capabilities. This is a layered issue which required an exploratory process (Boyatzis, 1998; Liamputtong, 2020). Though the research has built conceptual guiding blocks, the primary data is the determinant factor upon which the findings have been delineated. While there has been research exploring the concept of BMI there is still limited knowledge in perspectives of SMEs in the renewable energy industry in sub-Saharan Africa. Our research contributes to the specific and limited scope through careful consideration of the true meaning and content from the data set that has been obtained (Krippendorf, 2004).

Due to the RE companies being relatively small scale, their capacities range from a minimum of 5 staff to 100 (see Table 11). Therefore, the intended participants which were targeted for interviews within the enterprises include the CEOs, heads of strategy, project/innovation managers and other respective management personnel involved in the strategic planning and innovation of these RE companies.

4.1. Contextual Discussions

In this chapter renewable energy is discussed with emphasis on the contextual area of focus. The context as indicated in the introduction puts the setting of investigating the phenomenon of BMI within the renewable energy industry in Nigeria, a sub-Saharan African country. As current literature posits renewable energy businesses (REBs) to be performing within the confines of small and medium-scale enterprises (SMEs) in terms of capacity (Gabriel and Kirkwood, 2016), it, therefore, provides a necessary basis upon which the nature of SMEs in sub-Saharan developing countries will be discussed. To which the renewable energy industry will be discussed afterwards.

4.1.1. Small and Medium Scale Enterprises (SMEs)

SMEs are increasingly assuming a vital role in the global economies most especially in developing countries (DCs). This is evident as contributions to the employment rate fall within 60% of the total employment rate, also contributing to 40% of national income, especially in DCs (World Bank, 2018). This category of companies falls within the capacity of enterprises actively employing less than 250 personnel and a turnover of fewer than 50 million euros (European Commission, 2018). With projected job provision estimated at 600 million within the next 15 years (World Bank, 2018), SMEs represent a significant sub-sector which is increasing in relevance, to which investigating emerging management concepts would be of substantial importance to solving contemporary market challenges most especially for developing countries. Considering the significantly complex task of balancing internally available resources with the limitations available external resources, SMEs are often tasked with devising cost-efficient strategies to offset their limitations and maximise their value creation capabilities (Silvestri et al. 2018; Putra and Santoso, 2020). To this end, extant literature suggests that SMEs are more prone to be open to adopting more daring strategies in order to survive against the existing competition of similar or higher capacity (van de Vrande et al. 2009). By implication, from an entrepreneurial perspective, SMEs are inherently innovative in nature and as such, must develop the requisite business models which factor in the requisite innovative capabilities (Trimi and Berbegal-Mirabent, 2012). The latter refers to the distinct novel skills, processes, behaviours and structures which characterise innovative potentials for business model innovation (Inigo et al. 2017).

4.1.2. SMEs in Nigeria

SMEs play a vital role in most economies, as their volume in number and span across all industries make them an important factor in contributing to the job and wealth creation of an economy (Parker et al. 2010; Obi et al; 2018). According to the Bank of Industry in Nigeria, Micro, Small and Medium scale enterprises (MSMEs) are enterprises which have a minimum number of less than 10 to not more than 200 employees, total assets of less than N5 million naira and not more than N500 million, and an annual turnover of N20 million or less, but not more than N500 million (Bank of Industry, 2019). Though they may be more in number within an economy, the individual capacity of SMEs is limited as exhibited in the definition. This prompts the need to put infrastructure in place in a bid to support them and by extension enhance the vibrant nature of an economy as SMEs have proven to do (Pandya, 2012; Meijer et al; 2019). Table 4. Outlines examples of institutions directly responsible for regulating, supporting and managing SMEs in Nigeria, which can be termed enterprise support agencies (ESA). These bodies are tasked with providing advisory support, training, and financial and infrastructural development (Akinbola et al. 2019). In spite of the ESA's presence within the economy, extant literature eludes to the fact that SMEs in developing countries still experience difficulties in establishing conducive strategies to ensure long-term survival (Subair and Salihu, 2011; Pandya, 2012). For instance, a survey conducted by the Small and Medium Enterprise Development Agency of Nigeria (SMEDAN, 2013) reveals challenges faced by SMEs including poor infrastructure, inconsistencies in policy development, limited market access, multiple taxations, lack of ESA support services and technological obsolescence. This culminates in a resulting factor of 80% of SMEs folding up within 5 years (SMEDAN. 2013). These lapses also extend into the renewable energy industry of Nigeria (Mohammed et al. 2013). This is supported by the collated repository of identified renewable energy businesses in Nigeria in appendix 1, which places the RE companies within the classifications of SMEs based on their capacity ranging from 5 to 500 employees.

Enterprise Support Agencies	Acronym	Categorisation	Purpose/Objective
Bank of Industry	BOI	Federal	*Provides business support services and loans for SMEs*
Small and Medium Enterprise Development Agency of Nigeria	SMEDAN	Federal	*Promotes the development of micro, small and enterprises (MSMEs)*
Ministries of Commerce and Industries	MCI	State	*Foster business activities and promote capacity-building incentives*
State Cooperative Division and Units	SCDU	State	*Encourages savings and credit rating reserves accessible to businesses.*
Manufacturer Association of Nigeria	MAN	Industrial Organisation	Facilitate high standards and quality assurance of products through policies
National Association of Small and Medium Enterprises	NASME	Industrial Organisation	To build networking, capacity, policy advocacy and business growth.

Table 4. Identified supporting Entrepreneurship Agencies in Nigeria from Akinbola et al. 2017.

4.1.3. Renewable Energy in the Nigerian Environment

Being one of the most populated countries in the world with a population of 190 million, Nigeria is enriched with both renewable and non-renewable sources of energy. In spite of such opportunities, more than half the populace is still without access to electricity (Chineke and Ezike, 2010). This is consistent with narratives of the World Energy Council which indicates that half of the entire global population is without access to electricity (World Energy Council, 2019). This is contrary to the increasing relevance energy plays in the development of an economy. Additional issues to consider are the surging interest in renewable energy applications globally, and the low energy security stance possessed by most Sub-Saharan African countries. Also, the need to simultaneously up-scale the energy capacity on a national level, as well as achieve doing so while being mindful of the current global energy trends of reliance on more sustainable and renewable sources (Gabriel and Kirkwood, 2016; Burger and Luke, 2017; Budzianowski et al., 2018). This typically presents an exploitable opportunity for business ventures to utilise their entrepreneurial capacity and innovate strategies toward achieving these objectives. Existing literature posits the concept of business model innovation as a strategic process through which firms can clearly outline the requisite elements which aid in determining the value identification, proposition and capture on behalf of the firm (Osterwalder and Pignuer, 2010; Foss and Saebi, 2017).

Looking at the key concepts discussed in the course of this research in the forms of business model innovation (BMI), renewable energy application and stakeholder consideration, a factor that their objective seeks to explain in one way or the other is in achieving sustainability. Where the BMI is focused on achieving business sustainability through innovative strategies and competitive advantage (Teece, 2010; Bocken et al, 2013). In terms of renewable energy, leading arguments supporting its propagation have been largely centred on sustainability from environmental and economic perspectives (Pegels, 2010; Li and Shen, 2019). Lastly, paying attention to the research focus from the perspectives of SMEs has consequently given rise to the notion of keying into stakeholder consideration (Jones et al 2018) by RE-SMEs to ensure more sustainable practices via BMI. Also, there is an increasing trend in management literature establishing links between business model innovation and sustainability, exhibiting their interconnectedness and by so doing increasing their relevance on a practical and academic scale (Stubbs and Cocklin, 2008; Schaltegger et al. 2012; Geissdoerfer et al. 2018; Pieroni et al; 2019). Similar to this, two identified concepts of the

circular economy and the sharing economy also explore approaches geared toward more sustainable ecosystems, often converging in recent research (Diaz Lopez et al. 2019; Nubolz et al. 2019; Wang, 2019). These two concepts are further discussed in the following chapter. For the purpose of this research, these increasing interrelationships support a view which posits that in investigating the modern business environment for SMEs, understanding how these concepts can lead to scaling up within their respective environments can increase their effectiveness in doing so.

Nigeria, with a population of 190 million is currently faces energy challenges in energy supply. Although there has been a recent increase in national power generation capacity of electric from 4000 Megawatts (MW) in 2015 to 7000 MW currently as asserted by the former Minister of Power Works and Housing (CNBC Africa, 2018). In spite of this, it still dwarfs in comparison to the sheer size and requisite energy demand of the country. In addition, the value chain is hampered by challenges faced in the distribution phase, which is the final of three phases (production and transmission respectively). By implication, the actual power supply distributed is at a limited 5,222 MW (CNBC Africa, 2018). This consequently implies the need to engage in efforts which ups-scale the power capacity and energy mix of the country (Adedokun, 2015; Emodi and Boo, 2015), to which justifications for RE exploitation arise.

Title	Year	Policy Status	Policy Type	Policy Target
Nigeria Feed-in Tariff for Renewable Energy Sourced Electricity	2016	In Force	Economic Instruments-Fiscal/financial incentives, feed-in-tariffs/premiums	Bio-energy, Solar, Wind
Nigerian Electricity Regulatory Commission Mini-Grid Regulation 2016	2016	In Force	Regulatory Instruments	Multiple renewable energy sources.
National Renewable energy and Energy Efficiency Policy for Nigeria	2015	Planned	Policy Support for strategic planning	All renewable energy sources
Biofuels blending mandate	2013	In force	Regulatory instruments (Codes and standards), vehicular fuel economy, emission standards	Sources of Bioenergy and all forms of its application for transport (Bioethanol)

Multi-year Tariff order (MYTO) II (2012-2017)	2012	Superseded	Economic Fiscal instruments-Financial incentives, Feed-in tariffs, premiums	Multiple renewable energy sources (Wind, solar, Hydropower, Bioenergy)
Nigeria Renewable energy Master Plan	2011	In Force	Economic instruments-Direct investments in infrastructure, financial incentives (tax relief, policy support, strategic planning)	All renewable energy sources
Multi-Year Tariff Order (MYTO) I (2008-2013)	2008	Superseded	Economic instruments (Fiscal incentives), feed-in-tariffs premiums	Multiple renewable energy sources.
Rural Electrification Strategy and Implementation Plan of Nigeria	2006	In Force	Policy support and strategic planning	Multiple renewable energy sources.

Table. 5. Policies for renewable energy application in Nigeria from International Energy Agency Database (2019)

4.2. Case Study Selection

With the surging interest in renewable energy application globally, and the low energy security stance possessed by Sub-Saharan African countries, there is the need to simultaneously up-scale the energy capacity on a country-wide level, as well as achieve this while being mindful of the current global energy trends of reliance of more sustainable and renewable sources (Gabriel and Kirkwood, 2016; Burger and Luke, 2017; Budzianowski et al., 2018). This typically presents an exploitable opportunity for business ventures to utilise their entrepreneurial capacity to innovate strategies toward achieving these objectives. Existing literature highlights the concept of business models as a strategic process through which firms can clearly outline the requisite elements which aid in determining the value identification, proposition and capture on behalf of the firm as mentioned earlier (Osterwalder and Pignuer, 2010). From a practical standpoint, this is an important tool in ensuring business survival. However, a combination of high competitiveness, high up-front cost and ever-evolving shifts in trends demand consistent evaluation of the business model. It is on this basis that businesses consistently explore feasible formulas in the hopes of ensuring novelty in idea creation towards creating value for themselves and prospective customers. This process can be termed Business Model Innovation (Amit and Zott, 2010; Chesbrough, 2010; Aspara et al. 2010).

Bringing it down to the discourse of Renewable Energy (RE) application and development, the constant advancements in technology and strategies inherent in the field are a prerequisite for existing and intended RE businesses to adopt business model innovation tactics to secure competitive advantage. This becomes more apparent taking into consideration the innate nuances of the environments in which these businesses are located, and with Sub-Saharan Africa largely considered to be faced with institutional, infrastructural and managerial challenges in energy development BMI can serve as a viable option to offset such challenges (Engelken et al., 2016; Gabriel and Kirkwood, 2016).

In examining extant literature, there is a consistently promoted argument indicating a significant correlation between policy creation and Renewable energy development (Gabriel and Kirkwood, 2016; Tongsopit et al, 2016; Zhang et al, 2017; Al-Sarihi and Cherni, 2018; Budzianowski et al., 2018; Poudineh et al. 2018). These undoubtedly suppose that there is a need for favourable incentives to be introduced and such a role is attributable to the input of key stakeholders like the government, for the enhancement of business model prospects.

However, with regards to developing countries (sub-Saharan Africa included), there is limited government input regarding policy generation which largely stems from limited interest and inadequate infrastructure, threats from incumbent energy sources among other reasons as earlier discussed. This typically makes the prospects for an intending or existing business less probable. Hence, the constricted position of renewable energy businesses, coupled with the need to meet up energy demand and the relative inactivity of sub-Saharan African governments presents a viable research gap which demands further investigation. Exploring specifically how a business can position itself to scale up government interest within the region, and identify other external stakeholders and innovative capabilities is an opportunity that the concept of business model innovation can address. For this research, a qualitative research approach has been selected due to its suitability in answering the drafted research questions set out below:

> *(1) Which capabilities do SMEs use in their BMI process in order to scale up their business activity?*
>
> *(2) How do contextual conditions influence the transformation process from pre-existing BM to adequate innovative BMs?*

Numerous research has been undergone to understand the growing phenomenon of BMI (Zott and Amit, 2008; Teece, 2010; Foss and Saebi 2016; Geissdoerfer, 2019), which in turn has influenced the trajectory of this research. However, in a bid to further enrich the BMI discourse, it becomes imperative to understand the various influences, applications and factors which affect this phenomenon within various contexts. To this end, a qualitative approach provides an avenue through which an understanding of how actors apply and experience a phenomenon can be understood in depth in view of the real-life influences within the environment. The approach also allows the researcher to acquire analytical results deduced from participants within a given society, thereby increasing prospects for accuracy.

4.3. Methodological Selection

As there is a wide array of research methods, and techniques for conducting data collection and analysis. Each of these methods has features which rationalise their processes. Hence, the chosen qualitative method which is the multiple case study methodology has major guiding principles in accordance with this notion. Yin (2013) indicates the three conditions which are to be met are:

- Research questions: What type of research question series are presented; ‘who’, ‘where’, ‘what’, ‘how’ and ‘why’?
- Control of events: To what extent does the researcher have influence over the behavioural/conditional happenings? And
- Contemporary events: The degree of balance of emphasis between current versus historic occurrences.

Strategy	Research questions	Control of events	Contemporary events
Experiment	How/Why	Yes	Yes
Survey	Who/What/Where/How much-many	No	Yes
Archival analysis	Who/Where/What/How much-many	No	Yes/No
History	How/Why	No	No
Case Study	How/Why/What	No	Yes

Table 6. Summary of selected research methods from various research strategies and their application as espoused by Yin (2013)

In view of the research methods considered, the table gives insight into the nature of outcomes which could possibly be achieved. The case study and the archival analysis are viewed as more appropriate for investigating the outlined research questions. Creating grounds for answering the ‘how’ and the ‘what’ asked in the research questions. The guiding inquest of the research is twofold; Firstly geared towards exploring what features make up the innovative process of business models for small and medium-scale businesses in a developing country within the African context. The second aimed at understanding what contextual factors are present, and how they directly affect the BMI process. The researcher identifies an opportunity in carrying out such inquests within an inherently innovative and relatively young industry such as the renewable energy industry within Nigeria one of the largest economies in the region. As Yin (2014) opines, the case study provides a means to conduct research especially when the boundaries between phenomena and a specific context are not evident.

The manner in which the research is conducted is stated below;

- **Preparation**: This begins with developing a sampling strategy, identifying indigenous renewable energy companies and establishing contact (e-mails, calls etc.).
- **Field Research**: Conduct data collection process using accessible research tools such as semi-structured interviews, observations, reports, and websites (all from reliable impartial sources).
- **Analysis**: Data is collated and analysed using the thematic analysis process deduced by Braun and Clarke (2006) which is the six phases of familiarizing with data, generating initial codes searching for themes, reviewing themes, defining/naming themes and producing the report.

4.4. Multiple case studies

The research adopts a multiple-case study approach. This is vital because it serves as a means through which multiple sources of evidence can be combined and triangulated to obtain a common result (Yin, 2014). Other researchers also highlight the advantages of the multiple case study approach. While Glazer and Strauss (1967) gave earlier credence to the approach in the form of 'comparative methodology', which involves using grounded theory in relation to an individual case, Miles and Huberman (1994) discussed the 'bound' process through which associated methodologies concerning how corresponding qualitative data might be processed. Eisenhardt (1989) also surmises that multiple case studies are applied as data techniques in order to triangulate data and support internal validity. In conclusion, it is on these grounds that the research adopts the chosen methodology of multiple case studies for the research.

4.4.1. Qualitative Interviewing

As the research adopts a multi-case study approach, the main tool used for data collection has been through securing and conducting semi-structured interviews with renewable energy practitioners in Nigeria. This is because the method can serve as; a means of gathering qualitative data and is also used as an exploratory tool in moulding an interview structure that flows conceptually, giving room to make necessary adjustments where and when need be.

While the semi-structured interviews give ample room for participants to express their perspectives, it is important to maintain a guiding structure for the exercise (Baxter and Jack, 2008; Hancock, Sykes and Verma, 2018). This structure is derived in the form of a conceptual

framework gleaned from the literature review described in chapter 5. The initial idea was to conduct a face-to-face interview, which the interviews would conduct in Nigeria. This however could not be possible due to geographical constraints and the global lockdown which occurred as a result of the Covid-19 outbreak. Hence, the interviews were conducted remotely via communication technology platforms (phone calls, skype, zoom etc.).

In terms of discussing the pros and cons of conducting remote interviews, the advantages include a greater degree of flexibility and a lessened amount of resources required such as travel costs and logistical support. There are also a number of disadvantages which include limitations in gaining access. In relation to the regional cultural peculiarities within the country being looked at (Nigeria), there is significant preference placed on personal contact and in some cases gives way to an informal means of establishing communication, networks and relationships. The effect of this is that more formal means of establishing communications such as email and formal letters, while proper may not yield a quick response as a more personal touch might yield. So in the course of the data collection process, a combination of formal and informal means was applied to establish contact with Nigerian-based renewable energy entrepreneurs and practitioners.

4.5. Data Analysis and Approach

Typically the designs for data collection could vary from highly structured, theory-based to less structured (Miles et al., 2014) as illustrated in table 2. It is the objective of this research to tap into the inherent advantages of such processes. As has been established, the data collection process is influenced by the conceptual framework, which is derived from a comprehensive literature review. With the purpose of testing, exploring and explicating a conceptualisation, the research process also creates an ability to explore a unique phenomenon (Miles et al., 2014). The limiting nature of knowledge surrounding the phenomenon makes it necessary to adopt a design which permits a reasonable degree of flexibility. It is for this reason that a semi-structured interview process is adopted.

Types	Example Nature	Nature of Guidelines
Highly structured	The survey, Multiple choice, Questionnaires for market research, surveys	Questions are predefined in detail with potentially predefined answers
Semi-structured	Guided but the open-ended interview	Provides a topical guide with questions, but is open-ended with no answers.

Unstructured	Ethnographic (embedded) interviews	Individual questions lead to engagement in informal conversations, with no prescheduled guidelines

Table 7: Types of interviews, developed by Miles et al. (2014)

Consequently, the core elements from the conceptual framework were directly translated into five topical sections under section B of the interview guide. Section A initiates the interview process, beginning with establishing background questions within the lines of age range, educational background, prior experience before becoming a renewable energy practitioner and the like. Therefore the interview guideline for the question. As for the second section B, the five sections were categorised as follows; question set 1 pertains to navigating the business environment (context), question set 2 looks into investigating issues scalability, question sets 3, 4 and 5 explore questions on stakeholder relevance, business model innovation and innovative capabilities respectively. It should be noted that all questions have been designed to reflect the exploratory nature of this research.

4.5.1. Sampling

In the course of this research, the sampling of the cases exhibits a unique combination of strategy(s) which reflect innovative strengths as Table (8) illustrates. However to attain that, the research explored an array of sampling methods listed in table 3.

Sampling Strategy	Process and purpose
Random Sampling	An indiscriminate process of case selection to reflect the target population
Snowballing	Obtaining interviews based on prior recommendations is useful in scenarios where there are limitations/difficulties in gaining access.
Maximum variation	Targets a wide array of incidents regarding a phenomenon, from basic to very extreme cases.
Ad-hoc	Selection is based on ease of access, and availability and there are extreme pressures of time and cost.
Typical case	Aims at identifying a particular case type
Theory guided	Selection based on meeting theoretical characteristics being investigated
Negative/deviant case sampling	Case selection is based on having an opposing opinion, theory or explanation

Table 8: Sampling strategies, developed by Easterby-Smith et al. (2015)

Regarding the sampling for this research, the guiding principle was mainly a theory-guided sampling strategy. Due to the nature of the underlying conceptual framework, the

targeted respondents from the renewable energy companies would have to have a firm grasp of the fundamental elements pertinent to both the company and the research purposes. These would include the elements such as business model innovation, innovative capabilities, stakeholders in the renewable energy space and the contextual factors surrounding the said company. Considering the fact that the targeted companies were renewable energy small and medium-scale enterprises, they were typically of a smaller capacity, thereby making it a smaller pool of personnel who tend to multi-task and as such tend to be well-versed in the business elements. However, gaining access to these entrepreneurs and practitioners was quite restrictive and difficult due to timing and limited virtual response. Hence, the snowballing strategy was also applied to the process.

Of the 93 renewable energy entrepreneurs who were contacted (via e-mail and follow-up calls), 21 agreed to be interviewed, which is a 19.5% acceptance rate. But only 19 out of the 21 prospective interviews have been successfully carried out, all within the 10 RE-SME cases. In an emerging industry, locating a representative sample within a distant developing economy is quite difficult. Although upcoming databases are being harnessed by newly established associations for renewable energy practitioners, factors such as the erratic scheduling nature of these entrepreneurs, or the unforeseen developments make prospective respondents unable to participate even when willing at best, or unable to respond at worst. We make effort to augment this problem by accessing other reliable sources of information where possible such as websites, news and reports. By analysing the qualitative findings alongside supplementary secondary data, we reveal in-depth the nature of business practices by these entrepreneurs, as well as the factors surrounding them. We begin by exploring resultant insights gleaned from 8 of the respondents from 5 cases. The interviews ran on average for an hour (between 30-90 minutes). It typically began by asking participants to provide some background information, before delving into questions ranging from business strategy, to what their views on innovation might be, what operating their business in the country is like, how they intend to grow and what partner relationships they might have established if there are any (see appendix for a tabular overview of the cases).

The interviews were recorded after obtaining express consent from the respondent. Where possible video calls were held, however, due to challenges in network quality, video calls were obtained. The recordings were then transcribed verbatim after the interviews. Additional field notes and observations were taken during the course of the interview as well. The subsequent data collated formed the basis for thematic analysis and coding. Braun and Clark, (2006) refer

to coding as “the manner in which one defines what the data being analysed is all about”. It undergoes the process of identifying one or more statements from texts, pictures or other forms of data which demonstrate similar or the same theoretical descriptive ideas being investigated. Gibbs (2007) further explains that such texts are usually identified in a number of passages, which are then linked to a name descriptive idea (the code). This process continues until the relevant textual data have been assigned to a corresponding code. Table 4 illustrates the phases in which the coding process takes shape.

No	Phase	Description of phase
1	Familiarizing yourself with the Data	Transcribing, reading and re-reading to begin idea formulation
2	Generating initial codes	Coding valuable features in a systematic manner all through the data and assigning a significant code to them
3	Searching for Themes	Collating codes into initial themes & gathering necessary data for each theme
4	Reviewing themes	Assessing themes to see if it correlates with coded extracts and generating a thematic map
5	Defining and naming themes	Refining specifics of each theme, the assumptions of each theme and clear definitions of each theme
6	Producing and interpreting the report	Final analysis rendering, selecting compelling extracts for examples, the final analysis of extracts, relating back to the research question, literature and producing a report

Table 9. The 6 Phases of thematic analysis by Braun and Clark 2006

Following these phases was vital in implementing the step-by-step process of recording, transcribing, analysing and interpreting via Nvivo software. Upon completing the first phase of the analysis in Nvivo, the general codes were created. After further familiarization, similar clusters were then grouped into core themes designed and guided by the themes churned out on the conceptual framework from the literature. These relationships between codes and themes have been illustrated in figure 10 below.

Thus from the current analysis, the results have been deduced into themes 6 which are; *Business model innovation, Innovative capabilities, contextual factors, renewable energy in context, scalability* and *stakeholder relevance*. They will be explored in the next chapter.

In discussing the methodology, it is also important to outline the analytical approach which has been adopted that best enhances the objective of the research. Being a qualitative study, adopting an approach which has the ability to condense voluminous and diverse raw text

data into a concise summary format, establish clear links between research objectives and build toward a theory from a specific to a general standpoint (Yin, 2014). Therefore, the data has been analysed using an inductive approach, where new data has been disseminated and compared with the extant findings hinging on the principles of constant comparison (Eisenhardt and Graener, 2007; Miles et al. 2014; Klooster et al., 2022). As stated earlier, the interviews were first analysed prior to the code derivations. New data from each respondent's codes were initially constantly compared with already coded data to which similarities were identified, and new codes were further derived where necessary. This process was repeatedly done until it was deemed that no new codes and themes were found and optimum data density was achieved, leading to theoretical saturation (Creswell, 2007; Gioia et al. 2012). The data analysis of each interview was conducted singularly. The transcripts were assessed with line-by-line coding using Nvivo also known as open coding. The open codes were then grouped into categories after which they were merged with preliminary themes that were constructed with the aid of the conceptual framework designed for this research. The framework was effective in accurately streamlining the codes from the data with the analysed literature review.

In view of these generic analytical strategies and methods will be outlined along with a description of how they were utilised in the analytical process of this study. Extant literature on qualitative methodology refers to the analysis as a "series of spirals through which we look back and forth within the broader progress of the analysis" (Dey, 2005). The main process typically includes four objectives which include; Creating a data structure, analysing for context and process, establishing relationships between constructed themes and theoretical infusion.

These building blocks represent a core process in investigating phenomena and developing classifications. The strategies which have been employed through this process for thematic analysis by Braun and Clarke (2006) include familiarising with the data, generating initial coding, searching for themes, reviewing themes, constant comparison, defining and reviewing themes and finally producing a report (Miles, Huberman and Saldana 2018). The findings from an initial tabular analytical sample from raw data to themes are in table 10. However further in-depth explanation of the findings, code categories and themes can be found in the chapter the cases are further expanded upon in chapter seven.

4.5.2. Analytical Design

Phase 1: Familiarizing with the Data

Firstly, each interview was transcribed verbatim from the audio recording, thereby resulting in a written average of 8 to 12,000 words and between 14 and 20 pages per interview. These transcripts were imported into the Nvivo software package. Once that was done, each interview was read and listened to in order to cross-check and ensure the preservation of meaning. These recordings were also supported with written field notes, and observations (from the interview process) specific to each interview which captures certain peculiarities within each interview. The third source of data was also secondary material such as company reports and websites for the cases that had an online presence. Once the transcripts were generated and fed into the software, the first step was to identify prospective topics which were guided by the identified blocks from the literature review and conceptual framework which covered 5 areas which are; (1) business models (2) innovative capabilities (3) contextual Factors (4) Stakeholders and (5) scalability. Using the line-by-line reading process, a deeper level of understanding was ensured as the need to have a firm grasp of the data was enabled where keywords were identified creating initial formative understanding. The process of immersion was also ensured by the 'repeated reading' of the data (Braun and Clarke, 2006). As an interpretative process, there was a deliberate effort by the researcher not to outsource the transcription process to a third party, but to do it themselves, contributing to the accuracy of true narrative contexts (Bird, 2005).

Phase 2: Generating initial Codes

Following familiarizing with the data, the research leans upon the guiding conceptual blocks for a sense of direction, while also remaining open to and objective to all directions and possible outcomes (Yin, 2009). This was undergone to identify patterns, meaning and issues of potential interest in line with thematic analysis (Braun and Clarke, 2006). To delineate the full interpretation of each sentence, emphasis was placed upon a coding that was applied referring consisting of the "first cycle coding" through which a considerable amount of codes were deduced that represented new topics identified in line with the inductive approach (Saunders 2012). A combination of descriptive coding, in vivo coding, value coding and holistic coding was espoused by Miles, Huberman and Saldana (2014) to capture the genuine semantics of the data. Descriptive coding simply eludes to a manner of summarizing a particular piece of data in a word or a short phrase. This was particularly helpful and

appropriate when explaining environmental features, as opposed to actions. Fig. 5 presents an example of descriptive coding.

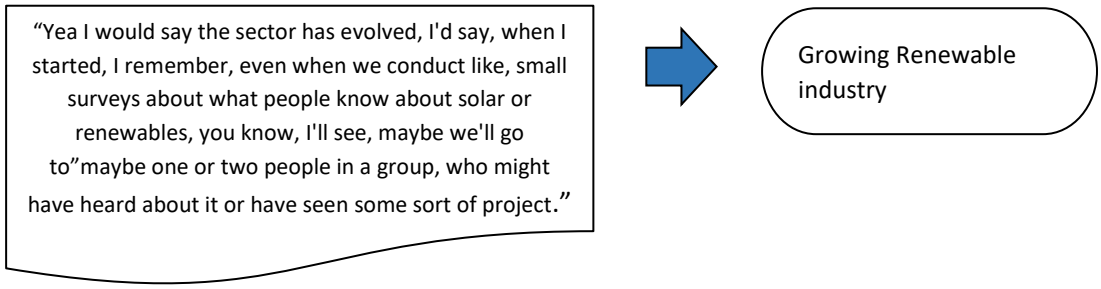

Figure 5. Sample of Descriptive coding from data

Under the In-Vivo coding, the research adopted this in line with this particular coding procedure's descriptive usage of the exact language or tone which has been used by the participant. For instance, as the cases are within a particular industry of renewable energy, there were certain common phrases and terms which were used by the participants which represent a commonality in terms and phrases they use to describe situations, actions or features. Referring to manufacturers of renewable energy components as 'original equipment manufacturers, and unbranded sellers of renewable products as 'Nomad practitioners' were common when interviewing the participants. These repeated use of terms and phrases helped serve as leads through which regularities and patterns could be observed as seen in Fig. 6.

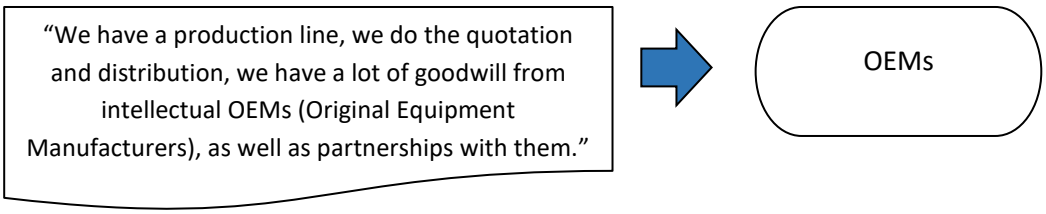

Figure 6. Sample of In-Vivo coding from data

Through the value-centred coding, an emphasis on the participant's values, attitudes and beliefs which formulate their world view has also been applied. This was instrumental in capturing the attributes, ideas and attitudes which could be observed from the data provided by the participants. Their opinions, intrapersonal and interpersonal reflections also played a critical factor in the understanding of their outlook on concepts such as entrepreneurship, innovation and motivations while operating in the RE industry within the Nigerian market. Consequently, this coding provided formative grounds for considering human factors portrayed in innovative thinking, and support in relation to the core research questions of this study. Figure 7 gives an example of value coding.

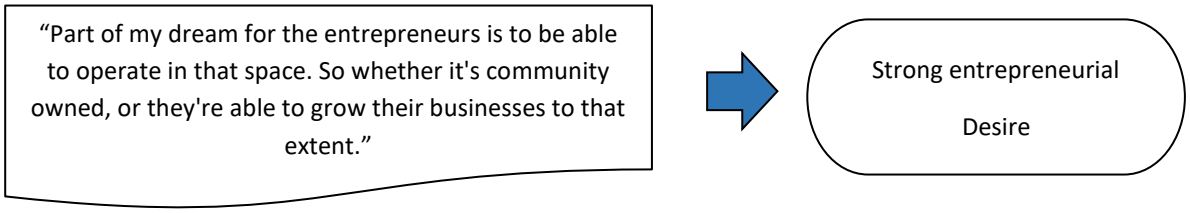

Figure 7. Sample of Value coding from data

The holistic method assigned a single code to a large unit of data, contrary to line-by-line coding. This was necessary sometimes to capture the full sense of content and contexts which extend beyond a line or a sentence. In such instances, applying line-by-line coding would render the context incomplete, increasing difficulties in comprehension and accurate coding (Biondi and Russo, 2022). It also helped served as a preparatory approach toward deeper categorization when going into the second cycle of coding when necessary. Some holistic codes ranged from a group of sentences to a paragraph, mainly because there was a common theme directing the data towards a particular coded or thematic allocation. Fig. 8 provides an example of such.

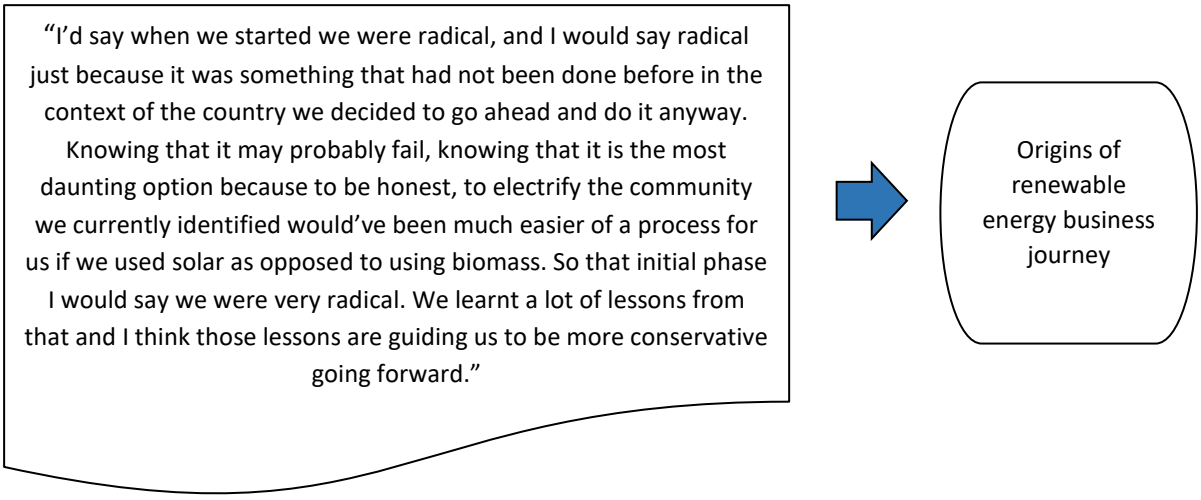

Figure 8. Sample of Holistic coding from data

Phase 3: Searching for Themes

At this stage, the entirety of the data had been coded and collated providing a long list of codes. Therefore, the attention was re-oriented towards a broader level of themes, essentially

beginning to organise code clusters which have possible homogeneity. By homogeneity, we refer to collating various coded extracts which can be combined in such a manner that they can form a predominant theme. A very useful practice which aided in this process is a visual representation to which Nvivo was utilised aiding in designing the mind-map geared towards a particular code phrase, briefly describing the cluster of codes. Some themes deduced at this stage eventually remain relegated to sub-themes because a larger encompassing theme emerged as the codes were re-analysed with the back-and-forth re-evaluations of the codes (Patton, 1990). Some codes were also collapsed and infused into other codes or re-named more accurately. Figure 9 depicts the initial thematic map deduced when working towards data extracts related to BMI and Figure 10 presents a final thematic map depicting the road map toward the main candidate theme of BMI theme.

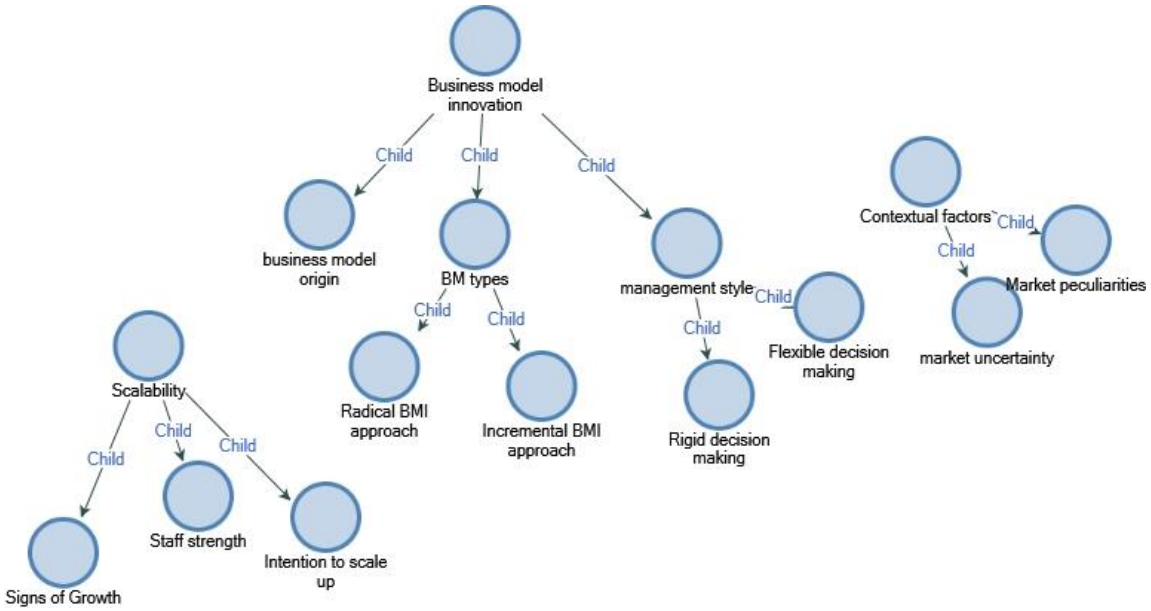

Figure 9. The initial formulation of sub-themes toward BMI-related data

As the initial sub-themes produced a wide array of codes which were tilting toward diverging trajectories as far as core themes were concerned. The contextual factors, market uncertainty and market peculiarity nodes were building towards an alternative aspect which focused on the narratives of context in this course of study. The nodes of intention to scale up, signs of growth and staff strength were more geared toward other trajectories supporting the state of the RE-SME environment, hence them being collapsed and moved towards another set of themes. In figure 10, the clearly outlined nodes were arrived at due to the growing sense of significance within each of the codes. This is also concerning the narratives that speak to the

participant's understanding of BMI-related concepts which were asked in the course of the interviews.

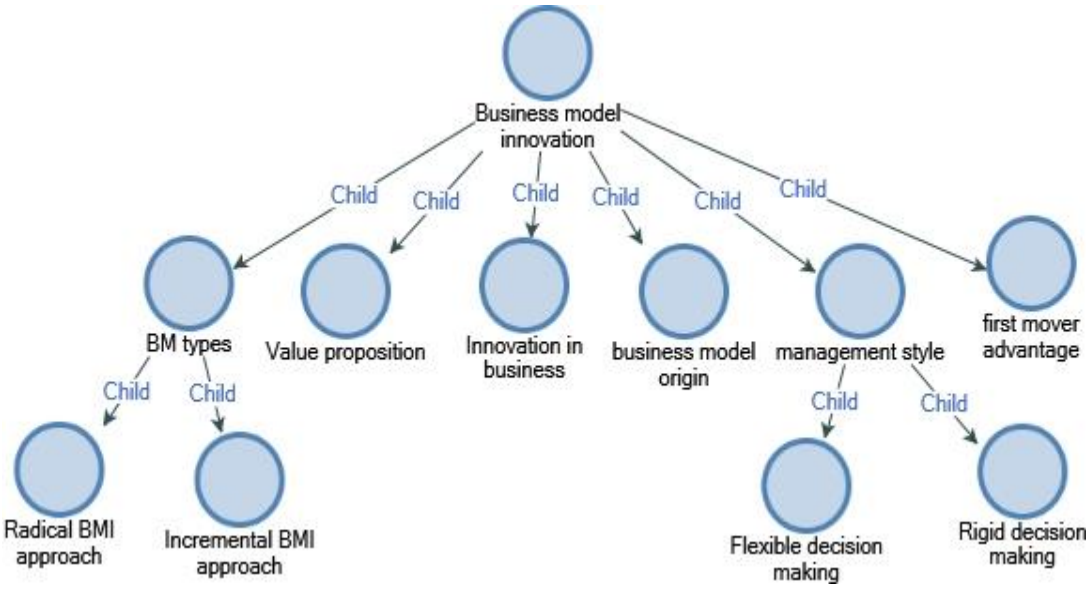

Figure 10. The final formulation of codes toward the main BMI-related theme

Phase 4: Reviewing Themes

Under the phase of reviewing the themes, the refinement of candidate themes (Braun and Clarke, 2006) was undertaken, where some themes collapsed into other themes owing to the insufficient data to support them. Some statements and paragraphs also exhibited diverse relevance in multiple themes. Some sub-themes may need to be further broken down into other themes or on the contrary in other situations, two or more separate sub-themes may be collapsed to form a single theme as seen in Figure 10. The determinant was in the homogeneity of sub-themes under a particular theme. And where there were problematic themes that did not seem to fit, they were re-evaluated and designed as either a new theme or the theme itself is re-adjusted into an already existing theme. Hence, the researcher re-evaluated all themes at the first stage and afterwards applied the second level of assessment where the accuracy of the true meaning under each theme was captured and reflected by the child codes (nodes). This process was repeated as every case transcript was read and coded.

Phase 5: Defining and naming Themes

With the previous steps being followed, this stage focused on 'refining and defining' the essence of what each theme captures and is all about. The study ensured that each designated theme was not overloaded and overly complicated. Collated data extracts for each theme were organised into comprehensible and consistent sub-groups. The motive was to begin to design the path toward the building blocks of a logically flowing story via the data. This was also done in view of two over-arching research questions of this research. As the first question seeks to investigate the innovative capabilities driving the BMI development process to enhanced growth, and the second research question entails investigating the contextual conditions and factors influencing this innovative development process, the guidance of literature knowledge aided in mapping out data-led themes. This influenced the growing configuration of prospective themes which were; (1)Business model innovation (2) Innovative capabilities to cover answering questions RQ1, (3) contextual factors (4) renewable energy in context and (5) stakeholder relevance to cover answering RQ2. Table 10 gives an exemplary snapshot of some data excerpts and their trajectory toward codes and finally toward each of the identified themes.

Phase 6: Producing the report

With the fully worked out themes, this phase deals with the final write-up of the extracted story which the analytical process is ready to tell. The purpose of this is to fluidly and logically explain the complex chronicle of the data in such a manner that the reader is convinced, persuaded and satisfied with the interesting account of the research findings (Poland, 2002; Gustafsson, 2017). To this end, the write-up is fully explored in the next chapter where the findings are well enumerated and discussed in detail with sufficient evidence. Examples and quotes from the various transcripts are used to provide supportive evidence in discussing these findings.

Case	Transcribed evidence	Assigned Code	Theme
CASE 3	*"Earning a living has never been a challenge for me because working with M.T.N. I had a certain level of comfort. So there was a need, it was more of having a need and being able to address it. And by extension to family and friends, then from there, it became a business for me. So I didn't set out to just earn a living from it. But then in solving my problem I was able to solve the same problem for other people and then make a business out of it. So right from finishing University, I've always worked in multinational companies, many different ones. So I've*	- Business Model Origin	-Business Model Innovation

	been fortunate in terms of earning a living. But this one wasn't just about"		
CASE 1	*"Learning is one of the key things in my organization. We are constantly learning. I mean, I'm currently on a study tour. I know I may not have all the answers but I'm still trying to find out more. Also, my team, I'm always pushing them to seek more and more. I just feel that life is all about learning. And it's only when you learn you know how to do things".*	-Upskilling	Innovative Capabilities
CASE 4	*"There are lots of companies. What we try to do is make our competitors our allies. Yeah, because it's supposed to be a huge market right? And we try to do a lot of collaboration with other solar companies that are in the space and we look at everybody's strengths. So our strength is in technical installation designs. And so if I look at other companies in that line yea there are a number of companies there in the same space but even with some of them, we try to collaborate with them. So yes there are a lot of competitors on paper, but in real life, we try to see if we can work together".*	- Value Co-creation	Stakeholder Relevance
CASE 7	*"The others are political risks. Seriously there's nothing we can do about that. Nothing. All we can do other than play our part. We can do much more than if anything happens with the politicking in Nigeria. There's also the big problem with Boko-Haram, there's the shutdown, so there's not much we could do, but we're always aware of all the risks, so we try and tread as carefully as we can"*	-Market peculiarities	Contextual Factors
CASE 6	*"I would say it's much more developed compared to when I started my project venturing into the renewable energy sector back in 2014. It was still a young industry with not a lot of players, and not a lot of concrete direction."*	-Renewable Energy Growth	Renewable Energy in Context

Table 10: Sample of Analytical process from raw data to coding to Themes

4.5.3. Within-Case and Cross-case analysis

This section introduces the discussion on explaining the immersive nature of the analytical process conducted in the research firstly from an individual entity as a singular case and also beyond the initial impressions through reviewing from multiple lenses (Eisenhardt, 1989; Mills et al., 2012). A significant explanation of within-case analysis has been given in the previous section, where descriptive, in-vivo, value and holistic coding methods espoused by Miles, Huberman and Saldana (2018) were employed in the six-step thematic analytical process of each of the cases. This was helpful in revealing what features influenced innovative capability development and the extent to which context affected such process within an individual case.

Regarding cross-case analysis, the justification for its implementation was to provide a comparison and synthesis of evident vital patterns across the cases while maintaining their integrity (Yin, 2018). Therefore, similar and contrasting themes were gleaned from this process, leading to pertinent varying themes and views from the cases. For instance, considering the approach of enterprises towards value proposition, three perspectives were delineated namely; source-centric, customer-centric and system-centric in nature. Dual differences were also noted in management style (flexible or rigid) and their BMI approaches (Gradual or radical), which would be elaborated upon in chapter 7. When it comes to commonalities, all cases reflect a trait of flexibility in their BMI adoption processes. Another core commonality reflects the importance of stakeholders within the business environment.

4.6. Reliability

In a bid to indicate transparency, it is important to exhibit fundamental features which indicate measured guidelines which mitigate bias, rigour and quality in a qualitative paradigm (Golafshani, 2003). Reliability is charged with ensuring the research is replicable in terms of its design and findings. Extant literature eludes to the fact that reliability could be elusive and challenging to implement quantitatively (Yin, 2013). However, an effective way to exhibit reliability is to emphasize consistency in the qualitative research process (Grossoehme, 2014; Lueng 2015). In order to improve reliability, this research followed the recommendations of the 3 step process proposed by Silverman (2013). The first aspect is the refutational analysis and consistent data comparison, where data assessment methods were implemented sequentially and the results of each were compared to the literature and findings. The second phase of the constant comparative method was also introduced to ensure ideas and concepts are not forced upon the data by a constant re-evaluation of whether there is a personal imposition of ideas and to ensure such ideas are not forced (Corbin and Strauss, 2008). The second recommendation of the constant comparative method was effective in sifting similarities and differences to this effect and this provides grounds for looking into deeper features the comparisons might provide (Becker, 2010). The comprehensive data treatment was also applied in addressing anomalies and deviant features to further enrich the data. For instance, deviancies in the BMI process adopted in each of the 10 cases were highlighted and outlined in a tabular format, which is the final stage opined by Silverman (2013).

4.7. Generalisability

In terms of generalisability, this refers to the ability of the research results to be transferable in terms of the comprehensive context of the theory (Silverman, 2013; Easterby-Smith et al., 2015). In the case of study research, there is a wide range of theoretical propositions based on garnered theoretical knowledge prior to the data collection (Verd et al. 2021; Krause et al., 2021). Such propositions reflect an anticipated problem, and in turn, ensure the highest degree of relevance to a corresponding response. Hence, the gleaned theoretical knowledge helps increase the prospects for locating an appropriate representative sample which reflects the identified units of analysis in a manner that enables generalizability beyond the cases (Maxwell and Chmiel 2014; Hancock et al. 2018). Yin (2013) also contributed to the case study narrative by explaining that theoretical knowledge is vital to choosing the controlling and contrasting measures especially in multiple case study designs. In this research, the criteria of theoretical knowledge were helpful in appropriately determining the characteristic nexus between the literature and the data (Verd et al. 2021).

4.8. Case Descriptions

The setting for this study consists of 10 local renewable energy-based companies operating within Nigeria. Although they are all within the same industry, they have developed numerous modes of operations and strategies within the environment. This section presents a descriptive profile of each of the companies. A concise description of all cases is provided in table 11. The table is categorised in terms of their span of existence, regional location, Staff capacity, nature of the renewable energy source, their adoptive approach towards business model innovation as well as the description of the unique innovative application to each case. The cases have been anonymized in line with the ethical research requirements of the research. For this reason, the cases from this point on would be referred to as either case 1 through to case 10 or C1 through to C10.

CASES	Year of Establishment	Regional Location	Staff Capacity	Core Energy Source	BMI Approach	Business Model Innovation Description
Case 1	**2004**	**North-Central/Middle-belt**	**15**	**Solar Energy**	**Flexible & incremental**	***Rural sensitisation through women and customer-oriented strategies*:** The company focuses on emphasizing the importance of women in the home and society at large. Providing solar-powered cook stoves as a healthier alternative to kerosene-based/firewood-based cooking equipment. On the consultancy front, they also adopt a personal combined process through which they ensure their customers are involved in every decision process. This fosters strong customer relationships and retention.
Case 2	**2005**	**South-West**	**44**	**Hybridized Solar/Diesel Generator Energy**	**Flexible & Incremental**	***Hybridization and Niche market targeting*:** The company concentrates on harnessing the contemporary source of energy and infusing it with a larger portion of solar renewable energy platforms. It does so with the objective of initiating a seamless transition into renewable energy, and recurrent cost reduction of power supply for customers. The company also deliberately established and carved a market niche in the banking sector (C&I industry). Most of their clients are commercial banks with numerous branches across the country.
Case 3	**2014**	**South-West**	**25**	**Solar Energy**	**Flexible & Incremental**	***Collaboration and a priori Technical experience*:** As the initiators of this company mainly worked in the IT, telecoms and

						engineering industry, the company is able to leverage its wealth of knowledge and expertise in order to establish reliable partnerships, especially with Original Equipment Manufacturers (OEMs). Through this, they are able to ensure the products which they sell in retail and those used for installation are of the highest quality. Relationship with the OEMs also aided in cost reduction of equipment and materials for the company.
Case 4	**1996**	**South-West**	**20**	**Solar Energy**	**Flexible & incremental**	***Collaborative implementation***: Leverages collaborating with other companies for large-scale Company and Industrial (C & I) projects. It also established links with high-quality renewable energy manufacturers in order to provide the best service implementation to customers. Partnerships are also established with expert companies to assist the company where expertise is limited.
Case 5	**2014**	**North-Central/Middle-belt**	**12**	**Biomass Energy**	**Flexible & Radical**	***Niche Technology and Circular Economy system*:** The company has focused on exploiting the technology of electrification through biomass waste (animal faeces etc.). The biomass plant is situated on a company-owned farm, making it easier to access the waste. This also exhibits resource efficiency in the reuse of waste, converting it to energy, commonly referred to as a circular economy.
Case 6	**2014**	**South-West**	**12**	**Solar, Wind, Biomass &**	**Flexible & Incremental**	***Diaspora Support Initiatives*:** The company actively taps into the strength of the diaspora possessed by the country. This is done through the Diaspora-Power (D-Power) initiative, through

				Geothermal Energy		which the company is working towards a yearly mobilisation of $1 billion from Nigerians living outside the country.
Case 7	**2010**	**North-Central/Middle-belt**	**99**	**Solar Energy**	**Flexible & incremental**	***Capacity building and Personnel Upskilling*:** Besides rendering consulting and installation services, this company seized the opportunity to invest in establishing training facilities for technical and administrative expertise for the Nigerian environment. Through this, building knowledge, and making such knowledge accessible to its staff and the public could be achieved. It also makes the challenge of searching for capable personnel much easier.
Case 8	**2010**	**South-West**	**5**	**Solar Energy**	**Flexible & incremental**	***Rural RE engagement and Women Empowerment*:** The company considers women empowerment very central to its business objective. It deliberately reaches out to women in the grass root community and educates and trains them to become partner retailers of the company's low-cost renewable energy products. These products are designed specifically for rural areas where access to electricity is limited or non-existent.
Case 9	**2018**	**South-West**	**4**	**Solar Energy**	**Flexible & Incremental**	***Solar home systems and Street Lighting*:** The company hones in on the household market where various setups for solar-based home systems for powering essential appliances such as water pumps, air conditioners, refrigerators and nifty solar fan face caps. Installing, refurbishing and maintaining street lamps is also undergone by the company.

Case 10	**2016**	**South-West**	**7**	**Solar Energy**	**Flexible & incremental**	**Establishing Green Initiatives:** To key into the shifting global trend towards sustainability, this company looks into renewable energy advocacy in the private and public sector, selling and installing solar home systems and unique inclusion of tree planting initiatives within their immediate environment. Thereby combining natural and technologically sustainable initiatives.

Table 11. Descriptive features of Cases

Case 1

This company has been initially started in 2004 (16yrs) and was created to use market strategies to address issues of energy poverty and development in the rural areas of the company. It is located in the North-Central part of Nigeria (Kaduna State). Their business model is centred on providing solar cook stoves, consulting & provision of solar home systems & businesses and women empowerment initiatives for developing RE distribution entrepreneurs. This comes along with flexible payment platforms.

Case 1 majorly implements its strategies under 6 major guiding principles which are; the distribution of solar energy products to rural communities, providing renewable energy-based consultancy services across the value chain of private businesses, creating awareness programs and initiatives majorly targeting women and developing them into energy entrepreneurs within the Northern region of the country. The educative drive towards rural renewable energy sensitisation is also complimented by providing practical home solutions such as solar-powered cook stoves. This is done in a bid to replace the firewood and kerosene-based cooking stoves. In a discussion with the CEO, she revealed that this was a major motivation, especially when she got to know that the effects of the fumes emanating from these sources were harmful to the health of women and families who use such stoves. The company also conduct sales of their renewable energy products via their online e-commerce platform which is linked to its website. The last objective is also an educative initiative toward the promotion and provision of clean water usage.

In addition, Case 1 has provided consulting, implementation and maintenance services for schools within the Northern region and also businesses and institutions located as far as the South Western part of the country. They are also actively looking into the agricultural sector by virtue of providing solar-powered dryers to help increase the shelf life of post-harvest produce and reduce wastage.

Case 2

Founded in 2005 in Lagos state (South-West), this company is into providing general power solutions for businesses across the country. It concentrates on an opportunity in providing hybrid systems. This is a combination of fossil fuel (petrol/diesel generators) and renewable-based (solar) based energy systems. They recognise the value of the current contemporary energy sources, as well as the high upfront cost of renewable energy systems. This is where the strategic objective lies therein, to maximise the value of both ends. They primarily target opportunities in the Commercial and Industrial sectors.

The company majorly targets its customers within the commercial and industrial space of the energy market. With a major drive towards establishing designing, implementing and maintaining hybridized energy systems for commercial banks in the country. The motive in targeting the banks is the fact that the banks are 'bankable', implying they possess the financial strength to provide for fund the characteristically capital-intensive project. The company views this as a feasible strategy to adopt within the Nigerian environment. Case 2 boasts a wide array of energy solutions and services, ranging from the initial strategy of providing backup systems such as UPS, solar inverters and solar batteries. The objective of these solutions as described by the company include;

- Ensuring energy independence,
- Self-use load shifting,
- Providing a stop-gap during a power outage, and
- Enhancing management efficiency.

The company also provide surge protection devices to safeguard equipment and appliances. The AC surge protection is tasked with restraining transient high voltages and redirecting excess current waves into the earth. They also provide power conditioning transformers which are touted to be durable and require minimal maintenance, ranging from 150,000KVA to as much as 250,000KVA. Another aspect is the transmission and distribution equipment by virtue of electric panels, power monitoring panels and substations. And the last aspect is the provision of consulting services such as energy audits, proposals, installation & commission as well as operation & maintenance.

Case 3

This company located in South West Nigeria (Oyo State) concentrates its efforts on carving a niche for service provision in markets that are too small for blue chip companies or larger companies that are too rigid. An example of such a strategy is the provision of solar home systems, energy packages for small estates etc. Through the technical expertise provided by their senior engineers, most of whom are from the telecom and ICT industries), they are able to translate their collective skills into hardware implementation of energy systems i.e. breakers, switch gears, wiring, batteries, fittings etc. The connections made with their Original Equipment Manufacturers (OEMs) also help provide a stable support system in terms of finances, tech support and quality assurance.

With a primary focus on providing affordable solar home systems and flexible payment platforms, this company focuses on systems for households and estates. Strategic flexibility is imbibed into to process as customers are able to mix and merge a wide array of combinations which customers can choose the household setting which is most suitable to their requirements. They also conduct retail services, selling solar inverters, batteries, charge controllers, UPS systems and solar generators on their website.

Case 4

Established in 1996, this company has amassed reasonable experience in the Nigerian renewable energy scene. They leverage their experience and technical ability in a concentrated effort to create feasible be-spoke solar-based designs for homes and businesses. This company lays emphasis on assisting and advising the technical, financial and operational application of energy solutions for their clients. This is handled through a project management team. They currently have plans on increasing their capacity in service delivery towards the Commercial and Industrial sector (C&I). The company is located in the South Western region of Nigeria (Lagos State). Case 4 focuses on their identified core competencies of designing, supplying and installing their products which serve as the guiding principles in achieving their business objective.

Their lengthy venture into the renewable energy field has provided them with a wide array of products and services which include; 50W to 200W solar home systems, solar home systems above 1kW, commercial and industrial projects above 1Mw, mini-grids, backup power installation, solar water heaters, dryers water pumps and service centres for maintenance upkeep. Some of their completed projects include;

- Supplying 6Kw photovoltaic hybrid power packages nationwide,

- Installation of an 11.5Kw solar power package for a convent in the eastern part of the region,

- A 20Kw installation of a power package in another convent,

- Designing supplying and installing a 26Kw power package for a hospital in the eastern regions, and a 6kw solar package for maize and cassava processing in the agricultural sector.

16.25Kw stand-alone solar package for a hospital in the North.

- 135Kw PV- Hybrid solar power package for a training institute in the South West, and,

- Their biggest attempt at venturing into the commercial and industrial space comes in the form of installing a 2.35Mw PV hybrid solar plant at a cocoa processing factory in the southwest as well. This comprised 7,132 PV panels, 1,692 PV inverters, 1MW battery inverters, and 2MW lithium-ion batteries.

As stated earlier, the wide experience garnered through the years has been vital in ensuring the successful completion of projects.

Case 5

This is a biomass-based project established in conjunction with an agricultural business. It focuses on creating electricity through biomass products (animal and farm waste). This is done with the aim of providing power for rural communities through mini-grid/off-grid systems. The uniqueness of the renewable energy sources, combined with the limited exploitation of biomass energy even by RE standards, provides the basis upon which this biomass business hinges on its business model. It is located in the North Central/Middle belt region of Nigeria (Abuja, Federal Capital Territory).

Case 5 considers is considered by the project manager to be an integrated farming enterprise, strongly focusing on socially driven innovations. This is done in conjunction with youth capacity-building initiatives known (referred to as YAE) which is an agro entrepreneurship-based program. Situated in the biomass field, Case 5 presents now sets its power plants within a private farm owned and run by the project manager. It was seen as the most viable option rather than hiring and hauling sewage disposal trucks to deliver sewage to the sight. The strategy had been adopted initially but was soon abandoned on discovering the high cost involved in operating such a model.

In the search for solutions to getting material, the company discovered an opportunity in dealing with the 3-ton poultry waste which was always a problem to get rid of. This posed a significant problem to themselves and the host community, so they decided to partner with another renewable energy-based company and come up with the project aptly named the "Waste 2 Watt" project. They then conducted a survey in which they profiled over 260 off-grid communities within the Kuje area of the Federal Capital Territory of Nigeria, thus giving an idea of the potential mini-grid customer base. They also have a plan to build and supply energy for building cooling systems to store perishable crops as well as a milling system. Through establishing instrumental networks from international bodies such as the USADF Power Africa, Mandela Washington Fellowship and the Young African Leadership Initiative, the company management are able to acquire funds and requisite support to train the youth on biomass renewable energy development.

Case 6

This company adopts a social entrepreneurial approach to providing feasible electrification projects, which are powered by alternative/renewable energy sources. These include solar, wind, and mini hydro power solutions. The guiding ideology of the company is to connect local communities to the potential renewable energy sources immediately available to them. An ideology they aptly named People to Potential-to-Power (P2P2P). The experience of the founder/CEO in both the academic and industrial fields has helped him in establishing the required network and an efficient team through which they thrive to achieve their objectives. It is also located in the South Western region (Lagos State).

The projects which are being implemented by the company include installing a mini-grid energy system deduced from conducting a load demand survey of 25 sites. This has been achieved with a grant from an international body (United States Trade and Development Agency). Upon completion, the project would deliver an estimated 4MW of power transmitted into 9000 units consisting of households and SMEs within the 25 sites. The company aims to achieve this while being mindful to ensure the cost of power is as affordable as possible.

The second project is centred on the educational sector of the country. The company realises the limited efficiency present within the sector and it intends to help bridge the gap by simultaneously providing technical educative programs while developing sustainable energy systems within targeted schools and other educative institutions. The company aims at partnering with private investors in order to achieve this project. Thirdly, the company is developing renewable energy initiatives towards telecoms masts and internet servers. The final initiative is geared towards exploring hybridized systems, hydro, solar and geothermal renewable energy technologies.

Case 7

Located in North Central Nigeria (F.C.T. Abuja, Kaduna and Plateau States), this business looks to integrate renewable energy solutions which cut across all levels of energy demand. These include solar home systems, mini-grid, hybrid and rural electrification systems. Significant strategies of the company include firstly the public infrastructure such as extensive street lighting projects, and secondary education through their technical and administrative training schools. Through this, the company has been able to build local internal capacity for itself and the country as a whole.

The enterprise case 7 partly specialises in multi-level solar lighting systems. These range from street lighting, traffic lighting, garden lighting, emergency lighting, plaza lighting, landscape, step, motion and underground lighting. They also have solar home systems and stand-alone appliances such as heaters, inverters, refrigerators, water pumps and power banks. The company also leverages social media platforms to promote the brand. Relying mainly on YouTube and Twitter. The company has also established partnerships which help give leverage and support where and when needed. For instance, this comes in handy when they are in need of more personnel on a large-scale project. This was very important to them when they underwent one of their biggest projects which was a large-scale street lighting set-up awarded by a state within the country.

Case 8

Case 8 is a non-profit social enterprise located in various African countries including Nigeria. It is primarily focused on women's capacity building which trains and supports women to become entrepreneurs and deliver clean energy directly to homes in rural African communities. Their business model finds its uniqueness in the company’s ability to understand the vital role of women in the home, and then establish supportive and sustainable relationships with these women in order to help promote their brand of business. Building trusting relationships is vital to the business.

Case 8 adopts a more horizontal and decentralised management structure, where there is a more collective approach to achieving its business objectives. Especially as it has sub-groups set up in different countries within Africa. This way, each subgroup is given the ability to function with a considerable degree of autonomy. Some of the products include solar reading lamps, radios, cook stoves, electronic fans, power banks and water filters. The company also employs funding strategies such as crowdfunding.

Case 9

The company is focused on procuring and installing renewable energy systems for street lighting, solar home and commercial. They are also into wholesale renewable energy solutions. The business has a high emphasis on street lighting projects and lighting projects for private and commercial buildings. It is relatively new, established in 2018 and is located in South Western Nigeria (Lagos State).

They also have other products both for sale and installation, such as;

- Monocrystalline panels ranging from 100W to 360W
- Inverter systems with in-built tracking and charge controller ranging from 1KW-2KW
- Valve-regulated batteries from 100ah-200ah.
- Solar fan caps

As a relatively young company, there are plans to introduce solar home components such as water pumps, air conditioners, refrigerators, fans and other accessories. Their milestone projects to date include the rehabilitation of a 14.4km street light system and the construction of another 8.9km long street light system.

Case 10

This company is focused on achieving sustainable development goals which include; Generating 10,000MW per day, targeting 20 million solar retailers nationwide, and planting 1 billion trees. These are the guiding principles which the company hinges its strategies upon.

They also categorise their target market into three which are

Residential

- Providing bespoke solar home systems for residential buildings and communities

Government

- Advocacy for the establishment of renewable energy independent power plants (IPPs) for private sector investors.
- Draft and promote rural renewable energy policies.
- Conduct government-partnered sustainable energy awareness programs

Commercial & Industrial

- Solar-powered ATMs, telecommunication masts, banks and private offices, water pumps, and cooling and heating systems.

It is also interesting to note that they have on their website a careers section dedicated to giving individuals interested in working in the renewable energy sector an opportunity to make an application which would be reviewed and reverted where necessary. This contributes to easing their recruitment process as opposed to investing in specialised adverts for job slots.

CHAPTER FIVE

CAPABILITIES EMPLOYED BY SMEs IN THEIR BUSINESS MODEL SCALE UP

5.1. Business Model Innovation

From the adopted definition of this research, business model innovation represents the concept through which a business is able to assess and re-invent its value creation logic and come up with novel strategies in order to ensure its survival and maintain a sustainable competitive advantage. With this in mind, it became necessary to be observant of the features which are reflective of the elements of this definition. This presents the premise upon which attributes like the form which the BMI process took, the origins of the BMI process, and the manner in which the process is managed. Another attribute which is observed is the through which value is harnessed, created and delivered, also commonly referred to in the literature as the value proposition.

5.1.1. Business Model Origins

In assessing the origins of these businesses, a common theme which pervades through their experiences is the fact that the idea for the business originated from sighting an opportunity in the industry, rather than getting into the renewable energy industry, but rather merely wanting to earn a living. This presents an additional perspective to prior research in which it has been opined that businesses in developing countries are largely formed due to 'factor-driven' motivations, meaning they are mainly formed out of the need to survive and earn a living. Although they do suggest that the factor-driven economies inherently have a greater effect on SMEs, there is a correlation observed in all the company cases from (C1 through C10). All cases identify that their interest in going into the renewable energy space largely stems from identifying an opportunity and filling a need and that this is what drives them in spite of the strong economic influences affecting their businesses. A statement from a respondent from C3 captures this;

> *"Earning a living has never been a challenge for me because working with the telecommunications M.T.N. I had a certain level of comfort. So there was a need, it was more of I had a need and was able to address it. And by extension to family and friends, then from there, it became a business for me. So I didn't set out to just earn a living from it. But then in solving my problem, I was able*

to solve the same problem for other people, and then make a business out of it. So right from finishing University, I've always worked in multinational companies, many different ones. So I've been fortunate in terms of earning a living. But this one wasn't just about that." (C3)

Despite the unifying feature of identifying an opportunity pervading through the responses, the form in which those opportunities take for motivating their business creation can vary. These motivations may stem from socially driven objectives, geared towards sensitizing the community on renewable energy technology as highlighted in C1 and C8. C1 gradually evolved towards the promotion and selling of solar-powered cook stoves, blending their new value capture with their core value proposition (promoting sustainable living through clean energy). While they constantly try to expand, they also ensure they maintain a personal approach to deploying projects for their customers, in order to ensure the project matches the system required by the customer. As C8 narrates;

"So we were on a mission, a non-profit mission to install solar in communities. And that's where we saw the opportunity of a woman and making the decision in the household and we thought hmm...women would actually be the best place to actually build a business around this problem. And that's how we started it was registered as a charity, pure charity. And that's when we had to build a social enterprise to kind of take care of the sustainability. So obviously it was, it was seeing an opportunity although it was never for profit, there had never been a profit angle to the best of my knowledge. And you know, we could say that we are seeing it from the women's empowerment perspective. So the idea was, how do we get this woman to build a business around this problem? To earn money but also to provide energy access? So I think that was the driver for the organization?" (C8)

In addition to this, a salient factor which supports a unified outlook of motivation via opportunity from the cases manifests in the form of the significant limitations in the current power supply output within the country. But in the vein of inspired variations, while C3 and C7 may have attained motivation through experiencing the renewable energy technology for themselves from the installation initially made in their homes, C5, C6, and C10 were primarily

inspired by observing external changes to the global energy market and making an attempt to key into the global sustainable energy adoption. On the other hand, C2 and C9 both made a strategic decision to change their business trajectories. Where C2 had initially engaged in providing contemporary fossil fuel-based energy solutions such as generator plants, C9 had changed from sea port logistics to venturing into the renewable energy space.

> *"I was working in the energy space but more focused on thermal plants, so gas to power, my venturing into the RE space was quite an adventurous journey let me put it that way. It really started from our family farm where we had a lot of agricultural waste and I had a quest to find out what means we could put those wastes into, what other productive means, and really that was how I ventured into renewable energy. Which led to building a biogas power plant turning agricultural waste into biogas for electricity generation more targeted towards off-grid communities and businesses."* Excerpt from C5.

5.1.2. Business Model Types

In the course of analysis, the data has been able to reveal there have been underlying traits of business model types pertinent and observed within the data. These business model features to factor in, the wider considerations of influences which drive the respondents to fine-tune their business model development strategies. The initial influences assume two major forms which are the focus on revenue maintenance and the focus on socio-economic impact. These business models will be termed the Cash-Flow Model and the People-Growth business models respectively.

Cash-Flow Model: Under the cash flow model the major focus of the business model is on securing, ensuring and enhancing the business's ability to maintain a consistent revenue stream, thereby making financial backing the major determinant for which the business model is created or altered. Within the cash flow model, the data from participants indicate that their businesses rarely have a singular revenue stream. This is owing to the particular nature of the Nigerian energy business market. The market is considered volatile and contrarily accommodating to the high-cost and capital-intensive traits prevalent in the renewable energy space. On this basis, RE-SMEs cannot maintain survivability on a singular source of revenue, therefore resorting to a multiplicity in identifying target markets to explore revenue acquisition options. An instance where this occurs is in C8 where concepts of a consignment model. This is an inventory model where the retailer sells branded products of a wholesaler (Original equipment manufacturer or OEM). In this arrangement, ownership of the products is still

retained by the OEM and a sharing formula is devised between both parties. There are similar arrangements visible in C1, C9 and C10, however, while C3 and C7 sell products developed by OEMs, they both assume ownership of the products as the agreement stipulates that the products are to be branded in the names of both companies. C7 has also been able to take a step further by setting up an assembly plant of its own with products devised by OEMs. In spite of differences, a common theme of the consignment style - cash flow model is the deliberate effort to manufacture and sell a wide array of products targeted to cater to different markets within the economy.

This multiplicity also extends to the process of payment options presented to their clients when undergoing transactions. As there is an understanding that the varying levels of purchasing power of prospective customers in the market space. All cases indicate a deliberate application of flexible payment platforms and packages for their customers. From the pay-as-you-go concept by C3 and C7 in particular, payment strategies can be designed specifically on a case-by-case basis between the business and the client.

People-Growth Model: This takes the form of a social enterprising dynamic where the focus on value is predicated on the ability to increase the standard of living of the prospective customer. And this is maintained to such a point where the customers become partners of the company, engaging in the sale of the products these businesses offer. In this arrangement, most of the products are portable energy devices such as solar rechargeable lamps, small unit lighting systems and solar cooking stoves. These small-scale products possess unassuming value within the energy market especially in an environment experiencing significant deficiencies in energy supply. As this is the case, RE-SMEs with a people growth-based business plan is ultimately still cognisant of the fact that they are at their core a business and increase their resource base in order to scale up. By implication, it does not mean the acquisition of profit is unimportant, but rather that the key to unlocking their profit potential lies in the strategic development of their customers within the target market and turning them into partners and associates of the business. We view this strategy implemented most especially in C1 and C8 where deliberate initiatives are poised towards women empowerment in the rural areas. C5 which operates biomass plants in rural areas also exhibits a people growth business model on the basis that the requisite fuel for their biomass plants is bio-degradable waste acquired from neighbouring farmers within their community.

C8 also discusses the model which is referred to as the last mile distribution model where they partner with suppliers, buying from them at discounts and selling to retailers who are typically sole entrepreneurs. They highlight a deliberate effort of building a relationship with their partners as a vital aspect in creating a double-margin mark-up where they can get an affordable rate while their customers (individual entrepreneurs) can also enjoy an enhanced prospect of affordability, which consequently ensures the entrepreneurs could have more financial slack and less of a strain.

> *"And long as an organisation we decided that was just as important as doing business, and, you know, having that capital to run yes is one thing, but growing entrepreneurs and empowering women. And the women empowerment bit, it's really important. And that's why we moved to the cash model. Of course, drastically things got slower, but it's still consistent. And that's what we used since that's what we've used in the last six years in Nigeria."* (C8)

5.1.3. BMI Approach

In delineating the data further, responses were discovered to be valuable in providing more insight into the philosophical nature of innovativeness within the business model process. This aspect refers to the way in which the RE-SMEs lean into the creative procedure in order to improve their BM strategy. There are three elements which intersect in explaining this section which is; the elements of flexibility, which describes the ability to be malleable and adjustable in the creative business process. The second is the gradualist-incrementalist element which depicts a slow systematic approach to adopting creativity to the point of practically changing. The third element is that of a radicalist trajectory which tends to approach adopting innovation with a more aggressive mindset. In this sense, tendencies exhibit a higher sense of urgency and understanding of the need for the success of the business lies within making not just changes to a current business model, but that these changes should reflect an immediate and unique observable effect.

In assessing the varying approaches from all angles of the spectrum, there is a consensus within all cases except C5 and C10 on the manner in which the BMI process is applied. When asked about their views on developing and including innovativeness in their business model, they suggest that while it is important to be creative, the business environment conditions make

it necessary to adopt a more pragmatic approach in applying innovative ideas and strategies to their respective businesses. This is indicative of a gradual-incremental but flexible style of innovative implementation in their business model processes. As an exemplar statement in C1 indicates;

> *"You need to also constantly look at what you're doing, even if you're not changing. You're adjusting or you're fine-tuning just like, you know, trying to just stay relevant. You always want to add value. Because constantly like the business is very much growing now. Everybody's getting into the space. So you want to also continue making sure that you have that value add that's different from everyone else. To say why would people buy from you and not someone else?"*

This denotes the combined effort of being aware of the necessity to change and adjust while doing so in a meticulous manner. In addition to this, a narrative from C7 discusses that their learning process has prompted them to adopt a gradual style as opposed to the radical style, explaining that "there are things you cannot handle recklessly because if you try to bend them too much, it brakes". The key factor of adopting a being gradual position is also to experiment and observe innovative concepts in minute doses and in the event of making a mistake, or that it leads to a counter-productive effect, it could be contained and adjusted for improvement.

With regards to the radical approach, the emphasis is on the distinct creativity of the business model process, and the speed with which this process can be implemented. As C5 adopts an opposing view of a flexible but radical approach to implementation, they offer the view that while it currently pays off, adopting such an approach came at a significant cost over the years since the inception of the business. The radical nature is exhibited in the source of energy chosen by the business which is biomass, making it one of the few companies using biomass as a source in the country, and the only one included in the case study of this research. In essence, the idea to look into biomass energy exploitation was deliberate and purposeful to delve into a form of energy which has been rarely exploited. The narrative from C5 also indicates that while they are radical and flexible, the management has become more methodical in terms of applying their BMI approach.

Interestingly, though two distinct approaches have been outlined, these are observable within the context of adopting innovativeness in business model innovation. But flexibility is

also observed in the manner in which the top management figures within these RE-SMEs conduct, direct and supervise their subordinates and employees in these business outfits. But in this managerial perspective, flexibility is dichotomously positioned with the rigidity of management. Principally, the cases reveal a consistent contention between the degree of flexibility or rigidity in management styles which is further elaborated in the next section.

5.1.4. BMI Management Style

The data also indicates the data also presents a correlation between the BMI approach and the style of management adopted by the cases. In this sense, speaking to the top-level management of cases C1, C2, C3, C4, C5, C7, C8, C9 and C10 operate flexible styles of management and decision making, creating avenues for idea contribution, but also maintaining a level of pragmatism when making choices or executing a plan. This is largely due to the unpredictability of the environment they are in. It also highlights the need for strategic agility.

From C7 the notion of man management was highlighted in the discussions. The ideology on this part was that different scenarios require different approaches in management as seen in this excerpt;

> *"Sometimes it involves castigating these people in meetings, where other people are on the group, you know, but in any case, after that's done, you take a step back, observe and watch out to see if there has been any impact. And then, you evaluate and then come up with the next strategy. So I think this has to be a kind of gradual process because it's not something that you rush. You know, when you're trying to teach people, you need to also understand their behavioural tendencies and the ability to absorb what changes you're trying to make in them. So in executing all these things you need the time."* (C7)

From the narrative, it could be observed that a trail of flexibility needs to be imbibed. The combined peculiarity of the task at hand and the characteristics pertinent to employees heightens the importance of having to effectively enhance their individual productive qualities while limiting their inadequacies through imparting knowledge. This typifies flexibility and its role in dynamic team management. However, an emphasis on being cautionary and systematic is also indicative of the gradual process of implementing management strategies and the need to undertake a patient route if workplace effectiveness is to be properly instilled. This notion is also echoed similarly in C2. Thus the case's approach to management typically adopts a flexible-gradual team management process.

Although C6 displays a flexible tendency toward approaching BMI, there is a preference for rigidity outlined in this case as the significant emphasis is placed upon the experience of the CEO and strong involvement in management and decision-making.

As innovative strategies and management styles coincide, the notion of the first mover advantage is brought into perspective. This is because in the pursuit of strategic agility, the need to instinctively create novelty is often considered. Hence the first mover advantage is further discussed next.

5.1.5. First Mover Advantage and Non-imitability

By first mover advantage (FMA), we refer to the deliberate strategic attempt to be proactive in acquiring a significant market share through introducing a novel product or service delivery. Non-imitability is the process of ensuring all elements of the business are not easily imitated or replicated.

While agility is viewed as important, the data shows there are varying opinions on the relevance of FMA in business. Cases C1, C2, C4 and C5 indicate that while it could help to achieve FMA, maintaining non-imitability is not so important. They opine that what is more important is delivering the highest service quality possible. Doing this, and maintaining best practices in their view can indirectly ensure you will stay ahead of the competition. C1 further iterates, identifying and creating solutions for customers that are paramount.

In contrast to the earlier opinion, cases C3, C7, C9 and C10 indicate there is an important role FMA has to play in the running of their businesses. An excerpt from a C7 respondent typifies the view on this;

> "*Yes, of course, I think to every business first mover advantage is important. You have to be able to make mistakes early, to learn from these mistakes early, and then to perfect your strategy. So when people are struggling with those things that you have gone over, you're already taking the next lap. So first mover advantage is key".*

Despite their opposing views on FMA, there is a consensus throughout the entire ten cases downplaying the relevance of absolute non-imitability. This is because as far as the technology is concerned, it is basically the same type of systems which are used, so there is little or no innovation in that regard. But from a strategic and management standpoint, there may be variations on how they are set up as businesses. Even so, there is a collective conviction that the huge energy deficit combined with the early stage development of the Nigerian RE industry, provides a premise upon which the market is wide enough for all RE businesses to function. The RE industry is still a relatively small community in the energy industry and the entire country at large, and there is also a collective understanding to welcome collaborations among competitors in order to grow collectively. This is a phenomenon which eludes to the notion of value co-creation which is further discussed in the stakeholder relevance block.

In understanding the over-arching views on BMI from the data, it is also important to understand what the cases considered as achieving value for both themselves and their customers. This is discussed in form of the value proposition.

5.1.6. Value proposition

The working definition of the value proposition is the manner in which a business actively identifies, creates and delivers value for itself and its customers. Bearing that in mind, there are three classifications of value propositions which have been identified which are; The Customer-centric value proposition, the system-centric value proposition and the resource-centric value proposition.

Customer-centric value proposition: This is the form of a proposition in which the focus of generating value is placed on giving their clients the best possible value for their money. This is in terms of being attentive to their needs and going alongside them at every step of the business relationship. With this adoption, investing in optimal customer experience takes precedence. Not to say technical expertise is unimportant, but building the customer relationship dictates strategic decision-making when it comes to value proposition; it pulls the other business elements. The findings reveal this is the most adopted form of a value proposition. C1, C4, C5, C7, C9 and C10 indicate this is their guiding propositional principle. C4 it as such;

> *"Well, what we try to put on, to give our clients is the best possible value. Now I know this is a regular question people ask, "How are you different from other people?" So I just give them the best I can, right? I script my review. And if there are other people doing the same, good for them. Yeah, if I just give you the best, I give you value for your money. I can't promise I'll be the cheapest, but I'll put in my very best. I'm also not going to promise I'll be the best. So I'm generally not a good marketer. But the thing is when we get jobs, they are mostly through referrals. So that means we must be doing something good. Getting something right".*

System-centric value proposition: With the system-centric option, the propositional focus is placed on the technical prowess harnessed through which reliable and efficient renewable energy systems can be developed by them for their customers. In this sense, focusing on the

technical aspect of the business serves as the vital lynchpin through which they can create a valuable system to satisfy their clients, which in turn creates value for themselves as well. C2, C3, and C6 are the proponent cases which channel this form of value proposition. The comments below are extracted from C2.

> *"So we do four annual visits per year to check the panels, clean the panels, check the inventor cleanly and Virta check the batteries and the batteries are more reactive because the batteries are consumable. So if the batteries are not working, we swap them out and it's just a bill. I think that that would be an example of a customer like a bind and thereby ensuring maintenance culture or putting their assets under maintenance agreements".*

<u>*Source-centric value proposition*</u>: Here the emphasis is placed on the availability of the source which is used to generate the energy. This is because of the increased difficulty in acquiring such sources within the country. This was particularly featured in C5 which is the biomass renewable energy company. It is so, especially because, from the experience of the company, the cost of transporting the required biomass raw material to the power generating plant is very substantial. This further adds financial strain to the already high cost of producing energy through such a source. In other more industrialised contexts, the deliberate effort by governments and institutions effectively help reduce such burdens by creating favourable incentives like payments to biomass companies by the government for receiving and utilizing such materials. The C.E.O. explains thus;

> *"For mine being particular to biomass, we can only grow to the extent were we can source biomass. So without having access to those agricultural wastes we use as feed-stock into biomass, it really limits our ability to grow. That is how our strategy has been to grow really, where we were looking for communities where we can have access to large amounts of biomass at affordable prices and then we can churn that into biogas to generate electricity. So that is like the most important component for us when we talk about worries- Do we have biomass to support us?"*

In concluding the value proposition section it is important to note that while the three forms of value proposition (VP) are from different perspectives, it is not a situation where the adoption of one VP annuls the use of another, but rather works complementarily. What

indicates the adopted VP of the business is the emphasis placed on either of them over the other two. This way, the chosen VP would serve as a leading guide for other vital aspects of the BMI process.

Figure 1 gives a collective map of the themes and sub-themes gleaned from the BMI narrative of the interviews.

The cases also described a positive outlook towards innovation in executing business operations. This creative process is discussed in a more detailed manner.

5.1.7. Creating Innovation in Business

As C3 puts it, for one to survive, one needs innovation. In considering their general outlook on innovation, participants from all cases respond in the affirmative when it comes to the necessity to innovate. The deduced drivers in which the innovation is adopted take the forms of application in technology as well as application to the business strategy. In addition to this, the collective perception on innovation is continuous and not static. Suggesting innovation to be more of a process which should be constantly revisited rather than a singular event.

> *"Yes, innovation you cannot do without it, you can't sit in that same spot and expect things to happen differently. So as I speak to you, there's a research going on somewhere in the other office. We are trying to see how we can come up with smart inverters. Like I said, that's the next thing. People are already using it. But we don't want to rush into it. We want to see why we should go into it, so we've been studying, and it might not be our theme for the next three, six months. But we can't actually sit back and just look so we need to research and develop ourselves. So innovation, we need to change a lot of things we have to look at the different sorts of new sorts of batteries. Excerpt from C9."*

Being creative could also vary in the scale at which it is applied. In this sense, as renewable energy companies, the cases are situated in an industry which is naturally inclined toward technology innovation, implying that the legroom to bring something new to the table as far as the core technology innovation may be limited. However, the key lies in unlocking technological innovation for these RE-SMEs to do so in smaller doses. To focus on making unique minute alterations which help them operate their businesses within their business environments. For technologically driven innovations, aspects of creativity and ingenuity could

include working on the smart systems within their energy product supply chain. These smart systems are crucial in increasing efficiency but must also be cost-effective so it does not further expand the already strained resource pool available to them. We see from C9 that efforts to use smart systems are central to their innovative focus. From C1, the introduction of solar cooking stoves is outlined as an innovative inclusion in their business, as well as agricultural dryers. These serve as examples of technologically driven innovation. C3 also exhibits technologically innovative traits where they try to manage their growing customer base through inventive exploitation of information technology processes.

On strategically driven innovations, the emphasis is not just on technology but is reflected in other aspects such as planning and operations. C7 expresses this by indicating that innovation is synonymous with business models.

> *"Yeah, yeah. So I think in this context, innovation in the sector now basically means business models, sort of. Okay. So before now, before the coming of PPA, power purchase agreement, or pay-as-you-go models, it was outright purchase. Yeah, so the outright purchase was just the norm if you don't have that bulk money. So but then now, things have changed, we've been part of that innovation to provide power based on an agreement, not for the, for the customer, or uptaker to put out that much amount of money for your components, and will then now be struggling to manage the system internally." (C7)*

Some cases have looked into adopting innovation from both perspectives of technology and strategy. C6 also contributes to this narrative, adding that the 'youth' of the industry makes it a perfect environment to be agile and creative. Adding that application of strategy should be creative enough to observe from learning, observe from the environment and apply it to the company stratagem. They also adopted technologically driven innovations by switching to more energy-efficient batteries within their power systems. C9 also described the need to create a workable strategy around technological or functional inventiveness when explaining the importance of consistent rethinking.

> *"Yeah, we just got those in about three weeks ago. It's not in the market but we got them in to begin to sell to customers and transport them in the country. So I wouldn't say it has been such, you know, radical disruption, in technology.*

But more about the strategy. Yeah, the strategy to the business model in, you know, as relates to the customer's ability to pay." (C9)

The palpable importance of innovation and innovation as a process highlighted in various ways within the cases justifies its value and consequently gives more credence to the need to better understand what innate peculiarities exist within these RE-SMEs. What sub-level components are present in creating the potential to be creative, in essence, innovative capabilities? This is where the answers to the first research question of the thesis are further fleshed out. To this effect, an innovative capability framework has been designed in Fig () and is discussed below.

5.2. Innovative capabilities

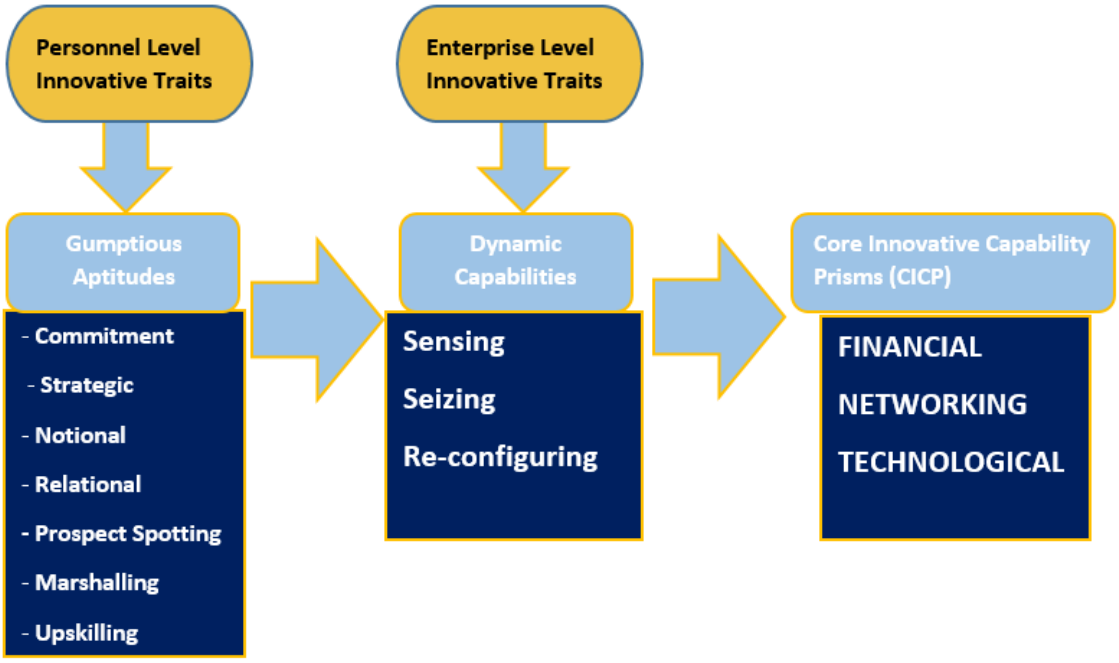

Figure 12. Innovative Capability development framework for SME-BMI

As the business model innovation traits have been deduced, the driving factor of this research has been to further understand the intricacies within which the innovative capabilities of the business model process are engineered. The importance of this cannot be overstressed on the basic premise that in spite of literature explaining various key catalysts of the innovative

drive, it has been done on a general enterprise-level basis. And in instances where they have been explored from an individual human level, literature discussing prospective linkage between the characteristic causalities from an individual level to a firm level is limited. This study continues in that vein to explain the causalities and relationships which drive the innovative process from the personnel-level to the enterprise-level and to the resulting outcomes of harnessing such innovative capabilities. In this sense, the inception of the creative process leading towards innovative capabilities for SMEs begins with the people who constitute the physical presence and entity of the business. Just like other businesses, the people create, dictate and adapt the trajectory of the business entity in terms of the drive, purpose and objective. This is the reason for looking into the innovative capabilities starting from the human influencing elements. Building on prior literature looking into both perspectives, this research has explored the trajectory which has been termed '*personnel-level traits*' explained through the purview of *gumptious aptitudes* and '*enterprise-level traits*' which is explained through the purview of *dynamic capabilities.* Finally, the two-tier characteristics lead to three capability outputs for SMEs which are of a financial, networking and technological nature. These resultant innovative capability outputs are termed the 'core innovative capability outputs'.

This entire process which is further explained below illustrates the sub-drivers which play their part in contributing to the culmination of the capabilities used to drive the innovative traits of small and medium-scale enterprises further explained below.

5.2.1. Personnel Level Traits

Businesses are indeed often regarded as individual entities. However, the activities of the said business as an entity are galvanised by the personnel running and operating the company. This is essential even more so for businesses archetypally within the confines and constraints of SMEs. SME businesses are typically initiated by purpose-driven individuals who identify an opportunity and actively seek the requisite resources to achieve their chosen business objective which could be interpreted as the values and virtues of the company. On this note, the values and characteristic aptitudes are moulded and exhibited by the founders or co-founders of the business and are expected to be exhibited by all personnel working within the said business.

This trickle-down effect in practising the values and aptitudes of a business is more pervasive in nature within SMEs by virtue of the fact that they are smaller-sized businesses.

Although size is often viewed as a detriment to these SMEs, a nascent advantage rests in these businesses being able to build and harness a workable team synergy in operating and achieving the business goals. An over-arching narrative which is gleaned from the responsive cases is that without team synergy, the existing pressures of 'making ends meet' operationally would be enough for a different career path. As a respondent in C4 puts it;

> *"If it wasn't for as per employee to organisation relationship, I would've found my way out of the place."*

This exemplifies the necessity for the entire personnel of SMEs to possess qualities which will act as proverbial 'rudders' in order to steer the business operations in the right innovative direction through the turbulent business challenges that a developing economy presents. For the purpose of this research, these qualities are termed SME gumptious aptitudes.

SME Gumptious Aptitudes

Due to combined factors of external pressures and resource constraints, the role of managing and carrying out professional duties in a venture becomes increasingly taxing. This gives a wider scope of management and organising which the owners are saddled with. And by virtue of the 'small-scale' nature of the business, other operatives are expected to inculcate the necessary skills required to fulfil business objectives as well. For the purpose of this research, the term gumptious aptitudes (GA) is defined as the driving characteristics of SME personnel who exhibit initiative, calculated aggressiveness and resourcefulness towards achieving business goals within the environment in which their business is situated.

This concept draws inspiration from prior research which captures these characteristics by outlining a concept of entrepreneurial competencies. Arguing that an entrepreneur should possess a wide resource management skill set in order to initiate, navigate, grow and ensure the survivability of a venture. The derived aptitudes are therefore categorised into aptitudes of; commitment, strategy, relational, notional, prospect spotting, marshalling and upskilling.

Commitment Aptitudes:

This is the segment which captures the traits pertaining to maintaining a focus, determination and motivation towards achieving business objectives. In the context of the cases considered in this study, the renewable energy SMEs consider the business environment in which they are in as highly challenging. From the response, there is a consensus within C1, C2, C3, C4, C5, C6, C7, C8, C9 and C10 acknowledging the fact that the pressures of trying to run

a business with minimal support are extremely difficult, and that it takes an innate resilience and tenacity in order not to collapse under the pressures and to keep moving forward. Gleaning from the leading founder in Case 1, the idea of understanding that there is a very limited probability of getting help from governmental institutions who have mostly paid 'lip service in terms of support, has spurred her to focus on operating the business on the basis of 'winning the trust of clients, while deploying more systems within the target communities'. Cases 3, 5 and 9 allude to the importance of having a drive, tenacity or a purpose for achieving a goal. All these terms express a sense of determination of going ahead with a task, even when the idea or project is difficult to execute when faced with evaluating the cost of executing such projects and simultaneously making access to the project service outputs affordable. Also, in line with Case 1's arguments, cases 4, 8 and 10 posit that their sense of strong commitment to business goals emanates from their informed decision by way of the experience that the market environment does not provide ample support. Therefore it is essential to build an innate character of resilience that fuels commitment or else nothing would be achieved in such environments. Observing from a different perspective, C6 and C7 that while they admit to having been able to carry out some projects in collaboration with key stakeholders such as the government, their commitment is to maintain a disciplined approach to executing the project. Because this is what ensures they are not convinced to compromise their company standards for purpose of maximising profit, even when such an idea is presented by powerful stakeholders with vested interests.

In C2, discussions surrounding commitment came into view when indicating that there must never be a situation where one resigns their fate to think there is no solution to a problem. Indicating that one must be constantly poised to show they are competent, focused and motivated to resolve challenges when they arise. And one must also have the ability to effectively impart this mindset to your colleagues and subordinates.

> *"Rather than saying it can never work, it has now changed to saying they're now saying maybe it can, so it now becomes our duty to sensitize everyone so they see that it does work, and that is why we need competent hands that can explain it step by step in a lay man's language that it can. So we still have our challenges but we keep improving day by day."* C2

Another dimension exhibiting commitment comes from the motivation and deliberate intent to venture into the renewable energy space. In all cases as mentioned in the starting

discussions of the business model section, the respondents indicate a strong sense of being driven into the business by genuine interest. Also during the day-to-day running of the business, a respondent from C1 describes being able to persevere and tolerate when dealing with issues. Further indicating that where some other individuals might tend to put the 'money' ahead of the job, they personally choose to put the job ahead of the money. So in this sense, income or profit is the resultant consequence of executing a good job and if done right creates more chances of being compensated, re-patronised or even referred. In summation, the phrase "if you do the work, the money will come forth" perfectly captures this sentiment of commitment and its result. This is pertinent to the industry because as C4 puts it usually when trying to acquire customers requires a lot of patience, perseverance and tolerance, stating that the inability to hone such skills would get one easily discouraged especially when things fall through, and this has made some practitioners lose hope and quit, but not them.

A lot of effort has been routed towards building their brand of the businesses and creating consistent patronage. What takes a peculiar turn here is that not only do they have to obtain revenue through customer patronage, but a lot of effort is also put into sensitizing the customer base in parallel with trying to make sales. This also requires a high level of commitment.

Strategic Aptitudes:

These are attributes that entrepreneurs and personnel within an SME business orient, assess and implement a structured plan of action towards achieving their business objectives. Evidence depicts that in addition to being committed to the business goals of the company, such motivation must be effectively channelled towards a workable blueprint upon which the company strategy would manifest. In essence, while all outlined aptitudes are important, their respective values would not be truly exploited if they are not reflected in the overall strategy of the business. In addition, the dynamic nature of the business environment requires constant "re-evaluation and re-assessment" as expressed in C4.

We see a similar mind-set towards views on the strategy through the entire Cases 1 through 10. Although evidence of versatility is evident in the different approaches to strategy within the cases. Where Cases 1 and 9 both exhibit the importance of an ability to strategize and exhibit versatility in doing so through targeting rural communities with low-cost renewable energy packs and deliberately seeking to partner with women in these communities. This way they surmise that they can gain access to the homes of these communities while empowering

the women in these communities. Case 5 also targets the rural communities specifically active in agriculture on the basis of gaining access to biodegradable waste, which is the core resource needed to run their biomass energy plants. Therefore, building the plants within these communities will significantly impact cost reduction in the transportation of biomass products to the plants, which was initially implemented as a strategy but scrapped because of the high cost involved. In Case 2 it was an indication of strategy manifests in form of seeking out and targeting banking institutions within the commercial and industrial space. C3, C4 and C7 adopt different trajectories they aim to branch out to different markets such as residential, commercial and mini-grid levels. All cases considered are indicative of the importance to be agile and versatile in strategic thinking, which is important to be able to construct business models which are adaptive, flexible and feasible.

> *"So our business strategy is to lay into the entire value chain. That's exactly what we've been aggressively pursuing."* (C10)

When it comes to strategy, the data reveals that the view of the personnel responding to the idea of strategy is aimed at addressing three major aspects of the business. These aspects will be referred be termed as the three R's which are; Reach, Revenue and Reduction of Costs. With the aspect of Reach, we refer to the ability to attain, expand and build upon the business scope of operations and the degree of accessibility it has towards prospective and existing customers and all other stakeholders.

> "*Yes, we get them technically sound, you know, carry out and deliver installations, then you're gradually developing capacity. So what we've been doing over the past two years, and that's formally. Informally, it's usually through an internship, long-term internship that's what the company has been doing to develop the capacities needed to support the company*." (Excerpt from C3).

The reach is important as it provides insight into what opportunities may be available to reach more customers. Understanding and identifying the span of reach also provides an assessment of how far the company has grown to date and what targets may be set in order to increase its scope.

The revenue is of obvious importance as it determines the level of financial strength the business can contend with and utilise. As businesses typically contend with having to match up the affordability of their products and services with the cost of production, it becomes more

important that revenue is to be one of the central points of focus for consideration in developing a strategy. And flexibility is key in factoring in these considerations. This is where the final R is brought into the limelight.

> "*You know I mentioned affordability, yes you raise capital which is fine and you deploy and you have a power purchase agreement or you have a means of paying over time...the challenge of credit management is there too. So if the system has better credit management it makes things easier. So that's a good way of increasing revenue for upkeep*." (C6)

Stemming from the second R, when it comes to considering the final R which is the reduction of costs, these businesses being RE-SMEs indicate run by personnel who are constantly thinking about the ways in which they could make their production and service more efficient for themselves and their customers. Cost management and reduction need to be kept in view, as this is intrinsic to the revenue base of their businesses.

Relational Aptitudes:

This attribute is defined as that which captures the ability to establish and maintain an effective means of connection, communication and correspondence in order to maintain workable relations with stakeholders which are valuable to executing the business objective. This aptitude takes two dimensions which are; internal towards effective teamwork and cohesion. The second dimension is of a more external nature which translates to networking with all requisite external stakeholders. From an SME standpoint, this is a vital trait which has been expressed in the cases explored within pertinent factors. Firstly, the inherent resource limitations such as financial capacity and size of companies put an onus to leverage upon whatever resources might help augment the resource lapses. To this end, it has been highlighted from Cases 1 through 10 that building and maintaining relationships has been a vital instrument through which their companies function as smoothly as possible. Also, looking externally, their relationships with stakeholders such as investors and clients have been established on the basis of tangible integrity and standards which their companies strive to cultivate and maintain.

In Cases 1 and 7, the interviews with the founders of these companies revealed that there is a great deal of attention to creating an inclusive environment, where staff can feel they are truly part of the business and are valued. This logic is further proven in one of the employee respondents in case 1 where it was said the Managing Director of the company makes it a point of duty to push every staff member to attain a better life, saying this was something he

experienced personally while recounting his time working under her. And that this has helped foster loyalty and drive which is replicated throughout the employee base. In case 7, the deliberate effort to leverage building relationships is observed through aspects such as the reward and remuneration schemes for making contributions and going the extra mile.

> *"Once we've taken you in, we value you, and then we try to groom you to become more and more productive until we're happy with the level of productivity. So it's much better than rigidly saying okay look, this guy is doing good, or he's not doing good, fire him and hire the next person, no. We have all kinds of, you know, support mechanisms. If you work for the company and you need to pay your house rent and you don't have that money in bulk, all you need do is go to the welfare department and apply, you get a facility and then we deduct it from your salary over time. So we have all kinds of arrangements like if you want to buy a private car, we can support the costing, and then have like three to five years, plan for payment, and all that. So that's the sort of flexible pattern that has worked very well for us."* (Excerpt from C7)

This translates to a sense of community within the company and has positive effects on the employee's ability to work and focus on work. Because the sense of support which has been established has been deliberately built by the management through building relationships.

Cases 3, 8 and 9 also contribute to this narrative by discussing the importance of ensuring the work environment remains a conducive space where each individual can work efficiently, with an employee in case 3 adding that as a woman, working within such a company is a breath of fresh air. Also adding that although there is still a lot of work to be done regarding equality in the workspace in the general context of the Nigerian market space, it has for the most part been the conducive work environment of the company, rather than the salary which has made her remain in the company. These elude to the relevance of relational aptitudes from an internal standpoint.

C4, C5, C6 and C10 contribute to the relevant external nature of relational aptitudes. Where C4 espouses the vital aspect of ensuring they follow up closely with their clients, C10 indicates that they also try to adopt round-the-clock access to getting help is also part of their company policy. While C5 and C6 indicate that important steps must be taken to ensure that stakeholders are made to feel valued, and in cases where investors are involved, the integrity

built upon the relationship established plays a big factor in ensuring long-term partnerships and interactions.

> *"So we have different companies we have a relationship with in terms of manufacturing. So we hone in on manufacturers of PVs, and then we focus on another one with only inverters, we focus on only batteries. So that we can get the best out of it."* (Excerpt from C9)

Notional Aptitudes:

Under this trait, the intellectual inclinations which have been deduced and infused into the virtues of an entrepreneur, their colleagues and subordinates are captured. It is the conceptual framework upon which the critical thought process is formulated toward problem-solving and decision-making competencies. Although this may not be easily quantifiable, the analytical ability required by an entrepreneur in solving complex problems when they present themselves is significantly important. This is because as an individual entrepreneur, there is a necessity to be able to harness and employ knowledge in a versatile, flexible manner. The notional trait is characteristically acquired through building on a knowledge base temporally. Whether tapped into subconsciously or deliberately identified and employed in a conscious manner, developing a notion indicates an ability to conceptualise a philosophy that will be able to harbour what the entrepreneur wants to achieve (the objective), and how they would want to achieve it (the strategy) and why they are adopting a chosen approach to achieving it (the motive). By doing so it becomes the overarching guiding principle that is promoted throughout the entire business operations. A statement taken from C1 gives an example of how such notions are developed;

> *"As far as you place the interests of the organisation and that of those benefitting from it, ahead of your interests...because what you should be looking at is, "what are you impacting? What contribution are you giving to the society?" So once you place that in your heart, ahead of what you are gaining, then you'll find a conducive environment. Whether you belong to where you are working, or whether what you are promoting is in line with your future actualisation objectives? We all have different calls, and mine falls in line with where I find myself".*

Similarly, C3 discuss the importance to have an ideology to fall back on when running and trying to achieve a task. From C5 a vital narrative is brought into view, which is that the daily pressures and difficulties one is faced with can often distract one from remembering the purpose of establishing the business. To this end, imbibing concepts and notions which could serve as mantras serve as helpful guidance tools. C4 also brings in the dimension of how having a mind-set for deep thinking can prevent a business from making knee-jerk decisions which can be detrimental to the business.

There are also discussions on morality in conducting business. There is an understanding that the need to maintain a decent moral compass within their business environment. This is especially important as they operate in an industry which has been marred by substandard delivery of service and equipment and the current practitioners are still having to grapple with the ripple effects of such ulterior practices. In spite of dealing with operating in an economy faced with substantial challenges as C8 describes it, it is crucial to include a purpose-driven logic of maintaining a strong mental compass driven by equity and equality.

> *"I mean for me, I think it's paramount. I really, I think, you know, moral leadership, moral entrepreneurship. You know? So, of course, not everyone can be a social business. Yeah. But at least you should have, you know, that at the back of your mind here, I feel like, it's extremely important, even business for development, and everything is purpose-driven businesses I think that's what they're called now. I think it's extremely crucial." (C8)*

Also, the keen sense to impart knowledge of the operations and services of the industry to prospective customers are also very strong within the mind-set of the RE-SME practitioners. When it comes to the mind-set, there appears to be a consideration for educating and imparting knowledge as opposed to just focusing on acquiring profit. As opined by C9, one cannot afford to give themselves a pat on the back, as there is a lot more to do as an industry.

Prospect Spotting Aptitudes:

This is the attribute which relates to the ability of an entrepreneur and their personnel to proactively observe, identify and assertively exploit an opportunity within the business market in which their company is located. A peculiar notion which can be discussed in the context of SMEs is again owing to their size. Although difficult to spot, when opportunities are identified, the business operations can be easily adjusted to take advantage of such an opportunity. This

depicts the natural flexibility which is essential to SMEs more so in erratic economic markets such as developing economies.

In spotting opportunities, C10 provides discourse referring to identifying a niche need and then looking for ways to exploit that niche market while meeting that need. There is a consistency in the cases referring to there being a wide range of market opportunities due to the nature of their businesses. Narratives from C2, C4, C7, C8 and C9 broach the point that being renewable energy companies in an environment where there is a significant energy deficit provides an ample market where in which they can aim to carve niche markets for themselves. However, in spite of the huge market potential, ensuring the services provided are affordable may pose a challenge due to the cost of providing such services. As a respondent from C1 puts it, there has to be resourcefulness when exploiting an opportunity. If not the business would be locked out of the market entirely. In addition, from C5, going into a business solely to make money may yield no results.

On a general scale, the respondents recognise the global appeal for sustainable measures of utilising resources.

> *"That the renewable energy sector is also one of the sectors that can promote, you know, reduction in our carbon footprint. So if they see that, I think a measure of flexibility. Pro-activeness, and thinking out of the box, would probably support organisations, or companies, such as ours."C6*

Through identifying opportunities, the business managers and their subordinates are aware of the peculiarities that could support their businesses. On this note using the context of the cases, the search for more efficient sources of energy creates a natural advantageous potential of being in line with global shifts towards alternative energy, which practitioners can seek to exploit for the benefit of the business. However, C9 also provides the perspective of harnessing more immediate potentials that could be identified within the local business environment. From C1 and C4, discussions on citing an opportunity, knowing how to leverage, and knowing the right channel to leverage are very helpful in identifying and pursuing a business prospect.

> *"I know the potential. I know what we from the south-south region, the river Rhine areas, and then we don't really have that much sun as much as other places because we are low land. But we can actually still do solar over there." C9*

Marshalling Aptitudes:

These are traits that encapsulate the ability to assemble the requisite personnel and coordinate them towards maintaining operational efficiency within the business. In doing so, it is also essential to ensure the quality and standards which have been set within the company are sustained. However, as relational aptitudes have been highlighted earlier, the manner with which the organisational culture and expectations are communicated takes a horizontal organizational nature. This is in the sense that while a hierarchical structure of authority might be present, entrepreneurs adopt a flat structure approach to managing where more authority is granted throughout the employee base. Where employees are able to make certain decisions where and when needed. They are also encouraged to make suggestions and contributions to the company, which breeds a sense of ownership, thereby enhancing the productivity levels towards achieving the objectives of the business. This also attests to the flexible management style that the founders and entrepreneurs within these businesses leverage.

> *"Yeah, it's really quite collective and open. It's very collective. We have team meetings twice a week, every week. This is where we discuss challenges, we brainstorm. You know? And engage in idea generation basically. So we do that from time to time, it's something that, especially as you said, I'm working with hands-on people who are experts and the experts are the ones in the forefront. They're the ones that are interacting with the women, they're the ones that are in the field. So their input is crucial, especially when we're doing any model. I mean yes, I've been there, I go around. I try to visit every single state, maybe not every single community, but at least I've immersed myself there. But there's no way it's, it's, it's impossible for me to hold on to all the expertise that the associates have. So we always have to involve them, especially when we're trying to make a decision that has to do with the entrepreneurs."C8*

With reference to the cases, C1 opines that although technological resources may be deployed within the business, the need for human capital can never be side-lined. It, therefore, becomes necessary to engage the right personnel who would be competent enough to manage these systems. And on the point of exhibiting competency, in C7 the CEO described the need to have the right drive and be a source of motivation to the rest of the employees. In this sense, the competency to strategically direct the personnel to efficiently use the right resources.

As personnel management is highlighted, the need to ensure standards are maintained implies that procedures have to have to be undertaken by employees which should bring each individual to the required level that the managers, owners and team members would be comfortable with. Such processes are carried out through training programs as clearly outlined in C1, C3, C7 and C8. Secondly, maintaining these standards also requires setting parameters which guide the collective work ethic, and in the event that they are not followed, appropriate reprimanding characteristics are also to be employed in order to maintain business standards.

> "*So for us, the training was really important. And the business coach, a business mentor, yeah, was done deliberately and it worked. And what happens when somebody gets in that person? I don't know, you know, people may feel shame when they falter, you know, maybe scared of the consequences or ashamed of the debt. Then you find that they won't come for meetings, then they become difficult to reach. And then that whole coaching, mentoring big just falls off*."

In carrying out business activities, the RE-SMEs engage in several projects in varying capacities. The relative size of the project naturally determines the number of personnel involved as well as the constitution of said personnel. For instance, some jobs may require more hands to engage in equipment installations and on-site construction labour, while others may require more focus on more technical aspects of the process. Irrespective of the skill set required, processes have to be undertaken to ensure control standards are maintained. The CEO in C4 gives an additive insight into this end.

> *"We try to get someone with the minimum educational qualifications, someone that can read and write. Once you can read and write, you should be able to comprehend whenever we give any information or objective to be carried out. Then since we're giving them the semi-skilled or unskilled kind of work, so it's not pretty technical to put them in not a highly technical job. No, just semi-skilled, low-skilled jobs, just a few minutes of one hour, 30 minutes of enlightenment training. And they're good to go. And we make them have to sign a form, stating that whatever we teach you, this information we're giving you actually understood it. Right? So once you sign it in case there is any kind of accident or anything, the project manager's culpability will be reduced because they've actually explained what needs to be done to this person. So*

maybe it was a mistake or carelessness on their part. But we did this training and it's compulsory under our health and safety guidelines, our safety officers will come around. We must ensure that every project coordinator explains what they're doing to everybody, verbally, and in written form as well. And everybody will sign against their name that, to say yes, I understood these things. So that's been working for us." (C4)

Upskilling Aptitudes:

With the necessity to be versatile in knowledge and experience, entrepreneurs adopt a constant and consistent approach toward learning. Responses all through the cases are strongly positive to the suggestion that it is through imbibing a perpetual approach towards learning that they are able to sustain the innovative nature necessary for survival in challenging environments. This is also an important trait that the entrepreneurs ensure trickles all through the personnel within the company. These aptitudes are able to accurately capture the attributes which the respondents portray in different forms. More importantly, the GA concept helps break down to the minutest detail, the most integral factor traits which are necessary to kick-start any business venture from conception to implementation. This is the human factor.

"So, yeah, when I got in, I'm someone who is driven, passionately driven. So with that drive, it was it was too inevitable for the top management to notice my input and I was just quickly rising to the top, up the ranks. Yeah. So I went through that I had so many responsibilities and activities, and I was getting them done at the same time. Yeah, I can have seven to five to seven projects at the same time, managing and getting them done. So it was quite a big plus on my own self."

In addition to these competencies, traits have been identified as factors for the businesses, these are the ability to leverage prior experience and let that experience inform the ability to upskill. Upskilling is a term which explains the process of learning new skills and teaching new skills to workers within a business. Participants from C1 refer to the process of constantly looking for ways to upgrade their skill set in the workplace, or are encouraged to do so by their boss as explained below;

"Learning is one of the key things in my organization. We are constantly learning. I mean, I'm currently on a study tour. I know I may not have all the answers but I'm still trying to find out more. Also, my team, I'm always pushing them to seek more and more. I just feel that life is all about learning. And it's only when you learn you know how to do things".

Case 2 further indicates that the ability to keep learning helps foster and maintain the proactive nature needed in business. Also that in the current state of the world things moving online and getting connected, and taking advantage of these opportunities from a learning perspective goes a long way in developing as an entrepreneur. Although excerpts from C2, C3 and C7 particularly indicate the process of learning is not just restricted to formal means of learning (schools, institutions, and professional bodies), but also most of the learning comes from the informal hands-on approach. This is more experiential in nature as noted in C5 where there had to be a significant change of sourcing for biomass through hiring sewage tankers to the establishment of biomass plants in rural agricultural communities. Even though this came about on a trial-by-error basis, it exemplifies the characteristic of maintaining a willingness to learn and use what is learnt to build on one's skill set.

Additional importance to upskilling is revealed are the reward strategies which have been put in place to encourage further skill acquisition and learning within the businesses. Reward strategies in form of varying incentives of a financial nature, career advancement or recognition of service are all examples of progressive company policies which reward the enhancement of knowledge or skill. An employee from C4 provides a narrative to this further explaining how they were rewarded and how it was implemented.

"Yeah, internally, last December I was given an award for hard work and there were little incentives that came along with it. Then there's another company policy, whenever a staff brings in a new client he/she's entitled to 5% of the profits, like a commission. So that means you have gone ahead to go out there and get a client for the company. Then 5% of the profits, even without asking the company will just pay it into my account. So that incentive has always been there even while I was an IT student to the right. Because one thing is it can be very easy for you to get a project out there and then outsource it to someone else to go and do it, which brings you profit. So the company deliberately made that policy to encourage people to bring in their clients."

The innovative nature of the industry in terms of creating alternative energy solutions also implies a hyper-drive towards constant active creative development. Being at the forefront of energy evolution, it becomes imperative for practitioners to delve deep and glean information in any way they can in a bid to improve their knowledge and skillset in line with advancements going on within the industry. The process of learning and upskilling featured significantly in discussions with participants. The process of learning was discussed through the lenses of both formal and informal learning, with the respondents eluding to having no preferred form between the two processes but rather highlighting the importance of combining both formal and informal processes. Discussions also hint at the relevance of needing to practically apply what is learnt but also relying on experience to inform or adjust what has been learnt, when and where necessary.

> *"I'm always looking for ways to improve myself, be it in taking courses online, attending conferences and forums to learn from other entrepreneurs, or share experiences. I think there is never an end to learning and growth so it's a continuous process. So I'm always eager and looking for ways to learn and develop myself".* From C5.

The research identifies the personnel level traits (PLT) as the starting point for the development of innovative capabilities for businesses. Following the identification of PLTs in the form of gumptious aptitudes, the ability to harness and combine those skills can lead to enhanced prospects for effectively carrying out business objectives. These are the traits that direct, reflect and guide the characteristics of the firm as a business entity, thereby enhancing prospects for the next phase of enterprise-level innovative capability development which is the tripartite dynamic capabilities of sensing, seizing and reconfiguring.

5.2.2. Enterprise-Level Traits

In view of this, the research provides further insight into the dynamic capabilities (DCs) by exploring what elements contribute to the business's ability to sense, seize and reconfigure. It is for this purpose that the personnel-level traits (PLTs) have been explored, which influence these tripartite dynamic capabilities. Hence, this research explores DCs from the purview of the capabilities applied on a company level, therefore the term enterprise-level characteristics are attributed to this level of capabilities. Subsequently, the data retrieved from the cases reveal evidence of DCs which are explained further below.

Dynamic capabilities

As strategy has been featured as the major building block for competitiveness over the past 3 decades, the search for sustainable advantage may well begin with the business model in the near future. This is indicative of an imminent paradigm shift toward delving into newer strategic concepts such as business models and innovation in management literature. Current literature has keyed into investigating intricacies which might explain such modern models further. One of these is the concept of dynamic capabilities, comprising sensing, seizing and reconfiguring capabilities.

Sensing

This refers to the ability of a business to be able to recognise global business trends, explore prospective opportunities which are in line with its objective and effectively pursue them. It is also important to identify at this stage any looming threats which may have a detrimental effect on the progress of the business. This invariably re-affirms the need for business practitioners to possess the necessary attributes and aptitudes to manoeuvre the business when necessary. Effectively, the concept of PLTs are attributes that can seamlessly be linked towards achieving the objectives of harnessing a sensing dynamic capability, as well as seizing and reconfiguring aspects.

> *"That the renewable energy sector is also one of the sectors that can promote, you know, reduction in our carbon footprint. So if they see that, I think a measure of flexibility. Pro-activeness, and thinking out of the box, would probably support organisations, or companies, such as ours." (C6)*

The ability of any business to have robust reactionary features towards identifying and adapting to change while also deriving a strategy which ensures the effect of that change is an advantage and not detrimental is a vital attribute in today's global business environment. This is because it assists in withstanding external pressures such as competitors and non-favourable policies. This process invariably depicts a practical manifestation of the saying "the best form of defence, is an offence". For SMEs, this understanding is notably real and acknowledged in the course of analysing the cases. A common thread through these cases is that the need to identify an opportunity is echoed. This is evidenced in table 10 describing the cases where

notable differences in their general business model strategies are observable. This is with the exception of C1 and C8, which although have similar strategies towards women empowerment and rural development, apply various approaches to executing these plans. The dynamic of opportunity spotting is also brought into perspective this was particularly expressed in C1, C3, C4, C5, C6, C7 and C9 when questions surrounding their motivation for initiating the business arose. An excerpt from C4 outlines the characteristic of opportunity identification specific to the Nigerian environment as follows.

> *"For us in Nigeria, the market is quite enormous and we're yet to even cover 10-15% of it. We believe there are still a lot of power challenges, and I believe the renewable energy revolution has started. Probably a mixture of renewable energy and the fossil fuel the soul, but at least as an alternative energy that can complement whatever we have now, which can help drive the economy. One thing I know in Nigeria is that we're very hardworking. And once there's power, people can do much more. And that's what drives me and the company I work with, not just the money."*

Subsequently, in terms of sensing, enterprises indicate an ability to identify the indicators which could pose notable threats to their businesses. In recognition of this, C9 describes the importance of having an internal response mechanism to stimuli within the immediate business environment. This is observed in other cases, echoing the need to have foresight in observing any factors that may metamorphose into a future threat. For instance, C10 describes *"the outcome of the number of new customers, advancement in technology and competitors"* as major indicators which form decisions towards sensing opportunities. While this may not be easily adhered to all the time due to the complexity of market pressure, it does not diminish the degree of importance a proactive mind-set towards threat prevention has.

> *"Usually it's just, indicators, well it's just me tinkering and trying to improve I would say. I'm not trying to wait for external stimuli, it's all internal stimuli, just tinkering and trying to see where we are and say how can we improve this?" From C9*

As nuances in strategies to identify opportunities are observed in the over-arching BMI strategy, the nuances trickle down into the sub-components within these strategies which invariably enhance the uniqueness and exclusivity of these broad strategies. It is for this reason that the aforementioned personnel level-based traits in the form of gumptious aptitudes are

identified. In order to not only understand the formative origins of these enterprise-level strategies but to also see the correlations through both levels of characteristics within the business. In essence, by having an awareness and understanding of personnel-level characteristics a plethora of enterprise-level seizing opportunities can be identified, which then informs the business decision to exploit by way of actively seizing that opportunity.

Seizing

This typically occurs after the opportunities and threats have been detected. This is where the action steps are taken towards operationalizing said opportunity, protecting against threats, or simultaneously doing both. It requires a methodical approach and combined leverage on all resources (knowledge, technology, networks etc.) available to the business in order to fully exploit the potential which has been discovered. Similar to firm-level sensing characteristics, seizing capabilities are guided by personnel-level aptitudes. Seizing encapsulates the deliberate attempt to develop practical steps towards bringing the opportunities which have been 'sensed' into fruition. On the matter of threat prevention, in C1, C2, C3 C7 it is discussed that when it comes to marketing, their companies are heavily reliant on advertising through word of mouth, due to the cost-intensive nature of the renewable energy business. Therefore, an inability to fulfil the best customer experience can damage the rate at which they are being patronized. This can be viewed as a significant threat to their company.

> *"So yes it was a deliberate effort and aside from that, I didn't want to deliberately make a difference. And then I started making money off it. But money was not the first thing in my mind. During that period, I find that when I go to a client's house, and I could solve their power problem, there's this inner feeling within me like I'm very happy, happy doing it. Even if you're not going to pay me, I'll go, and I'll be happy. Because I know I've solved a problem. And I don't think there'll be any reasonable person who would have you solve a problem and won't pay. They'll definitely pay once you can solve a problem that was my own interest and happiness doing the job. As the general power challenges increased, I'll come up with a design, a power solution, a renewable energy solution, and a battery backup solution and they are happy with it. And their power problem seems to disappear, I'm always happy to the point that I*

don't even care if they pay, but they do though. The priority is always the job."
From C4.

In order to circumvent this, they ensure the maintain efficient feedback loops where in the event of engaging with a dissatisfied customer, they look to find out where they went wrong and how they can derive valuable information from the feedback which will enhance their mode of service delivery. This tactic is also used in the event that they miss out on an investment opportunity as indicated in C1, they follow up with the investors to ask what areas of their proposal fell short and how they could be corrected. Through this process, the enterprises are able to equip themselves better in order to protect against the threat of losing out on future investment opportunities.

An aspect of seizing also deals with the ability to create value and ensure that the customers are able to recognize the said value. The degree to which customers recognise value increases the prospects for which the intrinsic value of the business can grow. As described in C4, when the value is recognised and appreciated, further creates a drive which the business seeks to maintain and increase when and where possible. Therefore enterprises actively aim to seize value by way of employing convincing methods and persuasive tactics with their prospective customers. C3 eludes to this by indicating awareness campaigns where they try to reach out to various sectors to enlighten and observe reactions within these sectors in order to collate data to learn from. In sustaining the value and convincing customers, another strategy the enterprises adopt is in securing maintenance contracts in order to exhibit and ensure the equipment and installations are working as optimally as possible. More importantly, this process being witnessed by the customers have a strengthening effect on the validity of their systems.

Re-configuring

In *Re-configuring* this phase occurs based on the informed outcomes deduced from employing sensing and seizing capabilities. This involves building, renewing and/or altering enterprise capabilities when and where necessary. It also requires a harmonious pooling and utilization of resources to be achieved. As discussed earlier when it comes to business operations, businesses have to actively inculcate the innovative process into the culture of the firms, which could pervade through the leadership and also be communicated down to the

employees in order to boost motivation and commitment to the business goals. Re-configuring from a perspective can be viewed as an extra step taken within the seizing process where a significant process of change is undergone regarding the operation and/or strategic processes of a company. Going back to the personnel gumptious aptitudes, aptitudes of upskilling, relying on prior experience and experiential learning are very instrumental in culminating a successful reconfiguration process. Especially as SMEs possess more urgency to be agile and dynamic within their business environments, coinciding with the new frontier nature of the renewable energy industry, the process of reconfiguring is observed all through the cases.

Where C5 changed their biomass sourcing strategy, C1 have branched out their operations into the agricultural sector through the provision of community crop dryers. C2 began by producing contemporary-based energy solutions (diesel-powered generators) to providing hybrid-based systems through a fusion of carbon-based and alternative-based sources of energy. As for C4, they have had the longest reconfiguration process and have been in existence since 1996, originally beginning with an aggressive approach to opportunities to a current pragmatic but flexible approach towards adopting innovation. While in C7 there is an inward process towards establishing capacity building in order to ensure the quality of large-scale street lighting projects is of the same company standard. C3 and C9 have faced varying levels of strategic alterations with regard to the partnerships established with their equipment suppliers.

In these examples, it is notable that there is not one universal method for the reconfiguration process. It is uniquely case specific. Where some have been strategic, others operational, or on multi-component levels. This is why in order to better understand this process of dynamism, understanding the varying influences contributing to this process is vital. As well as the potential outcomes which can be derived when this process is observed.

> *"Actually, we were doing something else in marine logistics. And then the plunge in the oil sector made us diversify into renewable energy. So, I went into marine logistics marine logistics is basically based on local content. So we may provide things like tow boats, barges houseboats for the multinational companies, almost… Okay. And then. So, in the, in the, I think it was 2014-2015 when we had the plunge in the oil sector. Most of the big multinationals started you know, losing money so they cut off in terms of leasing so we had our equipment, you know, we demobilised and then weren't making money*

because I didn't have a jetty. So I kept paying jetty fees, for the equipment and I said to myself this is not sustainable for me. And I looked into diversifying then came into the energy sector." Excerpt from C9.

C6 also admits to having to make changes with regards to changing the batteries in their energy systems from led acid based to lithium-ion, owing to the fact that they observed the innovative trends attributed to the "reliability, longevity and quick charging mechanisms". They also indicate their ability to adhere to and adopt such a change was due to them listening and applying the feedback obtained from customers. C3 makes reconfiguration changes in their sales process where there were physical contacts with customers, however, the Covid-19 pandemic instigated a revaluation from physical to other virtual methods.

"Like I could remember before, our sales process was basically a contact sales process, where we try to visit the customers. But with Covid when there was a lockdown, we couldn't move, and we had to re-evaluate our sales platform. Before it was physical. When we had this Covid incident we had to sit down through a change assessment and say 'look what's the worst case scenario, and what's the best case scenario, normal case scenario', and look at the different options. So you constantly need to be re-engineering yourself." C3

The ability to effectively discharge dynamic capabilities through the employ of personnel level traits/gumptious aptitudes can further lead to deploying the final phase in terms of translating innovative capabilities which are termed in the research as the core innovative capability prisms (CICP).

5.2.3. Core Innovative Capability Prisms (CICP)

Keeping in mind that the focus of the study is on SME development in developing country contexts, the research identifies the three enterprise capabilities essential for growing new enterprises in the modern business world. In current literature looking into small-sized businesses, new growing businesses have to skilfully identify resourceful patterns through which their business can exploit their technological, financial and networking capabilities. This does not imply other capabilities are unimportant, but that these three can serve as the linchpin for enhancing other potential capabilities. Putting things into perspective, SMEs within a developing country such as Nigeria are saddled with a more challenging and erratic business environment, which will be outlined in the following section. Therefore, the importance of

employing reliable technological platforms, accessing funds and building effective networks through establishing valuable relationships will help mitigate the numerous challenges. With a logical strategy of dynamic capabilities being developed and guided by vital gumptious aptitude PLTs, the resilience, survival and growth of an SME can be ascertained.

Financial innovative capability outcomes:

Borrowing from the common saying that 'passion is expensive', a major determinant to transforming an idea from just that into a feasible practising business is having the requisite resources to fuel that idea. And in the current business climate, it is insufficient to acquire the resources, but ensure the resources are managed in a manner which increases the longevity of resources being available. Achieving this increases the chances for survival of these businesses, which in turn justifies the evidence of sustainability. To this end, one resource which is often brought up while examining the cases is the need to have sustainable financial backing. An extract from C3 encapsulates this below;

> *"The limitation for most of the companies really is the capital, funding to get your information and resources because you know to get you as professional equipment, you know most of the components are all imported. So having the capacity to be able to pay for the products and all that is vital."*

And not just that, but having access to affordable funding. The ability to achieve this feat has been a very challenging experience as the participating companies suggest. Case 4 discusses the hardships that come with running a renewable energy business which is capital intensive, combined with the fact that traditional sources of funding such as commercial banks make it impossible for small businesses to access loans due to high-interest rates. Being acutely aware of these challenges makes the necessity for financial sustainability all the more important when it comes to the hierarchy of needs of an SME. To which the onus rests on the business to leverage all available avenues which limit notable negative financial strains posed within their given context, as a respondent from C10 suggests it is also for this purpose that the other outcomes of the entire innovative process which are networking and technology are essential, because among many things they are formidable factors in terms of reducing the costs and enhancing company efficiency.

The relevance of financial strength also comes in the form of having the ability to diversify the sources of revenue available to the business as C8 also postulates.

> *"So for us, our funding model is three parts. So we raise funds through earned income that's from the sales from the products to the owners. We raise funds for grants challenges, and competitions and we also raise funds through donations. So we try in terms of revenue stream. We need to do all three to be able to thrive."* (C8)

Having multiple revenue streams and financial models is part and parcel of strengthening and an enterprise's ability to survive. The excerpt from C8 exemplifies a feasible financial model. The pursuit of quality demands getting high-standard equipment. This however can be an expensive ordeal, especially when dealing with importing products and equipment from outside the country as highlighted by C4.

Technological Innovative capability outcomes:

Technology is a resource which is gaining more prominence on a global scale. In some instances, there is significant costs are accrued in achieving the advancements in the field, and there are also scenarios where technology can serve as means through which efficiency can be increased while cost is reduced. This usually occurs when the law of economies of scale takes effect – this is where cost saving is achieved owing to an increased level of production. An example of where this phenomenon has been observed has been in the telecommunications industry when in the early 2000s owning mobile handsets was mostly reserved for individuals in the high-class barrier. But as the years have gone by the demand has driven the costs significantly lower in comparison while increasing accessibility to all individuals irrespective of their perceived socio-economic classifications.

Also referred to as technological diffusion, it can be observed within the renewable energy industry. A large-scale ripple effect where a steady advancement coincides with technology diffusion manifests in form of an industrial revolution. Fundamentally, SMEs need to place themselves in the best possible positions to reap and exploit the advantages of these advancements, especially with regard to cost reduction. One way in which this is achieved in the renewable energy space is through implementing smart grid systems. This is a network of self-sufficient systems which enable the integration of power generation sources and aid in the monitoring, maintaining and managing of the entire power system.

> *"I think that technological knowledge is the reason why we're even able to get solar in bite sizes, I think it's the advancement of that technology that has*

enabled you to know the ability to make an embedded battery. And the solar panel, you know, in any portable form that can replace the latter. You know it was something we had to suffer through our childhoods because there was no other alternative. I think and there are more advancements and as it gets more advanced, it gets more efficient and gets more portable." (C8)

Through this, enterprises are able to work more efficiently in delivering accurate maintenance and service delivery routines as explained in C8. Although the prospect of automation is introduced into the power systems, the involvement of manpower is never completely absolved. From C4, it is explained that the nature of the Nigerian context makes one remember to involve the importance of including the human factor because one is not just trying to implement a system, but also providing potential job opportunities within the local communities where projects are carried out.

"When I say technology is like, I virtually come out to mention inverters. I don't think it takes away the labour force of the business. Because in terms of installation, for one you can't install with technologies. You understand? You still need the labour force, because it is very much hands-on in building the pillars if you're doing a solar home system, and then you want to put it on the roof. The labour has to be there. So you can install the batteries and the cable wiring. Even when it comes to the technology I mentioned about smart inverters. All you can see is that it doesn't take away the labour force all you're seeing is it being easier because you grab your mobile phone. Or a beep comes on and it says low power. And you know, that sun is actually supposed to be out. So no matter what technology pops up, you still need a labour force. So hard, I would say it's not even up to five per cent of the labour force." (C4)

Although technology diffusion assists these SMEs' operations, it may not imply that a heavily technologically driven industry such as a renewable energy space becomes automatically cheaper. It remains a capital-intensive industry as expressed in C2, C3, C5 and C9, however leaning on technology where and when possible enables the company to monitor their equipment and deliver the best service possible, which in turn builds trust between them and their clients. C9 also enumerates supportive discussions on the importance of technology as a means of easing access to learning, management of equipment and increasing efficiency.

"Technology plays a huge role. As I said, I only started like, four, I would say three years ago, because for the most part until 2016, I was basically doing my research, studying more and then I can say three years. But right now, technology has played a big part. Because from your home you can actually study certain inverters from the grid where you can do it remotely, and you can study devices remotely. So you can see if there's downtime if there's a problem with your batteries, and then you can actually send someone to go check it out and see what's going on. So technology plays a lot in this aspect. The inverters are becoming smart. Where you can actually have your mobile phone and then download and then you see if someone is actually plugging something via wattage when it's not supposed to be. And then you actually got to shut it down. We haven't gotten there yet but it's something we're looking at." (C9)

Another point of note with regard to technology is that when it comes to enterprises in developing economies is that the level of expertise required for the development of the industry is still largely not up to standard, although growing. C7 responds to the complex nature of the environment that presents their enterprise when they attempt to acquire technology-skilled labour.

"Well, it's a tough one, especially with capacity development. Because there are also not so many people who studied and have the expertise required for this industry. Some were just electricians before. Others were looking for a job and wanted to make a living. So theirs may just be focused on the mechanical installations and nothing further."

As technological importance has been outlined by the enterprises have been outlined, C3 also gives a cautionary narrative of the equal importance of strategy in business. By implication, an inability to strategize properly would be problematic to the application of any technology obtained, hence a balanced approach between technology and strategy is required.

"Technology is important, but not more important than the strategy. I would rate them 50-50 because if you do not know the technology, whatever strategy you're using, it will always fall back and fail." (C3).

Networking Innovative capability outcomes:

Just as technology assists in managing operational costs, the ability to identify partnerships and ensure the relationship established with each stakeholder is actively contributing to the business objective is also an important capability outcome. This is what the networking innovative capability output covers; the characteristic an enterprise has in identifying and establishing a valuable relationship with necessary stakeholders. As RE-SMEs in a typically capital-intensive industry, all cases unanimously propagate the need to establish relationships with stakeholders who are valuable to a company. For instance, considering the entrepreneurial attribute of SMEs, it is typically expected that they are to exhibit substantial degrees of competencies in a vast spectrum of management and operational roles. This however may not always be the case in every scenario. Some enterprises might not acquire the requisite level of skill or knowledge in some aspects, although this could be eventually attained over time. Therefore in order to circumvent this, these companies look to outsource these responsibilities to other companies typically within the SME bracket who specialize in those areas.

> *"So, for us, we've had a lot of partnerships, especially funding partnerships. But we've also had on-the-ground partnerships as well, one of the things that we have also as a quick criterion for success is trust. And so working with trusted organisations that have been on the ground, so that we can call them implementation partners, they can be the inward for us to actually reach women that want to do this business. So we've also found some really important local partnerships that have helped us scale the opportunity or scale the number of people that we can give this opportunity to come in on a platform that is already trusted, rather than going to start building new relationships from scratch. So I think that Yeah, partnerships are crucial."*(C8).

This is exemplified in C1 and C4 with regards to their financial management, who assist in organising and fine-tuning their financial records in a presentable manner which they can explain when developing proposals for funding from potential investors. C9 also outsources its accounting and book-keeping to another company which takes some pressure off the day-to-day running of the company. Another interesting observation in this purview of networking is also in forming partnerships among fellow competitors when it comes to executing a project, although this occurs when there is a large-scale power project involved. This exhibits evidence

of networking and interconnectedness between enterprises and their relevant stakeholders. It is due to this that the ideology opined towards competition in C4 is to view the competition not as competitors but as collaborators. Because the market is large enough to accommodate everybody, and everybody can get more value out of collaborative projects. Some enterprises may network with technically skilled stakeholders as evidenced in all cases, especially in the acquisition and training of such equipment. C8 has actively engaged in training partners which occasionally came in to assist in the training of their rural retailers when needed. C2 discusses the pieces of hardware which deal with analytics being designed by specialist companies in different parts of the globe, emphasising that they deliberately establish contacts with these companies to get the best possible quality of analytics for themselves. While other forms of networking may be geared toward providing assistance of an administrative nature. In C7 this is accurately captured.

> *"We do like to use professionals. In my company, I have, you know, a group of professionals that are into energy audits, you know, they do sight inspection comes up, so that's their area. And then I have other guys who are into system design. So when the energy audit guys come back with the report, the system design guys use that report to design the system. And then we have the field guys who go for the installation. And those guys have the capabilities to go and, and implement what they have on their design. You know, there's no way you can have one person who knows it all or who will do the audit, who will do the design and the design and delivery systems for the service. Sometimes we have that tendency or attitude to believe we can do everything by ourselves and we don't like engaging professionals. Even when it comes to managing the finances in your company, you need the professionals to manage the aspect of it, you know, the tax area, you know, you need an auditor, you know, a chartered accountant and the likes."* Excerpt from C7.

Another form of networking is in the shape of financial support systems and mechanisms. For instance, C1 indicates creating links in trade and financing, and how it assisted in enabling capital. A distribution network was also created where C1 establishes contact with retailer outlets across the country. This form of networking is also present in all cases at varying levels. C6 also channelled financial support systems by creating a network of stakeholders for the purpose of financial support geared towards mobilising funds targeted at 1 billion dollars. From this, the identified network is extremely important to achieving the set capital target.

In general, based on the importance of strategic agility, the cases view innovation as a very important aspect of their businesses. Vital importance has been placed on leveraging all forms of resources available to the business such as technological, financial, networking and human resources. They suggest not substituting one resource for another but finding ways to complement them, as they are all important within the business environment. This is exemplified by the employees (human resources) employing technological capabilities (Customer relationship management, enterprise resource planning platforms), which also enhances their ability to manage the internal processes of the business, and also monitor their equipment from anywhere in the world. They have been able to acquire funds from external sources. And through managing its financial capabilities, the business has been able to ensure the business is able to employ the capable technological and networking capabilities mentioned.

These core innovative capability prisms however are directly shaped by the ability of enterprises to be dynamically capable to sense, seize and reconfigure as a business entity, thus forming the enterprise-level innovative traits (ELT). The research however also delves further to outline the inceptive traits which are the personnel level innovative traits (PLT) of gumptious aptitudes. Through the skilful application of gumptious aptitudes of commitment, notional, strategic, relational, prospect-spotting, marshalling and upskilling, RE-SMEs have managed to maintain the growth and daily running of the business. Constant progression is also evident as the respondents indicate they constantly push and encourage to learn more, thus increasing company knowledge, skill and expertise. These aptitudes and skills have helped the business survive in a highly unpredictable and challenging environment. And like an orchestra with several moving parts, it takes the synergic application of skills and traits in order to build a harmonious symphony which eventually contributes towards a crescendo of constant development. Therefore a conceptual process model which we term the innovative capability development framework as shown in Fig. 12 is designed to further exhibit the feasible pathway through which SMEs develop innovative capabilities for their business model processes.

In this first aspect of findings, the concept of innovative capability has been explored in depth, and the innovative capability framework for SME-BMIs has been developed in order to address the first research question which is as follows;

Q1. Which capabilities do SMEs use in their BMI process in order to scale up their business activity?

The second phase of findings will be geared towards answering question 2 of the research which entails exploring contextual influences within the innovative capability.

CHAPTER SIX

CONTEXTUAL CONDITIONS INFLUENCING THE TRANSFORMATION OF PRE-EXISTING BM TO INNOVATIVE BMs

The contextual factors have presented a blend of narratives which take both positive and negative dimensions. In the course of collating and analysing the data, pertinent causal and effectual factors have emerged owing to the holistic features that the business ecosystem presents. These narratives have been outlined and will be discussed in this section for the purpose of answering the Q2 of this study which is stated as follows;

Q2. How do contextual conditions influence the transformation process from pre-existing BM to adequate innovative BMs?

Starting from the features which tend to possess a dual nature of positive and negative traits, followed by the contextual factors which are inherently negative in nature as well as the factors which are inherently positive. These factors which are discussed, though examined through SMEs within the renewable energy industry, reflect the experiences of SMEs within the Nigerian context. Another section immediately following the contextual factors focuses on more direct features of the renewable energy industry in Nigeria, which is aimed at understanding the structures and stakeholders currently active within the industry. Following this, the discussion delves into describing the pertinent stakeholders and their relevance within the contextual environment. This is done to holistically explore firstly if context plays into the BMI process and how context influences from all perspectives.

6.1. Market Peculiarities

Before discussing the dichotomy of positive and negative contextual influences, the market peculiarities are initially discussed in general due to the fact that cases discuss characteristics in the environment which are not outwardly viewed as negative but provide an unassumingly advantageous scenario and vice versa.

Market peculiarities:

The Nigerian business environment is considered one of the largest markets in the sub-Saharan African region. It is also a business ecosystem which from an SME perspective poses

challenges and loopholes which contribute to the hardships faced by these companies. An excerpt from C1 explains thus;

> *"I won't really say it is comfortable because when you're working in this environment you're not really feeling comfortable. It is kind of limited for you to be able to see what you're able to achieve, and what impact you can make. And for you to be able to impact you have to be able to impact you have to sure that what you are trying to impact on is already in use. And again to see how you are able to defend it when talking with other fellows".*

This exemplifies the convoluted nature in which business motivation and business actualisation are pitted against one another within a business. Similar notions resonate through the cases considered. However, in spite of the clear challenges that come with a highly erratic and uncertain environment, a logical question arises in the form of asking what makes such enterprises remain intent on operating. Simply put 'Why bother?' An answer to this lies within the confines of understanding the essence of exploiting an opportunity within the context and having a long-term ideology toward exploiting such an opportunity. To this end, an indirect positive of functioning in an uncertain market environment is that while there may be an absence of clarity in structure in terms of policy and support, it is also an avenue through which companies imbibe and apply legitimate strategies of ingenuity up can be attempted and experimented. Coincidentally, trial by error and experimentation have been historically regarded by literature as processes through which business models have been developed and enhanced. In C5, the Nigerian environment was described as the "Wild West" when they first ventured into the renewable energy space, where there has been minimal evidence of structure. Which although has been very challenging, has also provided an environment where there were very limited inhibitions or interferences from regulations or policy thereby breeding a wider range of creative thinking towards problem-solving for the business and its clients. By nature of the small size of the business,

Another advantage of operating in such an unstructured business environment emerges in the nexus between the increasing global shift toward sustainable business practices and is situated in an environment where narratives of sustainability are still in their early stages. In view of this, SMEs which are positioned in sectors that are key to sustainable opportunities could invariably create value by building knowledge and field expertise that is specific to

exploiting such opportunities within the given context. If this is maintained, the business can gain competent consultancy values which can expand the influence and brand of the business.

They are environmental and institutional in nature. The environmental factor stems from the high rate of pollution caused by the daily use of fossil fuels especially in everyday life via kerosene lamps and firewood for cooking. This has a harmful impact not just on the environment, but also on the health of the community. Although this is negative, it also serves as a selling point for renewable energy businesses, which is a positive for the RE industry.

This is where the relevance of being effectively savvy towards increasing the market comes into play. Another point is made by one respondent in C4 while speaking on the industry, a vital point made that while a big factor for RE promotion globally might be a good sell for patronage on a general level, there are more imminent challenges which should be honed into within the Nigerian environment. Firstly, the primary challenge is the lack of power supply and therefore that is the main focus behind the RE-SMEs in the market, solving the problem of lack of power supply. And this has an effect on the manner of approach towards their marketing approach as businesses which may have the general promotional narratives for RE development would be organised an exploited differently in environments with developing characteristics such as Nigeria.

> *"So we are in the power industry in Nigeria, mainly because power isn't available for many people. It's a different strategy I believe if you're working in Canada, for instance. There's going to be power in most places so people that are looking into renewable energy might be thinking of carbon footprint or saving the environment, or climate change. But that's not primarily the challenge in Nigeria. Primarily, there is no power. So really, I think right now that's the driving force more than anything else. So because there's no power, because there's no also no clear path to the grid being grown, it looks like it's a huge market for alternative energy. So that's the main driving force, some people theorise that when power is good the solar industry will die in Nigeria. I don't think so. Again, I think it's going to take a very, very, very long time before power can be as good as we think it should be."*

6.2. Negative contextual factors

From the 10 cases, pertinent challenges have been identified in various capacities. These are discussed as follows;

Corruption via vested Interest

A prevailing sentiment discussed among the participants is the looming frustrations caused by corrupt practices exhibited by individuals within institutions who interact with these companies. Discussion of this particular issue generally stems from experiences especially when it comes to the clearing and forwarding of their equipment which has been shipped from abroad for import. They express a great deal of frustration when dealing with personnel of the Nigerian Customs Service. They reveal that in order to clear goods and equipment 'money must exchange hands' (C10), and this adds to the already high cost of purchase due to the high exchange rate owing to the depreciating strength of the Nigerian currency (naira). The manner of corruption also manifests in the form of deliberately keeping the status quo of key positions based on politics over merit in relevant ministries, departments and agencies (MDAs). There is an opinion from C7 that another reason why that might be is that if more qualified individuals are appointed there would not be an ability to easily manipulate them towards vested interests, hence the resistance or lack of attention given to appointments.

> *"Even the guys in the early 40s who are going to be heading these agencies definitely didn't read renewables as their first degree. They either read it as their second degree or they had it as some courses to just study it. But for you to bring guys into such an agency, you know you're definitely using young guys who are dedicated and so you're not going to be able to easily manipulate them compared to those who are in the system, who are already corrupt and you know, who have played around with these things."* (C7).

Consequently, this leaves the business venture with a decision to contend with either passing these superficial costs to their clients through pricing or absorbing the cost internally and maintaining the price in order to make it more affordable to their customers (C8). Also, C1 puts it, "even where there may be provisions to increase ease of access to your goods, some personnel will lobby around that provision and get something out of you. And that is not really helping the renewable energy industry in Nigeria". In addition to this, further excerpts from C1 explain thus;

"Well, I know a couple of companies have gotten these funds. But they've made it seem very difficult to access. So I have a feeling that funds will sit down there in somebody else's pocket will soon gain them".

C9 also affirms this notion of corruption within the government suggesting that people usually tend to think that when in the government system, they tend to forget duty. Referring to the saying that one has to 'observe table manners' and not talk, thereby insinuating that one does not have to rock the boat and go with the typical flow of using resources for personal gain at the expense of doing the work they have been assigned to do. From C2 another specific reference was made to the phenomenon of incumbent energy providers creating barriers, hindrances and hardships for RE-SMEs. Referring to them as the 'Diesel Mafia', they are said to be responsible for the syphoning diesel required by their customers thereby increasing the prices for customers. While simultaneously engaging in counter-progressive measures towards any incoming energy new-comers like them. These measures may be in the form of bribing officials responsible for energy regulations, as well as policy makers who may be coerced to be more supportive of meeting their demands.

"They do not go out looking for the guys who do the job, they share the job among themselves. That's the politicians. Their friends and cronies. So jobs end up in the hands of people who do not even have renewable energy expertise. They now come to us to start re-negotiating. And by the time, you know, we settled in, we're left with so little to enable us to work efficiently." (C7)

The issue of corruption is not merely restricted to the government as C7 indicates, on the premise that illicit practices have been imbibed by some practitioners in order to cope with the environment. Taking the approach of making a profit by any means necessary, they take advantage of the naivety of prospective customers due to their limited knowledge. While this may yield short-term profits, it has adverse effects on the image of the industry in the long run.

"We the practitioners. We have our own problems. Number one, we are always in a hurry to, you know, if I may use our lingo 'hammer'. We want to quickly make that money. So we're not patient enough to observe the rudiments of the business. Sometimes, or most times, you need to look at the long run. Well, you mustn't make a profit from every transaction. And, you know, you could make lots of other benefits from that transaction for the future. You know, there are

> *other kinds of values. So most practitioners end up being insincere because people don't understand the technology. And we the practitioners end up lying to them, you know, misleading them, just because you want to maximize profit Somebody wants a battery, you won't turn the battery lifespan is between one to two years, you know, you just tell them it's five years, and then he invests his money, and then eventually, you know, he's disappointed because it packs up."*
> C7.

The presence of corruption constitutes a major factor of other observable negative contextual implications which are the lack of trust, inadequate infrastructure, ineffective policy implementation, ineffective institutional support and a lack of finance.

Lack of trust

This resultant factor is considerably influenced by the factor of corruption. With the volatility of the market environment being discussed at different levels in the cases, a consequent result effect in the grand scheme of things becomes a notable distrust among various elements of the business ecosystem. We identify three dimensions that this distrust can take. This tripartite cycle is; Business-to-government-distrust, market-to-business-distrust and investor-to-business distrust.

Business-to-government distrust develops upon the instance of the earlier mentioned factor of the perceived lack of support and deliberate effort to limit interactions with the government. Another contributor to this dimension is the frustrations of businesses by institutions interacting with these businesses. C1 discusses registering their displeasures while interacting with some government officials, indicating a 'tokenist' approach when government officials and parastatals are approached by RE-SMEs they are not given any actual projects but are rather used as a publicity stunt for sensitization and workshop sessions alone within their state of operation. Another stumbling block as C2 describes is the erratic nature in which there are always shifting goal-posts when it comes to creating plans for development.

> *The investor confidence in large grid-type solar in this country is very very low, okay? Because there were about 14 PPAs that were developed with reputable developers and tier one suppliers and proper engineering, companies and proper financial modelling and the proper financial institutions*

> *such as Bloomberg and everyone was here doing a report. So yeah, and then the Nigerian government changed the goalposts at the last minute, which meant that investor confidence and the grid spaces are very very low. It is not de-risked in this country. Dealing with the government would be classed as not bankable. Dealing with the DisCos is also not bankable.* (C2)

Stating that these inconsistencies contribute to a level of distrust not just between RE-SMEs and the government, but also between RE-SMEs, investors and the target market.

Investor-to-business distrust, reasons for this are largely due to the volatility of the business environment which typically reduces investor confidence. Therefore, while internal support from the private sector is not completely non-existent, "it is not where it should be" (C6, C10). Even when it comes to the more reliable international sources of support and investment when compared with contemporaries in other countries, the businesses 'have to put double effort to get access them' (C1). The quote from C2 above also indicates that investors like to be certain about the environments in which they intend to invest in. However, local and international investment has not been as forthcoming as it should be.

In the final dimension, ***Market-to-business distrust*** occurs due to the prior bad experiences of potential clients who have "fallen victim to unbranded installers who set up power systems inadequately or with even do so using substandard equipment" (C8). This presents another hurdle that C4 describes as a situation where those of us trying to do it the right way have to work extra hard to rebuild the lost trust of people who do not see any good in renewable energy power'. Also since most of these RE-SMEs rely on word-of-mouth marketing, they have to take the necessary steps toward ensuring their integrity is not sullied in the eyes of existing and prospective clients. C1 encapsulates this notion in the statement below;

> *"Well, it's been quite a challenging one. Yeah and I think maybe because it's quite expensive, but it's been an enlightening one. For example, it's quite a bit difficult to like convince people that this is good for you".*

<u>*Inadequate infrastructure*</u>

With regards to infrastructure, an argument can be made that owing to the relative infancy of the renewable energy industry in Nigeria, it would be overly ambitious to expect the market to have reached optimum saturation to a point where an entire value chain and structural

systems are currently established. However, when it comes to the general power supply infrastructure of the country, there are formidable lapses through the entire value chain of the system, with the collective domestic power output of the national grid yielding just 7,000Mw at the generation and just above 3,000Mw being available for distribution. With this scenario putting the inadequacies in perspective, the apparent lapses in the contemporary power generation complex imply would that there is little attention paid to off-grid and decentralised power systems, which renewable energy typically falls under.

> *"I think it's going to take a very, very, very long time before power can be as good as we think it should be. I mean we're still grappling with 3 to 4000 megawatts. That's ridiculous, and we can't see any clear path in sight. In fact, the government's plan is saying, "Oh we're going to do 20,000 megawatts by 2030 or 2035, even 20 megawatts is small. So the government is thinking of increasing to 20,000 in the next 10 years, and then the population keeps increasing. So it looks like there will always be room and need for alternative energy. If only they could be a lot cheaper, I'm sure everybody in Nigeria will have a solar panel on their roof."* (C4)

This in turn shifts the onus entirely on the companies to painstakingly develop a structure by themselves, putting "significant strain on their already limited resources" (C6). This challenge is even more significant when dealing with providing services to areas which are remote and hard to reach due to bad roads which can cause a ripple effect in costs such as 'damaging their vehicles or incurring more transportation costs' (C1, C8). Although these notable infrastructural inadequacies contribute to acknowledgeable difficulties for the businesses, it also presents a visible opportunity that all participants recognise and persevere to attain despite the very real troubles of inadequate infrastructure. As C3 iterates, the lighting public utility is not there, so the demand for alternatives is there naturally. They also give an example as to why certain infrastructures related to alternative energy solutions in other economies are not implemented in the Nigerian economy. The feed-in-tariff system which is one of such instruments synonymous with RE businesses would not be implemented within the Nigerian business environment. This is because as C3 puts it the 'structures are not in place for that.'

> *"When you look at, Nigeria as an example, wherever there's possibly a leaning towards more decentralized solutions because then the national grid itself is*

not capable of taking all these smart forms of energy and distributing it properly across the country." (C2)

A lapse in infrastructure is also identified in various parts of the supply chain. While all cases elude to varying levels of difficulty in acquiring equipment such as inverters, batteries and panels, C2, and C6 similarly discuss the difficulty in being able to get a large amount of equipment. C5 discusses their process of manufacturing some of their equipment from the nearby Benin Republic. C10 also admits to difficulties but also sees this as an opportunity to get to learn and make mistakes in minute details so that by an ability to scale is presented, the lessons learned should be adhered to in order to prevent mistakes on a larger scale. Another aspect is characterised as a lack of effective institutional support and is discussed in the following segment.

Ineffective institutional support

When it comes to regulation, there are still inadequacies in the terms of having a provisional structure of renewable energy practitioners in the country. In essence, there is no synergy between the power generation targets set out by the government, the provisional regulatory instruments that aid in achieving these targets and the regulatory bodies and institutions which would manage these processes in the form of either Ministries, Departments or Agencies (MDAs). Even in instances where there are allocated institutions dealing with these RE SMEs, the roles of these institutions are duplicated especially when it comes to licensing and levies as gathered from C9. Being accredited by these agencies requires paying annual levies, and in a situation where one is not getting sufficient assistance from these bodies and is still expected to pay annual subscriptions in order to function, there is an evident waste of financial resources occurring. Also taking from C4, the extant 'regulatory uncertainty' create confusion where what is needed is identified, but how to achieve it is absent;

"Regulatory uncertainty in the sense that as I mentioned earlier the government has a particular target right? For the renewable energy mix in the power sector, but because there are no clear guidelines on how to meet those targets, businesses are not able to plan as such. If they knew that the government was really supportive, and had a target…and a plan to achieve that target, as an avid developer you can know how to key into those plans to say 'okay, in this particular region because of the abundance of sunshine in

that region, for example in the Northern part of Nigeria the government has put a target of 100MW by the end of 2020. Those are concrete targets that you can now buy into as a private developer but unfortunately, those kinds of regulatory certainties are not there". (C4)

C4 further discusses how commercial banks are often not willing to give funds exceeding a four-year pay-back period (PBP). Whereas realistically, they as RE-SMEs are of the view that a 7-10 year pay-back period would be more considerable. This 4 year PBP is viewed as discouraging as it puts further unwanted pressure on businesses and such parameters cannot realistically be met. And even in peculiar instances where more favourable PBPs as long as 15 years are provided, they are usually from international stakeholders who would want their loan remittances in FOREX (foreign exchange). This in turn poses a problem when dealing with a fluctuating economy where a higher uncertainty means an erratic value in currency. As C4 puts it, "you can wake up tomorrow morning and the dollar has skyrocketed to an unimaginable price, leading to more uncertainty.

"And then another thing from, I'd say the financial institutions, getting, you know, recently we've been issuing out LCs letters of credit to our vendors to supply us components. So, unfortunately, it's really difficult to get forex from the CBN at the government rate, which is, which is much cheaper than the parallel markets. But before now, every source of forex has been from, the parallel market. So you know, that hasn't worked out so well in terms of getting the right price forex from the federal government, which should be able to help source this company. So that has been a bit challenging." (C7)

Although institutions such as the Central Bank of Nigeria (CBN) which is the apex bank, have devised monetary frameworks to which businesses seek to exploit, the ease of access often proves more difficult than expected. This leads them to depend on accessing FOREX from the parallel market, commonly referred to as 'Black Markets'. Unfortunately, these parallel markets would sell FOREX at a much higher rate than the rates officially set by the apex bank. This further puts the RE-SMEs into a deeper resource deficit. It is for these reasons that C1, C3, C5 and C10 have suggested that there is a need for purpose-created agencies to be created to cater specifically to RE-SMEs. While C5 and C7 opine that there are some existing institutions which they interact with, they are hampered by limitations in expertise which leaves

a lot to be desired. Therefore, further strengthening the clamour for more direct agencies and institutes.

> *"Those guys are not built for that purpose. I mean they might have departments that are doing what they can, but we need a full agency, a full parastatal that yes, this is what they were created for. And engage people who went to school for the purpose of studying renewables. There are a couple of people who studied abroad, who read, you know, something on renewables - either wind, biomass, solar or something. So put these people together and let them start something."*

It is inevitable that institutions directly have an influence on the policies, practices and enactments. Therefore the next challenge discussed would be orientated towards the policy.

Ineffective policy implementation:

As the previous factor covers institutional problems, guidelines and policies are also affected. With the exception of C4 and C7 giving a positive response to the government 'making efforts' to give more attention to renewable energy, participants from both cases also join the remaining eight cases in uniformly providing negative narratives to the effect of having favourable policies that work efficiently. Notions of a lack of legislative effort and exasperating bureaucratic procedures all contribute to the arduous interactions with instruments of government. There is also a collective understanding that there are policies geared towards the RE industry, however, a large part of the problem is in the implementation of these policies. The pertinent policy is the National Renewable Energy and Energy Efficiency Policy (NREEEP) passed in 2015 is one of such policies. Although it has been enacted, extant evidence and feedback from the cases indicate limited application of directives as indicated within the policy. Some of these included incentives such as access to finance, carbon credits, tax credits for energy-efficient systems, tax holidays and energy procurement packages.

> *"I think I did mention in the course of this interview that Nigeria often does not lack good legal frameworks. In most cases, where we struggle is how they are implemented. So we have the Nigeria, power sector recovery or you know, programme and law. We have the mini-grid regulation. All these things are there. And they're well couched in law. But I think it's, it's at this place of implementation, that we struggle."* (C4)

An apparent lack of clarity on policies related to the RE industry also serves as a contributory factor to their ineffectiveness. For example, in a situation where seemingly favourable policies such as the VAT tax exemption were introduced in the first quarter of 2020, proved very frustrating for the businesses to exploit. Although this implies that renewable energy equipment is to be 'non-taxable, companies are still presented with exorbitant import duties, which invariably keeps your cost high' (C3). In addition, C9 contributes to this narrative that in spite of the policy being able to cover all components of an RE system, the Customs service does not extend to the RE batteries, which happens to be the most expensive equipment within any RE unit. Therefore, 'deciding to pass the cost to the customer becomes complex and strenuous, so it's better to ignore the VAT exemption exists so to avoid getting into arguments with savvy customers who wonder why they still see VAT tax charges in their invoices despite the VAT exemption announced by the government. This results in businesses resolving to adopt a very measured and pragmatic approach when it comes to reviewing and applying policies. From the perspective of a customer, the VAT exemption policy should translate to an exemption of VAT charges on their bills when services are rendered.

> *"We should actually try as much as possible not only to proffer for laws, and regulations but be strict and stick to actual implementation. Like I said we have tax waivers. Now, for example, I have to bring in a solar generator and this is a question I put out there. There's a tax waiver on panels and inverters, but there's no waiver on the batteries. And the solar generator comes with all these components in the same box. So how does that apply? How does that work? So there's always that what is it called? That loophole because we don't think that."* (C9)

Another aspect that complicates the issue is the form of governance and oversight of these laws. For instance, the VAT exemption is purported to be governed by the Value added Tax Act, while the import duties are governed under Customs Law. Therefore the lack of synergizing the governance protocol would lead to problems such as cumbersome complications or in some cases duplications. Hence, more definite clarity is required.

> *"So, the question is how will DC generators be defined? Will it contain all the components panels, inverters, batteries, and all the balance of system components? What was also there is I saw it more as one entire DC generator. Are you talking about the solar panel itself? That is something well one could*

say that there was some technical argument. Because you can look at it and say, 'hey, FIRS, this is a generator within the definition of the law and it should be exempt. But I expect some will say there is a controversy or issue with the FIRS on what is considered a generator. And what is not a generator for the purpose of renewable energy?" (C2).

Duplication poses a major problem faced by RE-SMEs when there are multiple institutional bodies performing the same oversight which could be regulatory or supervisory. This is so most especially because the subscription of their services would typically require periodic fees and levies which the SMEs need to pay or else could be sanctioned or penalized.

Lack of Finance

In the entirety of the cases considered, this factor of financial insufficiencies is one which is echoed with a strong conviction. The existent lack of access to start-up capital is evidenced in the fact that all the cases did largely begin their entrepreneurial journey through self-funded means. Efforts were made to individually source for capable capital expenditure (CAPEX) through private means through friends and family. Although assistance from certain external bodies has occurred further down the line, it is also viewed by these SMEs not to be a sustainable source of funding. In the sense that while it provides some assistance and financial slack, accessing these funds and the "tenure of which the loans are to be repaid are usually too short, contrary to what their counterparts receive in other parts of the world" (C4).

"Affordable funding, now that first word is important, 'affordable'. Because there is funding, it's just not affordable. So if they can find funding that is affordable...but currently in Nigeria um..the tenure is not long, four years, even if you get five years, that's not long enough. There's funding out of the country, the tenure is longer, but then challenges of foreign exchange. I mean one or two development banks in Nigeria might do long tenures, but they are almost impossible to get sometimes, so not everyone can access them. So affordable funding I think is the most important thing". (C4)

This strain does not end with gaining access to start-up capital, it is also reflected in the day-to-day operational expenditure (OPEX) of the business (C6, C10). Another dimension

contributing to the lack of affordability is the access to affordable foreign exchange (FOREX). A statement from C3 explains as follows;

> *"Nigeria is more challenged in terms of FOREX. So FOREX is not stable, and the naira is not stable, so it's affecting the supply chain. So that's the affordability we're now grappling with. You have issues of forex and supply chain challenges".*

C9 provides a detailed experience to this effect. Indicating that while they initially agreed to sell batteries to a customer for N96,400.00(naira), this particular transaction coincided with the advent of the COVID-19 pandemic, which affected the dollar-to-naira from N360-$1 to N450-$1. With 100 pieces of batteries ordered, the agreed price could not be altered, thus resulting in a loss for C9. On consulting with another supplier, it was discovered that they had set their own price at N125,000.00. This led to C9 finally re-adjusting its price to N114,000.00. In narrating this scenario, C9 laid emphasis on how quickly things could change within a span of hours, explaining that is what they deal with on a regular basis.

> *"So, the Forex challenge we have is we can never predict it. So you bought today at 360, 380, tomorrow you might want to import and then you're having your dollar at 460. Those are the challenges they face. So you find out that sometimes you have to rob one product to purchase another product and see which one can actually move in the market more."* (C9)

Also, gaining access to commercial funding through loan acquisition from banks is considered impossible and unfavourable for two reasons; these are the high-interest rates tied to the loans acquired and the lack of investor confidence on the part of the banks. As C7 discusses access to funding, it is iterated that most existing financiers willing to give loans do so with double-digit interest rates (20% upwards), with the exception of very few at 9.5% or so. This is because the banks usually consider the risk of investment too high and volatile and are much harder to convince as C5 iterates;

> *"Funding in the sense that it's very difficult in general for fund-raising in the country. But then you break it down to the renewable energy sector…because it's a new sector there is…and I'm speaking particularly about those working off-grid, not on-grid. For those working off-grid, a lot of their business models have not been tested, these are very new business models being tested and as such, the typical financiers shy away because it's high risk. Um… you're going*

into a community to put up a solar/biogas-powered mini-grid when you don't have a Power Purchase Agreement and you're not really sure where your earnings will come from…but you look at your data and you think that you'll be able to sell power to that group of people. Um… it's difficult to convince a bank to give you debt financing for that, so funding is very challenging. There have been several programmes either by government, donor organisations or impact investors to introduce funding into the sector, which has helped a bit in the past years, but in terms of really commercial funding having commercial funding having affordable funding… because sometimes you see commercial funding but at an exorbitant rates that really don't make sense. Yea so funding I would say is definitely one of the big challenges". (C5)

For this reason, this leads to businesses choosing sources for investments and support from international bodies and multinational companies instead. One causal factor hinted at in the narrative above is a lapse and absence of proper application regulation to support the renewable energy industry specifically catered to financially incentivise the industry.

"Also access to finance is always an issue. And, you know, for us a lot doing retail, it's difficult for our entrepreneurs to access credit. Not just because it's not available, but because the interest rates will strangle them out of business. They're dealing with margins between 10 and 20%. And so if they have to get a loan that eats into the margin, sometimes the loans are just as high for rural loans. And then, of course, they still have logistics and running costs. So sometimes it just doesn't make business sense at the end of the day." (C8)

The high capital costs combined with the difficulties in affordable financing therefore figuratively puts RE-SMEs between a rock and a hard place. Therefore limiting their ability to fully exploit and leverage the global supply chain. Although the challenges explored are directly affecting the businesses, data from the cases also provide a specific narrative on growth challenges which are peculiar to the RE industry. These are followed in the following section.

6.2.1. Implications of Renewable Energy Growth challenges

This section puts the effects of challenges more directly into perspective the effects on RE-SMEs. Notwithstanding the apparent potential effects of economies of scale steadily increasing the global proliferation of renewable energy technologies, one would expect there

to be an exploration of local manufacturing opportunities in the sector. And while some companies have attempted to venture into this space, there is still a sense of weighty scepticism in delving into manufacturing locally at the moment. As C5 puts it;

> *"it's just a case of the economics of scale, I don't think the sector has really got to that point where there is a viable pipe-line where a company can now say because I know the government wants to put up 10 gigawatts of solar systems in the next 5 years I'm going to put up manufacturing plants in Nigeria to start manufacturing equipment. So I haven't really seen that economics of scale to support it, but also in terms of the price even…as you know with the challenges with power or the utilities, manufacturing in Nigeria might actually turn out to be much more expensive as opposed to shipping these panels from China, Germany and other countries where they import solar equipment from".* (C5)

Subsequently, other contributory challenge factors particular to renewable energy growth are;

Cost-to-Pricing Conundrum: This is the situation where a polarising void emerges between the additive costs owing to factors of challenging forex circumstances, strenuous bureaucratic levies, illicit practices of institutional personnel among others, and the developing a feasible pricing strategy which maintains value for service while being reasonably affordable for clients. To this end, continuous attempts are being made by the RE-SMEs in exploring inventive payment strategies to reduce the widening cost-to-price disparity. These take the form of 'flexible instalment payment packages' which take various forms all through the cases and are constantly being re-evaluated. As C3 captures the complex conundrum faced by RE-SMEs as follows;

> *"Imagine a scenario where you're struggling with affordability, trying to play with financial models to increase funding, and then also having to pay tax."* (C3)

RE-SMEs constantly have to contend with leveraging the best but often costly equipment and making sure that the service provided is affordable to prospective customers. By implication, there is a general acceptance that there is a considerable cost to getting good equipment, but it is part and parcel of providing the best service. To affirm this statement, a respondent from C1 opines that "if someone is telling you that solar is cheap, then take a second look at the equipment. My watchword is solar is affordable, but it's not cheap". They also add

that they usually have to sell the original equipment at a higher price to cover up for all their logistics overhead costs which may limit patronage, but as well help provide the best serviceable equipment possible to whoever patronises.

> *"And renewable energy is comparatively expensive, especially in terms of initial start-up costs, so when you expect somebody to pay that money it often becomes very discouraging, but access to funding, we'll probably be able to deliver the solution when you get people to pay over time. In that case, they'll probably be paying less than what they're paying for their generators for electricity, and they won't feel the impact. In fact, access to finance is a key challenge"*. (C7)

There are also admissions from C4 and C7 to the fact that some customers have and do succumb to some form of 'investor fatigue' which is where they are not able to continuously pay for services or put them on hold for some time. C7 describes it as a 'discouraging' scenario for the customer which in turn demotivates the traction of the business. This provides another reason for businesses to delve into various forms of flexible payments and arrangements on the basis of baseline economic instruments such as per capita income and general economic health analysis. As this helps in identifying how people could keep paying for the product, what is their cost of living? What amount of disposable income do they have, if there is any at all? In C3 there was a strong understanding that Nigerians do not have a lot of 'long run' money, mostly dealing with issues that instantaneously claim the money away. Which consequently affects their ability to spend more on energy outfits.

> *"On one hand you are bringing something that you as a company are sure it actually works for them, but then it is more expensive, even more than what they are used to. And they'll tell you "I didn't even spend this much, yet you want me to invest more? Why?" So people don't really understand. 80% of people believe solar is a replacement for a generator. There was somebody who wanted to install solar systems in their office, so I sent the engineers to do a load assessment for the project. So we got back and did the design and then sent him the bill. He then responded by saying he didn't know solar was this expensive, so they'll just stick to their generators as they couldn't afford it. I*

then sat him down and explained to him, but truthfully he just couldn't afford it mainly just because of the way the country was." (C3)

Limited RE knowledge:

"Well I would say it's picking up is becoming something that people want to try. Yeah. I mean, I remember when I started and how nobody even knew what it was. Even explaining how solar service was a problem for people." (C1)

As stated earlier, there are still limitations in the degree to which knowledge of renewable energy is being understood and accepted within the Nigerian market. Although that is changing due to increasing attention spotlighting the technology and potential application within the region, the awareness is still not wide enough to be considered fully engrained in the general social fabric of society. There are narratives arguing for and against the level of knowledge of RE within the Nigerian environment.

"It is a challenge, but it's not like a permanent challenge. And it's more of like consumer awareness, consumer education, those are the kind of things to kind of even raise the market potential such that the players can play with a lot of space. But I also know that there is a wide challenge with consumer education, consumer knowledge, the ability, even the payment models that are available, or that that can be utilized." (C8)

From C8 we can observe the value which is placed upon consumer engagement and the effect it has on increasing business prospects in the market. Although it is also confirmed that continuous efforts need to be made. C7 recounts getting into the RE environment initially and being acutely aware of their neophyte characteristics, venturing into an unfamiliar territory where a lot of things were strange and not taught to them both formally and informally. These facts, therefore, led to the admittance that all they learned thus far and continue to learn took some time and practice to be acquainted with. The C.E.O. of C7 further highlighted that issues of limited knowledge still pervade the industry, which has a ripple effect on the ability to apply in terms of installations, material, quality and proper service delivery. The government is also brought into the line of fire regarding a knowledge handicap as cases reveal that there have been attempted projects which have failed due to inefficiencies in analysing the concept and its solution, thereby urging the need to go back to the drawing board. These lapses contribute to the societal perception that C9 captures below.

> *"Also, we have problems with society's perception. Society believes the technology, that is solar technology doesn't work. Right? Yes, there should be some behavioural changes as well. So there should be some kind of education, to let them understand its implications, its limitations and to let them understand about energy efficiency as well. And conservation."* (C9)

C9 elaborates further about the existing doubt still present within society regarding RE technology, despite the strides the industry has made as a whole. However, they bring the importance of expanding awareness of the RE companies within the country both in sensitization and in practice, and the effect it has in 'diffusing knowledge' into the market space. It is through these means that the potential of market availability and potentials can be recognised by investors, policymakers, customers and key stakeholders within the RE space. C10 provides context to this effect.

> *"Not exactly. On the one hand, there is a massive market available upon awareness creation. While on the other hand, there is the poor access to funding and not many incentives."* (C10)

Converging with limitations in RE knowledge, cases discuss that it is also important to adopt a more deliberate approach towards educating the populace on the requirements for running businesses in general within Nigeria. This is outlined due to the importance of building an adequately skilled workforce and the effect it could have on industry productivity.

> *"You know, and most people didn't have a good knowledge of installation, of materials, quality, you know, even perhaps the ratings for some of these components, which are very important. So, you know, there was a lack of knowledge, there were only very few people in the industry who knew what they were doing at that time. And then lots of people were very much interested in venturing into distributions."* (C7)

With the limitations in knowledge being outlined and the ripple effect that has from varying scopes of society, industry, enterprise and individual, an important factor which is consequently brought into view is that of the inefficiencies in adequate maintenance culture practices as another looming RE challenge factor.

Limitations in requisite maintenance culture: Renewable energy technology makes use of various components which make up a cohesive system. The functionality of these systems largely depends on two fronts. One is the ability to set up the system in a position which has the best access to the power source. The other front is ensuring the equipment is in the "best conditions round the clock", according to C2. The latter front requires a devoted effort towards providing a high and consistent maintenance culture is maintained. In addition to this, an emerging feature peculiar to this environment is the nuanced variation in the performance of the equipment within each region. With a large part of the Nigerian renewable energy practitioners adopting solar technologies, ensuring photovoltaic panels are clear of dust, wiring, batteries and inverters are at optimal performance demands a great deal of attention. To this end, all cases make sure they carry out regular follow-ups and services so they could continue delivering the best experience possible. This is also deliberately woven into their contracts and agreements in most cases which end up contributing to their recurrent income.

> *"They have solar panels installed, they have batteries installed, and they have inverters installed. Almost all of them will be on maintenance contracts from someone like me. What we do is we do for annual service level agreements, so we do four annual visits per year to check the panels, clean the panels, check the inverter cleanly and then check the batteries and the batteries are more reactive because the batteries are consumable. So if the batteries are not working, we swap them out and it's just a bill. I think that that would be an example of a customer like a bind like Xanax or access to the maintenance culture or putting their assets under maintenance agreements."* (C2)

This is important because as deduced from various respondents within the cases, the demand which is placed upon the system in the Nigerian environment, 'will not be the same and is even higher in some cases (C3, C6, and C9). This led to a situation such as an example from C3 where a component which may be expected to last for 5 years ends up lasting for just 3 even after the best maintenance and care has been given to it, leaving the customer to question why such disparities exist. A way in which they attempt to address this is by explaining the weather variations to their customers, and more importantly, relaying the information to original equipment manufacturers. This information eventually becomes valuable data on performance levels and conditional weather effects on their equipment, which results in developing more suitable equipment to cope better within the local environment. It is for this reason that growing discussions are being had between the RE-SMEs and equipment

manufacturers or suppliers regarding more specific documentation and agreements regarding the accuracy of equipment performance. It is also an important reason why developing workable value-based relationships with the manufacturers and stakeholders, in general, is important.

> *"It's bound to happen. Let's say out of a hundred customers at least you'll see nothing three or five clients will misuse or abuse the solution. For example, I could say when we come across those kinds of people we let them understand that this solution that you're trying to abuse which you were supposed to use for like 10 years 15 years now you've already started abusing within the first six months, this way it will barely last for even a year before it packs up. Most of the users claim if they spend as much as I have on the system, I should be able to put as much load as I want on the power system. This is why as I said earlier we always try to make them aware by indicating there should be a process. This is how the explanation process comes into the picture, and why it is very important."* (C3)

Proliferation of substandard equipment and practices: This is a situation which often develops out of desperation by some practitioners to acquire equipment at a cheaper cost. Another reason is that some practitioners, 'get into the business solely for short-term profit-making purposes' (C8). These ultimately lead to 'black market' product sourcing, which ultimately yields poor services thereby affecting the legitimacy of renewable energy technology within the country. C1 sheds some light on problematic practices which some RE businesses operate upon.

> *"I have situations where people sit down and do very good project designs. But when it's implemented, the project fails because somebody has sold a product to them that is wrongly labelled or that he's deliberately been short-changed. So, you know, short-changed by some kilowatts or watts of power and that eventually leads to project failure. So most practitioners end up being insincere because people don't understand the technology. And we the practitioners end up lying to them, you know, misleading them, just because you want to maximize profit Somebody wants a battery, you won't turn the battery lifespan is between one to two years, you know, you just tell them it's five years, and*

then he invests his money, and then eventually, you know, he's disappointed because it packs up." (C1)

As the CEO of C4 confirms, fake items coming in, solar panels, all these would make life difficult for you selling high-quality supplies. An employee further indicates that though the price of high-quality supplies is high, the value of cost-effectiveness comes into play over a long period of time. Arguing that this is why it is much better to buy good quality rather than substandard products that would not last, it is identified as a fundamental factor which the C4 management emphasises upon. From C7, we see that discussions on quality and practice, and the economic difficulties push some RE practitioners to adopt quick-fix solutions, which often implies taking steps toward compromising ethical and moral underpinnings. Outlining that such practices often do not birth productive solutions. A technical staff from C7 identifies most of the businesses that blur the ethical lines and adopt opportunistic traits are non-branded RE businesses that rarely have established physical locations. Further stating that they do not have full training and qualifications which consequently affects their knowledge. These characteristics assign them an aptly accurate term of 'nomad practitioners'.

"Yeah. So that's another problem that we have we, you know, we were looking at that quick profit. And then we also don't like engaging professionals. You know, on the other side, also, when we get to the field, you know, we like to just get things done quickly, and just leaving. But efficacy and ethical practice demand that if you take your time and do things step by step, following the procedures, you know, follow the manuals, and what you've done, you follow the time required to test and ensure that your solution is properly installed. Sometimes, practitioners would go ahead and commission even when there is no grid. That way we wouldn't even know what the grid input looks like, or if it's healthy for the solution, but we just go ahead and commission, and then tell the customer "look when NEPA comes just put it on, and call me in case there is any problem". These are all very wrong practices. Sometimes we go commission systems in situations where there are no proper earthing or lighting arrestors, and that is also a very wrong practice." (C7)

C9 also touched on the phenomenon of morally questionable practices as the CEO confirms in conducting his own market research, that it was discovered that a lot of customers have been short-changed paying exorbitant amounts for poor functioning equipment. Another aspect

highlighted when discussing maintenance comes in the form of proper disposal of equipment at the end of its lifecycle C9 identifies the counter-productive practices some RE practitioners adopt, eluding to some the way recklessly dump worn-out batteries in general garbage dumps. Further explaining that in the event that such batteries are lead-acid based, they may tend to leak hazardous liquids which are harmful to the community and environment at large. If they are alternatively lithium-ion based, there is still an issue of contending with non-biodegradable components which are also harmful to the environment. C9 further explains that such practices must be curtailed as this may affect the image of RE-SMEs and the industry as a whole.

> *"So in time what you'll find out is that they must have spilt and caused some environmental hazards. That's where we also have to go back to where we talked about renewable energy being clean and green. We have to stop creating hazards for people. You know? Just like the lead acid batteries issue, because I read some of the abstracts from policies are trying to put a law stopping illegal dumping or recycling."* (C9)

With the negative contextual factor identified, it is important to note that the contextual peculiarity also presents certain factors which alternatively provide certain positive influences to RE-SMEs and the RE industry as a whole. These are discussed in the following section.

6.3. Positive contextual factors

Although contextual factors are largely negative, it has also contributed to building a sense of independence and resilience by the company management to the extent that they do not wait for local institutional support. Positive contextual derivatives are discussed as follows;

Convergence of Motivation and Ingenuity:

With the prevailing pressures present in the business environment, logical grounds for arguments for the challenges are daunting and almost insurmountable could be made. However, having a keen knowledge that the environment provides minimal support contributes to building resilient characteristics, an independent approach to problem-solving and a high level of applying inventive and resourceful methods toward solving these problems. Some narratives exemplify these attributes below;

> *"In terms of biomass in my own case what we did was…we needed to buy equipment, some of these pieces of equipment could not be fabricated or*

manufactured in Nigeria, and we needed to import them in. Some components we could actually make in Nigeria and some in Benin Republic and then bring it into the country. So to that extent, I would say there was a bit of local content but it's still minimal when I compare it to the whole equipment budget". (C5)

Through applying resourceful methods, C5 is able to circumvent its inability to access key engineering components used in its biomass plants. Another example of ingenuity is the identification of new prospective market segments which were both largely unserved and large in size. C1, C8 and C9 develop and exploit similar markets of cheap mobile solar-powered equipment such as chargeable lamps, cook stoves and micro lighting packages, usually targeted at the rural market segments. C2 focuses on the financial institutions in the private sector such as banks due to the availability of liquid cash. While C3 and C8 look into providing flexible solar home systems and street lighting projects where possible. The RE SMEs however do not rely on just one market, they are always in search of other markets to exploit and products to provide.

"Yes, one thing I've learnt about business is any business that doesn't have challenges will not be worth anything, it's challenging that makes the business worth it, it's also what makes everybody there not to be there or not to be exceeding as well. So challenges must be expected. And most times we've seen different kinds of challenges, especially when we have currency devaluations, you know like we're experiencing right now." (C7)

With the resourcefulness highlighted, ingenuity is also matched with a substantial degree of motivation within the RE industry. The respondents indicate a certain level of optimism which is a driving force behind their business operations. There is a clamour for more professional and entrepreneurial participation within the industry.

"Part of my dream for the entrepreneurs is to be able to operate in that space. So whether it is community-owned, or they're able to grow their businesses to that extent. So that's my dream. For right now, we'll see. So just being able to play across the, across the whole spectrum, I think all these things are needed in order to scale. Yeah, we need all the intellectuals and brains now to be injected into this sector. We didn't really talk about fossil fuels, but if you research, the amount of money that has been put into trying to fix electricity in

Nigeria, it's ridiculous, it is mind-blowing. And to look at where we are, you have to ask yourself, how come?" (C8)

There is also a 100 per cent positive response from all cases eluding to a genuine concern to address the national electricity deficiencies. Just as C9 refers to pressure as an opportunity to look into new ways to solve problems and acquire vital information, C10 refers to a keen interest in contributing to the Nigerian energy sector with clean and sustainable practices. The enormous energy market prospects are also brought into view as the operations manager from C4 also puts it;

"*For us in Nigeria, the market is quite enormous and we're yet to even cover 10-15% of it. We believe there are still a lot of power challenges, and I believe the renewable energy revolution has started. Probably a mixture of renewable energy and fossil fuel, but at least as an alternative energy that can complement with whatever we have now. Which can help drive the economy. One thing I know in Nigeria is that we are very hardworking. And once there's power, people can do much more. And that's what drives me and the company I work with, not just the money."* (C4)

Industrial Synergy

Being that the RE industry is still in its infancy within Nigeria, an advantageous consequence is observed in the 'bosom' relationship shared within existing RE-SMEs. This close-knit relationship enables RE-SMEs to harness a collaborative atmosphere where functional partnerships and sportsmanship are nurtured even amidst competition for electrification projects and contracts. A manager at C1 captures this phenomenon in a quoted statement below.

"So there's a lot of talk around development. There are conversations there's, you know, it's a little it's a small, big family in Nigeria and everybody knows everybody else. Every workshop I go to we all know each We're all you know, within the same space, like everybody is doing their own little bit, and we're going to get it right, you know, so it's about creating an enabling environment." (C1)

This connection and relationship are also made possible as a result of the industry's growing collaborative culture. The ability to maintain consistency of such a culture increases

prospects for an effective synergy which will pervade the entire industry. In addition, for RE-SMEs and other stakeholders, such an industrial culture also dictates the pace for any incoming stakeholders, policies or initiatives from the private and public sectors. This phenomenon is expanded upon under the stakeholder relevance section.

> *"Of course, you're competing healthily but you're also focusing on trying to do your work better. That's what we try to do, we try to do exceptional work. Yeah. So that there is no question. Of course, from time to time you'll have issues but if you do your best, it will speak for you. We need 1000s of companies, and entrepreneurs working on different sizes of projects, there is a market segment, you know, for smaller systems, and enabling these players by having equipment available on the ground, and shortening the supply chain is absolutely essential."* (C6)

Synergy is also exhibited in the periodic meetings and conferences organised by RE-SMEs under the platforms of member-based NGOs. These are avenues through which member enterprises are updated, enlightened and sensitized about requisite information and dealings relative to the industry. These platforms were also functioning during the COVID-19 pandemic in 2020 when a conference was held bringing RE-SMEs, legal experts and consultants to examine the V.A.T exemption policy which was enacted into law in the first quarter of the year.

Available prospects for the labour force:

With regards to the labour market, there is an acknowledgement of the skill levels of the available labour force leaving much to be desired, participants identify that the enthusiasm and willingness to learn by the mostly young population reduce the time needed to invest in capacity building initiatives. C2 discusses the fact that the "labour market is vibrant and they often deal with people who are willing to learn which makes things easier". From another perspective, the high unemployment rate experienced within the country creates an opportunity that SMEs look to exploit. In C4 and C8's views, the vibrancy of the labour market is not just about having available labour, but also using the opportunity to effectively engage young unemployed individuals and also gradually contribute to the gradual effort of skill building (Upskilling) within the labour market. C1 and C7 also key into this effort but from the viewpoint of woman empowerment and providing opportunities for the girl child, especially in rural communities.

> *"We find that talent is available in Nigeria. We genuinely are not worried about finding talent in Nigeria. We think there's an abundance of talent in Nigeria. Unfortunately, some Nigerians are a bit unrealistic in their demands. You do find skilled Nigerians in and around Lagos ready to work, ready to grow with your business and well-educated people. Even from the programs, we do that turns prospects to become staff. We, don't have any issues with talent here in Nigeria and in my opinion, you're always finding talent. Some of them, some guys, and some girls will be unrealistic. Some of them might jump from job to job because they'll be, they'll be chasing dollars all the time or they're chasing money all the time, but there's talent."* (C2)

In spite of the challenges, the renewable energy industry seems to be growing, but not without some adverse influences. Primarily because of the high cost of acquiring high-standard equipment and deploying services, there is a parallel growth in the black market, where sub-standard equipment is being patronised by the public due to affordability. This makes it difficult for companies with high-standard products to compete fairly. It also leads to a bad customer experience from customers using products from the black market. Consequently, they become less trusting, which presents another barrier the legitimate businesses have to scale, and in turn, the entire renewable energy industry is negatively affected. However, there are notable developments which are focused on the collective enhancement of renewable energy in the country. On this note, the next section discusses developments and features more pertinent to the outlook of the renewable energy industry in Nigeria. The following section contextualises other renewable energy features in the form of a general overview, research attention and classification of the RE markets.

6.4. Renewable Energy in Context

6.4.1. Nature of the Renewable energy environment:

The renewable energy industry in Nigeria is widely considered to be very much still in its early stages of development. Seven out of (C3, C5, C6, C7, C8, C9 and C10) the ten cases still are still on or under 10 years old, with all cases only just able to increase their capacity within the past 5 years. C1, C2 and C4 may respectively have lasted longer than 10 years, but C1 and C4's journeys have been similarly starting as a one-man and one-woman business for a long time only expanding in the brackets of the 2010s. C2 only just made a partial transition into the renewable energy space within the past decade, after years of operating in the fossil fuel-based power supply industry. The increased global attention towards issues surrounding climate change and more sustainable sources of energy has led to increased interest and proliferation of alternative energy technologies.

> *"It's a nascent industry is it is still in its infancy stage. I mean, you can be talking about some countries with, say some 20-30 years of experience in the sector. For Nigeria, we probe into the….into the mix, maybe, if I will say is from somewhere around 2010. So prior to that, there were no significant efforts or projects around the renewable energy sector. So it's still a very young industry in Nigeria. Because it's very young. We were still struggling to develop the right business model. In terms of showing that our projects are viable, commercially viable, and, of course, the problem of not having a track record is not so helpful to make the most of the opportunity we should be having in the sector."* (C6)

Despite the notable attention, renewable energy development has grown at different capacities in different regions of the world. In the sub-Saharan African region, the concept of renewable energy has taken some time to manifest in the social psyche, as eluded to by various participants. The drive towards acceptance by the general public is typically born out of the functionality of renewable energy systems rather than an apparent need to reduce carbon emissions and environmental reasons. This narrative although important in global sustainable development goals and policies unceremoniously takes a back seat while more value is placed on 'how reliable and affordable the system is (C10) because there are significant 'lapses in access to energy and power supply within the country' (C7) and the region at large.

"Okay the market here is still close to that of a virgin it is so massive and a lot can happen. We focus a lot now on commercial and industrial, starting from maybe 50 kilowatts to one megawatt, and it seems like there's a massive market there. There is a big market for anyone that wants to play in that field. And like I mentioned the main challenge, has always been funding. So if we can find a way around this funding. I think there's going to be a lot more happening in that sector. And then the mini-grid sector is still growing up in and the federal government is looking on that. The World Bank is also pumping some money in there. So it is a growing market in Nigeria." (C4)

Environmental and social implications of the RE adoption are however slowly but surely making their way into the heart and minds of individuals in the region. The rural sensitisation programs occasionally organised by companies such as C1, C5 and C8 contribute to this knowledge diffusion process. Especially towards the traditional cooking and lighting practices in rural communities which are typically using fossil-based fuels such as kerosene or firewood.

"I got to know that even kerosene lamps were a source of indoor air pollution. And it really scared me because I grew up with a mother who cooked by an open fire. So I bought into the idea of cookstoves" (C1).

All things considered, there is a steady increase in the knowledge and acceptance of renewable energy technology as expressed by an employee respondent in C8. C3 recommends that while an enterprise may not obtain a 100 per cent acceptance rate even after the third and fourth attempts, it takes consistency in following up not just for reasons of closing the sale but to also convince said clients of the value of what they are purchasing. Stating that it is vital to nurture the customers and stakeholders they interact with on the technical, commercial and practical value of their products. This often requires a detailed assessment of what is required and what options are available.

"I think a part of it would be people getting to know more. Because some people just reach out like 'Oh, I heard you guys do this. You guys do that? Can I please come along?' So I think people getting to know more". (C8)

6.4.2. RE Research Attention

Subsequent evidence of the steady increase in interest in renewable energy within the sub-Saharan African region as there is a unanimous response to the positive regarding the growing pace with which the companies are being contacted. These contact requests range from local and international media to global international organisations, to individuals from the field of academia. In entrepreneurial ventures, there is a heightened limit on how much time they could afford to engage in these discursive activities. However, the trade-off to giving their time comes in the form of increased publicity for their respective companies and industries, as well as an inward gratification that their efforts as companies have put them in a position to be recognised.

> *"Oh, I've had a lot I've lost track. Several from either PhD students like yourself, or from research institutes, we've had so many. Most are international. Indigenous not as often, we had a lot around when we launched because there was media and people were hearing of it for the first time so we did quite a lot of interviews and all that. But then we do have more on a continuous basis internationally. Again we have a lot of PhD students that reach out from different geographies. We have different bodies looking at biomass in Africa, particularly in Nigeria reaching out. I mean we talk a lot, and both myself and my C.O.O. spend a lot of time speaking to people about our business and what we do. It's part of the information sharing, it is one thing we enjoy doing, we want people to know what we do, and we want to be able to encourage more people to come into the space that we work in"* (C5).

Speaking to the Managing Director from C8, it was confirmed that part of the reason for their being accepted into the Forbes list for accelerator start-ups list was owing to the media attention she had garnered in recent years. Especially as she was not expecting to be considered on the basis of the company being over 5 years old. But still finds it reassuring to be considered innovative enough. This also brings the nuanced perspective through which RE-SMEs are classified especially in view of context. For instance, despite a key parameter of SME classification by Forbes as being not over 5 years in existence, considerable adjustments had to be made to capture the true nature of the environment being reviewed by them.

> *"Yea. Look, it's happened a few times recently, right, I mean, I've been interviewed twice for two specific reasons. Someone was doing a research paper on off-grids, one in Nigeria and another from France. So they contacted me. Another reached out from China and another from Singapore who was a*

paid consultancy. So that happens quite often, especially when they see my experience in Nigeria" (C2).

C2, C3, and C6 highlight being specifically approached more by the local media outlets. C1 and C4 discuss how frequently they are interviewed by research students with a focus on energy in Africa. Citing the huge energy burden in Africa leaving lots of people without power, thereby leading to heightened interest in the African space. C1, C6, C8 and C9 also echo similar sentiments in terms of increasing interview requests from researchers and students. While expressing their excitement, there is an admittance of the daunting difficulty of attending to every interview or meeting request. C.E.O of C1 goes a step further to indicate that a contributing factor which discourages her from granting interviews is the condescending nature in which some researchers approach the request, but on the other hand having conducted personal research, her empathy kicks in spurring her to occasionally grant requests.

"You PhD people will not leave me alone. Most times I'll think the best is to say I wouldn't do it but when I'm thinking of when I'm collecting my own data I want people to be nice to me. That's the only thing that keeps me going. Once I'm done with my dissertation now I will stop answering people. Some of you PhDs can be very rude about it. Imagine somebody will even come up. He's doing his thesis but wants to tell you he's asking you questions that will 'HELP' your company. So at that point, I'm like stiff it!" (C1).

This ultimately indicates positive growth in awareness which has not been experienced prior to the current times. C7 and C9 reverberate the sense of empathy as well, especially among researchers. Where the C.E.O of C7 indicates how usually impressed and excited he is when seeing people pushing to conduct any study on renewable energy, making it a point of duty to meet with them. Indicating that it was at the time of conducting the interview for this research was their seventh research-based interview within twelve months. C.E.O C9 revisits his studying days for his MSc as the reason indulges as much as possible.

6.4.3. Working environment

Another segment which is worth highlighting is that there is a positive and conducive work environment consciously created by the enterprises. This explains how entrepreneurs and subordinates foster a corporative workspace. This is reflected in the responses from the

participants. The side effect of this manifests in building a unique synergy, understanding and a real sense of a close-knit community. This proves advantageous when personnel are able to interchangeably play various roles while the founders or company heads can trust subordinates enough to delegate certain on-field decision-making processes or contribute to nurturing the innovative culture fostered within their respective companies.

> *"So it's to see when it is possible for you to tap into it and maybe to add on to your way of doing business. So it's a fortunate thing that I find myself in, but I count it as an opportunity and a privilege, and I can never take it for granted. So being in the renewable energy sector, working under this company is a really growing aspect for me"* (C8).

An administrative employee in C1 reiterates the collective approach practised when it comes to bringing ideas to the table for consideration. Stating that this gives them an added sense of purpose and value within the workplace. In C3 an enthusiastic response also affirms the close relationship and comradery built around the workspace.

> *"Oh, fantastic! I really. I'm enjoying it seriously. There's no hidden talk about that. Because I see it as a...let me call it a network system where you get to know a lot of people and where you'll be able to know deeper into what you are doing, exploring other renewable energy related aspects"* (C3).

This is what coincides with the relational gumptious aptitudes further justifying the benefits of ensuring a conducive, flexible and communal workspace which has stemmed from honing progressive interpersonal skills. C3 and C10 elude to the fact that the RE-SMEs are dominated by a lot of young, eager enterprising minds. Explain that this contributes to the vibrant nature pervading the RE space and the smooth transmission of knowledge gleaned.

> *"Yeah. So far so good it's been very cordial. And again as one of the top-level management staff. And as one of the top-level management staff, I mean it's not as much as if I'm trying to praise the company or the business owner, but the conducive environment creates an equal level playing ground. I can't say much about the junior-level staff but at my level, I think everything's okay. It's very nice. I'm very, very okay working here. That's why I've not been able to leave the place all these years. When I mentioned I've spent 7 years here, if it wasn't conducive I can assure you that from as per employee to organisation relationship, I would've found my way out of the place."* (C1)

While there is a substantial positive outlook on the working environment, a peculiar situation is cited by the admin and sales representative of C3. Being a woman, she described certain gender-based challenges in her line of work where in spite of her substantial experience in the field, she still has to deal with customers who are not comfortable speaking to her as a consultant, asking to speak to a male instead. This highlights salient gender-based challenges within the workspace, although it is important to note that this is purported to be experienced when dealing with customers and not fellow colleagues.

> *"I don't know if I can say this because I'm a woman working in this sector. I don't, I don't want to use the word recognition. But I know a lot of people meet me. I've been designing systems for four years now. And I was telling someone a couple of days ago that I have over 2 to 300 projects under my belt. I was going through my database, and I'm like, I've designed up to this amount of projects. But when I'm talking to somebody about a design, the person would rather talk to say, a male version. Because they believe that, you know, men are better engineers. It's quite tricky but oh well I think it's everywhere."* (C3)

The following section focuses on the market categories which have been delineated based on the information gleaned specifically from the markets currently existing in the Nigerian RE space.

6.4.4. Renewable Energy Market Categories

Under this section, the nascent market categories have been outlined in the course of assessing the data from respondents. Before reaching the categories, it is important to note that a common feature permeating through the cases is the wholesale feature which RE-SMEs adopt and include in their business operations. By definition, the wholesale feature refers to the method of creating a hub for the bulk sale of RE power generation equipment. Most of the equipment however is solar-based, owing to the extant proliferation of solar RE technologies in the country. C1, C2, C3, C4, C8, C9 and C10 have all indicated creating compact showrooms or arrangements when there are no rooms. In these settings, they showcase their inventory for customers to view and peruse through. The only case exempt from solar proliferation is C5 which deals largely in biomass base RE solutions, it also does not actively engage in wholesale show events due to the nature of the immobile nature of the biomass plants. However, through

interviews and audio, visual and print media, C5 still performs a demonstration of its power systems. It is also important to indicate the cases demonstrate significant efforts to venture into more than one market category. Some Cases such as C1, C4, C7 and C9 particularly cut across all four market categories. The specified market categories are discussed as follows:

Portable Product Market: This market is unique to the sub-Saharan African region and most developing regions. This is the market in which renewable energy is incorporated into small-sized devices which are typically essential for modern daily living. These devices include rechargeable lamps chargeable torches, single unit low voltage lighting equipment, solar/biomass-powered cooking stoves, and nifty fan-fitted hats for working under hot conditions. These products are characterised by their small sizes, the ease of mobility with which they can be deployed and their relative affordability. This represents the largest market potential where rural communities can be accessed. It is also the market where the strongest socially inclined impacts can be achieved. Cooking stoves are at the forefront of the promotion of this market. For instance, the women empowerment initiatives imbibed by C1 and C8 are instituted within rural communities where there is an observable link between the traditionally understood roles of women in the kitchen and using such traditions as an avenue for wealth promotion and RE sensitization. C1, C8, and C9 also particularly mention Pico lanterns as a solar lamp product which they acquire in their inventory for sale which is geared towards individuals such as students for study or hold when navigating in the dark. Such lanterns are widely promoted as alternatives to the candle and kerosene-based lamps which contribute to long-term health and environmental adverse effects. On the basis of exploring this market, C1, C3, C5 C8, C9 and C10 also actively exploit this market although not necessarily from a social impact standpoint, as the catalogues on their website display a number of portable products.

> *"Yep. So, as I said, the companies that we supply for a lot of them are also in the markets and selling directly. And so, you know, why should they buy so we sell a bunch of Pico lanterns of different shapes and sizes? Why would one of our entrepreneurs buy from us instead of buying from, you know, trying to find all other sources."* (C8)

The portable product market is a market which is uniquely significant within the Nigerian energy space due to extreme energy needs which are prevalent in the environment. In discovering that some of these needs could be delivered in minute portions, ideas have been developed leading to the conception of handy systems which can be sold at affordable prices

to low and mid-income earners. As C8 describes, the potential the market provides is to acquire revenue based on the quantity to be sold, that way the modest price could be offset by the volume of sales.

Solar Home Systems Market: Under this market segment, a higher capacity of units is targeted at powering particular electronics and appliances within residential homes. Currently designed with only solar-powered solutions, solar home systems are typically flexible and can be adjusted specifically to the customer's needs after a full load demand audit, after which no extra load can be added by the customer until the requisite additional power is added to the system. The solar home system is characterised by designing tailor-made standalone power systems in order to provide power to specific components, equipment and appliances within a building. It also provides an avenue for RE-SMEs to explore prospects of versatility in their power service delivery which they can add to their project portfolio. The knowledge applied and acquired in this sector is a valuable resource that the enterprises use as leverage when pitching to prospective customers. For instance, the C.E.Os of C3 and C7 both credit their motivation for RE business development to the solar home installations he implemented into his home, which in turn served as an effective marketing tool for other parties interested in solar home systems.

> *"So that's our business dynamics, but we're also into training just like some other companies doing some training on solar home systems. Another problem we have is in this system design and site assessment thing. People would just call you on the phone and say "I have a two bedroom flat, give me a quotation". There can be four different two-bedroom flats, with totally different load demands. It is very specific, you can't just give one size for all. So that is another problem. And everything is still tied to hands-on everything is still tied to standards and regulations. Because a doctor who knows they're doing wrong and is caught will have his or her license seized. But there's no fear of anything in this country, we see people using very, very slim gauges of wires for something that requires like 10 times more than that. Causing electrical problems and fires in buildings."* (C7)

A key value of this market is the flexibility with which the power systems can be deployed. While some clients may request a fridge and a fan, others might be more for an air conditioner and lighting. Some packages can be deployed with pre-set electronics and appliances, or

alternatively, the companies only provide the power system based on the desired load specifications. C1, C3, C4, C6, C7, C9 and C10 all actively participate in this market in varying capacities.

Commercial and Industrial Market: The C and I space eludes to providing power supply utility solutions for stakeholders within the private commercial and industrial sectors. This may include private educational institutions (schools, universities), down to private business outfits such as markets, manufacturing plants, banks, farms and various parts of the industry. For instance, C2's current target market is geared toward commercial banks and institutions. Explaining further, C2 outlines an advantage to targeting banks lies in the good liquidity they naturally possess in comparison to other industries. Also, C2 emphasises the increased expenditure on contemporary energy alternatives like generators contribute to the operational costs of these banks. Arguing that by convincing them to partly invest in solar systems within their branches, the banks would simultaneously reduce the strain on their capital expenditure while contributing to the energy requirements of the infrastructure. Also, the ability to convince one bank can go a long way in replicating the hybrid energy infrastructure (which is a combination of carbon-based and renewable-based systems) within multiple branches nationwide, thereby contributing positively to C2's bottom line.

> *"Well, I think with the banks, especially the top banks would be classed as bankable obviously. And they've got good liquidity. The cash, yes. But these banks are choosing not to spend their cash and appreciating assets. So? If I'm a bank and I have money and I have 500 branches that I want to buy diesel generator sets, so each bank is going buy say an 80 Kva at about 4 million naira each. The bank ends up tied tying its CAPEX in depreciating assets such as generators which will not last more than 4 years, this does benefit the bank. They just seat on the balance sheet as depreciating assets. In fact, they cost me money to maintain!"* (C2)

C4 has also been involved in establishing solar systems for a factory in Ibadan, Oyo State, in the South Western part of Nigeria. In C1's case, they indicated involvement in providing solar-powered units for schools in the Kaduna state, and North Central region, and C7 were at the time when the interview was conducted involved in reaching an agreement to provide solar units for a business not far from the Federal Capital Territory of Nigeria. C7 also eludes to the increasing acceptance the banking sector is adopting towards instituting RE energy systems to

their power generation infrastructure. Explaining that the value of such hybrid systems lies in the ability to alternate the energy sources from diesel generators to solar systems depending on the load requirement of the bank branch. C7 explains that a schedule is usually set up where generators could run during operational hours, while the solar system could be engaged when there is less load required during closed hours.

> *"Some of the potential uptakers have mentioned that outrightly that, you know, it's going to be very difficult. Especially for the large consumers. Yeah. But, you know, scaling down a bit further and coming to lower energy users, in the commercial sector, like banks, offices, etc. So that's like the commercial and industrial sectors. Yeah. So banks now are gradually accepting and implementing all sorts of solar projects through PPAs. Yeah, so I think we are one of the first companies in Nigeria to deploy that, to get them to sign that agreement. We've signed it with at least two or three banks. So they've had a massive scale-up of that project. So they were practically taking. those bank branches are off the grid here. So they especially have solar systems backed up with diesel generators because essentially, the effective operational hours for banks are between it's 8 am to 4 pm. So they're able to close the gap when solar PV cells are not generating as much so there's also a battery bank storage that augments the supply. So banks have been receptive because they see the viability and they can do it in small pockets, not that large megawatt scale, which typically is under 50 kilowatts. Most of the time that's for really large branches. Yeah, but for the smaller branches, it's around 30Kw, 25Kw, some 15Kw so they're able to sort of manage and commit to that long-term relationship.* (C7)

C3 explains that just like there has been an increasing proliferation of RE systems in the banking sector is also being replicated in the telecommunications sector, where numerous Mast/Base transceiver stations are constructed in various locations across the country. These transceiver stations usually require standalone sources of power supply due to the fact that they are often located in remote areas away from populated areas. And to this, end an exploitable basis for RE-SMEs to provide their services is created.

> *"So we have been doing that sensitization. And again some sectors have been buying into the idea like banks and other sub-sectors because they have been*

buying into the idea to be able to adapt it to its most of that be practising that and it has been helping them. Even when you go into telecommunications, nobody even relies on the national grid. But they go for the alternative which is renewable energy to solve the problem." (C3)

Mini-grid Market: The Mini-grid refers to an RE system which is designed to provide electrical power simultaneously to multiple buildings within a particular environment. It is also referred to as an off-grid system. This is because it is not tied to the national grid in any way, thereby being a standalone own grid. But the general term of off-grid is just the generation capacity, which means a group of solar panels which is stepped down as C4 describes. Providing more context, C4 indicates that Mini-grid systems have an inverter that converts the direct current (DC) into alternating AC. C6 also explains that confirms that mini/off-grid is anything out of it typically means some system that is not interfering with the National Grid. Although keenly points out that the current mini-grid projects are usually small in comparison to contemporary national grid systems, hence the 'mini' in Mini-grid, even explains that there are also microgrids. The mini-grid market targets larger projects which fall under 1 megawatt and below. In this sense, with 1MW globally estimated to power anywhere between the ranges of 400 to 900 homes, mini-grid power supply units souring from renewable sources are installed in order to supply power to a group of residential buildings such as housing estates and communities. The mini-grid space is a costly undertaking, which is why it is not commonly ventured into at the moment. The data indicate that C1, C4, C5, C6 and C7 Are currently forerunners venturing into exploiting opportunities in this space.

C6 describes a major issue RE-SMEs face in the pursuit of mini-grid projects in the form of a possible confrontation with the contemporary distribution companies (DisCos). These DisCos are private companies saddled with receiving transmitted energy from generation companies (GenCos) to the end consumers of the national grid. With jurisdictions awarded to these DisCos, RE-SMEs seeking to engage in the Mini-grid market would need to establish relations with DisCos notifying them of their intent which typically leads to negotiating the relationship between the enterprises and the DisCos going forward, as well as stakeholders within the community of interest. This brings the importance of establishing relationships of value between all stakeholders into view, which should always be considered. C7 explains such

negotiations should be geared toward developing a Power Purchase Agreement (PPA) where terms between a power provider and a power purchaser are clearly outlined and explained.

> *"So any mini-grid developers like ourselves that want to operate in those places must factor into our planning what we do with the DisCos that own those jurisdictions. So the mini-grid regulation was designed as an instrument to spell out the relationship. And when it was it was signed, I think it was probably one of its kind in Africa, stating the relationship between the Discos, the communities and developers like ourselves. The things we should look out for before we can go to any site. Under the regulation."* (C6)

There is significant evidence of completion for mini-grid projects competition, especially among the top established RE-SMEs as C5 explains, all vying for opportunities to deliver larger-sized projects than Portable Products and Solar Home Systems. Apart from the competition, C4 explains that there is a certain level of ease which is unassuming in nature, but important. This is because, in the Nigerian renewable energy space, it is the same group of company names that make the rounds, being a relatively small industry. Also, each of these businesses also has its individual business dynamics. However, some RE-SMEs as the Technical assistant of C7 admits are not so keen on venturing into mini-grids, especially distributed mini-grids, because as he puts it "if you really understand what mini-grid systems mean you'll see it is not necessarily a profit-making venture. It is more of a development of the project." C2 also makes similar claims that although it is indeed a project that solves power solutions and power problems in the country, it is not necessarily a money-making venture because they would be supplying power to villages and to rural areas that have never seen power before and may not be able to afford it. It is on this basis that the prospects of Mini-Grid systems are faced with scepticism by some enterprises. Despite this, C9 expresses intentions of approaching the mini-grid space as the next frontier they would be willing to venture into.

> *"Basically, these are the kind of things I want you to do next. Now, I'll be honest with you that will be my first mini-grid. I can tell you I've done 10 kVAs. That's like standalone systems. But this would be my first mini-grid. So you've seen that from where I was doing standalone systems also called solar home systems, where I was doing five kV or 10 kV at maximum, I found out that there was an opportunity for me to do hundred kVA 100 kilowatts of mini-grid. And, this actually made me see the possibility that we can actually expand instead*

of just doing home-to-home systems. So I can see that there are possibilities even for new entrants." (C9)

Public Infrastructural Development Market*:* In this market segment, the primary target for the RE-SMEs are public assets and institutions. These could include civil service buildings, secretariats, security outfits, traffic lights and street lights. The most viable avenue currently that RE businesses deploy actively is in street lighting projects. C7 completed a 3km street lighting project in a Plateau State, Middle belt/ North Central region of Nigeria. C9 has also been involved in small-scale street lighting projects in Lagos state. Also, during the pandemic. Within this market, the major customer engaging RE-SMEs is the government.

"We have over 100 kilometres of well-lit streets in Jos. One could drive for two and a half hours before you cover all the street-lit places and you wouldn't need headlamps. Now that is already opening up the economy and improving security. Flights are about to resume, you know, and that would be one of the tourism potentials." (C7)

While some practitioners in the industry may have exhibited opportunistic tendencies, viewing government projects as an opportunity to "rip the country off" as C9 iterates created a negative perception, especially the most of these projects were done as standalone solar streetlights across the country were awarded but poorly executed. To ensure a level of trust is established, C7 offered to the Plateau state government to refrain from paying fully upfront. It proposed to commit 20% initial upfront cost and spread 80% over the next four or five months. However there was a significant risk posed to C7 as at the time, gubernatorial elections were around the corner and the incumbent government were on the verge of power leaving office. Thereby presenting a very real risk of not being fully remunerated to get when complete payment is not made before the end of a government cycle.

Also, a training component is also introduced in this form of market venture. As evidenced in C1, C7 and C8, the government engages them in various capacities to undertake training programs. Particularly for C7 which entered into an extensive street lighting project with the government, they include a long-term agreement which is between 10 individuals from the state are chosen to carry out this maintenance training program. The opportunity this presents for the state is that they stand to have the local indigenes trained on managing that RE technology, as well as, increasing the knowledge of personnel and officers in key ministries such as the ministry of works. C7 identifies this as a vital part of their model, especially as it

had contributed considerably to persuading the state governor, who welcomed the idea of only having to pay 20% upfront. C8 opines that more state governments are beginning to push for projects further extended to more sectors, citing that these projects are able to "proliferate through almost every nook and cranny within the state capitals, streets, the internal roads, which has had a very high impact in that sense of it.

6.5. Stakeholder Relevance

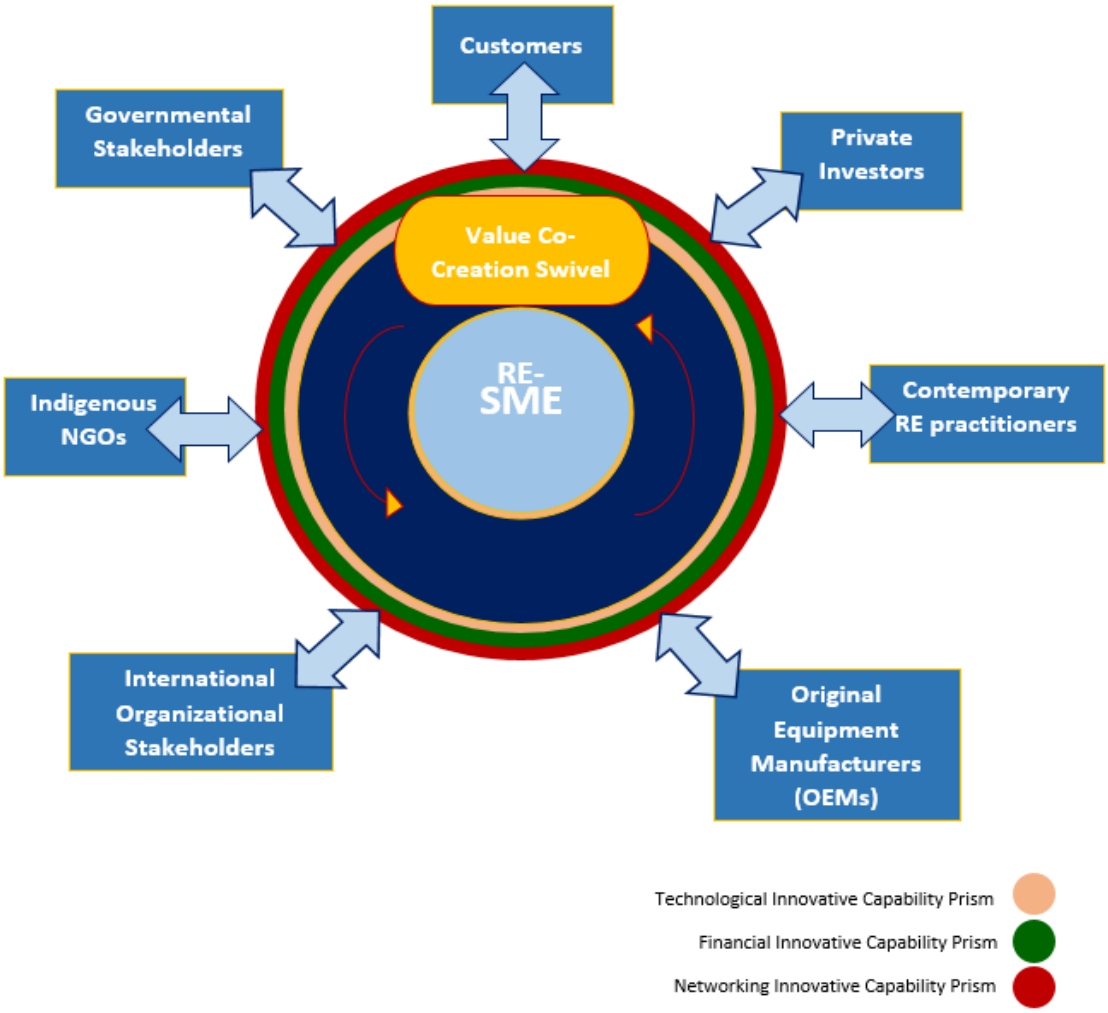

Figure 13. SME Stakeholder Value Co-creation Swivel

6.5.1. The Stakeholder value co-Creation Logic

The final aspect of the findings discusses the emphasis which has been placed upon establishing partnerships within the RE space. The cases indicate a mutually exhibited approach to the partnerships with the mindset of establishing a sharable value in the relationship between themselves and the engaging party. The cases as SMEs adopt a non-restrictive partnership model with all parties they consider as stakeholders. Notions which emphasise applying a heightened sense of value co-creation which is visible and sharable. C5 describes establishing valued partnerships as very important for any sector but most importantly more so in renewable energy, and in the context of Nigeria. It outlines that the industry is still at a very young stage, and there are a lot of lessons learnt that they as RE-SMEs tend to share through establishing relationships and platforms. Some of these platforms include the R.E.A.N. group – Renewable Energy Association of Nigeria and we also have the A.M.G.A. – The Africa Mini-Grid Association at some point. C10 also explains the importance to share and learn lessons when possible as this is an essential process which yields different business models, with different companies trying out different business models, and different companies using different equipment providers and seeing what works best in what location. C7 also sees identifying and partnering with stakeholders as a very critical tool in the sustainability and growth even of the entire sector. Because the sector still frequently has to lobby the government in a lot of ways they think there are policies the government can put in place to make it easier to conduct business. As C4 says, *"If we don't partner and come together as one voice, we will never be able to make any headway with that"*.

Bearing this in mind, our findings have also deduced active participants who are currently participating within the renewable energy space in the Nigerian context. These are classified and discussed in the following section;

6.5.2. Stakeholder categorizations of the renewable energy Industry in Nigeria

Customers

The cases in which the data has been collated have expressed in various capacities their recognition of customers as one of their key stakeholders in the renewable energy market. One reason which is immediately obvious is that the customers are the reason why businesses got into the field in the first place. An SME's existence is largely predicated on identifying a

nascent need within a market and attempting to address that need, which if achieved attracts considerate patronage.

> *"The second partnership is the community itself we're serving. Because we have to continuously make sure that we're serving the needs of the community, that we understand what the challenges are and that we're making sure at least from the electricity generation and supply point of view we're meeting those challenges and solving those issues the communities have."* (C5)

Another pertinent importance of the customers is the value they bring to the feedback loop of the entire value chain in the industry. to harness this better, RE-SMEs deliberately try to create very close-knit relationships with their customers, 'make them feel like partners' (C1), and this in turn makes the customers feel genuinely valued and recognised, thereby increasing prospects of retaining their patronage. Gleaning from the discussions on maintenance culture, the feedback loop vital to increasing durability and maintenance standards between businesses and their OEMs will be incomplete and potentially inaccurate without the input of customers. Taken from C2,

> *"You don't just necessarily need the developmental financing element. I think in Nigeria also for us, we speak a lot to our customers and find out what their biggest problems are".*

An additional aspect highlighting the importance of customers lies in the valuable marketing tool they serve as. An administrative staff of C1 and C3 have explained that the main way they advertise products and services is through referrals, giving an added sense of endorsements by already served customers. C1 posits that when prospects are hearing from already existing customers, they are able to not just get clarity in equipment functionality, but also prove the legitimacy of their service quality. This is important as C4 speaks about how they have had to work through dealing with people who have had bad experiences with inferior products and are therefore unwilling to patronize. C8 also indicates a 'hand-holding dynamic' where they work hand in hand with their customers, ensuring they are not just selling products to them but educating them on the concept of renewable energy. to the point where some customers have ended up becoming sales reps for them.

> *"It's a challenge, but it's not like a permanent challenge. And it's more of like consumer awareness, consumer education, those are the kind of things to kind*

of even raise the market potential such that the players can play with a lot of space." (C8)

C7 effectively captures the extra effort RE-SMEs take in order to ensure they convincingly and transparently explain the potential value to be captured by a customer. And if done right, this builds trust and a stronger bond enhancing the enterprise's growth prospects. C3 however highlights that while customers are indeed important stakeholders, enterprises need to constantly wrestle with creating the right balance between the customer's affordability and raising capital on each transaction. To do this, flexible and stretched-out payment packages might be deployed, although credit schemes are still developing, they increase the chances of achieving both aforementioned goals.

"Every customer is also a stakeholder. Be it an individual customer, be it the government, be it somebody who wants to buy a N1, 000 product or a person who spends a hundred million worth of a product or whatever. You know, the point is, for every investment that you make, and we happen to be the uptake of that investment, we appreciate the fact that you need to get value for your investment. A lot of times, a lot of us, don't ever let you understand that we're losing, we just ensure that you get value for investment." (C7)

A tactic C3 employs is to ensure when they are deploying a project, they execute such deployment in a neat and orderly fashion, and in instances where they are tasked with working with installing in private spaces, they are sure to remain sensitive to the demands on the customer. They do this by way of assuring the customer that they would not jeopardize any security instructions and will follow the ethical guidelines outlined in the company operations policy.

Governmental stakeholders

Although the data indicate a limited degree of participation of the government in the renewable energy space, there are still government institutions which currently interact with renewable energy practitioners. The government automatically becomes a stakeholder by virtue of its fundamental role in the national lifecycle of a country. In a civil society, its reach covers all aspects of national life in regulatory, supervisory or enabling capacities and they are chiefly responsible for creating requisite policies, departments, agencies or parastatals to institute objectives. In view of this, the RE sector is no different in regard to the attention it needs from the government. C8 talks about how the crash of the oil markets in recent years has

led to a price crash thus negatively affecting the substantially oil-dependent Nigerian economy. Further suggesting that this provides reasonable grounds to stimulate unnoticed sectors such as the RE industry and provide impetus to the industry in order to unlock the salient potential.

> *Now the oil markets have crashed, and prices have also crashed. And so, but I know that the subsidies have come out. Now maybe the government would, they will free up some I don't know, some funds for the government to now say, Okay, how do we stimulate the renewable energy sector to catalyze the renewable energy sector in order to meet our targets? This is me knocking on wood that, you know, the political will exists? And if that does, now, I think it's time that we can begin to start looking at how do we help the government as a government, start catalyzing the sector incentivizing the private sector, providing that environment for it to thrive."* (C8)

These government bodies are stated below;

Rural Electrification Agency (REA): in terms of the renewable energy industry, the current maximum capacity of any individual RE-SME is within the range of 1Mw and below, which puts them firmly in the distribution category of the Nigerian energy industry value chain. Also, the fact that RE-SMEs target communities with limited access to power supply, typically off-grid. The Rural Electrification Agency is largely responsible for supervising any extension projects to off-grid communities.

C3 contributes some narrative insight on the REA, stating they are involved in grid extension of the rural areas. Stemming from the massive privatisation scheme of the Nigerian power sector undertaken in 2013, it gave rise to the GenCos (generating power companies) and the DisCos (Distribution Power Companies). Prior to privatisation, the REA was mostly involved in grid extension to rural communities, however, with the selling to the DisCos, most of their extension into the rural areas is done through renewable energy and not the national grid. C2 affirms they are part and parcel of the government agencies that are involved in driving renewable energy.

National Electricity Regulatory Commission (NERC): This is the parent government body which handles the regulatory responsibilities for the entire power sector of the country. C5 points towards them as a regulatory body. Consequently, as they are regulating the DisCos and the GenCos, therefore, regulate the renewable energy space as well. Though they may not directly interact with RE-SMEs, they are also the closest authoritative medium in the chain of

command through which the legislative or executive policies are communicated through. For instance, the Value Added Tax exemption policy (inclusive of renewable energy products) which was passed into law in 2020, is in theory implemented and regulated by the RE-SMEs through NERC as C3 outlines.

Nigerian Electricity Management Service Agency (NEMSA): Still within the power industry, NEMSA is responsible for monitoring the implementation of policies and regulations (C5). They are also purportedly responsible for issuing instalment licenses. The body also liaises with the Standard Organization of Nigeria (SON), the governmental body concerned with monitoring the standards and practices of all private businesses and industries within the country.

> *"There is also NEMSA that is the Nigerian Electricity Management Services Agency. NEMSA is basically in the implementation side of things, ensuring that there is compliance."* (C3)

It is worth noting that all afore-mentioned bodies function under the umbrella of the Ministry of Power in Nigeria.

Bank of Industry (BOI): This is also another body which has been purported by C1, C4 and C6 to have aside funds for investment into renewable energy businesses. Set to the tune of 50 Billion naira. However, C1 points out an impediment to accessing such funds. Stating that though funds are supposed to be accessed, a problem still boils down to commercial bank interest rates. Further describing that it is an unfair and specious move to advertise such an incentive for renewable energy practitioners to access the funds. For instance, if a RE-SME is trying to bid for a 300 million naira project and attempts to access the funds from BOI, upfront he/she has to probably look for upwards of 40 million naira, which is unrealistic with SMEs. It may be more plausible to cope with such an undertaking if the enterprise's capacity is on the larger side. This presents the real difficulty in expecting SMEs to come up upfront with 40 million naira and then fulfil all the conditions for approval of such finds. Such disconnect would not be encouraging, indirectly leading to SMEs falling by the wayside by the time they get to the first or second hurdle, never mind the third.

Indigenous Non-Governmental Organizations

From the perspectives of non-governmental organisations, there are indigenous bodies which have been created for the purpose of providing platforms through which renewable energy companies and practitioners can commune and deliberate on salient issues within the

industry. The primary roles of these organisations. The primary roles of these NGOs can be characterised to be mainly of two streams which are; Firstly to provide a platform for dialogue and representation, and secondly to provide a channel through which the entire industry can effectively advocate policies from government or support from private/independent bodies of interest. This is seen effective an effective method because most developmental gains from the industry have come through the use of these channels, as C1, C3, C4, C5, C6, C7 and C9 particularly elude to. However, a tacit sentiment through all cases regarding the foremost active body in this category is the **Renewable Energy Association of Nigeria (REAN)**. C10 defines the Renewable Energy Association of Nigeria (REAN) as an independent non-profit association that most, individuals, companies and groups within the industry are a part of and is the closest structure they have to an organisational body for representation of the industry. C2 also describes REAN as the foremost body actively doing a lot in the industry after engaging with a number of similar organisations. There is also a known impact investor in Nigeria called ALL-ON is a foundation through which RE-SMEs consult and receive support in terms of funding and capacity building (C2). Another angle which confirms this is the fact that all cases are registered members of this particular association. There are other bodies which are mentioned, but some have been criticised as not being dedicated or organised enough to effect change. Another notable NGO body is the **Sustainable Energy Practitioners Association of Nigeria (SEPAN).**

Through these organisations, RE practitioners have been able to build a close-knit community where 'everybody knows everybody' (C1). Also, with the important strides which have been made through these NGOs, there is an increasing understanding of the benefits of having 'power in numbers for the collective good it presents in promoting the industry which every participant can gain from.

International Organization Stakeholders

Regarded as a major source through which a wide range of support mechanisms have come through. These stakeholders are comprised of well-recognised organisations and governments from more developed countries which have a presence in several parts of the globe. International organisations' access to governments affords them the opportunity to reach out to RE-SMEs through initiatives. These include the Dutch Good Growth Fund (DGGF), the United States Africa Development Fund (USADF), the World Health Organisation (WHO), the United States of America Development Fund, GIZ (a German-based organisation focused on sustainable development, rural and socio-economic development) and the World Bank

initiatives namely the West-Africa Power Pool (WAPP) and the Battery-Energy Storage Technologies (BEST) with a total approved amount of $465 million. In speaking about their efforts to deliver the best bespoke solutions and services, C10 discusses the collaborations and compares their standards with GIZ and the world standard for Renewable Energy. (C10). Through these initiatives, businesses are able to augment their resource lapses and establish workable support systems.

C2 and C4 both confirm obtaining funding from USAID via the power Africa initiative three years prior. C4 recounts the application process for the grants as certainly not easy due to the peculiar requirements, terms and conditions set. Also, stringent oversight functions have been put in place in order to ensure the money is spent rightly, making the funds quite difficult and very cumbersome to obtain.

> *"There are requirements to constantly write and update reports that we write a report for the next five years. Which is a good enough punishment. That's how they know how you're spending the money. You have to be giving them updates. Even long, long, long after you have used up the grant. They still want to know the updates on your company because their idea was to help build capacity or build something well for your company."* (C4)

C5 brings the involvement of a financial institution such as the African Development Bank into view. As a continental institution, C5 states the AfDB could easily crowd out the private sector in terms of the financiers quite easily due to its reach. However, the idea adopted by the AfDB is to work in collaboration with these banks to assist them.

> *"So for example, an AfDB lending to a sterling bank in the country first helps back them up, yes, but also to reduce the interest rates such that it's affordable, the bank makes the margin but is still affordable to the developer, and it's coming from a Nigerian commercial bank and not directly from AfDB."* (C5)

Private Investors

These stakeholders are individuals within the country who are interested in RE-SMEs and possess the financial capacity to contribute to the company's equity, thereby becoming shareholders of the company. C3 discusses the importance of these private shareholders, elaborating that they assess the company through key performance indicators, paying keen attention to them;

"We have our stakeholders too-though not public but private shareholders. Like the shareholders, we have key performance indicators for them so we try our best to meet up to our responsibilities to the shareholders. So stakeholders are always important in business because if you don't make them happy, you're not in business. You will not have any enabler, and when the enabler is not there then you won't be able to deploy your product and services". (C3)

C8 attributes a portion of RE development to private investors, stating that private investors within the private sector have always had and will always have a huge role to play in increasing the growth potential of the RE Industry.

Contemporary RE practitioners

This segment encapsulates the entire renewable energy businesses in the community. While there is pertinent competition amongst the businesses, there is an understanding that the market is far from saturated, thereby increasing the propensity to be more collaborative than competitive. This 'Wolf pack' mentality is especially applicable when it comes to bidding for large-scale power projects and lobbying the government for favourable policies and support.

"Okay, I mean, there are lots of companies. What we try to do is make our competitors our allies. Yeah, because it's supposed to be a huge market right? And we try to do a lot of collaboration with other solar companies that are in the space and we look at everybody's strengths. So our strength is in technical installation designs. And so if I look at other companies in that line yea there are a number of companies there in the same space but even with some of them, we try to collaborate with them. So yes there are a lot of competitors on paper, but in real life, we try to see if we can work together" (C4).

C5 speaks to the collaborative nature fostered by the RE-SMEs due to the nascent limitations in generating large-scale power supply. Also particularly for C5 as a biomass-based energy enterprise. Looking at the electrical component and the sector in general, the enterprise partners with all the companies, particularly when implementing mini-grid projects. C5 has partnered with existing companies which are solar, made possible due to the similar electrical components they have. They also sought private partnerships when looking to implement pre-paid metering by looking at the local market to see what was applicable and what their mini-grid partners. Through collective private partnerships, they contribute to the decision-making process that is geared towards improving the functionality of the sector. Another important

point which brings RE practitioners to the helm of stakeholders is iterated by the C.E.O. C4 discussing that there is only so much information that could be hidden when it comes to the implantation process of RE electrification components, therefore a good way to capitalise on this adopt a sense of collective knowledge application as opposed to adopting an aggressive stance towards competition.

> *"You know because the market is so big in Nigeria we haven't really gotten to a point where…I mean there is competition…so let me break it down starting from within the renewable energy space, there would be competition between the different types of energy providers, so solar, biomass etc.* (C5)

Original Equipment Manufacturers

These are principally the suppliers and manufacturers of renewable energy equipment to the RE-SMEs. They play a significant role in providing technical assistance to the businesses and conducting collaborative training with company personnel, putting them through the necessary rudiments of their technology outfits, and also carrying out follow-up pieces of training on new updated technologies where necessary. In some situations, OEMs provide financial assistance to RE-SMEs, partnering with them via a possible Memorandum of Understanding (MoU) or other binding documents. With the value OEMs provide to RE businesses, they also receive value through harnessing data valuable to accurately develop their products better.

> *"Okay, um, basically, it works well. It's a good thing in the sense that we communicate most times with our OEMs that's original equipment manufacturers. We collaborate with them and originally designed ideas because unfortunately, we cannot produce them here in the country. So we tell them what works for Nigeria, send them design, send them calculation, they're able to do samples for sending those Nigeria we test."* (C7)

C3 goes as far as suggesting that if an enterprise wants to have sustainable success, the manufacturer has to be considered a major stakeholder in the business. Because being in the service business, if a RE-SME deploys a product and is not getting adequate technical support from the O.E.M (Original Equipment Manufacturer), there would be a serious problem in future. C1, C3, C4, and C7 have all directly spoken to the fact that most of their sales we give with warranty support, so if an enterprise does not have a manufacturer that honours the

warranty terms and conditions, the enterprise would be greatly at risk. Therefore manufacturers are considered to be major stakeholders. C10 also affirms the importance their manufacturers have in their business.

> *"With a highly skilled and experienced team and major technological partners that are world-class manufacturers."* (C10)

CHAPTER SEVEN

DISCUSSION AND CONCLUSION

This study has examined two guiding objectives. The first is understanding the innovative capabilities which have been developed by SMEs in order to grow their business capacity. The second is in understanding the role that contextual conditions play in influencing the innovation development process (Nguyen and Neck, 2008; Gibson and Jetter, 2014; Putra et al., 2020). Based on the multi-case study of ten RE-SMEs in Nigeria, we have been able to discover evidence of unique innovative capabilities which answer Q1 by providing insight into the process of beginning human characteristics necessary for the innovative capability development of the enterprise. At the enterprise stage, the study builds on the dynamic capability perspective (Mezger 2014; Teece 2018; Huikkola et al., 2022), further embedding its functionality from an SME perspective. With regards to Q2, the particular inclusion of the relevance of context accentuates the complexity and relevance in relation to the importance of stakeholders and their influence on augmenting contextual conditions affecting contemporary SME operations (Elbanna et al., 2020; Panca et al., 2020; Child et al., 2022). By answering RQ2, we have also been able to unpack the contextual challenges, as well as peculiarities which serve as an advantage for SMEs, further enriching the discourse on BMI-SME discussions.

7.1. Theoretical Implications

The first implication of the data relates to bridging the gap in understanding innovation and SME literature (Arbussa et al., 2017; Anwar, 2018). While BMI emanated from strategy and management, a deeper understanding of how this BMI process is developed is rather scant, thereby creating grounds to contribute to giving more insight in this regard. Our study highlights the peculiar creative processes SMEs adopt in a developing economy. The study develops the SME innovative capability development framework (Fig. 12) which depicts the integration of individual traits, dynamic capabilities and the outputs these processes lead to. From personnel level traits and how it influences the innovative characteristic of an enterprise as well as its effects. Hence, an empirical analysis by way of personnel level traits (PLT) gumptious aptitudes that are commitment, strategy, notional, relational, prospect spotting, marshalling and upskilling in nature. In continuum, their connection with formulating dynamic capabilities of sensing, seizing and reconfiguring (Lai et al., 2012; Teece 2018; de Silva et al.,

2019) on the level of an enterprise and the core outputs the process leads to. The dynamic capabilities in this research are representative of the enterprise-level traits (ELT) which are influenced by PLTs. Also, the study reveals that the customer-centric, system-centric and source-centric value propositions outlined dictate the trajectory of dynamism in the capability to sense, seize and where to re-configure ELTs (Schoemaker, Heaton and Teece, 2018). The tripartite perspectives in value proposition have been identified by the SMEs as a result of their assessment of the enterprise strengths they could leverage on. With regards to the customer-centric value proposition, an SME would adopt such a proposition when they recognise prospects in emphasizing building and maintaining relationships with their customers. A system-centric perspective puts their propositional focus on their tested proficiency and expertise in delivering their service, ensuring they emphasize improving their methods, and processes and employ them when trying to identify, create, and deliver value for themselves and other stakeholders. While in the source-centric perspective, a substantial focus of an SME would be centred upon their accessibility to the resources and raw materials necessary for their products or service. We also surmise that the three value propositions do not have to be independent of each other, a chosen value proposition only indicates the perspective which an SME chooses to lay the most emphasis upon. This offers new grounds for understanding the individual traits which influence the innovative characteristics of an SME and the capabilities that are channelled by the SME forthwith, Hence, clearer in-depth insight and construct clarity (Casadesus-Masanell and Zhu, 2013; Foss and Saebi 2017; Asemokha et al., 2019; Schaller and Vatananan-Thesenvitz, 2022) is provided for theory building in business model innovation for SMEs in developing economies.

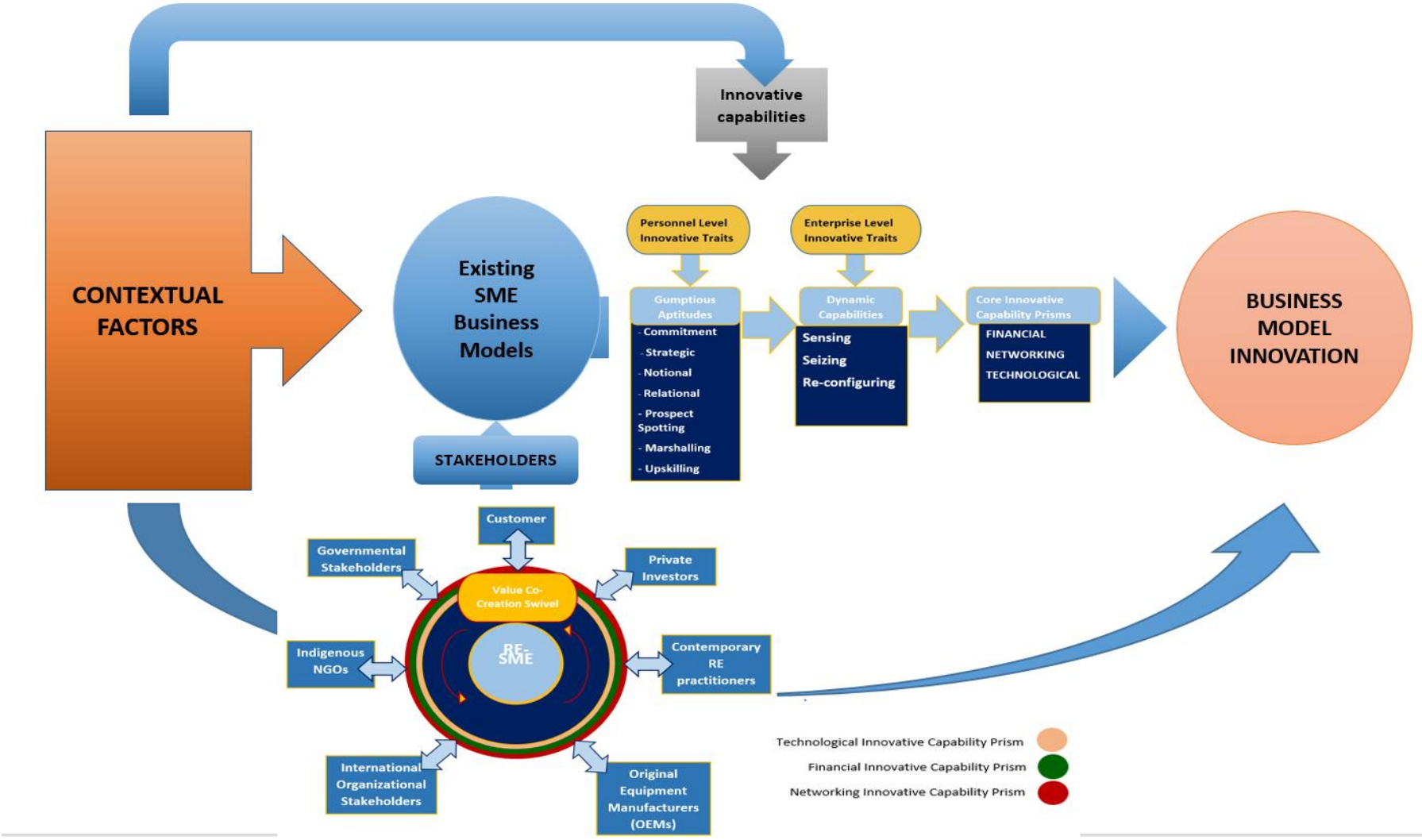

Figure 14. Holistic SME-BMI development framework

Second, the research also captures tenets of contemporary business model concepts in terms of their adoptive behaviour in accepting and instituting innovation. The RE-SMEs have shown traits of adopting a flexible but incremental approach to adopting any form of innovation, largely owing to the uncertainty of the environment. By being flexible yet incremental, we refer to the ability to be agile in strategic decision-making. While this is inherent in RE-SMEs, our study introduces the notion of also applying innovation in a gradual/staggered process, indicating the incremental nature of innovation adoption. While there are also instances where an SME indicates a radical approach, the feature of flexibility is also employed in the BM process. This connects to the foundational discussions of incremental and radical approaches to business model creation (Chesbrough, 2007; Amit and Zott, 2010; Demil and Lecocq, 2010; Kraus et al., 2022), as well as more recent discussions of incremental, evolutionary and radical BMI (Velu, 2016; Foss and Saebi 2017; Inigo et al. 2017). A fundamental factor in the adoption of an incremental approach to BMI is predicated on the heightened level of uncertainty experienced in developing economies. It is for this reason that SMEs also imbibe a high level of flexibility in spite of the gradual nature in which they adopt and implement innovation. The other opposing approach to the aforementioned BMI-SME adoption is a flexible but radical approach (Hennart, Majocchi and Hagen, 2021). This is where an enterprise adopts a fast-paced and more holistic approach toward implementing innovation within its enterprise. While also maintaining flexibility, the purpose of an SME is to be radical to ensure focus on harnessing immediate ingenuity. In terms of the management style adopted by RE-SMEs, they are also favourable to employing a flexible decision-making process.

Third, the results provide insights into the existing business models of SMEs and it also contributes to linking BM literature and strategy in the way renewable SMEs do. Through our research, the findings have been able to modify the formative conceptual model (Fig.8), infusing the SME-BMI innovative capability development framework, as well as the SME stakeholder value co-creation swivel into the SME-BMI. While this has been deduced through the purview of RE-SMEs the framework can be adopted and utilised by SMEs across sectors. A particular difference would be in the configuration of stakeholders under the stakeholder swivel. The current business models adopted by RE-SMEs are under the dichotomy of the cash-flow model and people growth model. The cash flow model refers to the BM in which an emphasis is placed on creating multiple revenue streams with the aim of maintaining the financial strength of the enterprise. On the other hand, the people-growth business model places an emphasis on adopting a human development approach, working in tandem with prospective

customers in order to proliferate practical alternative energy-sourced products. With respect to comparisons, both BMs possess peculiarities which offer advantages to entrepreneurs. The cash-flow model lays emphasis on building multiple revenue streams and profit pools which have potential. With this, the BM trajectory is borne out of a need to be inventive in accessing multiple target markets. A key aspect of success is the ability of the RE-SME to create feasible and diverse payment mechanisms for the customers to assess and be convinced to pick from. This is due to the obvious fact that RE proliferation is still a considerably capital-intensive concept, thus RE-SMEs within developing country economies have a greater need to take this factor into account when approaching their target markets. Examples of such payment mechanisms include venturing into credit schemes, and flexible but sustained payment instalments, solar home systems which all denote the be-spoke characteristic which pervades the RE industry in various capacities and practices. The People growth model focuses upon the human impact factor of their business strategies with the goal of building strong, valuable relationships with a nurtured intent to establish, maintain and retain recurrent customer patronage. There is also a purposeful relationship-building approach by close marking and hand-holding the customers every step of the way. This however requires a lot more investment and resource channelling towards creating fluid and stable communication networks than the Cash flow BM. While success may be heavily dependent on the ability to retain prospective customers, substantial value when achieved manifests in the form of also enlightening the customers, thereby enhancing knowledge diffusion and increasing market scope.

Fourth, taking a script from past research looking into the business models existing within the RE space (Richter, 2013; Bocken et al. 2014), our research contributes to expanding the narrative not just in RE companies in general, but also the heterogeneity which is exhibited and specific to RE-SMEs. As prior research has eluded to the motivation of entrepreneurs to be formed largely as a result of economic factors (Casero et al., 2013; Gabriel et al., 2016) the findings of this research contribute to additive notions of entrepreneurs going into business as due to sensing an opportunity as opposed to just factors of economic necessity. From the responses, a high sense of motivation can be gleaned which is essential to the formative personnel traits which are crystalized into the gumptious aptitudes inherent in these entrepreneurs.

Fifth, we provide deep insight into the understanding of the nature of renewable energy businesses in sub-Saharan Africa. Although sustainable energy literature has been gaining more ground (Stubb and Cocklin, 2008; Abdelkafi and Tauscher; Schaltegger et al. 2016), there is still a paucity of understanding of the manner in which it is adopted and applied in different parts of the various contexts. Empirical evidence has only started to emerge and is still in its nascent stage. Concerning sub-Saharan Africa, new theoretical insights have been provided with regard to the external and internal factors influencing RE-SMEs in their innovative process toward sustainable development. In our study, it is shown that the RE-SMEs have actively ventured into the energy space with a conscious decision to implement sustainable practices by the nature of alternative RE energy sources (Schaller and Vatananan-Thesenvitz, 2022). There is also evidence of a triple-bottom-line approach that the RE-SMEs are purposefully adopting in terms of expanding on social, economic and environmental implications. An instance which portrays this is the nature of the people growth BM which looks into going every step of the way in enlightening the customers while providing an insight into the services the renewable energy industry has to offer. Certain RE-SMEs incorporate social-centric initiatives by infusing empowerment programs to effect a change of perception within their communities. Enterprises engage with the stakeholders in the community via awareness campaigns on the practical use of renewable energy (Tomola et al., 2021; Derks et al., 2022). This portrays the instrumental perspective of the stakeholder theory. Such initiatives have led to steady growth in the proliferation of solar cooking stoves for instance. Some RE-SMEs have also taken a step further by training and turning customers into active marketers and promoters, eluding to unlocking the economic prospects for the stakeholders and the industry at large. The cook stove initiatives also provide grounds to educate prospective customers on the environmental implications as opposed to contemporary methods of cooking fuelled by firewood. This provides theoretical insights into understanding sustainability in developing country contexts.

Sixth theoretical contributions are in the form of contributory narratives on the relevance of stakeholders in terms of developing country contexts. With the limiting resources outlined by SMEs, the importance of recognising and identifying value amongst stakeholders has become more apparent in the literature (Boons and Ludeke-Freund, 2013; Bocken et al. 2019; Freudenreich et al. 2019; Velter et al. 2020). Extant literature has eluded to the importance of demonstrating efficiency through normative, descriptive and instrumental orientations, which are the major tenets of the stakeholder theory (Harrison et al. 2010). It is upon the basis of the

recognising value that can be created for a business and the stakeholders that resource constraints can be managed efficiently (Stubbs and Cocklin, 2008; Breuer and Ludeke-Freund, 2017). To this end, we have deduced that RE-SME cases for this research have also reacted positively to the importance of considering stakeholders and creating valuable partnerships. As several stakeholders have been outlined by the RE-SMEs through a theoretical tool which has been designed in the course of the thesis. We refer to this tool as the SME stakeholder value co-creation swivel. This instrument serves as a tool for which SMEs identify and constantly review the value co-creation logic between themselves and each respective stakeholder. It explicates the agile nature that SMEs within developing economies possess towards maintaining collaborative stakeholder relationships. The tool also presents an additive factor in the form of colour-coded spheres representing the core innovative capability prisms (derived from the SME innovative capability diagram). These colour-coded spheres explain that enterprises aim to channel their stakeholder relationships towards assisting their financial, networking and technological capabilities.

7.2. Managerial and Policy Implications

The research also provides implications of a managerial nature. First, it is evident that there is significant pressure on SMEs to be creative in managing their resources. More so, managing this within a characteristically erratic environment further compounds the need for flexibility and innovation. The first managerial implication stems from the active utility of the gumptious aptitudes which are their personnel-level traits. The awareness of these traits by entrepreneurs creates an avenue for visualising the characteristics they possess thus enabling them to employ various perspectives in channelling their PLTs towards their SME innovative capability process. In essence, we find that the effectiveness of innovative capability development for SMEs is contingent upon the effective use of the personnel level traits to influence the enterprise level traits, which ultimately channels the core innovative capability prisms towards achieving innovative business objectives. Entrepreneurs should be able to apply the innovative capability prisms of Finance, network and technology in order to direct their objectives.

Second, the collective industrial synergy adopted within the RE industry provides grounds for a strengthened prospect in value co-creation. Serving as exemplar enterprises, the RE-SMEs

exhibit a strategic choice of considering potential rivals as prospective partners as opposed to pure competition. A combination of the high energy deficit, the limited deployment capacity of individual RE-SMEs and the relative infancy of the RE industry provides a salient scenario in which the RE –SMEs approach business prospects not from an individualistic standpoint, but are open to collaborating with competitors where and when necessary. By implication a tendency to cooperate encourages strong relationships which pervade the RE-SMEs, thereby engendering a propensity for seamless synergy. For instance, the current traits of physical and virtual interactive fora (e.g. conferences, meetings, seminars online and in person, non-governmental bodies) of this have been directly instrumental in fostering productive dialogue towards enhancing the industry in its entirety (Muller, Bulinga and Voigt, 2018). The resultant outcomes have manifested in the form of keeping up to date with contemporary trends, approaching project bids, grant applications and favourable policy advancements. This makes the need for businesses to complement their resource lapses by establishing valuable relationships, thereby highlighting the importance of having a holistic view of stakeholders available to a company. The partnerships which have been established, and the manner in which the relationships between the business and all stakeholders are managed, create value for the business by contributing to the overall objective of the business. It is, for this reason, a key theme which is peculiar to the research is the notion of value co-creation (Wilson and Post, 2013). In the sense that practitioners echo tacitly the collective importance of not considering themselves as contemporaries, but as colleagues and fellow practitioners (Palmie et al., 2022). Their responses suggest that while they might be contemporaries, the fact that they are a growing industry, situated in a growing economy, presents a scenario where the evolution of a collective value trumps any individual urges for engaging in fiercely competitive practices. This is besides the fact there is a strong agreement for establishing partnerships and managing all stakeholders across the board. Respondents see value in maintaining favourable relationships with all stakeholders in order to ensure better output and fluidity in service delivery. The logic of pursuing value attainment in the purview of the business objective, understanding the potent value in leveraging on ‘knowing who to connect with, while recognising that a sense of value must be mutually established provides firm grounds in considering value co-creation as an essential aspect to SME growth in developing country contexts. In essence, a business has to. Understand the importance of not being an Island in business, and understand that they must be acutely aware of who they interact with directly in the day-to-day running of their business while consciously pursuing ways to channel the interactions towards yielding value for the company. And recognise that as a company the

relationships established must be managed in such a way that all stakeholders are not just yielding value for their businesses, but are also yielding value for all stakeholders.

Third, the environment presents issues and significant challenges which have a direct external influence on RE-SMEs. The high rate of erratic characteristics palpably stimulates the inherent need for innovativeness and flexibility. But it is also important to be aware of what challenges are specifically an affront to the SMEs. A wide range of contextual observations has been discussed which contributes to giving a holistic bird's eye view of the interactive factors within the country (Putra and Santoso, 2020). In doing so, nascent pressures and peculiarities have been examined. The latent capacity of RE-SMEs in terms of individual operations is very limited, especially when factoring in the environmental pressures the businesses have to contend with. In a bid to address this, businesses have consequently sought to create supplementary strategies which assist in extenuating these pressures. For instance, the lack of standardisation has given rise to sub-standard practices and equipment mostly by unbranded nomad practitioners. This should serve as a flashpoint for policy implementation and institutional support. While there is an advantage the limited standardisation may also present grounds for creative freedom for SMEs to explore, experiment and innovate, it also gives room for bad practices which if left unchecked negatively affect the industry image and trust of the enterprises by prospective customers.

Fourth when it comes to viewing sustainability in a developing country context, it is important for players within said contexts to take note of the peculiarities within the business environment. Sustainability-centric models such as the triple bottom line of a social, environmental and economic outlook (also referred to as people, profit and planet) have been very effective in aiding a broader global understanding of sustainable practices. However, it must be stated that the salient nuances already identified in the developing country context also affect the approach to which sustainable thinking should be perceived and practised. From an enterprise perspective, it is important to emphasise highlighting the product or service value to the prospective customer before introducing any other value. RE-SMEs naturally are centred within an industry promoting modern and futuristic energy solutions, however, pitching the environmental value of an energy system would not be convincing in a developing country context. An emphasis has to be laid upon the functionality first, as renewable energy is very much in its infancy. Another aspect for consideration is the cost of said product/service, which can be augmented by offering payment options which are flexible and malleable. From this instance, we can see that economic sustainability, representing cost for customers but profit for

the SME would be at the forefront of both parties. The successful achievement of a mutual value increases prospects for convincing more patronage, thereby enhancing prospects for a larger socially sustainable diffusion. Finally, the last mile of environmental sustainability can be introduced after the economic and social perspectives have been tested and trusted. Understanding this could also aid developing country governments in designing supportive instruments and policies which would be more effective in enhancing contemporary sustainable practices on a national scale.

Finally, stemming from the previous issue of peculiarity also applies to the mode of business practice. As SMEs, there are notable inherent limitations in terms of their capacity, more so when situated in a developing country. This phenomenon often leads to their vulnerability when faced with information and resource asymmetry when faced with larger competitors and institutions, thus creating more pressure. In a bid to address this SMEs are often prone to abandoning their BMs in favour of adopting what is practised in larger multinationals or SMEs in other countries. Specific to RE-SMEs historical evidence attests to this being a key reason for SME failures. It is for this reason that SMEs must adopt a philosophy of supplementation as opposed to an outright substitution of practices and strategies. By supplementation, SMEs stand a chance to maintain strategic elements which are effective within their respective environments, while complimenting such strategies with elements which are relevant and applicably derived from similar enterprises within more developed countries. A substitutive approach would not take into account the contextual nuances. To this end, SMEs possess an opportunity in ensuring these peculiarities are captured ad espoused when dealing with stakeholders (government, international bodies, multinational companies etc.).

In summing up the discussion, the innovative capability development framework deduced from this research provides the first major finding for practical and theoretical development for BMI. Through the framework, we are able to understand the importance of not only developing capabilities but feasibly identifying how SMEs generate, harness and direct innovativeness for a sustainable competitive advantage. The inception of the seven gumptious aptitudes via PLTs forms the guiding Enterprise Level Traits (ELTs) which influence dynamic capabilities of sensing, seizing and reconfiguring. To complete the IC process, SMEs should consider applying their capabilities through the prisms of finance, building networks or technology (CICP). The other major contribution of the stakeholder value co-creation swivel (VCCS). SMEs face a higher degree of external pressure which limits their bargaining power and

accessibility to resources. A vital way to augment this problem therefore comes inform of establishing relationships of value with stakeholders. SMEs must be agile in taking advantage of the growing collective value-building partnerships. The SVCS plays an integral role in helping SMEs channel CICPs to augment lapses and enhance financing, networking and technological capacities.

7.3. Limitations and future research

Several caveats should be taken into consideration and should be considered in future research. First, there are limitations in the scope of research, as it has been studied within a singular country context. While being the largest African economy and global developing economy, Nigeria is still a singular country which brings limitations of replicative characteristics into the limelight. The Nigerian respondents may be valid candidates to glean business traits from in the African context. But in order to further test the current findings, and theoretical and managerial implications it would be prudent to veer towards conducting more research within other similar contexts in order to improve the generalizability of the conclusions. Furthermore, giving the possibility of comparative analysis, research can be conducted between two or more countries in a continental and cross-continental developing country context.

Second, the samples of respondents were solely within a particular sector which is the renewable energy industry of Nigeria. Although it is indeed representative of an emerging and innovative field, the renewable RE industry is just one out of the many industries and sectors present within the economy. To this, future research could conduct further investigations within SMEs in multiple sectors of the developing economy. This would be vital to understanding and capturing more peculiarities as well as corroborating our extant findings where possible.

Third, there was also a limitation with respect to the data collection. Firstly, the process had to be subjected to strictly virtual interviews owing to the covid-19 pandemic which coincided with the timing for the data collection. Hence, fieldwork was mainly online in the form of interviews via platforms such as zoom, skype, and WhatsApp as well as written feedback interviews. While this may not be in line with traditional face-to-face interviews largely espoused and adopted in contemporary qualitative based research, it is worth noting that the respondents for this research were very engaging, averaging a duration of 1 hour and

above, besides 3 respondents which were between 30 to 45 minutes respectively. However, it is also worth noting that accessing data within the African context can be considerably difficult, with limitations in response rate which we experienced in the course of our research. Bearing this in mind, it is important to highlight the research idiosyncrasies when it comes to data access and collection within developing African economies.

Fourth, the research could also benefit from a longitudinal study in order to shed more light on the BMI development process being that by nature it is an ever-evolving phenomenon. A promising research topic is to examine the characteristics that may be present in other company sectors such as multinationals who have established footing within the developing country space in order to observe if their contextual peculiarities are present in their experiences.

Fifth, the study approached answering the thesis questions with a focus on the interrelationship between BMI and DC, as well as the impacts stakeholders have within the context. Further research could be considered in order to consider other management concepts and theories which may provide a contributory or alternative view on the concept of BMI from SME perspectives within developing country contexts.

7.4. Conclusion

This study touches on the issue of scalability within SMEs through business model innovation. Potential theoretical contributions include propagating more insight into BMI and SME development. Understanding the intricacies pertinent to how the exploitation of opportunities through BMI provides another angle for potential theoretical contributions to research.

The study explored the phenomena through nine chapters beginning with the introduction to the research. It provided the foundational arguments upon which the research is predicated. With a brief descriptive overview of the BM concept and its continuous development in relevance with theoretical literature and practical application in the business environment. This was followed by the introduction of innovation in BM literature, which highlighted issues that eluded to the salient limitations with respect to exploring BMI and SMEs in developing country contexts. The guiding question for this research was constructed into two main trajectories which were as follows;

1. Which capabilities do SMEs use in their BMI process in order to scale up their business activity?

2. How do contextual conditions influence the transformation process from pre-existing BM to adequate innovative BMs?

The chapter concluded with a discussion of the contributions and an outline of the research.

Chapter two contains the related literature within the confines of business model innovation, SMEs, scalability, innovative capabilities, sustainability and stakeholders. This included the definitions and dimensions of BM and BMI. This also discussed contemporary approaches to BMI, as well as BMI perspectives on sustainability, scalability and SMEs. A deeper focus is also outlined in terms of the extant identifiable features in relation to innovative capabilities which include dynamic capabilities, entrepreneurial competency and establishing a connection between SMEs. The BMI concept is also investigated in the purview of introducing stakeholders and the degree of value they have in the BMI process.

The third chapter is dedicated to literature on renewable energy, where an overview is present regarding BMI in contemporary literature on renewable energy. Discussions on policies relating to RE development are also infused into the section. This is followed by the fourth

chapter in which the contextual discussions in terms of BMI, SMEs and renewable energy in relation to the sub-Saharan African environment and through the purview of Nigeria in particular. Renewable energy is also discussed in the context of the Nigerian environment. Chapter five crystalises all the studied literature into a theoretical framework and highlights the interconnectedness between the formative theoretical blocks in terms of BMI, stakeholders and their role in value co-creation. Chapter six looks into the methodological underpinnings undertaken in the course of this research. Since the thesis sought to understand the intricacies formulating BMI development in relation to context, a qualitative interpretivist multiple case study approach was adopted to obtain genuine knowledge of germane knowledge of the real-world interpretations in relation to the research objective. Chapters seven and eight respectively entail the findings and discussion, leading to this final concluding chapter.

From an SME perspective, the thought of assuming an innovative stance comes naturally in order to maintain a competitive advantage in a developing economy. In the course of this research, the innovative process has been linked to a transition of seven key traits from an individual human perspective. Such traits are vital to outlining the influence for which dynamic capabilities of the business enterprise are channelled to know when to sense, when to seize and when to reconfigure their business models. A final aspect of this innovative business model development process entails the practical ways through which the previous stages are applied, which from a SMEs perspective are primed towards the financial, networking and technological capabilities and opportunities available to them.

With regards to investigating the contextual factors, as discussed in chapter eight, regional context plays an essential part in influencing the stakeholders which are in and around the SMEs. This eludes to the importance of taking note of the nuances within the environment and ensuring that they are captured in the business development process. Also when it comes to the sub-Saharan African context which is an exemplar of a developing economic region, the onus is on SMEs to establish valuable instrumental stakeholder relationships which they could leverage and ensure resource lapses are kept to a minimum. Failure to do so would provide grounds for stronger external pressures.

From a renewable energy perspective, the global interest in renewable energy has been substantially increasing. Though this is generally positive, discussions of business potentials within the sub-Saharan context are not as pronounced and require more attention. This is important as the challenges in power supply faced within the region present an evident business

opportunity which can be exploited by increasing the power generation capacity while leveraging on the global clamour for using cleaner sources of energy. Therefore identifying efficient management processes which can hasten RE propagation for intended businesses is essential to solving the power crisis. It is, for this reason, the business model innovation is identified as a potential conduit through which RE businesses can achieve said goal.

Using the BMI to investigate RE potentials provides an opportunity to actively gain more insight into the concept of BMI, and its practical capabilities for navigating unique contextual impediments. Undergoing this research also creates the opportunity for increased clarity regarding the fundamental components of the BMI narrative. This would ultimately contribute to the body of knowledge in BMI academic literature.

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APPENDIX A

A.1 Rationale for Interview Questions

Research Questions	Rationale behind question
Participant group 1: CEO/MD/Administration	
Section A: Background information	
1. Could you describe your educational background?	-To help understand the level of education of the individual (can contribute to understand literacy levels)
2. What were you doing before getting into establishing/taking over/joining this business?	-More insight into the motivation. Whether it is factor driven (common in developing countries) or opportunity driven from an entrepreneurial perspective.
3. How did you end up in the renewable energy industry? And why the Renewable energy industry in particular?	-Consolidates understanding the motive behind venturing into the renewable energy industry in particular. Deducing their experiences and also contributing to Q2.
4. Does a moral orientation have any role to play in establishing this business or business model? If YES/NO, how?	-Exploring BMI phenomenon from developing country context requires a holistic approach. Religious perspective could give rise to further studies on the degree of religious/moral influence on business in the sub-Saharan African context.
5. Does a moral/ethical orientation also have role to play in your establishing a renewable energy business? If so, why?	-This narrows the focus down to deduce any moral/religious influence on the development of the renewable energy industry from developing country perspectives. Especially as the context (Nigeria) is a highly religious society.
SECTION B: Research interview Questions	
(I)NAVIGATING THE BUSINESS ENVIRONMENT	
1. How would you describe the renewable energy industry in (Nigeria)?	-Gives room for participants to express their opinions on the state of the renewable energy industry.
2. In your opinion, who are your existing competitors?	-Understanding the level of competitiveness of within the field, as well as influences on them

3 How conducive is the current business environment?	-Gives option to understand current experiences of the businesses so as to deduce possibly unique characteristics pertinent to the given environment.
4 Are there any challenges in this environment? What are they?	-A follow up question to the previous question. To understand unique contextual factors affecting renewable energy and SME growth.
5 Are there regulatory bodies specifically dedicated to assist your kind of business?	-Specifically designed to get an idea of the governmental structure and support available to the business.
(II) SCALING UP	
1. Does the firm currently have any plans on increasing Its capacity?	-To look into the possibilities for growth of the business. If there are intentions to. And also to provide an introduction into factors affecting the process.
2. In what ways have the business expanded; or would you expand?	-In most cases, it is the inherent intention of every business to grow. However it is specific to their individual experiences, so the aspects to expand may or may not be the same.
3. Does the current business environment encourage/discourage scalability?	-Looks into possible impediments to growth within the business environment. In order to better understand the challenges faced by the business.
4 Are there any incentives for your type of business?	-Ties into the previously asked question on regulatory bodies and governmental support. Especially as there is an established correlation between the incentives and business growth.
5. Have you applied? If YES, describe the experience, if NO why?	-To further understand the level of ease/difficulty and overall access to support structures provided by the government and private sector.
(III) STAKEHOLDER RELEVANCE	
1. Do you consider partnerships relevant to your business? If YES/NO, why?	-Being that the research is investigated from SME perspectives, the limited bargaining power possessed by these businesses gives room to understand if establishing relationships are relevant.
2. Have your business established any business relationships with prospective stakeholders?	-Serves as a follow up question to the first question.
3. In what ways have they influenced your current business model?	- Designed to look to helps assess the degree of relevance stakeholders have on the value identification, capture and delivery system of the business.
4. How valuable are stakeholders to your business?	- Serves as a follow up question to Q3. And also how to help deduce the personally informed opinions of the participant.

5. Would you advise SMEs to consider stakeholders in their business model process?	- Based on the Nigerian perspective, do businesses tend to gain from building stronger stakeholder relationships or is it irrelevant?
(IV) BUSINESS MODEL INNOVATION	
1. What sets your business apart from other renewable energy companies?	-Targeted to deduce the innovative capability of the business in comparison it its competitors.
2. Would you classify it as your business model? And why?	-Serves as a follow up to the previous question.
3. What process(s) do you adopt when faced with uncertainty?	- Contributes to understanding the innovative practices and capabilities of the company
4. How often do you reconsider adjusting your business model, and why?	- To understand the shifts, trends and influences for developing innovating capabilities for existing business models.
5. What indicators encourage you to re-invent your strategy?	- Specific to garnering the influences for innovation for the business.
Participant Group 2: Employee based questions	
SECTION A: Background information	
1. Could you describe your educational background?	-To help understand the level of education of the individual (can contribute to understand literacy levels)
2. What were you doing before working for this establishment?	-More insight into the motivation. Whether it is factor driven (common in developing countries) or opportunity driven from an employee perspective.
3. How did you end up in the renewable energy industry? and, why the Renewable energy industry in particular?	-Follow up question to better understand the motives behind employees within the industry.
4. Did your religious orientation have any role to play in choosing working for this business? If YES/NO, how?	-Exploring BMI phenomenon from developing country context requires a holistic approach. Religious perspective could give rise to further studies on the degree of religious/moral influence on job opportunities in the sub-Saharan African context.
5. Did your religious orientation also have role to play in choosing a place of work in renewable energy? If so, why?	-This narrows the focus down to deduce any moral/religious influence on looking for work specifically within the renewable energy industry from developing country perspectives. Especially as the context (Nigeria) is a highly religious society.
(II)NAVIGATING THE BUSINESS ENVIRONMENT	

1.How would you describe the renewable energy industry in (Nigeria)?	-To understand the working ethics and conditions of Employees within the Renewable energy industry. How easy/difficult it gaining employment.
2. Do you know any other companies (competitors) doing what your company is doing?	- Helps gain insight into the knowledge base of employees regarding their awareness of competitors.
3. How conducive is the current business environment?	- It is to help understand how the staff fare in an everyday working environment. The pros, the cons and all.
4. Are there any challenges in this environment? What are they?	- Follow up question to Q.3.
5. Are there regulatory bodies (unions and associations) specifically dedicated to catering for employees in your kind of business?	- To understand if the organisational structure, and if there are other external structures which protect the interest and welfare of employees.
6. How long have you been working for this company?	- This would indirectly enlighten perspectives of the company life-span, and workforce turnover/retention ratio.
7. Have you worked in any other Renewable energy establishment?	-Also links to gaining knowledge regarding the turnover/retention ratio of the workforce within the industry.
(II) SCALING UP	
1. Has there been any increase in staff capacity in the company?	- To help assess the growth rate or stagnancy of the company in terms of numbers of expertise (via training) and general opportunity for advancement in their given profession.
2. In what ways have you noticed expansion in the business?	- Follow up question to Q2. As it still falls between the same line.
3. Does the current business environment encourage/discourage growth?	- Specifically follows up on the issue of development of expertise and opportunities for advancement.
4. Are there any incentives in your line of work?	- Serves as a follow up to Q3.
5. Have you applied? If YES, describe the experience, if NO why?	- To understand employees' accessibility to training courses and advancement (follow up to Q.1)
(III) STAKEHOLDERS	
1. Does your company conduct business with any partners known to you?	- To understand how the company co-exists with existing partners and stakeholders within the day to day business dealings.
(IV) BUSINESS MODEL INNOVATION	
1. What sets your business apart from other renewable energy companies?	- In order to capture the unique value delivery process in the workplace

2. In your view how does your company react in times of uncertainty?	-Addresses the available practical innovative application (or lack there-of) used in the workforce.
3. Could give an example where that was applied?	- Follow up to Q2.
Participant Group 3: Questions for Policy makers/Government Officials/Key private sector Stakeholders	
SECTION A: Background Information	
1. Could you describe your educational background?	-To help understand the level of education of the individual (can contribute to understand literacy levels)
2. What were you doing before assuming this position?	-To understand the professional background of the individual prior to the current position
3. How did you end up in a department centred towards Energy/Renewable Energy Industry? And, why the Renewable energy industry in particular?	- To understand the motives behind joining the designated department
4. How did you end up in a department centred towards SMEs? And why SMEs in particular	- Same intentions as Q.3
5. Did your religious orientation have any role to play in working in this department/ministry? If YES/NO, how?	-Sheds light into broader perspectives of influencing factors within developing countries.
SECTION B: Research Interview Questions	
(I)RENEWABLE ENERGY DEVELOPMENT	
1. What is your view on Renewable Energy in the (country's) setting?	- Designed to get a view of the government's perception of the renewable energy industry.
2. Does the government encouraged/discouraged renewable energy growth? In what ways?	-To deduce the level of interest the government has in renewable energy

3. How accessible are support systems (policies, incentives, grants etc.) to SMEs? & what are they?	- Follow up questions to support both questions 1 & 2.
4. Are Renewable energy businesses of value to the (country's) energy sector?	- Specifically linked to support the Question 2.
5. Could you identify any impediments to developing businesses in the renewable energy sector?	- To better understand inherent challenges of renewable energy from a legislative standpoint.
(II)SCALING UP SMALL AND MEDIUM SCALE ENTERPRISES	
1. Are there incentives specifically designed for SMEs in (country)	- To get more insight into the current support system available to SMEs by the government.
2. Do you consider them effective/ineffective, and why?	-To consider how effective these incentives are on the SME development
3. If you have any, what recommendations would you make to current SME incentives?	- Deduce prospective ideas which would help make incentives more effective.
4. What is your view on innovation?	-To deduce the level of importance the government has towards inovation
5. What specific incentives can encourage/discourage innovation for SMEs?	- Follow up question to the previous things.
(III)STAKEHOLDERS	
1. Do you consider partnerships relevant to SMEs in Nigeria? If YES/NO, why?	- To consolidate the relevance of stakeholders to SMEs but specifically from perspectives of the government.
2. Is there value in businesses establishing business relationships with prospective stakeholders?	- Follow up to question 1.
3. How important is stakeholder consideration to SMEs in the current business environment?	- Follow up question as well
4. Would you advise SMEs to consider stakeholders in their business model process?	- Helps deduce the informed opinion of the government official on stakeholder relevance.

[redacted]
Ph.D. Candidate in Management
Kent Business School, University of Kent-UK
CT2 7FS, Canterbury-Kent,
[redacted]
--/--/----.

Dear Mr/Mrs/Ms,

REQUEST FOR INTERVIEW

My name is [redacted] and I am a third year Ph.D. student at the Kent Business School, University of Kent, United Kingdom. I am currently working on the topic of 'BUSINESS MODEL INNOVATION AND RENEWABLE ENERGY APPLICATIONS: Scalability of SMEs in sub-Saharan Africa'.

The motive behind this study is to investigate the concept of business model innovation from perspectives of renewable energy small and medium scale enterprises (SMEs), in order to lead to growth in developing countries. This is in a bid to get an in-depth understanding of what capabilities are inherent within SMEs in developing countries, how they innovate their business models and what factors influence their business process within the environment. On this basis, renewable energy entrepreneurs, CEO's, employees in renewable energy businesses, government officials, NGOs and relevant stakeholders within the energy sector are invited to discuss these issues. The discussion will be designed around themes on *background information, business model innovation, navigating the business environment, scalability (growth), stakeholder relevance, innovative capabilities and support systems* (key concepts are defined in page 2, along with sample interview questions). Results from this research will benefit the participants, employees, SMEs, the renewable energy industry and prospective stakeholders within developing country economies. Key benefits are as follows;

(a) Providing insight into the structure of the renewable energy industry in Nigeria.
(b) Understanding the role of business model innovation within SMEs in developing country environments.
(c) Contribute to the discussions of approaches to maintain competitive advantage for SMEs.
(d) Enhance arguments towards policies, incentives and structures in support of renewable energy businesses and SMEs in sub-Saharan Africa at large.
(e) Highlight the unique challenges and opportunities experienced by SMEs in sub-Saharan African developing economies.

I sincerely hope this invitation will be honoured by you. In the event that it is, kindly reply to this invite by email. Thank you very much and look forward to hearing from you soon.

Yours Faithfully,

[redacted]

Kent Business School

Definitions and Sample Questions

Definition of Themes:

Business Model Innovation: This refers to the process through which a business identifies, enhances and re-adjusts its value creation process for the purpose of maintaining competitive advantage and ensuring long-term survival.

Scalability: This is the specific ability of a firm to maintain growth without being affected by restraints of resources or structure.

Innovative capabilities: These are the characteristics which stimulate innovative thinking and application in the business process of a firm.

Stakeholder Relevance: The identification of persons and groups of interest surrounding the operations of a particular business.

Sample questions:

Q1: How did you end up in the renewable energy industry? And, why the Renewable energy industry in particular?

Q2: Are there regulatory bodies/policies specifically dedicated to assist your kind of business?

Q3: What areas of the business model are critical to achieve growth in your firm?

Q4: Do you consider partnerships relevant to your business? If YES/NO, why?

Q5: In this business environment, what indicators encourage you to re-invent your strategy?

Q6: Would your firm adopt a gradual or radical approach towards adjusting your business model?

NOTE: These interviews have been reviewed and ethically approved by the University of Kent. The data will be recorded with the permission of the participant, after which it will be transcribed and stored securely for analysis.

A.3 Classification of Identified Cases

CASE NAME	DESCRIPTION	No of interviews	Interview medium	Supplementary Data
CASE 1	This company has been initially started out in 2004 (16yrs) and was created with the objective of using the market strategies to address issues of energy poverty and development in the rural areas of the company. It is located in the North-Central part of Nigeria (Kaduna State). Their business model is centred on providing solar cook stoves, consulting & provision of solar home systems & businesses and women empowerment initiatives for developing RE distribution entrepreneurs. This comes along with flexible payment platforms.	**3**	**Virtual audio (Skype, Zoom)**	**Webinars, Web site info, newsletters, social media platforms, observations**
CASE 2	Established since 1996, this company has amassed reasonable experience in the Nigerian renewable energy scene. They leverage on their experience and technical ability in a concentrated effort to create feasible be-spoke solar based designs for homes and businesses. This company lays emphasis on assisting and advising the technical, financial and operational application of energy solutions for their clients. This is handled through a project management team. They currently have plans on increasing their capacity in service delivery towards the Commercial and Industrial sector (C&I). The company is located in the South Western region of Nigeria (Lagos State).	**2**	**Virtual audio (Skype)**	**Web site info, media outlets, Company reports, observations**
CASE 3	This is a biomass based projects established in conjunction with an agricultural business. It focuses on creating electricity through biomass products (animal and farm waste). This is done with the aim of providing power for rural communities	**1**	**Virtual audio (Skype)**	**Social media, media outlets, observations**

	through mini-grid/off-grid systems. The uniqueness of the renewable energy sources, combined with the limited exploitation of biomass energy even by RE standards, provides the basis upon which this biomass business hinges its business model upon. It is located in the North Central/Middle belt region of Nigeria (Abuja, Federal Capital Territory).			
CASE 4	Founded in 2005 in Lagos state (South-West), this company is into providing general power solutions for businesses across the country. It concentrates on an opportunity in providing hybrid systems. This is a combination of fossil fuel (petrol/diesel generators) & renewable based (solar) based energy systems. They recognise the value in the current contemporary energy sources, as well as the high upfront cost of renewable energy systems. This is where the strategic objective lies there in, to maximise the value of both ends. They primarily target opportunities in the Commercial and Industrial sector.	**1**	Virtual Audio (Zoom)	Media outlets, media interviews, video documentary, observations
CASE 5	This company adopts a social entrepreneurial approach to providing feasible electrification projects, which are powered from alternative/renewable energy sources. These include solar, wind, and mini hydro power solutions. The guiding ideology of the company is to connect local communities to the potential renewable energy sources immediately available to them. An ideology they aptly named People to Potential-to-Power (P2P2P). The experience of the founder/CEO in both the academic and industrial field, has helped him in establishing the required network and an efficient team through which they thrive to achieve their objectives. It is also located in the South Western region (Lagos State).	**1**	Virtual Audio (Zoom)	Website info, newsletters, observations

CASE 6	This company located in South West Nigeria (Oyo State) concentrates its efforts on carving a niche for service provision in markets that are too small for blue chip companies or larger companies are too rigid for. An example of such strategy is provision of solar home systems, energy packages for small estates etc. Through the technical expertise provided by their senior engineers (most of whom are from the telecom and ICT industries), they are able to translate their collective skills into hardware implementation of energy systems i.e. breakers, switch gears, wiring, batteries, fittings etc. The connections made with their Original Equipment Manufacturers (OEMs) also help provide a stable support system in terms of finances, tech support and quality assurance.	**3**	Virtual Audio (Zoom, Skype)	Website, social media platforms, observations
CASE 7	Located in North Central Nigeria (F.C.T. Abuja, Kaduna and Plateau States), this business looks to integrate renewable energy solutions which cut across all levels of energy demand. These include solar home systems, mini-grid, hybrid and rural electrification systems. Significant strategies of the company include firstly the public infrastructure such as extensive street lighting projects, and secondly in education through their technical and administrative training schools. Through this the company has been able to build local internal capacity for themselves and the country as a whole.	**3**	Virtual Audio & Video (Zoom, Skype)	Website, Media interviews, News articles, observations
CASE 8	Case H is a social enterprise located in various African countries including Nigeria. It is primarily focused on women capacity building in which it trains and support women to become entrepreneurs and deliver clean energy directly to homes in rural African communities. Their business model finds it's uniqueness in the company's ability to understand the vital role of women in the home, and then establishing	**1**	Virtual Audio (Zoom)	Website, News articles, observations

	supportive and sustainable relationships with these women in order to help promote their brand of business. Building trusting relationships is vital to the business.			
CASE 9	The company is focused on procuring and installing renewable energy systems for street lighting, solar home and commercial. They are also into wholesale renewable energy solutions. The business has a high emphasis on the street lighting projects, and lighting projects of private and commercial buildings. It is relatively new, established in 2018 and is located in South Western Nigeria (Lagos State).	**2**	Virtual Video (Zoom)	Website, News Feeds. observations
CASE 10	This company is focused towards achieving sustainable development goals which include; Generating 10,000MW per day, target 20 million solar retailers nationwide, and plant 1 billion trees. These are the guiding principles which the company hinges it's strategies upon.	**2**	Written response to interview questions	Website. Observations
	TOTAL	**19**		

APPENDIX B

B.1 Sample summary tables of Literature on Business Model Innovation and Renewable Energy

No	Author(s) sorted by Year	Theoretical Pathway	Data Source Methodology	Key Findings	Future Directives for Research	Link with work
	General					
1	**FOSS, N. J. AND SAEBI, T.** **(2018)**	Conducts an overall critical analysis of BM, BMI and the inherent vagueness in fundamental core concepts between them		-Indicates a lack of distinctive clarity between BM and BMI which poses a potential threat of conceptual consistency from an academic perspective		This phenomenon has been highlighted in various literature and could be a potential opportunity to clarify going forward in the research
2	**LAM, P. T. AND LAW, A. O.** **(2018)**	Explores existing state of financing conditions and options in the RE industry	Conceptual literature review of financial options with use of case study reviews	-Debt (loans, bonds), equity (Venture Capital, Private Equity), Grants, subsidies are currently main options available to RE industries. -Grants, Concessional finance, private equity and venture capital may be most Feasible options in the African context.	Concessional finance for RE application in Sub-Saharan Africa.	Presents financial standings currently in RE industry which could be explored & modified. through BMI

				-Financial buffers play a vital role in limiting cost burden for RE firms, as well as willing private-sector investors. Government plays a major role in ensuring this occurs & businesses through BMI can take advantage of such key partnerships		
3	**POUDINEH, R., SEN, A. AND FATTOUH, B.** **(2018)**	Looks into optimizing the high resource availability of Renewable Energy options within Middle Eastern and North African Regions (MENA)	Conceptual literature review and exploratory hermeneutic analysis of policy/data trends within MENA countries	-Two-way investment arrangement between private sector entities and from the government (via grants) and favourable policies should help interested entrepreneurial firms establish affirmed value proposition. -Government policy (monetary or fiscal) investment is astoundingly vital to RE promotion and cannot be factored out. Hence the manner in which firms strategically position themselves can further attract government/ regulatory interest.	Fossil fuel subsidies and their effect on diffusion of Renewable energy in Sub-Saharan Africa. -Analyse the policies most suited to Renewable Energy Businesses with industry impact based value propositions	Has relevant information on policy types, incumbent energy challenges and the practical solutions for RE development.
4	**PRIEM, R. L., WENZEL, M. AND KOCH, J.** **(2018)**	Assesses the preceding nature of value creation and its importance to value capture, also stating their differences &	Literature review	-Entails arguments similar to the incumbent vs new entrant's reactions towards either of their strategies (Osiyevskyy and Dewald 2015); Where the incumbent's exploitative approach may help protect it against a radical innovative concept	Innovations in value capture processes	-Provides a niche look at value capture and value creation which are vital in deducing the business value proposition.

		why they are relevant in demand perception. -Explores theories in strategy and Business Modelling such as resource based view (RBV)		introduced by a new entrant business strategy. - Through understanding demand-side strategy, innovative ways in which a firm identifies and captures its value is better understood and analysed. -The shift from product focus to consumer focus also highlights an important crossroad where BM and demand side strategy coincide.		
	Wind/Dimensions					
5	**HOU, J., ZHAI, X. AND LIU, P.** **(2017)**	Investigates the strategic use of the internet as an information network management resource tool using PEST/SWOT analysis.	Conceptual Literature review analysing Information Tech on Wind energy potential via Economic, Policy social and technological SWOT analysis	-Identifying the potentials of utilising Information Systems may provide avenues for time/cost efficiency improvement. -IT management potentials also exist in large scale maintenance purposes as well as collective monitoring of off grid information	Smart system structures and its effect on cost management for Renewable Energy	Can contribute to the 'Network' narrative for Knowledge
	Dimensions					

6	**STUBBS, W. AND COCKLIN, C.** **(2008)**	Geared towards sustainability model development investigating through the lens of Ecological Modernisation Management	Analyses a case study in banking & tech sector through applying adductive approach and grounded theory tactics (Qualitative) -Data collated via semi structured interviews and secondary sources (reports, journals, sites etc.)	-Relies on the Ideology of Ecological Modernisation to argue for the forwards integration of environmental awareness with elements of policies, innovations & technologies in order to maintain firm value while enhancing environmental sustainability. -The 'greener cleaner energy' motive of Renewable Energy (RE) application can explain a high degree of sensitivity it would have towards ensuring BM designed for implementing RE in environmentally friendly manner. (e.g. wind vanes and bird kills/solar panel farms and potential intrusion of sunlight for plants). -Sustainable centric Business Models are typically long term in nature, employing an innovative approach should assist in managing the seamless nature of the process so it remains consistent.	Balancing Ecological modernisation and BMI in practice for rural/urban development. (How can RE structures be set up while limiting its impact on nature and eco-system?) - Changing business behaviours; Towards a more sustainable culture in Developing countries. -Culture and Structure, which influences which first?: Looking from a BMI perspective.	Presents opinions which could assist in Managing and Networking proposed dimensions to BMI -Structural and cultural characteristics of firm reaction to sustainability potentially fits into the 'managing' dimension argument as well
7	**ABRAHAM, S** **(2013)**	A comparative analysis discussing the possibility of	Descriptive literature review paper	- With reference to Casadesus-Masanell & Ricart (2010), Strategy, Business Models explains who customers are, value to create and	- Investigate Inherent disparities between Strategy and BMI.	Lack of clarity on strategy and BMI should be further looked into

		BMI replacing Strategy entirely		how to get ahead of competitors. Strategy is the process to achieving said objective. -Strategic analysis is able to assess competitive advantage while BMI can assist in creating it.		
8	**BERENDS, H., SMITS, A., REYMEN, I. AND PODOYNITSYNA, K. (2016)**	Uses Organisational learning theory due to its wide use in analysing complicated comprising of interconnected components (BM), in developing better learning processes in BMI processes.	Literature review with emphasis on theoretical elaboration and replication logic on BM development -Conducting interviews (primary data)	-In an instance of transitioning form an old Business Model to a new one, certain components may not change, this is contrary to radical novel business development. - **Cognitive learning** involves either *Conceptualisation*-Idea generation for new BM interrelationships between same components without changing them, *Creation*-Involves entirely new components based on reassessment analysis of incumbent ones (usually consolidated by technology). -**Experiential learning**- Explains altering BM components on account of viewed outcomes of the BM adopted.	Forces of inertia and the effects on Business Model Innovation.	Provides supportive argument for BMI dimension outlines (Most especially in the intended 'Learning' dimension).

				-The importance of multi-faceted learning mechanisms enhances BMI viability. -Can possibly include 'trial and error' (Sosna, 2010) to these learning paradigms and consolidate intended dimensions' argument.		
9	**MARTINS, L. L., RINDOVA, V. P. AND GREENBAUM, B. E.** **(2016)**	Employs concept of cognitive psychology (human element) in identifying the feasibility in following the strategic pattern of proactive BMI development	Purely conceptual and theoretical based	-Suggests BMI can be carried out without reactions to external factors such as technology, policy etc. Contrary to other literature ideologies (Chesbrough,2010) on BMI which refer to BMI development as a response to a problem. -Take note of the evolutionary school of thought for BMI under which 'incremental' innovation can be classified under. -Integrates analogical reasoning and conceptual combination into BM development in that they both involve information processing and rely on pre-existing knowledge (akin to organisational learning)	The Psychology of Innovating Business Models (from the aspect of human cognitive perception)	Consistency in cognitive processing in terms of managing strategies and generative cognitive processing in line with BM Development.

10	**OSKAM, I., BOSSINK, B. AND DE MAN, A.** **(2017)**	Lays emphasis on the external appendages of business models, and develops a model depicting the interrelationship and value sharing process between business modelling and networking.	Assessing network TIES development using longitudinal qualitative approach to investigate 2 case studies - 2 source data collection processes; semi-structured interviews and archived (secondary) data	-The process of BMI development consequently creates an avenue for locating and associating with relevant exogenous elements which enable seamless cost efficient management, supporting argument for a networking paradigm dimension. -Technology centred businesses benefit from creating cohesive collaboration in vertical, horizontal or lateral TIES.	-Networking Relevance in BMI dimension development. -Sustainable Value shaping in sub-Saharan Africa business development through BMI.	-Investigates similar paradigms using sample case studies similar to RE centric businesses.
11	**BOJOVIC, N., GENET, C. AND SABATIER, V.** **(2018)**	Intricate look into experimentation in Business modelling with 2 case studies of small & large scale nature, but are both start-ups. -Exploring literature on strategic legitimation to	Qualitative Process of abductive reasoning and systematic (deduction & deduction) combining study approach to observe micro processes of	-Regarding managing BM learning processes of cognition and experimentation, cognition aims at understanding the actual situation of things, experimentation takes it further by understanding, assimilating and employing 'innovative' tactics to develop new business processes. This makes experimentation a strong candidate for BMI promotion regarding learning dimensions.	-Experimentation in practice (towards BMI application in African RE Industry)	Supportive narratives on need for Experimentation as well as 'Learning' dimension. -Strategic legitimation could also present an arguable concept

		assist in understanding learning	experimental learning -Data obtained from interviews, secondary data & ethnographic observation	- Highlights a major issue faced by start-ups which is monetization of technological innovations as case study analyses suggests (similar to Chesbrough, 2010). Intended research is also potentially faced with monetization (via BMI) through technological innovation (Renewable Energy).		on how firms should manage and present their companies (management. dimensions)
12	**GARCIA MARTINEZ, M., ZOUAGHI, F. AND SANCHEZ GARCIA, M** **(2018)**	Investigates the degree flexibility to which firm knowledge diversity can positively affect the level of effective innovativeness. -Borrows concepts from resource based view, open innovation and strategic Alliance Portfolio Diversity (APD)	Quantitative analysis - Data acquired from statistical instrument for innovation and estimate results through General Structural Equation Model form Stata.	-Though Open Innovation is important to building and acquiring knowledge for a business, excessive external influence is detrimental to the value proposition of the firm. Hence, businesses must exhibit knowledge control and how it affects its organizational objective. -Optimum Synergy between firm's vision and acquired external knowledge is essential to firm validating the knowledge acquired. -Nuances in regional and organizational characteristics require innovativeness. The manner in which businesses create strategic alliances (through government and private	-Structural Alliance and knowledge management for businesses Renewable Energy Businesses.	Relevant to arguing the Learning dimension knowledge acquisition of a firm through open innovation tactics.

				partnerships) can also determine the value of knowledge .		
13	**ISLAM, M., HOSSAIN, A. T. AND MIA, L. (2018)**	Explores relevance of strategic alliance and innovative capabilities on the survivability of a business with assistance from strategic management tools such as Product lifecycle (PLC), Balanced Score Card (BSC) and concepts such as environmental collaborations (EC),	Data Survey conducted assessing management teams of American and Canadian companies. -Conducts regression to measure level of relationship between SA, PLC & OS (Organizational Sustainability)	-The effect constant technological advancement has on business trends presents need for more integration of necessary elements and partners to help firm growth, effectively triggering networking alliances. -Current academic and practical literature increasingly argue the inclusion of internal (business entity) and external (environmental) sustainability. This requires a unique management process to achieve said objective. Hence necessitating Business Model Innovation -As product/service lifecycle gets shorter, it is essential to consistently enhance resource efficiency through innovative tactics. - While it is majorly beneficial to create allies, firms must also	-How strategic alliance affects Business Model innovation prospects. -Prospective Alliances for progressive Renewable Energy development in Africa. -How far can a firm go in opening up during a collaborative management process?	Supports the Network dimension paradigm.by highlighting collaborative ideologies (which can be supported by concepts from open innovation)

				consciously protect their inherent value propositions and structure.		
14	**LAASCH, O.** **(2018)**	Uses theories of institutional logics to get a better understanding of how organisational values are marshalled and created	Comparative Structured review of literature within relevant fields to develop questions investigating an organisation's philosophy towards achieving value, merging commercial and sustainable attributes as well -Develops a structural representation of research pathway.	-Suggests firms mostly seek to combine two logics rather than one to assist firm survivability. For instance, in Business Model Innovation keys more towards combining the 'commercial' (profit yielding) logic and the 'sustainability' logic (longevity). - Logics can be adopted Homogenously (where on logic dominates the firm's philosophy), or heterogeneous (where two or more are adopted). Some of these logical paradigms include; sustainability, government, religious, and family based. -A basic trend is in heterogeneity is the commercial logic is almost always included in the mix (due to the natural idea of monetary gain in business).	-Are African Start-ups better of practicing homogenous or heterogeneous institutional logics? -Possible Links between institutional plurality and organisational ambidexterity.	-Contributes to the 'management' narrative and the nature of institutional logic effects in value determining proposition -Develops a strategic research map which can be adopted in the course of examining literature review.
15	**JIN, Y. AND JI, S.** **(2018)**	Uses Information visualisation technology to Identify rising trends and	Conceptual & Theoretical Literature review	-Renewable energy is considered to be a topic which demands academic attention and practical application of BMI.	More grounded literature for Networking elements of Business model innovation.	Supports the proposed 'Networking'

		progressions within the confines of BMI, placing emphasis of the feature pertinent to networking	-Data Collation from secondary citation index repositories	-The internet of things is a vital determinant trend of networking and its role in BMI. -Suggests open innovation as the biggest hotspot in BMI literature, also signifying the increasing importance of networking in practical BMI		Paradigm for BMI dimensions -Presents a pictorial representation of key themes within BMI
16	**TEECE, D. J.** **(2018)**	Investigates the nature of BMI and the need to ensure its flexibility via dynamic tactics of BMI tactics. -Developing a Framework explaining dynamism, business modelling and strategy.	-Literature review using case studies from Uber and Lyft to examine BM dynamism	-Despite the need for its uniqueness in development, a successful BMI is not devoid of complete imitability as competing firms will aim to adopt working elements into their strategies and BMI structure (when disruption). Innovation assists the root BMI to stay ahead and retain competitive advantage even when imitated. -With example from Uber suggested to be a pioneer in the sharing economy logic, its 'first mover advantage' gives it an edge over its 'Lyft' rival, in spite of Lyft's imitation. This edge is largely owing to BMI. - Dynamism ensures greater adaptability and transitional nature of a Business Model. And the managerial competence should be	Managing dynamism for Africa centric Business Models.	-Importance of dynamism and how it can be achieved via innovations Business modelling incorporating -Could fit into 'managing dimensions' paradigm.

				innovative enough to guard against replicability. -BMI is often triggered by technological advancements.		
	Antecedents					
17	**DAHAN, N. M., DOH, J. P., OETZEL, J. AND YAZIJI, M.** **(2010)**	-Emphasis collaborative potentials between businesses and NGO's from a Multinational (existing/incumbent) business perspective, exploring literature in social/strategic partnerships, social alliances, and	Uses a case studies illustrating collaborative business models in 3 facets.(already existing BMs, partially existing BMs & non-existent BMs between both entities)	-Considering the nature of NGO's are not for profit based, and a typical business on the contrary is largely focused on monetary gain, a challenge of justifying a value proposition of the partnership arises. -However, this also presents a basis for arguing that though profit is value, not all value has to be monetary/profit based. Perhaps the kind of value in this arrangement can be cost-cutting incentives such as reducing marketing campaigns, and providing product/service for an already existing customer base provided by NGO's. -Suggests there is a symbiotic relationship between both NGO and MNE (business) entity, such as capital & managerial capabilities	-Can NGO's centred on Clean energy promotion provide viable infiltration strategy for RE based businesses in within Africa? -Role of market liberalisation in easing entry level businesses. - Can application of stakeholder theory hold in this scenario? -Potential RE centred NGOs in sub-Saharan Africa.	-Provides potential strategy for new entrants through social constructs(NGO) value creation in order to create economic value.

				(from business), and market knowledge/social legitimacy (NGOs).		
18	**DOZ, Y. L. AND KOSONEN, M.** **(2010)**	Builds on literature on strategic agility to edify tactical proactive (Human element) leadership and its effects on BM innovation. It examines this through case studies	Theoretical literature review Explaining 3 subcategories of strategic agility (strategic sensitivity, leadership unity & resource flexibility)	-BMI is an enabler for strategic dynamism. However, Adopting the same innovative formula increases the threat of strategic rigidity. This should be consistently considered in the development process. -Balanced thought process enhances cognisant impediment assessment faced by a firm, which is utilised in effective structural business model development.	Challenges and Hindrances to Strategic agility for new Business firms. -Rational Decision making proponents for prospective business developers.	Experimental elements are discussed which suggest is a means for new BM development (as other papers have also discussed)
	SVEJENOVA, S., PLANELLAS, M. AND VIVES, L. **(2010)**	Examines progressive Business development via concepts of BM and creative freedom	Inductive approach towards a Case study review	-Being mindful of existing capacity with regards to a firm's available resources is important in business development. It helps in managing innovativeness in a strategic manner, applying creativity where it is most needed. (Within the Business Framework).	Limitations to creative freedom in business model Innovation	Looks at a step by step process of Business model creation with innovative inclusion from a practical perspective
19	**THOMPSON, J. D. AND**	Case studies of the Wharton Societal Wealth Program (WSWP)	Literature review	-Businesses should be created with an objective of creating new markets, in addition to joining existing ones.	Handouts or hands on? Choosing between social aide and Business Models.	Looks into the effects of Business Model application

	MACMILLAN, I. C. **(2010)**	investigating BM prospects in societal development		Particularly within developing countries. -Touches on trends of experimentation and adaptation, similar to BMI literature. - Frugal innovation BM can thrive in creating business development capabilities effectively than simply sending 'aide' to less developed regions		on Societal development
20	**ACHTENHAGEN, L., MELIN, L. AND NALDI, L.** **(2013)**	Investigates antecedents for Business Model change through activity and capability based literature.	Longitudinal assessment of 25 SME's and singular cross case analysis -Data collated Semi-structured interviews. -Used Quantitative data with qualitative criteria	-Contrary to Martins et al (2016), this paper refutes the 'ex ante' ideology of BMI, suggesting that BMI is achieved in a timely learning fashion. Akin to the Experimental process by Chesbrough (2010) and Trial & Error learning (2010). - Combined effort of High sensitivity towards exploratory and exploitative BM creation (Jansen et al, 2005), sound balance in resource utilisation, and cognitive synergy between firm direction and solid organisational structure (refer to institutional logic from Winterhaler and Newman, 2017).	-The potential relationship between firm capable dynamics and strategic practice with relevant perspective of new entrant (regarding RE businesses). -Gearing BMI towards organic customer and business growth.	-Entails argumentative elements towards supporting managing dimension paradigm as well as a descriptive on BMI drivers.

21	**BOCKEN, N., SHORT, S., RANA, P. AND EVANS, S** **(2013)**	Aims to objectively create an all-inclusive sustainability	Interviews conducted to deduce 6 firm BM tactics & workshops to sustainability, for the creation of a 'value mapping tool'.	-Identifies industrial sustainability growth as largely incremental in nature. This could be further investigated to clarify (if there are radical/disruptive trends). The paper also insinuates BMI may possess tendencies to introduce radical innovations to sustainability within an industry. - Proposed diagram for value innovation depicts a somewhat circular SWOT analysis of new opportunities, missed values & discarded detrimental values which assist in assessing a firm's current value proposition.	Potential business development tools for sustainability.	Value mapping for prospective sustainable business In Africa.
22	**SCHALTEGGER, S., LUDEKE-FREUND, F. AND HANSEN, E. G. (2016)**	Observing Corporate sustainability, business models, entrepreneurial innovation through co-evolution framework.	Literature review	-Niche markets and new entrants tend t adopt business models differently from already existing and incumbent firms. -Re-echoes the notion of smaller and younger businesses being more open to developing innovative and sustainable frameworks. -By understanding co-evolution, a better grasp of causatives to market changes can be deduced.		-Touches on concepts of incremental & radical forms of innovation, incorporating them into co-evolution (variation, selection and retention) frameworks

						sustainability frameworks
23	**STRUPEIT, L. AND PALM, A.** **(2016)**	-Discusses various adopted BM strategies for Renewable Energy diffusion within 3 varying regions (Europe, North America, Asia)	-Mainly Secondary Data collated from trade journals, legislative literature and company websites. But acquired primary data (interviews) from Japan due to language & security constraints. Uses theoretical sampling in case studies	-Where Germany thrived on favourable policies on Feed-in-Tariffs & low interest loans for Solar PV (photovoltaics), US owes its RE growth largely to collaborative Third-party ownership and Japan adopts cross-selling as its tactic. One major similarity is the assistance of favourable policies & regulations, this is essential. -	Diffusion tactics for Africa centric RE based businesses (considering no inclusion of such contexts within this paper). -How can RE based businesses locate attractive value proposition which has a persuasive effect on the government towards escalating favourable policies for African regions?	Regional nuances affecting the adoption of Renewable Energy and how regions should manage them
24	**MATEU, J. M. AND MARCH-CHORDA, I** **(2016)**	Extends from the concept of resource based view to determine the value of 'experience' In BMI development	Uses experimental methodology to test experience, and its influence in BMI and industry.	-In order to successfully execute BMI, internal (Components, Organisational systems & activities, value chain) and external (Market, external value chain, Environment) must be considered. This promotes an enhanced & robust experience factor**.**	- Infusion Resource based view to Regional Renewable energy application	Raises an important notion of 'experiential balance', I developing business models. How does one mediate between

			- 8 experiments (BM based lecture & workshop) between 105 people in 24 groups. -	- Successful BMI implementation Is usually assessed intuitively by its 'after effects' rather than prior implementation. Hence, might a better experience level enhance BMI effectiveness? -While core firm resources are largely beneficial, they can also increase a firm's reluctance to change, which goes against the BMI Logic and can be harmful. Experience can help mediate this factor OR cause it - Less experienced may be more open minded in decision making, a more experienced individuals may be confined by fundamentals		technical know-how and open mindedness in RE business development?
25	**COSENZ, F. AND NOTO, G.(2018)**	Geared towards using theories in systems dynamics and representation schematics in creating strategic tools for manipulating business ideas in a favourable manner	Case study analysis exhibiting dynamic business modelling in Italian based business	-While strategic alliance is encouraged, the Business model should also serve as a protective irreplaceable structure which protects the core value system of a business. This should be useful in terms of scenarios of open innovation and inter-firm partnerships. -BMI is a representative form of a firm actively being dynamic.	-Systems Dynamics in Renewable Energy Business literature. -Conceptual Differences between Dynamic Business Modelling and Business Model Innovation	Indicates the relevance of using strategic management tools such as BMI and Dynamic Business Modelling to maintain relative flexibility & adaptability of a firm.

			(an academic language text verifier)	-Experimentation undergone by the business case study assisted in gauging firm sensitive boundaries in order to determine the financial slack or tension.		
26	**OSIYEVSKYY, O. AND DEWALD, J.** **(2018)**	Borrows from Behavioural decision-making theories, prospect theory to discuss the stimulants that instigate the need for new BM ideas and practices	-Survey questionnaires (data collection) from business practitioners (estate brokers) and academic fields (Universities)	-Major innovation kick-starters include the need to survive, the intensity of the pressure to do so and the volatility of its situated business environment. -Fits in the argument of organisational behaviour and its suggestive need for managerial flexibility of resources, structure and the willingness to adjust and adapt to external stimuli prompting need for change	Triggers for decision making in Business Model Innovation.	Contributes to exploratory and exploitative literature and their potential causes.
	Consequences/Performance effects					
27	**ASPARA, J., HIETANEN, J. AND**	Examines varying Financial effects caused by adopting BMI and the continuous	-Data collated via survey form over 500 CEOs of companies	-Is suggestive of firms actively practising Business Model Innovation to have a higher rate of revenue absorption (largely owing to the potential of opening new markets &	-Towards a limiting replicability on BMI and optimizing uniqueness.	Gives a look into the relevance of BMI on financial stability of a firm.

	TIKKANEN, H. **(2010)**	used of an existing Model	-Uses pairwise median costs to measure profitability growth.	profit pools) as opposed to firms not actively involved in BMI.	-BMI and its Financial implications on African RE start-ups.	
28	**CASADESUS-MASANELL AND ZHU** **(2012)**	Investigates the reaction of new entrants and old incumbents regarding their BMI in perspectives protecting against fund providers	Model development involving two profit-based firms..	-Is strategic revelation or concealment still relevant to the entrants when the incumbent BMI is threatened by obsolescence? -Innovations in Business Modelling can be hampered by an entrant choice to conceal its BM by adopting an imitative stance with incumbents. -Through perspectives of open innovation, entrant BMI concealment may prove more challenging, irrespective of sponsor involvement. -The scepticism of an entrant by adopting a rationale of concealment reduces novelty and lessens prospects for profit maximisation. -And strategic revelation can give rise to radical innovation on the part of new entrant, and incremental	-How can prospective new Renewable Energy Application business entrants protect against incumbent replication? And how much innovation should be revealed? -BMI protection and fund seeking: a look at venture capitalists and angel investors	-Highlights new entrant (RE businesses) vs incumbent (contemporary energy based companies) & how entrant BMI can be protected from both financial investors and incumbents - It also opens grounds for IP potential and inclusion among other means.

				innovation on the part of the incumbent.		
29	**SCHALTEGGER, S., FREUND, F. L. AND HANSEN, E. G.** **(2012)**	-Explores the viability the business potential of sustainability in contemporary business practices through papers on Sustainability and business models	Theoretical literature review on sustainability business mindedness	-Similar arguments with Achtenhagen et al (2013) on leadership and management. -Criticises the negligence of enhancing societal sustainability (CSR) due to contemporary rigidity of managerial and financial norms, hence prompting the need for innovative inclusion to exploit such potentials. -Towards sustainability as a business prospect, strategic approaches should be defined to help infuse socio-environmental elements into business (e.g. Renewable Energy application within major industries), and also identify how these elements influence the BMI (cleaner energy provision & increased power capacity). Innovation in practise. -Outlining 4 strategic pathways: reactive, defensive, accommodative & proactive which vary in terms of sustainable intensity, suggesting	Sustainable enhancement with proactive BMI strategies for developing economies. -Are Technology based businesses sustainable oriented?	-Environmental effects of Renewable Energy BMI on firm (internal) and social (external) sustainability -Provides a prospective argument supporting Renewable Energy application, as a platform for social sustainability (power generation and Carbon reduction) and BMI as a tool in applying it**.**

				proactive sustainable strategies as strongest in sustainability promotion.		
30	**ABDELKAFI, N. AND TÄUSCHER, K (2015)**	Explores concepts in Sustainability, business modelling in a bid to create an explicatory, diagram via objective and constructive perspectives	Literature review and utilization of system dynamics, and partial modelling methodology in designing complex system simulations (towards BMfS-Business Models for Sustainability)	Note: The core concept unit for sustainability is linked with the natural environmental element. (Renewable Energy on environment for instance). -Classifies the BM literature streams into 2; Activity based and Value-based. Could these be termed as philosophical paradigms to BM? -Elucidates that a significant amount of literature opines conscious sustainable efforts to be negatively correlated to maximising firm profit. However more recent papers identify initial POSITIVE correlation btw environmental inclusion and economic growth. (Schaltegger et al, 2012) - Above point could provide an appendage objective to the intended research on RE through BMI in developing countries.	-Philosophical Paradigms of Business Modelling. -The positive/negative effects of sustainable based BMI (with RE application as case study). -Decision maker's mental perception by Boons (2013) -Systems Dynamics modelling	Provides supportive argument for Sustainable enhancement of RE through BMI in sub-Saharan African contexts. -Could be linked with the work by Munzel(2017) on institutional logic and car sharing to support argument towards Managing paradigm of BMI dimension.

31	**HAAKER, T., BOUWMAN, H., JANSSEN, W. AND DE REUVER, M.** **(2017)**	Leans towards evaluating BM viability and robustness through 'stress testing' concept via BMI literature and scenario planning.	Qualitative stress testing tool which is still under development	-BM stress testing provides a conceptual tool which can assist the experimental learning capacity of the firm and its innovative strategy.	Deeper look into strategic scenario planning	Stress testing logic can be infused into the learning dimension paradigm and is also a proponent of 'experimental' innovative learning
32	**SORESCU, 2017**	Descriptive assessment of BMI enhancement through networks and from a marketing standpoint	Conceptual literature review	-Takes a suggestive standpoint of BMI being of greater significance to firm growth than product Innovation, indicating it as a sub-component of BM.		Hints at product innovation and its relationship with BMI
33	**DIAZ LOPEZ, F. J., BASTEIN, T. AND TUKKER, A.** **(2018)**	Mainly Investigates Business Model innovation in relation to resource efficiency, and hindrances to achieving desired efficiency with	Quantitative analysis of 143 case studies showing trends in BM1, RE & impediments.	-Identifies technological and environmental factors as having elements of being both barriers as well as opportunities for Business model Innovation		Links BMI with resources efficiency, in relation to managing inherent barriers and maximising opportunities

		assistance Business Model Canvas				
34	**RITTER T., AND LETTL., C 2018**	Promotes BM academic development from lenses of strategic management literature, and identify links with fundamental concepts like Resource based view (RBV) among others.	Uses literature to create visual representations of interaction between BM core BM concepts	-From an academic standpoint, it is important to identify a clear synergy between the business model and the principal strategy in order to fully justify BM validity. A lack of clarity on this distorts BM structure viability.	-Importance of Clarity in BMI terms, types and schools of thought -Strategy to BM relationship	Gives an attempt in identifying core elements in BM literature development
35	**VAN WAES, A., FARLA, J., FRENKEN, K., DE JONG, J. P. AND RAVEN, R. (2018)**	Increasing BMI potentials from a Co-evolutionary standpoint, and how social/technological elements can be integrated to enhance revenue prospects	Qualitative data collation through semi-structured interviews as well as secondary data (policies, websites etc.)	-Discusses two bike-sharing models which are similar to the Car-sharing models by paper by Muntzel (2016). This enhances discussion of innovative diffusion using traceable patterns.	Transitional Power of BMI in business development.	Discusses BMI its diffusive capabilities, as well as its role in increasing firm value proposition
36	**WELLS, P. AND**	Revisits the diffusion model		-Pinpoints the current consumerist norm of high rate of obsolescence of	The nature of incumbent consumerism on BMI	Can sustainable RE Infrastructure

	NIEUWENHUIS, P. **(2018)**	of Roger(1962) to identify current similarities in consumerism and outline criticisms		products (gadgets, vehicles) presents a challenge for sustainable product/service promotion. How does this pan out in RE centric technologies, and is its effect significant? - Suggests the capitalist ideology promotes	sustainability; Case study of Energy consumption norms within Developing countries. Roger's diffusion Model	be devoid of short term obsolescence and be more retentive?
	TYPES					
37	**HELMS, T., LOOCK, M. AND BOHNSACK, R.** **(2016)**	Looks at considering developing Business Models on a basis of time factor and its effect on BM flexibility, in bid to discover the resourcefulness of time based BM development -Borrowing from organisational management theory	-Primary data collected via interviews and secondary sources (annual reports) within German and Swiss energy sectors -Merges interview data with mixed derived data (Qual. & Quant.) to further validate analysis derived	-Certain peculiarities are present within the energy industry, one of which is the need for accurate balance in the levels of energy demanded and the capacity to supply such power. In essence accurate 'load analysis' must be carried out and included in the business structure in order to ensure cost effectiveness. -Time-based BM dimensions are classified into two different paths of the level of influence it has on demand/supply of such energy and the number of elements the BM influences (power generation, storage, distribution etc.)	-importance of considering Time and its effect on Business Modelling within the renewable energy industry. -On grid vs. off grid Business model opportunities for Renewable Energy development in Sub-Saharan Africa.	-Gives insight into the volatile nature of energy production in RE industry with respect to time (similar to the on/off peak price and demand fluctuations in numerous transportation systems).

				-The four categorised types of BMs can be further grouped within the 3 sub-groups mentioned earlier which are; 1.the Time-based models (centred around initial energy production demand/supply), 2. Power-optimisation BM (seemingly focused around energy storage), 3. Virtual power plant (focuses on energy distribution) 4. Large & Small scale energy response BMs (cuts across all three sections) -Where incumbent practitioners may be looking to time-based factors to consolidate their business (incremental), opportunities arise for new entrants in form of focusing strongly in developing time-efficient/cost cutting BM (which may be more radical in nature)		
38	**BUDZIANOWSKI, W. M** **ET AL (2018)**	Conducts holistic analysis on Business Modelling prospects and Renewable	Compiled secondary data from student analysis of African-Based Renewable	Current RE based projects undergone are predominantly within Solar and Bioenergy RE spheres (also suggest favourable policy promotion).	Partnership prospects between RE multinationals, government regulatory bodies and emerging Renewable Energy businesses	Gives pointers towards stakeholder the importance of considering all prospective stakeholders

		Energy application	Energy project reviews	-Regulations and policies are essential to business development in RE space		(stakeholder theory)
39	**HORVÁTH, D. AND SZABÓ, R. Z.** **(2018)**	Uses Business Model Canvas, combined with Lean Model Canvas gives exemplary structure for PV business management process, also highlighted inherent challenges.	(Hermeneutics) Cross sectional review of relevant Literature within Business Modelling, Renewable Energy	-The high initial cost of renewable energy application prompts need for innovative strategies (via BM) so firms can cushion the financial stress burdened on them. This provides argument for public private partnerships - Echoes impediments to RE Technology development which stem from barriers in finance, regulation, awareness, technology, and resource available to firms. As discussed in other	Further prospects for Business Model Canvas (emphasizing on Business Value Proposition)	Examination between Third party owned (outsourced/external) host-owned (self-developed)photovoltaic, community shared (collective social mangt.) power supply.

No	Author(s) sorted by Year	Theoretical Pathway	Data Source Methodology	Key Findings	Future Directives for Research	Link with work
	Implications					
1	**SILVESTRI, D., RICCABONI, M. AND DELLA MALVA, A. (2018)**	- Investigates pro-cyclical relationships (economic quantity vs. fluctuations) between business cycles and innovation. - Lays emphasis on business reaction rate midst economic uncertainty, business cycles and patenting.	Qualitative data and quantitative analysis surveying over 100,000 observations in relation to the effect on patents within 1,076 US based companies in the manufacturing sector.	-Economic/ financial uncertainty provokes exploratory traits in strategizing, leading to innovations through technology or business tactics (BMI). -Suggests availability of external resources (through stakeholders) to a firms increases if the stakeholders/resource providers persuaded by the firm's unique business strategy. - In a bid to sustain relevance, technological advancement in businesses requires consistent re-evaluation. RE companies require this trait as well as a matching innovative structure to manage such.	- Relevance of patenting in business innovation	- Looks into the existing knowledge management process of business and how novel reconfiguration may increase innovative capabilities (similar to number objective 3 of current research)
2	**BUCHERER, E., EISERT, U. AND**	- Conceptual framework building of BMI through	-multiple Case study analysis (11 case studies) using interviews	- Purports BMI to be a process. Because although BM appear static as a structure, ensuring such structure stays uniquely ahead	Relevance of developing contingencies through long term BMI planning	Expresses similar notions of external-to-internal factors as

	GASSMANN, O. (2012)	investigating product innovation. -Borrows from contingency theory in order to emphasize importance of long term based strategies such as innovation	from top level management (primary data) who are familiar with the business model of the firms.	requires mustering innovative capabilities. Hence generating BMI - From an organisational perspective, a combined effort of ensuring internal and external features are complementary and collaborate seamlessly promotes firms consistency regarding its objectives and how it achieves such. - Infusing innovation into organisational culture is essential to novel idea generation		important influencers BMI development
3	**LINDER, M. AND WILLIANDER, M. (2015)**	Explores constraints to circular BMI prospects their effect on optimum product efficiency	Case study approach via semi structured interviews of managers and entrepreneurs practicing CBM. -Backed up by market surveys and customer interviews	-Understanding the true conditions of the situation of the market environment increases prospects of realising unique BM structure capabilities. -Circular Business models refer to potential value created after primary use of a specific product e.g. recycling. - Similar to new age businesses, firms adopting CBM based logic are significantly dependent on technological proficiency. Managing such requires innovativeness	-Linear and circular business models	-Highlights firm sustainability prospects through BM innovation for enhanced product/service efficiency
4	**ANTIKAINEN AND VALKO**	Exploring the BMI prospects within the circular economy through perspectives of Lifecycle thinking	Conceptual literature review of BMI and Circular economy interrelationships.	-Lifecycle assessment keys into product/service development while being mindful of environmental impacts. This relates to notions in renewable energy development.	- Consolidating stakeholder justification in BMI research	- Major highlight is the need for stakeholder identification, an integrative BM

	KARI (2016)	and lifecycle assessment	-Single case study approach using semi structured interviews	-Growing economies need to be more resourceful to mitigate cost of growth and long term impacts. This creates need for consistent dynamism & re-evaluation of BM structure, garnering innovativeness. -Emerging RE businesses must look beyond achieving economic value in order to be sustainable. - This implies need for considering a larger percentage of stakeholders and innovative management processes.		structure and value co-creation**.** (i.e. RE businesses and their stakeholders)
5	**FORES AND CAMISON, 2016**	Investigates concepts of knowledge creation, internalisation as it relates to BM development through concepts of Absorptive capacity, internal knowledge capability.	Quantitative cross sectional analysis of small medium and large scale industrial Spanish companies via questionnaires	-A vital contributor to a firm's innovative capabilities is its knowledge acquisition and management dynamics. Such internalisation resonates with features of institutional logic. -An optimal knowledge management process involves gaining knowledge internally via experience and skill, while integrating external knowledge through which innovation can be more efficient. - Diversification of knowledge without sufficient integration tactics into the business plan inhibits commercial BMI prospects. -Solely depending on internal knowledge generation limits scope	-Managing Firm innovative capabilities through institutional logic. -Effects of knowledge management o firm dynamism	-Relevance of knowledge in incremental and radical form of BMI.

				managerial foresight. Firms must also consider external sources as well (stakeholders included)		
6	**LAUDIEN, S. M. AND DAXBOCK, B. (2016)**	Investigates BMI phenomena within companies performing closest to the mean average level as opposed to underperforming or over performing firms.	-Multiple case study reviews via inductive grounded theory building. -10 firms	-Clearly categorises BMI types into incremental/Systemic and Radical/Disruptive BMI. -Polarising arguments made for BMI antecedents being that it firstly occurs as a result of deliberate pre-conceived need to ensure competitiveness. -Second assumption being that BMI occurs as a result of external emerging market changes. (Touches on BMI network integration capabilities and stakeholder management). -More focus needs to be given to BMI in relation to contextual nuances. -Average performing firms tend to harness BMI traits as a result of learning and exploring (similar to the trial by error process by Sosna et al 2010)		-Discovering BMI through trial by error. Are Nigerian RE businesses impulsive or reactionary towards developing BMI characteristics?
7	**FOSS AND SAEBI 2016**	An in depth reflective analysis into the growth of BMI concept over the past 15 years.	Scholarly Peer review of 150 BMI literature over a 15 year span	-Extant over-arching themes for BMI research include; Initial conceptualisation, BMI as an agent of change, BMI as an outcome, and implications of BMI application. - Most BMI literature are currently more conceptual in nature than	Further conceptual and theoretical development across industries and economies. -Which of the four types of BMI are most suited in to	-Gives a synopsis of BMI literature development and is useful in understanding its potential growth trajectory

				explanatory (i.e. antecedents to BMI are not clearly outlined). - Developing a solid theorising requires understanding the prerequisites and precursors leading up to a phenomenon. -Hence, understanding antecedents to BMI in RE application would be useful in developing the theory in RE-BMI. -Suggests other types of BMI include evolutionary, Adaptive, focused and complex BMI.	RE businesses in developing countries?	
8	**TAUSCHER AND ABDELKAFI 2017**	Discusses the peculiar aspect of simplifying cognition complex frameworks via adequate visual representation. -Borrows from Information systems and visualisation into the research	Peer review of visual representation systems for business models.	-Inherently complex frameworks and systems such as BMI can be assimilated easier by cognitive structured diagrams with paying attention to key communication and mental skills.	-Developing visual representation of RE-BMI frameworks	Highlights importance of visualisation and cognition in research
9	**PEDERSEN ET AL 2018**	Investigates the interrelationship between BMI, sustainability and organisational values	-Mixed method conducting 492 interviews with managers in the fashion industry as well as survey questionnaires	-Keys into to similar notions on BM sustainability expressed by Schaltegger et al, 2016, Stubbs and Cocklin 2008 and Ludeke-Freund, 2008. -Recognises relevance of synergy between organisational culture and external factor management.	- Merging BMI with the whole sustainability full spectrum objectives (environmental, economic and social)	Discusses firm dynamics and stakeholders relevance to BMI sustainability

				- Businesses need to create value for itself and all stakeholders in order to maintain relationships with respective stakeholders. - Forming efficient strategic partnerships are essential to reducing overhead cost. Particularly in RE industry which is capital intensive, government and private sector holders are essential to that.		
10	**MARTI 2018**	Looks into social impacts and existing challenges faced by BMs with innovative capabilities	Literature review	-Purport BMI possesses a positive and negative effects on socio-environmental spheres. Regarding the RE application, though energy capacity would possibly increase, adverse effects such as acquiring more land in open (rural) spaces could limit the arable land available for farming. - The onus rests on the BMI process to limit the negative effects on sustainability while maintaining feasible competitive advantage. - Ethical implications must be considered in developing RE-BMI development.	-Potential missed or destroyed values embarking on BMI within renewable energy development. -Business Model Innovation vs. Business Model oppression.	-Indicates the importance of considering potential negative impacts of progressive concepts such as BMI
11	**BARTH ET AL. 2017**	Discuses integrative capabilities of BMI and sustainability literature form	- 500 Peer reviewed articles on BMI, Sustainability and	-In order to infuse pro-sustainability into BMI narrative, the scope of research must be beyond the singular firm, and include socio-environmental (external).	-Matching-up theoretical sustainability with practical sustainability in RE-BMI research.	- Connects theoretical relevance building with practical

		perspectives of the agro-food industry.	agric. Business development.	-Ties in to arguments for stakeholder consideration. -Hints at the search for understanding value proposition as essential to BMI development (Bocken et al, 2014). Also derives firm upscaling as an antecedent to sustainable BMI development.	-How can such balance enhance conceptual sustainability within newly developing research fields?	viability of a research concept.
	VALUE AND SUSTAIN ABILITY					
12	**BOCKEN ET AL. 2013**	Deduces existing categorical examples of Sustainable business models	Systematic review approach of literature	-Though short term profit making appears more apparent, BMI presents an avenue for long-term value firm survivability, which is what current businesses should focus upon. -Increase in global product/service demand, firm self-reliance is an increasingly insufficient strategy for business survival. -This prompts the need for shared value within firms and prospective stakeholders, as is the case in emerging industries (RE) situated in emerging economies (Sub-Saharan Africa). - Energy is a key area in which the BMI & SBM can be best explored.	Resource efficiency through BMI tactics. BM archetypes in Renewable energy.	-Interrelationship between technological inkling of RE and possible business upscaling via BMI.

				-Out of the 3 broad identified BM archetypes, the intended RE falls within the lines of technological (RE) and organisational (Scale-up solutions) categories.		
13	**KYPRIANOU 2018**	Highlights the relevance of value co-creation in modern business environments from perspectives of peer-to-peer marketplaces.	Theory building multi-case study approach (20 pilot interviews), literature review and meeting observations, archives,	-Cost reduction tactics must be employed by RE firms in developing countries through establishing efficient partnerships. - Necessity breeds innovation (RE application), and meeting a need breeds value (power supply). The process through which such values are created requires strategy (BMI). -Uncertainties and market heterogeneity pose threats to businesses. Strategic consolidation via unique value proposition in developing countries is underexplored. -Firm costs are subsidised via strategic partnerships. - Managing heterogeneous value objectives between stakeholders require balancing & reaching a value mid-ground.	Identify specific stakeholder theory approach which best explains RE business development, partnerships and value creation	-Links participant (stakeholder) relevance to value creation in business development.
14	**REISCHAUER, G. AND MAIR, J. (2018)**	- Exploratory looks into the sharing economy phenomenon	(Qualitative) Multiple Case study approach within 23 firms	- Knowledge management is a vital tool for value creation within the sharing economy. - Value co-creations is an increasing phenomenon within practical and theoretical spheres of business.	-Renewable energy's place in the spheres of the sharing economy. -Relevance of stakeholder consideration in sharing economy	-Emphasises on knowledge management, internal/external resource gathering

				-Internal/external resource management is essential for new age value creation		in relation to value co-creation.
	STAKEHOLDER					
15	**MITCHELL ET AL. 1997**	-Assessment of the stakeholder theory identifying archetypes and groupings, with assistance of stakeholder salience.		-Stakeholders influence and can be influenced by firm actions. -Configuring and identifying stakeholders depend on their relevance to the identified value proposition and resource required. -By definition two streams of ST are occur; 1st stake can both influence and be influenced (Freeman, 1984). Secondly stakeholders are classified based on risk level (voluntary/involuntary). - Need for resources, and reduction of costs towards acquiring such resources are key reasons why stakeholders must be considered. - The management resourcefulness needs to clarity in what stakeholders contribute to firm survival as well as the innovative capabilities of the firm	-Categorizing stakeholders for RE companies in developing countries. - Stakeholder salience concept	-Intended research would be adopting the narrow stakeholder view (emphasising stakeholder relevance to the value proposition of the firm). -Power Dependent stakeholder relationship is essential for upward mobility (government in RE).
16	**DEWI ET AL. 2018**	-Highlights correlations between stakeholder networks and entrepreneurial positioning.	Looking into case study of payment platforms for hospitals in Indonesia	-Ensuring provision for collaborative capabilities in tandem with BMI tactics increases chances for creating flexible survival strategies.	-Government participation in value co-creation.	-Supports the arguments for considering external/internal features in relation

		-Also looks at government participation in such process	-Quantitative data collection via questionnaires and interpretation via SPSS and structural equation modelling (SEM).	- Significant correlation between active government participation and entrepreneurial/innovative development in business. - Innovative thinking breeds proactive culture ;by extension companies with such traits stand better chance at creating competitive advantage and survival.		to context specific nuances in BMI development.

No	Author(s) sorted by Year	Theoretical Pathway	Data Source Methodology	Key Findings	Future Directives for Research	Link with work
	General					
1	**RICHTER, M. (2013)**	Identifies two streams for Business Model development within the RE environment which are from the initial Generation of Renewable Energy and the Customer side (end user)	Conducts exploratory qualitative (interviews) research of early stage German RE businesses.	-Large Scale Renewable Energy projects although initially capital investments are highly consistent in returns. To this regard, the intended research seeks to promote renewable energy business participation in key regional industrial fields (Agriculture in the African context) in order to stimulate government interest and support via beneficial policy/regulations (with probable backing from stakeholder theory). -With respect to BM development streams, the intended research identifies possible opportunities in Production, Storage and Distribution of renewable energy.	BMI opportunities in producing, storing and distributing renewable energy.	An understanding of Business Model Innovation within the context of renewable energy.
2	**SCHREURS, M. A (2013)**	Policy reviews and analysis towards RE adoption in the German context, while avoiding	Literature review on Japanese policies the pre-emptive stance taken by Germany in	-The high volatility no nuclear energy production, combined with the infrastructural lapses in numerous African energy sectors provides an insecure combination, pointing to the need to focus on less	-Safety and environmental sustainability in RE application in Developing countries.	Challenges (Crises) provides opportunity for favourable policy alterations.

		nuclear reliance on energy production	adjusting their Energy policies	hazardous RE options (SOLAR, WIND, BIOGAS, THERMAL etc.) -Pro-active nature towards energy resolution (exhibited by Germany) should be inculcated by innovative energy stakeholders (government, firms, regulatory bodies).	Social perceptions towards Renewable energy adoption in African industries vs incumbent norms and practices.	-Promotes argument for cohesive government/business relationship (possibly through Public private partnerships).
3	**ELLABBAN, O., ABU-RUB, H. AND BLAABJERG, F.(2014)**	-An overview analysing Renewable Energy and its potentials in the coming years.	Literature review	-Though Renewable energy presents significant potential, challenges in storage and conversion of certain RE forms presents a real threat of gross resource tension and waste.	-Determining the most viable Renewable Energy sources for Africa.	-Gives a descriptive overview of contemporary types and sources of renewable energy. And is useful for explaining witin the literature
4	**GEEM, Z. AND KIM, J. (2016)**	Seeks to identify feasible energy proportions which simultaneously promote carbon based energy reduction, increase renewable energy production and increase the overall capacity of energy output	-Quantitative Uses Integrated Markal-Efom System Model, calculated using evolver algorithm software -Data from Korean Ministry of trade, industry & Energy	-At the moment contemporary RE sources are not cost effective in the short term. Hence strategies need to be developed to ensure financial slack on firm resources in order to help offset cost. Can BMI be a viable contributor to this? -An incremental approach in Fossil-to-Renewable energy adoption may be more feasible on a large scale basis. Radical innovation may be more viable small scale off grid projects.	Integrated markal system model and its use of technical and economic approaches for RE application optimisation (focusing on potential BM elements) -RPS Policy exploitation prospects for Renewable Energy based businesses.	-Discusses importance of sound energy mix and how transitional tactics to more Renewable sources.

		-Examines policies (Renewable Portfolio standard)				
5	**ENGELKEN, M., RÖMER, B., DRESCHER, M., WELPE, I. M. AND PICOT, A. (2017)**	Looks at Business model prospects and challenges within developing and developed countries. Using a wide range of theories (30), some of which include open innovation, disruptive, monte-carlo simulation, institutional theory, RBV etc.	-Collated data from academic material discussing RE&BM (Renewable Energy & Business Modelling) -Conducted mixed methodology (using quantitative for developed countries, and qualitative case study method for developed countries).	-There is a limited amount of papers describing business model intricacies in detail. -More papers discuss RE business modelling in developed countries than developing countries, (Of which Africa is least explored) prompting the need for further discussion in the African context -Supports the argument for mindful inclusion of policies and regulations for RE development.	Expanding Business Model literature in African context; Case study of Renewable Energy industry. Liberalization of Energy from the incumbents; via industry based Business Model Innovations in Sub-Saharan Africa. -Innovative Data collation strategies for countries challenged with lack of available data on Energy.	Gives an exemplary outlook on Business model analytics and its infusion into renewable energy development, considering academic methods & theories as well as regional opportunities,
6	**AL-SARIHI, A. AND CHERNI, J. A. (2018)**	Uses strategic niche management (from evolutionary theory) to assess potential strengths and weaknesses in RE application	Semi-structured interviews are conducted on RE initiative actors within Oman. -Secondary data is also collated from Journals,	-Mentions ‘experimentation’ as a means of technological diffusion of sustainable technologies (Chesbrough 2010, Teece 2010) -Renewable Energy BMI practitioners should take cognizance transitional management elements	Potential strengths and weaknesses of RE application in Western Africa (a case study of Nigeria). -Strategic niche management in Business start-up development	Gives insight on positives and negatives of RE application within a relatively new developing RE industry.

		-Employs literature on technological diffusion, strategic niche management (SNM), technological innovation systems(TIS)	government source, etc.	which can be leveraged upon for better management of the process. -Niche management can be a pathway through which the most prominent RE sources are simultaneously exploited and managed in a structural fashion		
7	**FANG, L., NIU, Y., ZU, Q. AND WANG, S. (2018)**	A technical paper looking into RE enhancing efficiency in storage, as well as its transfer of energy; Through analysing the Micro grid system and Battery Energy saving potentials (BESS)		- By carrying out diligent load analysis and consistent regulation of the Battery Energy Saving system, production costs can be kept to a minimum which would have a multiplier effect on the overall cost of maintenance of the RE system (most especially in Solar power generation).	-Energy storage management of Renewables within sub-Saharan Africa.	-Discusses a vital area of concern in RE application which is storage and transfer of energy and challenges in efficiency (a potential weakness in RE development as Al-Sarihi et al, 2018 also investigate).
	SOLAR					
8	**KARAKAYA, E., NUUR, C. AND HIDALGO, A. (2016)**	Places singular focus on one Renewable Energy centred business, investigating BM challenges on a small scale basis.	Uses exploratory case study approach analysing RE diffusion processes undergone by a pioneer German photovoltaic (PV)	-Policies pack a higher impact punch in enabling small-scale RE businesses function efficiently. Without which small scale RE businesses are nigh impossible. BMI may well help in creating a viable strategic pathway but policies make a world of difference in easing the load.	Challenges in Technological Diffusion of Renewable Energy within Africa.	Looks at RE businesses from an individual small scale perspective.

			marketing company. -Data collated within a 4 month time period via interviews and ethnographic study			
9	**TONGSOPIT, S., MOUNGCHAREON, S., AKSORNKIJ, A. AND POTISAT, T. (2016)**	-Explores the available business model pathways in relation to the financing options which are feasibly available for 'rooftop solar energy application'	Primary data collation (interviews)	-Adopts BMs from other developed countries such as Feed-in-Tariff (Germany), Power Purchase Agreement (PPA) & 3rd party ownership (US), (Sturpeit and Palm, 2016) -Financial strain impedes RE development and service provision in Developing countries	-Financing prospects for Renewable Energy business in Africa.	Gives an exemplary look into the interactions between key facilitators (policies & regulations) & its impact on Solar energy development in a developing country.
10	**BURGER, S. P. AND LUKE, M. (2017)**	An empirical study pinpointing practising business model opportunities within the energy distribution (demand response) and management industry. Identifying inherent trends	-Data obtained from secondary (Cleantech i3 clean energy database) of 144 random Energy related Businesses in U.S & European regions	-Strongly suggests a heavy reliance on regulatory and policy frameworks for effective Business Model Development. -Contemporary Renewable Energy are categorised between 'wholesale' companies distributing Larger energy capacities to other Energy System Operators (ESO), and second 'retail' stream which mainly distributes to final end users	-Business modelling practices for Renewable Energy in developing economies. -Merging Energy resource with requisite policy development incentives for Sub-Saharan Africa (such as FIT, RPS and TGC's as	Gives idea of current Business model trends within the solar RE industry.

			-Quantitative empirical approach	(household, etc.) via energy management systems. As such, value capture methods (BM) vary and are dependent on the customer scope. -Other prospective BM opportunities and revenue streams are also present in the energy storage and supply infrastructure.	opined by Zang et al, 2017) -Revenue opportunities in RE Software interfaces mediums (for RE monitoring)	
11	**ÖVERHOLM, H. (2017)**	Uses elements of strategic alliance to explain the concept of Product-Service systems (PSS) and how it affects business management and transactions between RE firms and prospective end users.	Analyses 5 case studies where PSS is actively practised. - Data obtained via interviews (primary) and (secondary) archived data	-The PSS exhibits rudiments of networking, strategic integration and technological inclusion (Internet of things). Effectively describing the relevance of collaboration in business (open innovation) and the potentials technology has in creating such interconnected mediums within the Renewable Energy Industry.	Technological resource management structures for Renewable energy application in developing countries.	-Explains co-relationships between human and IT interfaces, and more importantly how this interaction can lead to profit pool creation.
12	**ZHANG, Y., ZHAO, X., ZUO, Y., REN, L. AND WANG, L. (2017)**	Looks into the Energy policy development via solar photovoltaic (PV) power industry development using ***system thinking*** and ***feedback control theory*** to assess FIT and RPS policies.	-Uses systems Dynamics to draft out long term structural frameworks for RE Feed-in-Tariffs (FIT) & Renewable Portfolio standard (RPS) systems.	-Suggests RE development can significantly enhance industrial growth and sustainability. This supports a major motive for intended research regarding the significance of Renewable Energy resource to augment energy issues of major industries in sub-Saharan Africa. Promoting the need for viable RE businesses with sound BMI strategies to be established.	-FITs, RPSs and TGCs; How can they be applied from an African perspective? (Literature centred from African perspective are scarce) -Potential of System dynamics in RE based eco-systems for Africa (Businesses, Government	-Provides literature on policy/structural development within an emerging economy (China), from which sub-Saharan African RE strategies for policy

			-SD can be applied qualitatively or quantitatively (it is quantitative in this case). -Data collated from secondary sources (China Statistical Yearbook & other government related agencies)	- The TGC (Tradable Green Certificate) is a fixed unit of account, like shares/bond but for energy i.e. 1Kwh is equivalent 1 unit TGC. This system though efficient requires significant technical investment in most of African region, and can be largely considered for long term.	& Public private partnership potentials)	development can be inspired (and adjusted to Africa specific contexts).
13	**ASTANEH, M., DUFO-LÓPEZ, R., ROSHANDEL, R. AND BERNAL-AGUSTIN, J. L (2018)**	Adopts scientific concepts of simplified scientific particle modelling and reduced order modelling to determine the optimal utility of solar based batteries.	-Mathematical modelling (core electrochemical model) to analyse effects on batteries carried out in an experimental scenario	-Lead-acid and lithium ion batteries are the two forms of batteries used within the Solar Energy Industry. - The nature of operating conditions (by way of weather, temperature, discharge/charge depths and maintenance culture) affect the performance of the batteries. How best can they be maintained in Africa? -The higher the temperature of the environment the higher and quicker the detrimental effects will have on lithium batteries. With relatively high temperatures in experienced in African regions, what cooling/temp. controlling effects can be applied?	-Maintaining Solar storage batteries in the African Region; Towards developing Cost effective initiatives.	Discusses the formidable challenge of PV system batteries and the effects of environmental & physical elements on their longevity. -Would be useful in explaining factors to consider in developing maintenance culture for Solar based Businesses.

14	**HUANG, J., BOLAND, J., LIU, W., XU, C. AND ZANG, H. (2018)**	Uses the Decision making model to theoretically back up mathematical values for PV solar storage capacities.	(Quantitative)Mathematic modelling (MATLAB) for determining optimum storage values for solar PV panels -Data used are solar radiation values acquired form south Australian capital.	-Highlights the importance of storage efficiency in solar energy production management, which is key in maximising unit energy consumption.	PV panel efficiency and storage in sub-Saharan Africa.	Lays emphasis on small grid RE systems to assist in energy capacity building. Presenting opportunities of strategic small scale collective RE businesses for hard to reach rural areas.
15	**MARIF, Y., CHIBA, Y., BELHADJ, M., ZERROUKI, M. AND BENHAMMOU, M. (2018)**	Looks into Renewable Energy potentials in Algeria (Estimating the Solar energy potential) and the practical challenges solar turbidity has on solar energy output	Analyses solar radiation turbidity-to-clarity ratio via mathematical formulation -Collates data from rooftop solar units of the Algerian RE energy ministry over 3 years.	- Having a mapped out estimate of solar energy potentials helps in building a more clarified load analysis, promoting more accurate efficiency incentives thereby reducing cost. -Solar Turbidity is affected by climate & environmental factors such as dust haze and air pollution (which is a common phenomenon in Africa).	Solar Radiation intensity in 3 major countries within sub-Saharan Africa (Nigeria, Kenya etc.)	Gives an exemplary account of solar application in Africa (specifically in the area of solar radiation estimation)
16	**LAURISCHKAT, K. AND JANDT, D. (2018)_**	Contributes to the theory of systems dynamics literature, using it as an added tool for developing BMs for Renewable	Applies systems dynamics to fields of energy efficiency and sustainable mobility	- Discusses the duality of PV application systems in supplying EVs and conventional power supply. This raises a possibility of creating higher frequency in energy supply as opposed to excessively	Efficiency in Technological synergies	Has similar discussions on Solar PV application systems such as feed-in-Tariffs,

		energy integration systems		store energy acquired. Since challenges in storage pose potential spots for energy wastage, can a Business Model be tailored towards more frequent end user supply systems?		Renewable energy efficiency.
	WIND					
17	**BENNOUK, A., NEJMI, A. AND RAMZI, M (2018)**	Assessing wind supply systems in view of discussing creating a combined unification of both systems	Examines a case study while using it to run a hybrid simulation	Note; Double-fed Induction generator(DFIM) and permanent magnet synchronous machine (PMSM) types of wind energy conversion systems. -Machine and grid converter outputs are negatively affected by the wind turbine wind speed and rotation, which can be occasionally be erratic. This is similar to Turbidity effect in solar generation and should be minimised.	Further clarification of Wind energy system functions	Adds to wind energy literature, describing key terms and concepts. -Geared towards optimizing efficiency in wind energy systems.
18	**LEI, X., SHIYUN, T., YANFEI, D. AND YUAN, Y. (2018)**	Case study of investment prospects in the Chinese wind Energy industry to develop multi objective programming/optimisation model for risk management	Monte Carlo Random sampling technique to determine potential risks in Wind energy investment in the Chinese markets	-Renewable Energy projects characteristically have long term positive effects and short term uncertainties, which is concerning to investors. And can also provide an avenue for BMI problem solving. -Propose clean development mechanisms benefits to be fully integrated into RE policies to support and encourage quality energy output.	Impediments to Renewable Energy investment.	Wind energy management and its value in holistic sustainability. Highlights potential risk factors involved in RE adoption
	BIOMAS					

19	**MAVROTAS, G., SKOULAXINOU, S., GAKIS, N., KATSOUROS, V. AND GEORGOPOULOU, E. (2014)**	Assesses greenhouse gas emissions in Waste management through the scientific process of multi-objective programming, and builds upon creating a structural model for its management	Mathematical programming model (via multi-objective programming) -Data collated from a case study	-Mathematical modelling is suggested to be a viable tool for determining resource efficiency and also proffers feasible models in achieving them (majorly practised in Operations research).	-Optimizing renewable resource management and how it can be applied in developing countries. -Identify possible residual waste/emissions in Renewable Energy production and if so how can they be managed	Points to the efficiency in resource management viewing it as a vital means of ensuring indirect business and environmental sustainability
20	**KRETSCHMEET AL., (2015)**	-Discusses resource optimization through detecting potentials of waste water in regional energy production	Case study of Biogas renewables in Austria.	-Waste-water is an energy source through which chemical and/or thermal energy can be produced through Waste Water Treatment Plants. - Business opportunities are present in the stages of production, storage and distribution of Renewable Energy. Through BMI efficient value capture tactics could be identified (explored) and exploited.	-Interdependencies in Renewable Resources and how they can be exploited. -Process network synthesis (and its relevance in RE integration from a practical perspective).	Gives insight on Waste water (Biogas) and its potentials.