Global relevance of scaling African indigenous entrepreneurship

Abstract

This research focuses on the way African indigenous entrepreneurs (IEs) use at hand resources and strategies to overcome challenges in resource constrained and munificent environments. Although there have been considerable past progresses in the technology, innovation and entrepreneurship literature concerning non-predictive strategies, our understanding of the relevance of bricolage in Africa context remains limited. This paper examines the issue of global relevance of scaling African indigenous innovation; and focuses on how IEs can scale their businesses. We relied on qualitative cases of IEs based on semi-structured interviews to explore the practical context of using non-predictive strategies to solve contemporary problems through the more cost-effective and environmentally friendly solutions. Specifically, we argue that IEs can scale their indigenous solutions by leveraging on bricolage to provide globally relevant solutions. The sample consists of twenty indigenous entrepreneurs from Nigeria who operate in resource constrained and munificent contexts. We present bricolage theory as a preliminary way of understanding how IEs operate and may be scaled. The paper enhances appreciation of the scaling processes of indigenous entrepreneurs based on forms of bricolage; and it extends the application of bricolage to resource munificent contexts. Finally, we outline the implications of the findings for research and practice.

Keywords: African indigenous entrepreneurs; Indigenous entrepreneurship; Innovation; Bricolage, Selective bricolage; Parallel bricolage
1. Introduction
Interest in indigenous entrepreneurship is rising quickly, driven in part by the numerous solutions at the “base of the pyramid” markets (e.g., Linna, 2013; Pansera & Owen, 2015; Witell et al., 2017) provided by indigenous entrepreneurs who are solving “grand societal problems” (Hilson, Hilson & Maconachie, 2018; Giudici, Combs, Cannatelli, & Smith, 2018) and “changing the world” (e.g., Meyskens, Robb-Post, Stamp, Carsrud, & Reynolds, 2010). Indigenous entrepreneurs also provide valuable cost-effective solutions that are useful to all populations and solve contemporary problems. For instance, the usefulness of shea butter, which is indigenous to sub-Saharan Africa, has been known and used for decades to successfully treat health and skin ailments, before it became known and demanded globally. It is now used around the world, for cosmetics, pharmaceuticals and chocolate formulations.

Indigenous entrepreneurs are well situated to finding valuable solutions to widespread local problems, because they have first-hand experience of these problems (Onwuegbuzie, 2014), and the natural resources available to solve them. The focus on “at hand resources and strategies”, usually available to indigenous entrepreneurs (Dana & Light, 2011; Duymedjian & Ruling, 2010), makes indigenous entrepreneurship distinct and worthy of consideration from the perspective of bricolage (Baker & Nelson, 2005; Garud & Karnoe, 2003; Keupp & Gassmann, 2013; Senyard, Baker, & Davidsson, 2009; Senyard, Baker, Steffens, & Davidsson, 2014; Witell et al., 2017). Albeit other theoretical perspectives such as effectuation and frugal innovation are equally suitable to explore entrepreneurial activities of indigenous entrepreneurs especially regarding base of the pyramid markets (e.g., Duymedjian & Ruling, 2010; Fisher, 2012; Perry, Chandler & Markova, 2012; Ratcliff & Doshi, 2016; Marinakis, Harms, Ahluwalia, & Walsh, 2017). Moving from these promising strands of literature, two issues are crucial in choosing bricolage as our theoretical lens.

First, how indigenous entrepreneurs use at hand resources and strategies in practice. Second, whether indigenous entrepreneurs operating under resource constrained and munificent contexts scale their
innovation. More recent studies have shown that indigenous innovation is a common phenomenon (Henry, Dana & Murphy, 2018; Onwuegbuzie, 2014) often associated with grassroots or indigenous entrepreneurs.

A great number of empirical studies, published in this journal – TFSC and elsewhere, focus on emergence of entrepreneurial innovation from resource constrained contexts (Dana & Light, 2011; Henry, Dana & Murphy, 2018; Hossain, 2016; Hilson, Hilson & Maconachie, 2018; Hindle & Moroz, 2010; Pansera & Owen, 2015; Rhisiart & Jones-Evans, 2016; Sarkar & Pansera, 2017; Li, Ji, & Zhang, 2020). While there are several innovation and entrepreneurship studies exploring these issues of at hand resources and non-predictive strategies (e.g., Anderson, Dana & Dana, 2006; Duymedjian & Ruling, 2010; Garud & Karnoe, 2003; Sarasvathy & Dew, 2008; Senyard et al., 2014 Witell et al., 2017), the issue of how African indigenous entrepreneurs can scale their innovations using ‘at hand resources and strategies’ has received less theoretical and research attention.

Moreover, research suggest that most indigenous entrepreneurs tend to face a scaling challenge and are not usually successful in scaling their indigenous innovation. Consequently, we investigate how indigenous entrepreneurs can scale their indigenous knowledge solutions in a systematic way for global value creation. In this paper, indigenous people are referred to as those who are original descendants of the land. On the other hand, indigenous entrepreneurs are those who understand and entrepreneurially use the traditional indigenous knowledge that is unique to the different communities in which they operate. Since African indigenous entrepreneurs are more likely to “making do by applying combinations of resources under conditions of resources at hand to new problems and opportunities” (Baker & Nelson, 2005, p. 333), we extend existing studies to enhance our appreciation of the scaling processes of indigenous entrepreneurs using the theoretical framework of bricolage.

Traditional research of Levi-Strauss (1967, p. 17) defined bricolage as “always to make do with whatever is at hand” whereas other studies conceptualized bricolage as having the capabilities
to discern and utilise resources at the periphery in order to gain innovative outcomes (Gibbert, Hoegl, & Valikangas, 2007). Previous studies have largely used bricolage to explore how entrepreneurs mobilise resources in developing their businesses (Baker, 2007; Baker & Nelson, 2015; Desa & Bau, 2013; Linna, 2013; Witell et al., 2017). The popularization of bricolage as the capacity to recombine resources under conditions of resource constraints or when having to work with limited resources to generate greater value for clients (Baker & Nelson, 2015; Salunke, Weerawardena, & McColl-Kennedy, 2013) do not take into consideration indigenous entrepreneurs operating under resource munificent contexts. Therefore, our research extends existing bricolage studies which theorize the concept around the themes of making do with resources at hand, improvisation and refusal to be constrained by environmental limitations (Baker & Nelson, 2005; Baker, Miner, & Eesley, 2003; Desa & Basu, 2013; Di Domenico, Haugh, & Tracey, 2010; Gibber et al., 2007; Linna, 2013; Salunke et al., 2013) to resource munificent contexts.

Drawing on the bricolage theory, we posit that African indigenous entrepreneurs may scale their indigenous innovation for global relevance by leveraging on improvisation to try out different global solutions to overcome not just resource-constraints imposed by the institutional settings but also recombine indigenous knowledge and resource munificent at local level to gain competitive advantage and enhance business survival (Baker & Nelson, 2015; Desa & Basu, 2013; Di Domenico et al., 2010; Linna, 2013; Salunke et al., 2013). We find that the application of indigenous knowledge by African indigenous entrepreneurs through ‘ideational bricolage’, which is a form of bricolage that describes the process whereby members of different local communities recombine aspects of older myths to create new myths with uses (Baker, 2007), are able to mitigate conditions of resource constraint by allowing their businesses to create new values, innovations or ideas that contribute to their expansion (Desa & Basu, 2013). In addition, we find that while
indigenous entrepreneurs who did not have mainstream education practiced parallel bricolage and failed to scale, those who had both mainstream and indigenous knowledge practiced selective bricolage and were able to scale. Therefore, we emphasize the importance of ambidexterity in the exploration and exploitation of mainstream and indigenous knowledge to enable indigenous entrepreneurs scale and grow their businesses for global relevance.

This research contributes to the literature in four ways. First, we offer a unique explanation of the usefulness of valuable solutions and indigenous innovations provided by African indigenous entrepreneurs and show a better understanding of how they can scale their businesses to achieving sustainable development. While previous studies emphasized that small businesses and/or entrepreneurs through bricolage are accorded the opportunity to attain their goals with the barest minimum of resources at their disposal (Baker & Nelson, 2015; Desa & Basu, 2013; Di Domenico et al., 2010; Linna, 2013; Salunke et al., 2013), we extend the literature by examining how African indigenous entrepreneurs can solve contemporary problems on a global scale while utilizing ‘resources at hand’ as well as operating under resource constrained and munificent contexts. In doing so, our work contributes to the very few but growing strand of literature that have investigated entrepreneurial bricolage (Fisher, 2012; Linna, 2013; Senyard et al., 2009; 2014; Pansera & Owen, 2015; Witell et al., 2017), technology entrepreneurship trying to make sense out of chaos (Spiegel & Marxt, 2011; Bailetti, 2012; Ratinho, Harms, & Walsh, 2015), indigenous entrepreneurship under institutional and environmental constraints (e.g., Amankwah-Amoah & Hinson, 2019; Hossain, 2016; Hilson et al., 2018; Keupp & Gassmann, 2013; Rhisiart & Jones-Evans, 2016; Sarkar & Pansera, 2017) by suggesting that bricolage capabilities help Africa indigenous entrepreneurs provide affordable solutions for base of the pyramid markets.

Second, we highlight the significance of bricolage in the context of indigenous entrepreneurship. Although there was much progress in uncovering the role of bricolage in small
businesses and entrepreneurial performance (Baker, 2007; Senyard, Baker, Steffens, & Davidsson, 2014; Baker, 2007; Baker & Nelson, 2015; Desa & Bau, 2013; Linna, 2013; Witell et al., 2017), how the African indigenous entrepreneurs can utilize indigenous knowledge and innovation through bricolage has not been sufficiently examined in the literature. Therefore, drawing on the bricolage theory, we consider the relative importance of bricolage in making indigenous knowledge and innovations globally relevant solutions and illustrate how solutions by indigenous entrepreneurs can solve contemporary problems through the more cost-effective and environmentally friendly solutions.

Third, we also extend existing literature in international business and entrepreneurship by examining how parallel and selective bricolage affects the scalability of business ventures of indigenous knowledge entrepreneurs. We emphasize that indigenous solutions that are based on selective bricolage which integrates indigenous and mainstream knowledge results in scalable ventures among indigenous entrepreneurs. Specifically, we argue that African indigenous innovation is scalable when combined with conventional mainstream processes that recognize their usefulness, which in turn further enhances their bricolage and innovative capacity (Baker & Nelson, 2005; Owuor, 2008; Langevang & Namatovu, 2019; Mafimisebi, Obembe, & Aluko, 2020; Miettinen & Virkkunen, 2005).

Finally, we believe that the significance of indigenous entrepreneurship in this study extends beyond the local level and has vital implications for a bricolage perspective of small and international business. In this regard, the study contributes to the literature on indigenous entrepreneurship by highlighting the distinct usefulness of indigenous innovations and strengthening the theoretical understanding on the effective scaling processes of these solutions for indigenous entrepreneurs. In sum, this study also adds to the existing discourse on bricolage by examining its application in both resource-constrained and munificent contexts (Baker, 2007;
Langevang & Namatovu, 2019; Namatovu, 2018; Onwuegbuzie, 2014; Sarkar, 2018; Wierenga, 2019).

In the next section, we start our literature review by defining key concepts, such as indigenous people and indigenous entrepreneurs and indigenous knowledge. We also provide a historical background to indigenous entrepreneurs in Africa, who generate solutions to solve context-specific problems. Next, we discuss theories that contributed to the marginalisation of African indigenous entrepreneurship, and bring to the fore, valuable information about indigenous knowledge, the problem-driven innovations derived from it, and their relevance to contemporary society. This is followed by methodology and a discussion of the findings. Finally, we conclude the study by discussing its implications for research, practice and policy makers.

2. Indigenous entrepreneurship

There is a plethora of definitions of the term indigenous in extant literature which border on social, geographical, political or cultural perspectives (Dana, 2007; Maritz & Foley, 2018; Peredo, Anderson, Galbraith, Honig, & Dana, 2004). The core elements highlighted are the descent from the residents of a region before the subsequent inhabitants; locals or immigrants’ geographical, political and/or economic dominance and efforts to retain certain distinctive social-cultural norms and institutions (Anderson, Hong & Peredo, 2006). Lindsay (2005) defines indigenous people to be the original owners of a country’s resources or the descendants of such persons, who are known and accepted by the community in which they live as indigenous.

Furthermore, indigenous knowledge refers to a body of knowledge acquired by local people through experiences accumulated overtime, informal experiments and an intimate appreciation of the environment of a particular culture and is used to tackle problems within a society (Warren & Rajasekaran, 1993; Mkenda & Aikaeli, 2019). It is neither static of archaic as often misconstrued, rather it evolves in a local environment, and is especially suited to the needs
and conditions of indigenous people (Islam, 2013; Mkenda & Aikaeli, 2019).

In defining indigenous entrepreneurship, a school of thought points to economic activity for economic or non-economic reasons (Dana & Anderson, 2007; Gallagher 2015; Mrabure, 2019). On the contrary, another school of thought refers to indigenous entrepreneurship as enterprise related activities undertaken by indigenous people for indigenous people – the interest of the indigenous community is paramount (Brueckner, Spencer, Wise, & Marika, 2014; Hindle & Lansdowne 2005; Mrabure, 2019; Pansera & Sarka, 2016; Peredo & Anderson, 2006). The various perspectives highlight the purpose of the venture and the people who undertake the venture. Considering, both perspectives, at the core of indigenous entrepreneurship is indigenous economic activity by indigenous people. It conveys the idea of pursuing economic opportunity that is targeted towards the common good of indigenous communities. Nevertheless, for simplicity, this study refers to indigenous entrepreneurs as entrepreneurs who apply indigenous knowledge in their entrepreneurial process.

2.1. Indigenous knowledge for innovation

Innovations derived from indigenous knowledge are generated by indigenous entrepreneurs in their attempt to solve problems in their environment or find alternative low-cost solutions when existing ones are unaffordable. The need to integrate innovation and community involvement in order not to undermine otherwise effective interventions is one of the crucial considerations for indigenously driven innovations (Njenga, Iiyama, Gitau, & Mendum, 2018). These innovations are sometimes defined as bottom-up social innovations developed by rural communities, and are aimed at solving problems and satisfying needs not considered important by wider markets or major institutions (Njenga et al., 2018; Seyfang & Smith, 2007). They may also be considered social innovations because they meet the needs of underserved populations and foster social inclusion, as they tend to be both affordable and sustainable. They also tend to employ
though simple, indigenous knowledge solutions can be considered genuine innovations. Innovation is a function of individual characteristics of the entrepreneur and the environment in which the entrepreneur operates (Jack & Anderson, 2002; Koellinger, 2008; McDade & Spring 2005; Shane & Venkataraman 2000). People at the grassroots in Africa and around the world apply indigenous knowledge to generate innovations from resources that abound in their environment, and because they usually operate in resource-constrained environments, their inventions tend to be simple and rudimentary though effective (Mkenda & Aikaeli, 2019; Monaghan, 2009; Subba Rao, 2006; Verma, Tsephal, & Jose, 2004).

Even though indigenous innovations have been eclipsed by mainstream practices, an increasing number of scholars are beginning to acknowledge the global relevance of these inventions (Grenier, 1998; Gupta, 1995; Gupta et al., 2003; Pathak, 2008; Seyfang & Smith, 2007; Srinivas & Sutz, 2008; Van stel, Carree, & Thurik, 2005), and their potential to provide solutions to contemporary problems (Gupta, 2001). These innovations have the potential to generate market transformations (Monaghan, 2009; Seyfang & Smith, 2007) because they provide cost-effective alternatives to existing mainstream offerings. An example is their contribution to making medicine affordable and therefore available to more people (Mashelkar, 2001). As a result, indigenous solutions have a significant wealth-creating potential as they meet the unsatisfied needs of a large proportion of local populations (Mrabure, 2019; Prahalad, 2009).

Though innovations by indigenous people are not always able to address all the problems in their environment, and some of their solutions are sometimes inadequate (Gupta, 2000), some low-cost indigenous innovations have proven to be more effective than mainstream solutions (Gupta, 1995, 2000). Grenier (1998) points out that in comparison to modern technologies, many traditional solutions have been tried and tested and found to be ‘effective, inexpensive, locally
available and culturally appropriate; and in many cases are based on preserving and building on the patterns and processes of nature’ (Grenier, 1998, p. 7). Some cited examples of indigenous innovations, which are less expensive and more effective than modern day technology include: ways in which indigenous people conserve potable water in arid, drought-prone areas; unique, ecosystem-friendly solutions developed by farmers to control pests, as well as diseases in crops and livestock; and their ways of conserving aquatic and terrestrial biodiversity, as well as soil conservation (Gupta, 1995, 2000); and the solution found for making dirty water potable in areas where modern infrastructure is unavailable (Srinivas & Sutz 2008). In the health sector, Kaya (2009) notes that over 65% of poor indigenous people in Africa depend on indigenous knowledge solutions for their health needs. More so, the solutions in the health sector are usually made from plants and animals that have been discovered by the indigenous people to be effective (Kaya, 2009, p. 97). Thousands of other indigenous knowledge solutions, which are gradually being documented, are known to have solved hitherto unresolved problems, especially in local and rural communities (Odukoya, 2010), and provide low-cost alternative solutions to wider markets. Research and development efforts channeled towards the indigenous health solutions can make significant contributions to developing cost-effective plant medicine (Kaya, 2009).

Furthermore, indigenous knowledge solutions have an in-built bias for effectiveness because they are need-generated and need-oriented. They are also developed by those who have “first-hand” experience of the problems they seek to solve. The innovations therefore tend to have a better fit with the local context and sometimes end up being more effective than some conventional solutions (Gupta, 1995, 2000; Monaghan, 2009; Njenga et al., 2018). In recent years the growing interest in indigenous solutions among scholars has been driven by the recognition of their potential to provide effective solutions to problems and their ability to contribute to sustainable, economic development (Agrawal, 1995; Ganguli, 2000; Monaghan, 2009; Sen, 2005; Seyfang & Smith,
2007; Shankar & Narang, 2019; Srinivas & Sutz, 2008), particularly innovations originating from emerging markets which have been identified as vital to global economic growth (Shankar & Narang, 2019), because they use resources that abound in their environment and are therefore more affordable and sustainable.

2.2. African indigenous knowledge and innovation at the base of the pyramid

Most African indigenous entrepreneurs face extensive resource constraints and crises (Amankwah-Amoah & Hinson, 2019; Onwuegbuzie, 2014; Mafimisebi, 2016; Mafimisebi & Nkwunonwo, 2015; Mafimisebi & Ogbonna, 2016; Mafimisebi & Thorne, 2015; 2017). In context, research notes that one billion people live in the least developed countries and four billion people live in developing countries under conditions of resource scarcity (cf. Collier, 2007; Gupta, 2012), a situation which particularly affects those living at the base of the pyramid (Anderson et al., 2006; Braungart & McDonough, 2009; Gupta 1999; Hall et al., 2012; Pansera & Owen, 2015). Although research suggest that a significant number of African indigenous entrepreneurs are located in areas usually classified as “remote” or “very remote” but some are also located in urban areas (Amankwah-Amoah, 2016). However, notwithstanding issue of resource constraints and institutional voids in Africa (Amankwah-Amoah & Hinson, 2019; Fyvie & Ager, 1999; Onwuegbuzie, 2014; Mafimisebi, 2016; Mafimisebi & Nkwunonwo, 2015; Njenga et al., 2018), African indigenous entrepreneurs continue to innovate at the base of the pyramid (cf. Desa, 2012; Hilson et al., 2018; Ratcliff & Doshi, 2016; Marinakis et al., 2017) providing valuable solutions to many of the grand societal problems. This makes African indigenous knowledge and innovation essential for this group at the bottom of the pyramid.

A great deal of research in area of technology entrepreneurship provides valuable insights into how the success of entrepreneurial firms are tied to disruptive technologies (cf. Bailetti, 2012; Li et al., 2020; Marinakis et al, 2017; Sarkar & Pansera, 2017; Walsh & Kirchhoff, 2002; Walsh & Groen, 2013). In
particular, African indigenous entrepreneurs that lack resources can scale their indigenous knowledge and innovation by leveraging on disruptive technologies (Christensen, 1997; Walsh & Groen, 2013; Walsh & Kirchhoff, 2002; Kirchhoff, 1994). Several technology entrepreneurship researchers have shown that disruptive technologies are crucial to overcoming barriers that might hinder entrepreneurial activities at the grassroots level (cf. Abrol, 2005; Linstone, 2011; Mangematin & Walsh, 2012; Halme et al., 2012; Prahalad, 2012). In this perspective, technology entrepreneurship is conceptualized as “recognizing, creating and exploiting opportunities, and assembling resources around a technological solution irrespective of the organizational context” (Ratinho et al., 2015, p. 169). This promising line of research recognizes that technology entrepreneurs derive competitive advantage either by a combination or singularly utilizing three fundamental approaches: (1) the recognition of technological possibilities; (2) the ability to use technology to decrease transaction costs; and (3) the ability to use new technology product paradigm to provide a solution to a market gap (Ratinho et al., 2015). These three approaches are germane to African indigenous entrepreneurs who have indigenous knowledge and innovation at hand to overcome barriers in the entrepreneurial space. Therefore, we expect that the entrepreneurial action of African indigenous entrepreneurs based on technological solution could help overcome resource constraints and institutional voids in Africa.

We find that resource constrained innovation at the base of the pyramid in developing countries has generated the attention of an increasing number of scholars (e.g. Amankwah-Amoah & Hinson, 2019; Hall et al., 2012; Gupta, 2012; Pansera & Owen, 2015; Prahalad, 2012; Sarkar & Pansera, 2017; Smith et al., 2014). Our review of existing studies suggest that African indigenous knowledge and innovation is essential to make the continent self-sufficient and also provide affordable solutions to large number of people at the base of the pyramid. Likewise, people at the grassroots tend to operate in ways that respect and conserve the natural environment and conserve biodiversity (Gupta, 1995; 1999). They usually have an intimate knowledge of the environment in their locality and, through accumulated experience, have
learnt to manage the resources available in sustainable ways (Grenier, 1998; Gupta, 1999; Gupta et al., 2003; Mkenda & Aikaeli, 2019).

Despite the increasing interest in resource constrained innovation, indigenous entrepreneurship and innovation studies sometimes present diverse narratives and conflicting views around which such indigenous knowledge and innovation are often framed. For instance, this strand of literature frames indigenous knowledge and innovation around fascinating concepts such as frugal innovation (Bound & Thornton, 2012), pro-poor innovation (Gupta, 2012; Hall et al., 2012), BOP innovation (Prahalad, 2010; 2012), Jugaad innovation (Radjou et al., 2012), reverse innovation (Govindarajan & Trimble, 2012), inclusive innovation (George et al., 2012), below-the-radar innovation (Kaplinsky, 2011), disruptive innovation (Spiegel & Marxt, 2011; Prahalad & Mashelkar, 2010), and resource constrained innovation (Cunha et al., 2014; Pansera & Owen, 2015). The issue of resource scarcity and insecurity remain central as a common feature within these narratives of innovation (cf. Baker & Nelson, 2005; Desa, 2012; Duymedjian & Ruling, 2010; Keupp & Gassmann, 2013; Linna, 2013; Pansera & Owen, 2015). More markedly, this heterogenous literature has seek to collectively addressed whether innovation occur in resource constrained environments (Keupp & Gassmann, 2013), ways in which innovation contribute to several goals such as poverty reduction and social inclusion (George et al., 2012; Halme et al., 2012), and/or the emergence of markets for commercial gain (Pansera & Owen, 2015). This allows us to consider how indigenous entrepreneurs use at hand resources and strategies in practice. While there are other theoretical perspectives such as effectuation and frugal innovation which are equally suitable to explore entrepreneurial activities of indigenous entrepreneurs especially regarding base of the pyramid markets (e.g., Duymedjian & Ruling, 2010; Fisher, 2012; Radjou et al., 2012; Perry, Chandler & Markova, 2012; Ratcliff & Doshi, 2016; Marinakis, Harms, Ahluwalia, & Walsh, 2017).

There is scarce research concerning how African indigenous entrepreneurs make use of ‘at hand resources’ and non-predictive strategies to scale their indigenous knowledge and innovation. As such, our
research connects with some technology entrepreneurship and innovation scholars that focused on the possible opportunities that indigenous knowledge and innovation may present for scaling up markets at the base of the pyramid (Gupta et al., 2003; Radjou et al., 2012; Prahalad, 2012) through the development of affordable products (Prahalad & Mashelkar, 2010; Pansera & Owen, 2015). In addition, our study also relates to other studies that have focused on indigenous forms of resource constrained innovation especially under informal settings by indigenous or grassroots movements sometimes in response to environmental problems or social injustice (Abrol, 2005; Fyvie & Ager, 1999; Smith, Fressoli, & Thomas, 2014).

Finally, the academic literature concerning entrepreneurial bricolage suggested that more attention should be given to resource scarcity (Baker, 2007; Barrett et al., 2015; Cunha, Oliveira, Rosado, & Habib, 2014; Desa, 2012; Hossain, 2016;Senyard et al., 2014) because lack of a resource can affect innovation capabilities of indigenous entrepreneurs (Baker, 2007; Krause, 2013; Amankwah-Amoah & Hinson, 2019). Consequently, we need to reflect and provide theoretical explanations on how the concept of bricolage manifested in indigenous entrepreneurship. In our discussion below, we elaborate on the operationalization of bricolage as a means to increase our theoretical explanation of scaling up indigenous knowledge and innovation.

2.3. Theoretical framework

‘Bricolage theory involves making do by applying combinations of the resources at hand to new problems and opportunities’ (Baker & Nelson 2005, p. 333). Bricoleurs are referred to as ‘tinkerers’ who, searching for new and unexpected cultural resources, discover new solutions (Miettinen & Virkkunen 2005). This practice has evolved as individuals and communities who rely heavily on natural resources for their livelihood respond to challenges in their social and
natural environment (Owuor, 2008). Bricolage theory provides a framework to understand how indigenous people in Africa and around the world have survived for generations by innovating solutions based on an intimate knowledge of their environment and the useful resources therein. Indigenous knowledge innovations are developed by experimenting with available resources in the environment to develop solutions (Onwuegbuzie, 2014).

The discourse of bricolage in literature is largely linked to resource-constrained contexts and studied within the category of bottom-of-the-pyramid people such as grassroots entrepreneurs (Baker, 2007; Langevang & Namatovu, 2019; Namatovu, 2018; Sarkar, 2018; Wierenga, 2019). People at the grassroots usually operate in resource-constrained contexts and consequently generate low-cost solutions as they use the resources available in their locality. The application of indigenous knowledge by indigenous entrepreneurs may be understood through the notion of ‘ideational bricolage’, which is a form of bricolage that describes the process whereby members of different societies recombine aspects of older myths to create new myths with different uses (Baker, 2007). This is different from ‘material bricolage’, which entails resourcefulness in using and combining ‘the various resources at hand as a means of finding workable-if-typically-imperfect approaches to a wide variety of problems and opportunities’ (Ted 2007, p. 697).

Baker and Nelson (2005) identified two key forms of bricolage, which they refer to as parallel and selective bricolage, and demonstrated that these two forms of bricolage influence the scale and quality of entrepreneurial outcomes, as well as the extent to which the market accepts solutions from the various processes. Parallel bricolage is described as ‘multiple on-going projects relying on bricolage’ (Baker & Nelson, 2005, p. 16). This form of bricolage is characterized by non-conformity to conventional standards as a widely applied and frequent practice (Baker & Nelson, 2005; Mair & Marti, 2009). Selective bricolage, on the other hand, is described as the use of bricolage on a selective basis rather than consistently using it across various fields (Baker &
Baker and Nelson (2005) pointed out that though parallel bricolage allowed venture survival with the lowest minimum of conventional resources, business growth or scaling was compromised because institutionalized standards were routinely ignored, and unconventional resources consistently used. This made the end products unattractive to richer mainstream markets. Second, because entrepreneurs practicing parallel bricolage tended to move from one project to another frequently, as a result of the different problems they faced, they usually lacked the focus required to evolve discovered solutions (Baker & Nelson, 2005). On the other hand, ventures that practiced selective bricolage were found to frequently grow because they combined low-cost, unconventional substitutes with conventional standards. They were therefore not consistently acting unconventionally (Baker & Nelson 2005). This suggests that the innovative solutions by indigenous entrepreneurs may be scaled by combining their indigenous knowledge principles with conventional standards. Figure 1 shows our theoretical framework which explains how bricolage affect scaling. In context, Figure 1 suggests that parallel bricolage compromises scaling, while selective bricolage allows scaling. In sum, our theoretical framework suggests that for indigenous entrepreneurs to scale, they need to embrace selective bricolage.

INSERT FIGURE 1 HERE

3. Methodology
A qualitative research approach was used (Eisenhardt, 1989; Yin, 1994), an approach consistent with testing bricolage theory as shown in previous research (e.g., Baker, 2007; Desa, 2012; Sarkar & Pansera, 2017). Our research focused on African indigenous knowledge and innovation. In order to uncover the use of bricolage by indigenous entrepreneurs, we use inductive method that allows for establishing generalizability of inferences, theory testing, and permit richer and more nuanced interpretations of a phenomenon (cf. Eisenhardt & Graebner, 2007; Sarkar & Pansera, 2017; Sigglekow,
In context, we followed a grounded theory approach which enables theoretical insights to emerge from interpretation of qualitative data such as observations, documents, and semi-structured interviews (Gioia, Corley, & Hamilton, 2012). Specifically, we obtained our qualitative data from observations and one-on-one in-depth interviews conducted over several weeks with twenty indigenous entrepreneurs, both male and female with different age groups, from different industries. Ten of the interviewed entrepreneurs had only indigenous knowledge and were mostly found in resource-scarce contexts, while the other ten entrepreneurs had both indigenous and mainstream knowledge were found in more urban and munificent contexts. Collectively, these entrepreneurs from each category were interviewed to understand whether they practice parallel or selective bricolage, as well as whether their ventures have scaled in the course of their operations.

Furthermore, qualitative methods are considered appropriate for our investigation because the subject of the study is exploratory, seeking to understand rather than measure (Jack & Anderson 2002) the impact of parallel and selective bricolage on the scalability of business ventures of indigenous knowledge entrepreneurs. Performance metrics such as profit, revenue, expenses, inventory growth have been noted as measures for scalable stage of growth in businesses (Maurya, 2016; Rompho, 2018). This study adapts income streams and transaction volume as indicators that show whether the interviewed entrepreneurs are able to scale. The context of investigation is Nigeria. In the data collection process, we selected indigenous entrepreneurs through personal connections, and then used referrals to connect with additional indigenous entrepreneurs. Using purposive and snowballing sampling techniques, we were able to identified and conducted interviews with the twenty entrepreneurs. Data and observations from interviews with the 20 entrepreneurs are captured in Table A1, shown in the Appendix. The multiple cases of entrepreneurs used in our study, is typical of indigenous entrepreneurship and entrepreneurial bricolage studies where cases are drawn from multiple entrepreneurs (Munkejord, 2017; Smallbone, Bertotti, & Ekanem, 2005; Nyame-Asiamah et al., 2020), enable thick narratives and exploration of understudied phenomenon.
3.1. Data analysis

The data analysis explores the theoretical perspectives of parallel and selective bricolage. Consequently, the actions of the indigenous entrepreneurs are examined using the lenses of bricolage. The initial interviews were semi-structured and face to face. To ensure an audit trail, after each interview, the telephone numbers of interviewees were noted, and our impressions recorded. The various interview recordings were transcribed at the earliest opportunity. In following the grounded theory methodology, we used three coding stages – open coding, axial coding and selective coding to identify and distil the main data constructs (Caprar, 2011; Corbin & Strauss, 1990; Nyame-Asiamah et al., 2020), with example illustrated in Figure 4, shown in the appendix. In context, open coding “involves breaking down the data to compare, conceptualize and categorize them into first-order themes (Corbin & Strauss, 1990, p. 61). Here, we categorized the participants’ descriptions, key terms and phrases, and practices to enable us identify bricolage practice under resource constraints and munificent contexts from the data.

Where necessary, in the course of transcribing the interviews and open coding, several phone calls were made to the interviewees to gather information as well as clarify ideas. Next, we followed the axial coding which involved incorporating the first-order categories into second-order themes to establish the interrelated elements of the data (Corbin & Strauss, 1990). To analyze the data, a content analysis was done, where concepts related to the research objective were identified. Quotes from the interviews gave rise to the concepts, from which the observed patterns within the groups being studied emerged. A systematic labelling of the content of a set of texts aids analysis of patterns and meanings of content (Kuckartz, 2019). The themes that emerged were then colour- coded, this way, all aspects that referred to the same theme were highlighted in the same colour. After this stage, we utilized selective coding to aggregate the main themes as suggested by prior research (Corbin & Strauss, 2008). This helped us to identify a pattern in the type of bricolage practiced in relation to the scalability of the respondents’ business ventures. It also
facilitated writing up the data analysis and findings.

4.0 Findings

In this section, we present our findings using the new constructs or concepts from our cases and juxtaposed the empirical data with some theoretical constructs in the literature. We employ a combination of illustrative quotes and examples describing the data from which we drew our inferences (cf. Miles & Huberman, 2003). Our analysis of the data suggests that indigenous and mainstream education is essential in the scaling of indigenous entrepreneurship and innovation. The findings also indicate that achieving scaling in resource constraints environment is influenced by selective bricolage capabilities of indigenous entrepreneurs. In line with extant studies, the findings suggest that indigenous entrepreneurs that practiced selective bricolage frequently grow because they combined low-cost, unconventional substitutes with conventional standards (Baker & Nelson, 2005; Fisher, 2012; Keupp & Gassmann, 2013; Sarkar & Pansera, 2017). Indeed, our findings indicate that selective bricolage capabilities allow indigenous entrepreneurs to overcome their resource difficulties. The data from Table 1 (summary of results) reveals that while the indigenous entrepreneurs who did not have mainstream education (Group A) practiced parallel bricolage and failed to scale, those who had both mainstream and indigenous knowledge (Group B) practiced selective bricolage and were able to scale. For the entrepreneurs in Group B, the indigenous solutions provided were noted to have aesthetic appeal, durability, better quality, and the entrepreneurs refined relatively crude solutions and as such were accepted in mainstream markets. These entrepreneurs created more impact by reaching a wider market, while still enjoying the benefits inherent in indigenous knowledge solutions (e.g., cost-effectiveness and environmentally friendly solutions). They overcame the scaling challenge by integrating indigenous and mainstream knowledge.

4.1.1. Innovation Process

The data analysis provided insights on the methods of developing solutions. The
entrepreneurs who had predominantly indigenous knowledge and little or no formal education consistently used unconventional means in developing their solutions. For instance, a bonesetter (No. 5 in Table A1) explained how he set the bones of his fractured patients using balms made from herbs in his environment and his homemade ‘African POP’ (see Figures 2 and 3):

‘I call this my “African POP”. I also make the balms I use from herbs. I can treat both fractures as well as crushed bones.’

Insert Figure 2 Here
Insert Figure 3 Here

Demonstrating how the ‘POP’ is used to set bones. (Source: Author)

From the unconventional tools and principles he uses in treating his patients it is evident that he practices parallel bricolage. He also uses a room in his home as an admission ‘ward’ for his patients. Despite successfully treating patients for years his venture remains micro-scale. This was also the case for the indigenous entrepreneurs who had mainly indigenous knowledge and little or no formal training. They also relied largely on resources from nature, found within their immediate environment. These entrepreneurs practiced parallel bricolage. One common feature across all those who practiced parallel bricolage is their use of unconventional approach to solving problems and reliance on several on-going projects to overcome resource constraints. This is similar to what has been observed in previous studies (Baker & Nelson, 2005; Desa, 2012; Keupp & Gassmann, 2013; Pansera & Owen, 2015) noting that parallel bricolage is characterized by non-conformity to conventional standards. On this issue, a traditional dentist and farmer who practiced parallel bricolage, as evidenced by his consistent use of local herbs and unconventional resources in preparing his remedies, reiterated that: “The treatment is made from the bark of a particular tree. You peel it, crush it, mix water and gargle with it”. Notwithstanding the constraints of resources,
frugal (affordable) innovation continue to emerge from this environment (cf. Baker & Nelson, 2005; Cunha et al., 2014; Gupta et al., 2003; Mkenda & Aikaeli, 2019).

In addition we observed among the second category of entrepreneurs, who had both indigenous and mainstream knowledge, applied both knowledge in their entrepreneurial ventures. In the case of a traditional medicine healer, bricolage is observed in the way she combines herbs to create remedies. She does not only practices what she learnt from her grandmother but also explores more remedies. We found that mainstream education informs her further research of the various herbs she was taught to use and find ways of combining with other herbs to make new remedies that have been effective in curing patients. This traditional medicine healer discussed her experience as follows: “My grandmother taught me a lot of herbal cures. I still remember them and use them to treat patients today.” Selective bricolage is evidenced in the way she combines what she learnt from her grandmother with her knowledge from personal research on herbs and how they work. Further, it is evidenced in her quest to seek regulatory approval for her herbal solutions.

These indigenous entrepreneurs were observed to enjoy the uniqueness and cost-saving advantages of using indigenous knowledge of available useful resources, which they combined with conventional materials and standards to develop solutions that were appealing to wider markets. For instance, in the case of an Artist and Fashion designer (No. 15 in Table A1), the entrepreneur was observed to practice selective bricolage. She used indigenous textiles inherited from her parents, and creatively combined them with more mainstream fabrics to create modern styles. According to her:

‘What people like most when they see my collection are the things I make with local fabrics…My collection featured at a fashion show in Germany last year and it was very well received.’

‘I use the traditional method to dye my fabrics and also use traditional fabrics inherited from my parents. I then sew them into modern styles, using standard tailoring and sometimes, combining
them with modern fabrics.’ Collectively, we observed that these indigenous entrepreneurs used combination of local material, natural resources, ideas and lessons from family to innovate – displaying the bricolage attitude of making do with what is at hand (Hall et al., 2012; Pansera & Owen, 2015; Smith et al., 2014).

4.1.2. Cost-effectiveness and Scale

The indigenous entrepreneurs who practised predominantly parallel bricolage, though being in the same line of business for several years and providing cost-effective solutions to their customers, usually did not scale, as shown in the first 10 entrepreneurs reflected in Table 1. For example, a traditional medicine healer (No. 1 in Table A1), even though he had been in business for years and that his herbal medicines had proved effective (as confirmed by his customers), his venture showed little growth in the volume of transactions done. The rudimentary production process (which was a common thread among the entrepreneurs in Group A) of manually grinding the leaves, storing and tying portions in small polythene bags meant he could only produce very small quantities at any given time. The creation of cost-effective solutions at the base of the pyramid is usually common to grassroots or indigenous entrepreneurs (Abrol, 2005; Cunha et al., 2014; Krause, 2013; Smith et al., 2014). Albeit we also observed that combination of cost-effective solution and parallel bricolage appears to be insufficient in scaling of indigenous entrepreneurship.

On the other hand, indigenous entrepreneurs who practised selective bricolage were found to provide cost-effective solutions and scale up. For example, a respondent (No. 15 in Table A1) pointed out that she seeks inspiration from both mainstream sources like Vogue magazine, as well as indigenous attires. This combination of ideas informs her unique designs. Her business has scaled significantly since she started, and she continues to enjoy good patronage. A similar trend was observed among entrepreneurs in this category who had both mainstream and indigenous
knowledge. They all practiced selective bricolage as they combined their indigenous knowledge with mainstream knowledge to achieve the advantages of cost-effectiveness and scale, as shown in their responses in Table A1 in the Appendix (Group B). They were also able to produce in large quantity and cater to more customers. The indigenous entrepreneurs, indeed, are able to leverage on a number of informally embedded institutional and indigenous factors (e.g., personal ties, kingship ties, local norms, local business knowledge, etc.) to grow and scale their businesses. These factors have been found to represent potential source of frugality solutions in resource constrained environments (Baker, 2007; Dana & Light, 2011; Senyard et al., 2014; Witell et al., 2017). The frugality element emerges from the twenty cases of indigenous entrepreneurs analysed in our research.

4.1.3. Branding and quality

Unlike the indigenous entrepreneurs with predominantly indigenous knowledge (Group A in Table A1), most of the entrepreneurs in Group B (Table A1) highlighted the importance of ensuring good quality and attractive packaging of their products. For some, this was evidenced by the brand name, logo, label and the way their products were packaged. They also strived to meet regulatory standards. The findings suggest that the scaling challenge faced by the indigenous entrepreneurs can be overcome by helping indigenous entrepreneurs’ transit from the practice of parallel bricolage to selective bricolage, which requires combining indigenous and mainstream knowledge. This may, however, be difficult to achieve, as those who practice parallel bricolage tend to have no mainstream education. It therefore requires such indigenous entrepreneurs to work in collaboration with those who have mainstream education. For this collaboration to work, those with mainstream knowledge would also need to value and become familiar with indigenous knowledge resources and principles in order to explore ways of combining indigenous knowledge and mainstream knowledge to produce more cost-effective solutions.
Moreover, the scientific identification of useful principles of local practices could lead to the development of new knowledge, which is applicable to mainstream processes (cf. Fisher, 2012; Perry et al., 2012; Onwuegbuzie, 2014; Ratcliff & Doshi, 2016). Hitherto, we emphasized that African indigenous entrepreneurs should leverage on disruptive technologies (Christensen, 1997; Mangematin & Walsh, 2012; Walsh & Groen, 2013; Walsh & Kirchhoff, 2002) to scale their businesses especially by using technology to decrease transaction costs and provide solutions that closes market gaps (Ratinho et al., 2015). When successful, African indigenous entrepreneurs not only help solve grand societal problems (e.g., poverty reduction and food security, etc.) and bring economic benefit, but also impact lives and contribute to community empowerment (Amankwah-Amoah & Hinson, 2019; Nyame-Asiamah et al., 2020; Onwuegbuzie, 2014; Pansera & Owen, 2015). A case in point is an interior designer and promoter of young entrepreneurs who work with artisans that tend to use traditional methods, to create certain designs like thatched roofs for gazebos and professionals who provide the architectural designs for her building projects. This indigenous entrepreneur is trying to build credible brand and quality products, captured as follows: “Creativity is a passion for me. I’m working towards product design…to be like IKEA of Africa where people can walk in and get affordable home accessories…I combine indigenous and western styles to create my unique designs.”

5. Discussion and implications

5.1 Theoretical contributions

This study contributes to the field of entrepreneurship and international business research by examining how parallel and selective bricolage affects the scalability of business ventures of indigenous knowledge entrepreneurs. While previous studies emphasized that small businesses and/or entrepreneurs through bricolage are accorded the opportunity to attain their goals with the
barest minimum of resources at their disposal (Baker & Nelson, 2015; Desa & Basu, 2013; Di Domenico et al., 2010; Linna, 2013; Salunke et al., 2013), we extend the literature by examining how African indigenous entrepreneurs can solve contemporary problems on a global scale while utilizing ‘resources at hand’ as well as operating under resource constrained and munificent contexts. We found that indigenous solutions that are based on selective bricolage which integrates indigenous and mainstream knowledge results in scalable ventures among indigenous entrepreneurs. In doing so, our work contributes to the growing strand of literature that have examined entrepreneurial bricolage (Fisher, 2012; Linna, 2013; Senyard et al., 2014; Sarkar & Pansera, 2017), indigenous entrepreneurship under institutional and environmental constraints (e.g., Amankwah-Amoah & Hinson, 2019; Keupp & Gassmann, 2013; Sarkar & Pansera, 2017), and technology entrepreneurship (Spiegel & Marxt, 2011; Bailetti, 2012; Ratinho et al., 2015) by suggesting that bricolage capabilities help Africa indigenous entrepreneurs scale their businesses and provide affordable solutions for base of the pyramid.

We also suggest that African indigenous innovation is scalable when combined with conventional mainstream processes that recognize their usefulness. If harnessed and exploited maximally scaled ventures of indigenous entrepreneurs will not only benefit the entrepreneurs economically, but also his employees and apprentices, as they can employ more people and pay them better. It will therefore promote inclusive growth and shared prosperity, contributes to the transformation and wellbeing of society and the economy. Likewise, we extend existing literature in international business and entrepreneurship by examining how parallel and selective bricolage affects the scalability of business ventures of indigenous knowledge entrepreneurs (cf. Desa, 2012; Gupta, 2012; Hilson et al., 2018; Pansera & Owen, 2015; Ratcliff & Doshi, 2016). We emphasize that indigenous solutions that are based on selective bricolage which integrates indigenous and mainstream knowledge results in scalable ventures among indigenous entrepreneurs. Specifically,
our study extends existing studies by arguing that African indigenous innovation is scalable when combined with conventional mainstream processes that recognize their usefulness, which in turn further enhances their bricolage and innovative capacity (Baker & Nelson, 2005; Desa, 2012; Owuor, 2008; Langevang & Namatovu, 2019; Mafimisebi et al., 2020; Miettinen & Virkkunen, 2005; Sarkar & Pansera, 2017).

Furthermore, we believe that the significance of indigenous entrepreneurship in this study extends beyond the local level and has vital implications for a bricolage perspective of small and international business. In this regard, the study contributes to the literature on indigenous entrepreneurship by highlighting the distinct usefulness of indigenous innovations and strengthening the theoretical understanding on the effective scaling processes of these solutions for indigenous entrepreneurs. In sum, this study also adds to the existing discourse on bricolage by examining its application in both resource-constrained and munificent contexts (Baker, 2007; Langevang & Namatovu, 2019; Linna, 2013; Namatovu, 2018; Onwuegbuzie, 2014; Sarkar, 2018; Wierenga, 2019; Witell et al., 2017). Hence, we highlight the distinct usefulness of indigenous innovations and strengthening the theoretical understanding on the effective scaling processes of these solutions for indigenous entrepreneurs. By ambidextrously exploring and exploiting resources at hand through combination of indigenous and mainstream knowledge, indigenous entrepreneurs may be able to better scale their businesses and expand into unfamiliar or global business domains. Therefore, we believe that strengthening indigenous entrepreneurs’ capacity to simultaneously combine indigenous and mainstream knowledge is critical to them improving their business performance that, in turn, have significant effects on global scaling of indigenous entrepreneurship (Baker, 2007; Desa & Bau, 2013; Langevang & Namatovu, 2019; Mafimisebi et al., 2020; Namatovu, 2018; Onwuegbuzie, 2014; Sarkar, 2018; Wierenga, 2019).

5.2 Managerial implications
This research has significant consequences for practice. First, finding a systematic way to scale indigenous African entrepreneurship can lead to sustainable development in diverse fields. For instance, in the field of medicine, significant savings can be made from developing indigenous herbal solutions that can replace expensive imports. Apart from providing higher returns to the farmers who cultivate the herbal gardens, the cost-effective herbal solutions are also globally relevant. Given that the prevailing global economic crises has left more people seeking affordable alternatives, there is a ready market for cost-effective herbal remedies that have all the required regulatory approvals. Similarly, as noted earlier, the use of locally-available mud bricks for construction can significantly reduce the cost of housing. It can therefore mitigate the housing problems faced in developing countries that currently rely heavily on importation of expensive building materials. While cement (a major building component) is now produced locally, energy is better conserved with the use of mud bricks, as producing mud bricks requires 300 times less energy than producing concrete blocks of the same volume. This study is useful to policy makers and development workers who seek to achieve a more inclusive economic growth and sustainable development, as it suggests how indigenous entrepreneurs—who form a significant portion of the population in developing countries—can be helped to scale. Scaling these entrepreneurial activities will lead these entrepreneurs to contribute and benefit more significantly than they currently do from the national economy.

5.3 Limitations and future research

Our research has some limitations that provide unique opportunities for future research. First, indigenous entrepreneurs who practise parallel bricolage were found to primarily exploit resources in their immediate environment. Therefore, from a research perspective, it would be interesting to investigate if and how the practise of bricolage among indigenous entrepreneurs is linked to the goals of sustainability
in terms of people, profit and the planet. Future studies may investigate whether bricolage practice under resource constrained contexts differ substantially from resource munificent contexts. Our research expounds bricolage as practice under resource constrained and munificent contexts, which leaves room for further investigation regarding the impact of bricolage on indigenous entrepreneurs’ business survival and global scaling. Second, there may be opportunities to conduct experimental research examining the effect size of bricolage on indigenous entrepreneurship under situations of resource constrained and munificent. There may be other interesting observations and research opportunities regarding how indigenous entrepreneurs can ambidextrously combine indigenous and mainstream knowledge to scale their businesses for global relevance. Therefore, future research may extend this study by examining how the interactions between indigenous and mainstream knowledge facilitate the expansion of indigenous entrepreneurship.

6. Conclusions

We examine the usefulness of the valuable solutions by African indigenous entrepreneurs (IEs), and explore how they can be scaled, because, we believe they can make a significant contribution to achieving sustainable development. In this study, we presented the challenges faced by indigenous entrepreneurs in resource munificent contexts. Accordingly, we investigate how indigenous entrepreneurs can scale their indigenous knowledge solutions in a systematic way for global value creation. We draw on bricolage theory because African indigenous entrepreneurs are more likely to “making do by applying combinations of resources under conditions of resources at hand to new problems and opportunities” (Baker & Nelson, 2005, p. 333). Specifically, we argue that African indigenous entrepreneurs can scale their indigenous solutions by leveraging on bricolage to provide globally relevant solutions.

We identified that the application of indigenous knowledge by African indigenous
entrepreneurs through ideational bricolage, are able to mitigate conditions of resource constraint by allowing their businesses to create new values, innovations or ideas that contribute to their expansion (Desa & Basu, 2013). In addition, we find that while indigenous entrepreneurs who did not have mainstream education practiced parallel bricolage and failed to scale, those who had both mainstream and indigenous knowledge practiced selective bricolage and were able to scale. Therefore, we emphasize the importance of ambidexterity in the exploration and exploitation of mainstream and indigenous knowledge to enable indigenous entrepreneurs scale and grow their businesses for global relevance.

As an extension of the current literature (Baker & Nelson, 2005; Baker, Miner, & Eesley, 2003; Desa & Basu, 2013; Di Domenico, Haugh, & Tracey, 2010; Gibber et al., 2007; Linna, 2013; Salunke et al., 2013), we examined how parallel and selective bricolage affects the scalability of business ventures of indigenous knowledge entrepreneurs. Parallel and selective bricolage help indigenous entrepreneurs generate novel ideas, innovations and mobilise resources at hand to produce solutions with global relevance (Desa & Basu, 2013; Langevang & Namatovu, 2019; Salunke et al., 2013). Thus, indigenous entrepreneurs with greater utilisation of bricolage are more likely to scale their businesses and significantly navigate resource paucity as well as sustain their businesses. The successful operation and sustainability of indigenous businesses is crucial for the indigenous entrepreneurs, their families, local communities and wider society. In conclusion, we have added valuable knowledge concerning the global relevance of scaling African indigenous entrepreneurship.

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Seyfang, G., & Smith, A. (2007). Grassroots innovations for sustainable development: Towards a


Appendices

**Fig 1:** Theoretical framework explaining how bricolage affects scaling.

**Figure 2:** Bone-setter displaying his ‘African POP.’ (Source: Authors)
Figure 3: Demonstrating how the ‘POP’ is used to set bones. (Source: Authors)
**Table 1 Summary of results**

<table>
<thead>
<tr>
<th>ID</th>
<th>Gender</th>
<th>Marital status</th>
<th>IK/MK*</th>
<th>Age</th>
<th>Location</th>
<th>Resources</th>
<th>Field of practice</th>
<th>Bricolage</th>
<th>Scaling</th>
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<tbody>
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<td>1</td>
<td>Male</td>
<td>Married</td>
<td>IK</td>
<td>35-45</td>
<td>Rural</td>
<td>Constrained</td>
<td>Traditional medicine healer</td>
<td>Parallel</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>Male</td>
<td>Married</td>
<td>IK</td>
<td>&gt;60</td>
<td>Rural</td>
<td>Constrained</td>
<td>Traditional medicine healer</td>
<td>Parallel</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>Female</td>
<td>Married</td>
<td>IK</td>
<td>&gt;60</td>
<td>Rural</td>
<td>Constrained</td>
<td>Traditional medicine healer</td>
<td>Parallel</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>Male</td>
<td>Married</td>
<td>IK</td>
<td>45-60</td>
<td>Rural</td>
<td>Constrained</td>
<td>Traditional medicine healer</td>
<td>Parallel</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>Male</td>
<td>Married</td>
<td>IK</td>
<td>45-60</td>
<td>Rural</td>
<td>Constrained</td>
<td>Traditional bone-setter</td>
<td>Parallel</td>
<td>No</td>
</tr>
<tr>
<td>6</td>
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<td>Married</td>
<td>IK</td>
<td>45-60</td>
<td>Rural</td>
<td>Constrained</td>
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<td>Parallel</td>
<td>No</td>
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<td>IK</td>
<td>25-35</td>
<td>Rural</td>
<td>Constrained</td>
<td>Bronze carver</td>
<td>Parallel</td>
<td>No</td>
</tr>
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<td>Married</td>
<td>IK</td>
<td>&gt;60</td>
<td>Rural</td>
<td>Constrained</td>
<td>Traditional dentist and farmer Cobbler</td>
<td>Parallel</td>
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<td>Male</td>
<td>Single</td>
<td>IK</td>
<td>25-35</td>
<td>Urban</td>
<td>Constrained</td>
<td>Traditional dentist and traditional bar owner.</td>
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<td>IK</td>
<td>45-60</td>
<td>Urban</td>
<td>Constrained</td>
<td>Traditional dentist</td>
<td>Both</td>
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<td>Female</td>
<td>Married</td>
<td>IK &amp; MK</td>
<td>35-45</td>
<td>Urban</td>
<td>Munificent</td>
<td>Traditional medicine healer</td>
<td>Selective</td>
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<td>IK &amp; MK</td>
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<td>Urban</td>
<td>Munificent</td>
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<td>Single</td>
<td>IK &amp; MK</td>
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<td>Munificent</td>
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<td>Single</td>
<td>IK &amp; MK</td>
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<td>Urban</td>
<td>Munificent</td>
<td>Interior designer and promoter of young entrepreneurs</td>
<td>Selective</td>
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<td>IK &amp; MK</td>
<td>25-35</td>
<td>Urban</td>
<td>Munificent</td>
<td>Artist and fashion designer</td>
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<td>Married</td>
<td>IK &amp; MK</td>
<td>45-60</td>
<td>Urban</td>
<td>Munificent</td>
<td>Artist, decorator, gardener, hotelier, and fashion designer</td>
<td>Selective</td>
<td>Yes</td>
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<tr>
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<td>Married</td>
<td>IK &amp; MK</td>
<td>45-60</td>
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<td>Munificent</td>
<td>Product designer plastic components</td>
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<td>&gt;60</td>
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<td>Munificent</td>
<td>Traditional herbal medicine</td>
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<td>IK &amp; MK</td>
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<td>Medical doctor</td>
<td>Selective</td>
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<td>Married</td>
<td>IK &amp; MK</td>
<td>35-45</td>
<td>Urban</td>
<td>Constrained</td>
<td>Traditional medical healer</td>
<td>Selective</td>
<td>Yes</td>
</tr>
</tbody>
</table>

* IK = Indigenous knowledge; MK = Mainstream knowledge
Table A1.
Exploring the practice of bricolage among two categories of indigenous entrepreneurs-those with only indigenous knowledge (group A) and those with both indigenous and mainstream knowledge (group B) (source: interviews).

<table>
<thead>
<tr>
<th>Name</th>
<th>Sex</th>
<th>Age bracket</th>
<th>Marital status</th>
<th>Knowledge type</th>
<th>Venture location and resource status</th>
<th>Field of practice</th>
<th>Exploring the practice of bricolage among indigenous entrepreneurs</th>
<th>Exploring the practice of parallel/selective bricolage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 “Hak”</td>
<td>Male</td>
<td>35-45 yrs</td>
<td>Married</td>
<td>Predominantly IK only</td>
<td>Location: Rural Resource-constrained context</td>
<td>Traditional medicine healer</td>
<td>Evidence of bricolage “The leaves come from 5 different trees in the forest. They are not plucked. You have to wait for them to fall. Then you pick them and combine them in the known proportions.” “I am now trying out another combination of herbs to develop a fertility treatment.”</td>
<td>Parallel bricolage is observed in the way he processes his tea. He uses a mortar to grind the leaves and a bucket for storage. He then ties portions manually in small polythene bags. No scaling observed in spite of the fact that his customers find his remedy effective and he has been practicing for years.</td>
</tr>
<tr>
<td>2 “Ote”</td>
<td>Male</td>
<td>Above 60 yrs</td>
<td>Married</td>
<td>Predominantly IK only</td>
<td>Location: Rural Resource-constrained context</td>
<td>Traditional medicine healer</td>
<td>Evidence of bricolage “My cures are made from the herbal plants found in my village”. “When I had a rash I could not cure I went to see a doctor. I could not afford the prescribed remedy, so I went home and experimented with different herbs till I got a mixture that cured the rash. I now sell it to others.”</td>
<td>Parallel bricolage is evident from the rudimentary production process and packaging of his remedies. No scaling observed in spite of the fact that he has been practicing for years and effectively healing patients.</td>
</tr>
<tr>
<td>3 “Iya”</td>
<td>Female</td>
<td>Above 60 yrs</td>
<td>Married</td>
<td>Predominantly IK only</td>
<td>Location: Rural Resource-constrained context</td>
<td>Traditional medicine healer</td>
<td>Evidence of bricolage “The herbs I use are available around me in abundance. I have developed cures for different ailments such as skin rashes, convulsion, teething problem, hypertension etc.”</td>
<td>Parallel bricolage is evident from the rudimentary packaging of her remedies. No scaling observed in spite of the fact that she has been practicing for years.</td>
</tr>
<tr>
<td>4 “Yek”</td>
<td>Male</td>
<td>45-60 yrs</td>
<td>Married</td>
<td></td>
<td></td>
<td>Traditional medicine healer</td>
<td>Evidence of bricolage and explorative learning. “My solutions are all from nature. I try to find solutions to</td>
<td>Parallel bricolage is evident from his rudimentary production process, where everything is done</td>
</tr>
<tr>
<td>No.</td>
<td>Name</td>
<td>Gender</td>
<td>Age Range</td>
<td>Marital Status</td>
<td>Occupation</td>
<td>Bricolage Description</td>
<td>Parallel Bricolage Description</td>
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<td>----------------</td>
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<td>---------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>“Ala”</td>
<td>Male</td>
<td>45-60 yrs</td>
<td>Married</td>
<td>Bone-setter</td>
<td>Evidence of bricolage</td>
<td>Parallel bricolage is evident from his “tools” of work and no scaling is observed in spite of the fact that he has been practicing for years.</td>
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<td>Bricolage is evident from the implements he uses in treating his patients. For example, what he refers to as “African POP”, which he uses to set his patients’ fractures. His balms to facilitate healing are made from plants in his environment. “I call this my African POP. I also make the balms I use myself”</td>
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<td>6</td>
<td>“Fat”</td>
<td>Male</td>
<td>45-60 yrs</td>
<td>Married</td>
<td>Wood carver</td>
<td>Bricolage is evidenced from the local herbs he uses to treat wood. “I know some plants that produce juice that can be used to treat wood before carving He also showed me some apparent “weeds” that are useful for treating various ailments like boils and hypertension.</td>
<td>Parallel bricolage is predominant in his operations as he uses mainly non-conventional in-puts. A few of his carving tools, like his chisel and hammer, are conventional; however, his entire work process is manual. No evidence of scaling up in spite of having been in the business practically all his life.</td>
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<td>7</td>
<td>“Ade”</td>
<td>Male</td>
<td>25-35 yrs</td>
<td>Single</td>
<td>Bronze carver</td>
<td>Bricolage is evidenced from the traditional local process he uses to make his carvings. The process is full of improvisations, such as using metal drums to heat the drums over which the copper or bronze materials are melted and moulded. He also applied his traditional skills hitherto restricted to carving traditional masks and religious symbols to modern items like keyholders, envelope openers and fashionable belt buckles.</td>
<td>Parallel bricolage is practiced as he makes do with what he has in processing his carvings. No evidence of scaling up, though he has been in the business for several years.</td>
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<td>8</td>
<td>“San”</td>
<td>Male</td>
<td>Above 60 yrs</td>
<td>Married</td>
<td>Traditional dentist and farmer</td>
<td>Bricolage is evidenced by his use of local herbs for his cures “The treatment is made from the bark of a particular tree. You peel it, crush it, mix with water and gargle with it.”</td>
<td>Parallel bricolage is evidenced from his description of consistent use of unconventional resources in preparing his remedies. No evidence of scaling up in spite of being in this business practically all his life.</td>
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<tr>
<td>Name</td>
<td>Field of practice</td>
<td>Exploring the practice of effectuation and bricolage among indigenous entrepreneurs in resource-scarce contexts</td>
<td>Exploring the practice of parallel and/or selective bricolage.</td>
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<tr>
<td>“Tun”</td>
<td>Cobbler</td>
<td>Evidence of bricolage is observed in his skilled use of unconventional and locally-available resources to deliver perfect repair jobs.</td>
<td>The entrepreneur learned through apprenticeship. Predominantly parallel bricolage is observed, though a few very basic conventional tools have been introduced to his process, showing signs of a gradual movement towards selective bricolage. This may be as a result of his urban location and his proximity to more munificent contexts. His venture has, however, not scaled significantly, though he is doing better compared to his counterparts in rural areas who practice mainly parallel bricolage.</td>
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<tr>
<td>“Geo”</td>
<td>Traditional dentist and traditional bar owner.</td>
<td>Evidence of bricolage is observed in the use of local root herbs to treat dental problems. Exploratory learning is also observed in his experimentation with other herbal remedies learned from other herbalists and. “I stock treatments I have discovered and I also get some from other herbalists”</td>
<td>Though parallel bricolage has been predominantly practiced, a gradual shift towards selective bricolage is observed, as he tries to incorporate some conventional standards, like seeking regulatory approval for his herbal remedy. This appears to be largely influenced by his migration to an urban location. He is still not scaled-up, though selling more than his counterparts who practice parallel bricolage.</td>
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<td>“Ess”</td>
<td>Traditional medicine healer</td>
<td>Bricolage is observed in the way she combines herbs to create remedies. She not only practices what she learnt from her grandmother but explores more remedies. Her education leads her research of the various herbs she was taught to use and find ways of combining with other herbs to make new remedies that have selective bricolage is evidenced in the way she combines what she learnt from her grandmother with her knowledge from personal research on herbs and how they work. It is also evidenced in her quest to seek regulatory approval for her herbal solutions.</td>
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been effective in curing patients. “My grandmother taught me a lot of herbal cures. I still remember them and use them to treat patients today.” However, she lacks the funds to carry out the depth of research she believes can make the use of her solutions more widespread.

<table>
<thead>
<tr>
<th>12</th>
<th>“Add”</th>
<th>Natural beauty product manufacturer (and Lawyer by training and profession)</th>
<th>This entrepreneur operates in a munificent context. Although she maintains conventional standards, elements of bricolage were observed. For instance, she melts her shea butter in a cooking pot and after filtering, whisks it in a blender. Her products are basically manufactured in her kitchen, though she plans to buy standard machines as the business grows and also to set up a workshop.</th>
<th>Selective bricolage is evident as she combines non-conventional and standard practices in her manufacturing process. She has a clear plan to purchase the equipment required for mass production as her sales grow. “The first equipment I plan to buy is the one for blending coconut. I currently outsource that process.” The venture, which is barely two years old, already shows signs of scaling up as her sales volumes have been growing.</th>
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<tbody>
<tr>
<td>12</td>
<td>“Add”</td>
<td>Female</td>
<td>-25-35 yrs</td>
<td>-Single</td>
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<tr>
<td>13</td>
<td>“Fun”</td>
<td>Natural beauty product manufacturer (also a professional economist)</td>
<td>Though the entrepreneur operates in a munificent context, she combines conventional standards with bricoleurial improvisations in her manufacturing process, which is carried out in her home. “My friends and I do everything ourselves from scratch. We source the shea butter. Purify it by heating and filtering and then depending on whether it’s for the hair or skin, we add different oils before we package it. We also do coconut oil with menthol for hair…”</td>
<td>There is clear evidence of selective bricolage in her production process, which combines non-conventional and conventional standards. Though her manufacturing is done at home, her products carry her brand name and logo and look like they come from a conventional factory. The venture is clearly scaling as the product has strong market acceptance resulting from the appeal for natural products and an attractive packaging and label.</td>
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<tr>
<td>13</td>
<td>“Fun”</td>
<td>Female</td>
<td>-25-35 yrs</td>
<td>-Single</td>
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<tr>
<td>14</td>
<td>“Oma”</td>
<td>Interior designer and promoter of young entrepreneurs.</td>
<td>Though operating in a munificent context, the entrepreneur still applies some measure of bricolage as she achieves some of her concepts by combining non-conventional</td>
<td>Selective bricolage is observed in the way she combines African and mainstream designs to create unique settings.</td>
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<tr>
<td>14</td>
<td>“Oma”</td>
<td>Female</td>
<td>-20-25 yrs</td>
<td>-Single</td>
</tr>
<tr>
<td>Name</td>
<td>Gender</td>
<td>Age</td>
<td>Marital Status</td>
<td>Education</td>
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<tr>
<td>Bim</td>
<td>Female</td>
<td>25-35 yrs</td>
<td>Single</td>
<td>Has a first degree in Interior Design</td>
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<tr>
<td>Jos</td>
<td>Female</td>
<td>45-60 yrs</td>
<td>Married</td>
<td>Has a Master’s degree in Economics and Arts</td>
</tr>
<tr>
<td>Mad</td>
<td>Male</td>
<td>45-60 yrs</td>
<td>Married</td>
<td>Has only primary education, but is a voracious reader.</td>
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</table>
LOCATION: Urban Munificent context

| 18 | “Njo” | Traditional herbal medicine | Bricolage is evidenced by his continuous research to understand how to improve herbal mixtures. Though the entrepreneur points out that he has been treating people since 1968, he continues to experiment with varying doses and new combinations of herbs in response to his patients’ needs. “I have been successfully treating patients since 1968, and I am still researching to discover more remedies and more uses for existing remedies. 

19 | “Ova” | Medical doctor | Bricolage is applied along with conventional methods. The basic principle used by the entrepreneur to develop the Emergency Auto-Transfusion set (EAT-set) is bricoleurial, as selective bricolage is observed as he combines conventional and alternative medicine. “I combine Nigerian herbal treatment with Indian and Chinese herbal methods of treatment. I have studied a lot in this field and knowing these other types of herbal treatments as well as orthodox treatments fills the gap in our knowledge.” He produces in commercial quantities and has therefore scaled up. |
- Medical doctor/Surgeon
- Location: Urban Munificent context

it is based on perfecting an indigenous method of trying to purify and re-infuse a patient’s blood.

“I wanted to find a way to make this crude method of scooping and filtering blood from patients, more hygienic and less messy. I was determined to do this because I had seen too many patients die because they could not afford to buy blood needed for transfusions. The crude method allowed us to re-use a patient’s blood and save their lives, but I wanted to find a better way to carry this out. This was what led me to develop the EAT-set.”

“It gives me great pleasure when I hear people tell me ‘Doctor you saved my life’ … that is worth more than a million Naira to me.”

Conventional standards were employed in developing the EAT-set. The venture has scaled as the equipment is currently being produced in large quantities for hospitals.

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<tr>
<th>20</th>
<th>“Mos”</th>
<th>Traditional medical healer</th>
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<td></td>
<td>Male</td>
<td>The entrepreneur applies bricolage to a large extent as he uses a lot of local herbs. His father was an herbal healer and he learnt about medicinal herbs from him. This training provides a tendency to explorative learning. However, he combines this with conventional treatments imbibed from his formal training.</td>
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<tr>
<td></td>
<td>- Male</td>
<td>- 35-45 yrs</td>
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<td></td>
<td>- Married</td>
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<td></td>
<td>- Possesses both IK and MK</td>
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<td></td>
<td>- Traditional medicine practitioner</td>
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<td></td>
<td>- University degree in Pharmacology</td>
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<td></td>
<td>- Location: Urban resource- constrained context</td>
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<td></td>
<td>- Varied experience</td>
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Selective bricolage is evidenced by the combination of bricolage and conventional standards. Though the demand for his service is significant, and the venture has grown since it started.
Figure 4: Data Structure and Coding

**First order codes**
- Use unconventional means to develop solutions
- Use of unconventional tools and principles
- Rely on resources from nature within immediate environment
- Use ingredients from nature
- Use multiple projects to overcome resource constraints
- Use and combine resources to innovate
- Provide cost-effective solutions to customers
- Produce small quantities of products at a time
- Use mainstream and indigenous knowledge
- Use informal networks
- Indigenous solutions
- Target solution at the base of the pyramid
- Personal ties and kinship ties
- Local norms and local business knowledge
- Good quality products
- Use local materials to improve products
- Attractive packaging of products
- Branding name and logo
- Smart labelling
- Specialised packaging to improve brand
- Place emphasis on value of products
- Build quality products
- Compliance with regulations

**Theoretical categories**
- Unconventional means, tools and principles
- Uniqueness and cost-saving solutions to wider markets
- Recombination of resources to innovate
- Provision of cost-effective solutions
- Leverage on informal embedded indigenous factors
- Use technology to decrease transaction costs
- Focus on good quality products
- Branding of products
- Meeting regulatory standards

**Theoretical dimension**
- Innovation Process
- Cost-effectiveness and scale
- Branding and quality