



Contextual influences on new technology ventures: A study of domestic firms in Ghana

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ABSTRACT

This study examines the mechanisms and processes that explain the contextual influences on the development of new technology ventures. Based on interviews with technology entrepreneurs in Ghana, we developed a three-phase dynamic process model that demonstrates how institutional factors interact with firm-specific factors to influence entrepreneurial development. We identified constraints such as lack of access to financial credit, inadequate infrastructure, and human capital and resource constraints in Phase I, followed by formulating post-formation strategy in Phase II. Phase III focused on strategies for overcoming the constraints through innovations, leveraging new technologies and different financing models to outwit incumbents. The implications of the analysis for the sector and promising opportunities for future research are also outlined.

1. Introduction

In an age of growing global competitiveness between nations, unearthing the challenges and constraints facing new technology ventures could help developing nations in making a transition from a largely natural resource-based economy to become rapidly industrialising nations (see Paunov and Rollo, 2016; World Development Report (WDR), 2016). The dawn of big data and social media, coupled with the mobile phone evolution, have unleashed copious opportunities for technology-related businesses (Paunov and Rollo, 2016; Sheng et al., 2017, 2018). Indeed, technology as the great equaliser in the 21st century has played and continues to play a pivotal role in helping to bridge the income inequality between the rich and poor, and created conditions for new technology ventures to flourish (Chambers, 2015; WDR, 2016; You et al., 2018). Furthermore, many countries in the developing world have also sought to initiate and implement policies that allow individuals to emerge as technology entrepreneurs (see Acs et al., 2009; Audretsch, 2013).

As we approach the end of the second decade of the 21st century, one perennial question that remains largely underexplored is how best new firms can be nurtured to power economic development growth in the developing world (see WDR, 2016). In addition, an effective attempt to improve small firms' competitiveness and foster innovation is partly predicated on understanding factors that are barriers and facilitators of innovation activity (Hewitt-Dundas, 2006). In spite of

burgeoning streams of research on new technology ventures and new venture firms (Ahmadi and O'Cass, 2016; Li and Atuahene-Gima, 2001) and inclusive innovation (Paunov, 2013; Paunov and Rollo, 2016), limited scholarly attention has been devoted to how contextual factors such as institutions, technology, and policy influence innovative start-ups' development (Audretsch et al., 2018; see also Zahra and Covin, 1995). Broadly speaking, contextual influences refer to domestic and foreign environmental factors such as economy, technology and policy that affect firms' behaviour and their ability to compete.

With this in mind, this paper seeks to fill the void by examining the mechanisms and processes that explain the contextual (e.g. institutions and resources) influences on new technology ventures' development. Reflecting these developments, a deeper analysis of the contextual influences on new technology ventures' development would enhance our understanding of how technology entrepreneurship can be energised as agents for change and economic development in the developing world (see Audretsch et al., 2018).

To illustrate our analysis, we focus on new-technology-related new ventures in Ghana as our empirical setting. First, Ghana has long been regarded as "Africa's democratic poster child" since becoming the first sub-Saharan African nation to gain independence (African Business, 2017, p. 82). Since emerging from colonial rule in the late 1950s, Ghana has moved from democracy to dictatorship on a handful of occasions. These culminated in the shift towards democracy and stable government in the 1990s. Besides becoming the first sub-Saharan

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African country to gain independence in 1957, Ghana also provided the path to independence and market reforms for many other African countries (Amankwah-Amoah and Debrah, 2010; Appiah-Adu et al., 2018). Besides being regarded as a liberalised economy in recent years, Ghana also witnessed a GDP growth rate of 8.5% in 2017 attributed to political strength and development of effective industrial policies (see World Bank, 2017). These have created conditions for aspiring entrepreneurs and local start-ups to flourish. Accordingly, Ghana offers a unique setting to explore this issue in the African context.

Compared with past research, our study advances the current literature in a number of significant ways. First, we build on current research on institutional constraints (Castellacci, 2015; Dawar and Chattopadhyay, 2002) and resource scarcity (Heirman and Clarysse, 2004; Ray and Ray, 2010) by developing a dynamic process model that elucidates how institutional factors interact with firm-specific factors to influence new technology ventures' development in an emerging market. In addition, we extend the existing body of research on constraints in doing business in emerging economies (Cavusgil et al., 2002; Peng et al., 2009) and resource-constrained innovation (Pansera and Owen, 2015) by demonstrating how institutional factors can curtail development of new ventures, thus adding to the growing body of research on institutional effects on entrepreneurship in emerging economies (Tracey and Phillips, 2011). By shedding light on the obstacles faced by entrepreneurs, our study provides useful insights towards formulating an effective public policy and responds to recent calls for in-depth analysis of the contextual effects (Audretsch et al., 2018).

After setting out a review of the literature on institutions and resource constraints, we present an analysis of the research context and method. This is then followed by our key findings. Finally, the theoretical and practical implications will be examined.

2. Theoretical background: resources, industry, and institutional constraints

This section engages with two important streams of research, *i.e.* institutional constraints and resource scarcity in a chronological order. North (1990) defined institutions as the formal and informal rules of the game that govern a society or nation. According to Khanna and Palepu (2006, p. 62), institutional voids refer to "the absence of specialist intermediaries, regulatory systems, and contract-enforcing mechanisms" in a nation's economy. An accumulating body of research has demonstrated that the impediments to doing business in emerging economies including inadequate legal framework and weak protection of intellectual property (Acquaah, 2007; Khanna and Palepu, 1999, 2006); some firms also engage in dysfunctional competitive behaviours such as opportunism and unlawful acts to outwit rivals (Li and Atuahene-Gima, 2001).

Past studies indicate that inadequate institutional barriers or poor legal enforcement systems and weak property rights have been found to hamper innovative acuity of new firms (Adomako et al., 2015; see also Cavusgil et al., 2002). These impediments ultimately hamper firms' ability to achieve improved performance. Indeed, voids such as weak political system and legal and regulatory framework can obstruct contract enforcement and add to the cost of doing business, thereby hampering innovation activities (Adeyeye et al., 2018; Ahen and Amankwah-Amoah, 2018). One of the outcomes of institutional voids such as lack of good infrastructure including roads and rails is that it leads to geographically isolated markets and high costs for serving the poor or those at the bottom of the pyramid (Dawar and Chattopadhyay, 2002; Karnani, 2007). Given that many products developed in Organisation for Economic Cooperation and Development (OECD) nations are beyond the reach of many people in developing economies, innovative products by local firms in the emerging-market have a higher chance of success (Ray and Ray, 2010).

According to Barney (1991), organisational resources can be classified into financial, physical, and human resources. Past studies have

demonstrated that resource deficiencies can curtail the development of new ventures (Heirman and Clarysse, 2004; Hoegl et al., 2008; Shepherd et al., 2000). At founding, new venture firms may possess different levels or even inferior levels of resources compared with existing firms and incumbents (Heirman and Clarysse, 2004; see also Shepherd et al., 2000). Recent streams of research indicate that resources can constrain entrepreneurs' ability to identify and exploit market opportunities (Amankwah-Amoah, 2014). Some recent research attributed the challenges facing new firms' development to resource constraints (see Hoegl et al., 2008; van Burg et al., 2012). A burgeoning stream of literature has demonstrated that within the confines of resource-constrained environments in emerging markets, firms may be forced to innovate and utilise resources in a more efficient manner to gain or maintain competitive advantage (Hoegl et al., 2008; van Burg et al., 2012; Zeschky et al., 2011).

By responding to resource constraints that permeate emerging markets with cost-advantage products, firms improve their survival chances and ability to outwit competitors (Zeschky et al., 2011). Frugally innovative products tend to be inferior compared with existing offerings and have limited functionality (Zeschky et al., 2011). Frugal innovations refer to the "good-enough" affordable products that meet the threshold requirements of resource-constrained consumers in developing economies (Zeschky et al., 2011). To capture the untapped purchasing power of those at the bottom of the pyramid, organisations must harness their resource constraints and navigate the institutional constraints of emerging markets to innovate (Karnani, 2007; Prahalad, 2004).

Taken together, these streams of research indicate firm-level and external factors that curtail firms' activities, but offer little insight into the interactive processes of internal and external factors in hampering the development of new venture firms. In spite of the growing interest in start-ups in developing countries, limited scholarly works have been devoted to exploring the contextual influences. One of the daunting challenges that confront modern organisations is how to do more within the resource-constrained environment in emerging economies (Ray and Ray, 2010). By developing affordable and sustainable products through innovation, resource-constrained local players can improve their competitiveness to outwit large multinationals (Ray and Ray, 2010). Given that new venture firms can force major players to change, thereby accelerating the pace of technological development (Sorescu et al., 2003), governments that eliminate barriers to new venture formations are more likely to foster innovation and technology adoption. Therefore, it remains a strategic imperative for developing nations such as Ghana to seek to foster new firms' development through business-friendly policies such as tax incentives and minimum red tape. This research seeks to shed light on this vital issue.

3. Research method

3.1. Research context: Ghana

When Kwame Nkrumah ushered in independence in 1957, signs of African self-rule and booming confidence of future prosperity were seemingly everywhere across the continent (Agyemang et al., 2016; Amankwah-Amoah et al., 2018a, b). Yet, the challenge of managing post-colonial administrative systems proved far beyond the capabilities of many post-colonial freedom fighters culminating in decades of underdevelopment and economic mismanagement. Although Nkrumah's bold initiatives in areas such as science, education and technology adoption were never fully implemented due to his overthrow in the 1960s, it charted a new direction for the newly independent nation.

Much of the late 1960s and 1970s in Ghana's history were punctuated by multiple changes in government through coups d'état (Amankwah-Amoah and Lu, 2018). It has been more than six decades since Ghana became a republic in 1960. The changes in the environment in many ways stifled economic development and national

technological capabilities. The 1990s saw the emergence of a more stable democracy, ushering in a new era of development followed by deregulation of industries such as telecoms and aviation, and initiatives to promote new technology adoption. This, coupled with technological breakthroughs across the globe including internet and smart phones, created new conditions for technology entrepreneurs to flourish.

By the turn of the 2000s, many African nations had turned the corner from their turbulent pasts and were cemented in a level of stability and economic development. After the proclamation of the “Golden Age of Business” in 2000 by Ghana’s then national government, numerous reforms have been implemented that are geared towards creating conditions and enabling environments for entrepreneurial development (Adomako et al., 2015). For many start-ups, bringing new products to market is marked by multiple challenges and opportunities. One area that provides an opportunity to combine quality education and new technology to facilitate economic development is technology entrepreneurship (see Chambers, 2015; WDR, 2016).

At the beginning of the 21st century, it was anticipated that many countries in the developing world would introduce and utilise new technology as an impetus for development (Amankwah-Amoah, 2016; Amankwah-Amoah and Sarpong, 2016). Although technological advancements have occurred, many developing nations have failed to utilise them as a vehicle for economic development. Ghana, like many sub-Saharan African nations, faces major challenges including rampant corruption, and red tape and government bureaucracy, which discourage entrepreneurship and investment (Amankwah-Amoah et al., 2018b). These affect not only firms’ ability to obtain government support and contracts, but also hamper the effective function of the market. Thereby, forcing many resource-rich firms to rely on “grease payments” to politicians and public policy officials to expedite processes and gain unfair market advantages. Such payments also curtail the development of business activities and possess barriers to new entrants. Accordingly, Ghana offers a unique setting to explore this issue in the African context.

3.2. Methods

Given the limited prior research on the subject, we adopted an inductive approach to provide more in-depth analysis of the intricate processes that underpin how these constraints to entrepreneurial development manifest and impact businesses (Langley, 1999; Miles and Huberman, 1994; Yin, 2013). In line with prior scholarly recommendations of studies in a high-relational context such as Ghana (Acquaah, 2007), we employed a combination of formal and informal approaches to help identify potential interviewees. These included using personal networks and the snowballing approach, government registers of small businesses, and small business associations. We also utilised networks within a local university to help identify individuals who had recently formed new ventures in the technology-related sectors. One of the authors was able to utilise this approach to identify and contact the key individuals in areas such as digital marketing, financial services, and telecommunication sectors to discuss the purpose of the research before proceeding with formal interviews at their workplace or locations suggested by the interviewee.

In addition, we offered a copy of our findings to the potential interviewees as an incentive to help increase participation (Bendapudi and Leone, 2002). Our semi-structured interview questions elicited their motives and expectations prior to formation of the business, expected constraints, and their experiences after formation, which includes threats and opportunities identified after the formations. We explored the underlying process, mechanisms, and conditions that characterised different types of environmental and organisational constraints and how they affect new ventures. During the interviews, they were asked to elaborate on how prior experiences and expertise equipped them for the new ventures. Subsequently questions focused on challenges and issues that emerged after the formation of the business.

We explored their relationship with suppliers, clients, partners and competitors. We explored how environmental shifts have impacted the business, and their ability to change and design a robust business. The effects of government, institutions, and resource constraints on their operations were also explored. In the follow-up interviews, we generally sought to clarify issues which were not clear. In addition to the interview data, we utilised archival data including posters of the businesses, reports, planning documents, newspaper cuttings, and web articles about the ventures and the industry. In all, we conducted 42 interviews with the founding entrepreneurs from early 2016 to 2017.

3.3. Data analysis

The interviews were audio-recorded, transcribed and coded by one of the authors and lasted between 30 min to 2 h. The other authors checked the transcripts and identified areas which needed further clarification. We adopted a stage-based approach to data analysis. First, the interview transcripts were analysed to construct a story for each entrepreneur and their experiences. Second, we adopted an element of “cross-case” analysis (Eisenhardt, 1989; Yin, 2013) by developing and comparing key themes from the different interviewees. Based on the interview data and archival records we were able to deduce the different factors and constraints in their operations and how they were manifest. The analysis reflected the challenges and opportunities in fostering high-technology entrepreneurial development in Africa.

Taken together, our approach was anchored in an inductive theory-building approach, which encompassed moving iteratively between the different data sources outlined above (Locke, 2001; Locke et al., 2008). The research revealed three stages which focus on identifying the forces at play, identifying the interaction between contextual factors, and confronting the constraints. These capture the mechanisms and processes that explain the contextual influences on start-ups’ development. Fig. 1 vividly summarises the process of identifying and overcoming entrepreneurial constraints. The time period captures the immediate post-formation to late stage developments. Below we tease out the findings in the phases.

4. Findings

4.1. Phase I: identifying the market forces at play

This phase focuses on two main challenges: resource scarcity and

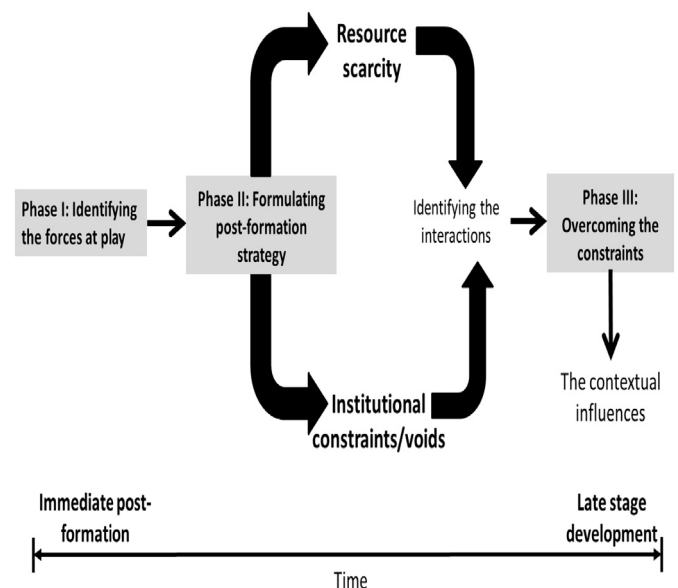


Fig. 1. A dynamic process model of overcoming entrepreneurial constraints.

institutional constraints/voids. Specific barriers and challenges such as cost and availability of internet, lack of access to financial credit, inadequate infrastructure, and human capital and resource constraints emerged from the data analysis. Regarding inadequate or under-developed infrastructure, the importance of reliable and fast internet services and the high cost of internet services came up repeatedly in the interviews. Many saw it as a barrier to technology industry taking off in the country. Interviewee N gave the following account that was typical of other interviewees' perspectives:

"The biggest barrier to growth in this industry from my point of view is lack of affordable infrastructure and poor internet connectivity. There are talented developers in Ghana; you can almost get anything done here in Ghana."

In discussing the issues, Interviewee O noted:

"Internal: unstable and high cost of internet, electronic illiteracy, inadequate regulations, cost of electronic equipment and maintenance are the challenges."

Our data also suggests that financial credit availability is a major constraint to growth. Representative accounts of how this constraint affects their operations are as follows:

"We still have to deal with the challenges of sourcing for funds to undertake some capital-intensive projects as and when they arrived. Our biggest challenge is dealing with delayed payments after the project has been completed."

(Interviewee I)

"Financial resource is a major challenge especially when macro-economic indicators don't favour growth of private businesses."

(Interviewee H)

Interviewee M concurred:

"We never accessed financing from banks; we could not afford the interest rates."

Table 1 provides a summary of the various resource and institutional-related constraints with illustrative quotes. The data highlights the importance of superior human capital in new venture early development. As one interviewee puts it:

"I have seen a lot of start-ups in this field that have failed miserably. You need money, yes but the most important is knowledge and adequate skills."

(Interviewee O)

The data suggests that organisational resources appear essential in their ability to navigate the environment after formation. Interviewee Q added:

"Most people are trying to figure things out as they go. Very few professionals are actually qualified to be in this sector."

This was more so where institutional factors such as lack of access of financial credit, lack of credibility of government institutions and red tape were seen to be suffocating such ventures' early stage prospects. In addition to the resource scarcity, they also carried the burden of lacking legitimacy in the eyes of the relevant stakeholders. Another interviewee echoes this by noting that:

"On the contrary, start-ups face lots of challenges including, but not limited to, fund raising and high operating cost. However, due to the relative smaller size of start-ups, they have the ability to take quick decisions and adapt to new technology."

(Interviewee M)

In discussing other high-tech firms' closures, Interviewee N noted:

"Yes, I know of a few that have closed down. A company called xxx. They designed and simplified accounting and payroll software for companies but even though their app was not expensive and easy to use,

businesses didn't really subscribe to it. They didn't have resource challenges because they were fully sponsored and supported. Beep also developed a social media messaging app. They seemed to be too high priced in that space so they didn't get a lot of subscribers, so they struggled and closed down."

One interviewee added:

"Brands didn't understand digital and didn't see the need for it. It was difficult to find employees who already had expertise in digital. We were a new brand and had to compete with incumbents who did not necessarily have our expertise but were more familiar with our prospects."

(Interviewee Q)

"One challenge I faced was how to get my company to compete with the bigger fish already in the market."

(Interviewee P)

On the challenges of bringing something new to market after the business formation, one interviewee puts it this way:

"Very difficult and disheartening at times ... Brands did not understand what digital marketing was or why they needed it. Those that did understand it would reduce it to a Facebook page. So even brands that you would expect to have 'good' marketing budgets had them skewed completely towards traditional media if they had any at all for digital. A lot of education had to happen, trials would have to follow sometimes for free in order to close a client; our scope of work rarely matches the client budget and it typically took/takes about six months to close a client from first meeting."

As Interviewee J explained:

"The challenge with bringing something new to the market is with cost of promotions. It cost so much to promote using the above-the-line method. Even with the below-the-line method, you may only be looking at the youth demographics. Depending on the target audience, lot of education is required to get the product into the market. Those pose a great challenge as if care is not taken; one could fail to carry the message across."

The quotes above highlight the effects of lack of legitimacy after founding. The quotes below illustrate this:

"The major challenge is the fear of failure as to whether the product or service being introduced will succeed or not. Africans, and for that matter Ghanaians, generally don't like trying new things."

(Interviewee T7)

Another interviewee echoes this sentiment:

"For internal threat, our major problem was with the staff and business owners refusing to understand the need for ICT (Information and communications technology) in their businesses and a new change. Some of the clients have little or no knowledge about computing hence they feel they may not have control over their business if computers are introduced."

(Interviewee J)

Taken together, these constraints have created conditions which often rendered the positive effects of their early advantages, including expertise and knowledge.

4.2. Phase II: formulating post-formation strategy

Our data shows that the technology entrepreneurs' initial motivation for business formation often influenced their ability to thrive in the face of environmental turbulence. Besides applying their own knowledge in responding to early declines in sales and introduction of new technology and apps, some of the entrepreneurs sought to exploit external knowledge by bringing in new partners and through new hiring to offset the knowledge deficit. The threats to their existence are often exacerbated by lack of key resources and market expertise and knowledge, as well as a lack of talented developers, and perhaps the availability of similar products in the market. The second phase can be

Table 1
Resource scarcity and institutional constraints.

Factors	Representative quotes
Lack of access to financial credit.	<ul style="list-style-type: none"> “Factors include accessing funds from the local banks and poor infrastructure development in Africa ... main barriers includes high operating costs, such as utility service costs and attracting skilled IT personnel are some of the barriers confronting start-ups.” (Interviewee M) “The banks have consistently been a challenge to us in accessing finance, so we have resorted to investment houses, and equity offers to finance our business when and where necessary.” (Interviewee L) “You know in Africa at times the banking sector does not work the way they are supposed to. How did you outcome difficulties in accessing finance?” (Interviewee H)
Human capital and resource issues.	<ul style="list-style-type: none"> “Human resource would definitely be the main factor affecting the growth of the sector. Secondly, a lack of proper collaboration between firms to further solidify solutions has stunted the growth of the sector ... SMEs sometimes look to grow a little too rapidly, and that puts them out of the range of certain advantages reserved for start-ups.” (Interviewee L) “In terms of resources, I had little savings which I started with before I gained some support from friends and family members. I had some training in IT (hardware and software) ... When I started, the internet wasn't so popular like today, but it has helped greatly with materials for training and also helping us now because that's what we basically use.” (Interviewee T13) “Most of the challenge has to do with the ability to purchase. This is hugely as a result of the low performance of our local currency against the internal market currencies. A good notebook computer of \$400 ends up being sold for anything up to 4000 Ghana cedis.” (Interviewee I) “The barriers are (lack of) talented developers, financial resources, lack of affordable infrastructure.” (Interviewee G)
Competition.	<ul style="list-style-type: none"> “Competition is our major challenge. The market is currently flooded with so many companies offering the same services to XXX. In view of this we had to diversify our product offerings.” (Interviewee R) “Yes, there have been a lot of firms shutting down over the years and for those who have been in close competition we tried to find out. Some have been as a result of a lack of finance, others improper management and sometimes lack of regulatory compliance.” (Interviewee L) “Competition is our major challenge. Similar products on the market.” (Interviewee T11) “Internal threats were financing capacity and trusted employees. External threats were competition from bigger established companies who had relationships with companies needing IT services.” (Interviewee T10)
Government-related factors.	<ul style="list-style-type: none"> “The tech industry is highly unregulated. Everyone is ‘doing their own thing’. But so far as we have a solution meeting the needs and challenges of our customers, we are in business.” (Interviewee N)
Inadequate infrastructure.	<ul style="list-style-type: none"> “Internal threats were infrastructure change and utility bills ... External threats were bullying from clients who had other contractors and subcontractors...and also giving excuses that they haven't been paid.” (Interviewee T4) “Our level of customer engagements and service, quality solutions deployment, in addition to free training distinguishes us from our competitors ... Most organisations are hesitant in migrating their legacy systems to keep up with evolution in technology and as a result, becomes a challenge for start-ups.” (Interviewee H)
Awareness, legitimacy and newness.	<ul style="list-style-type: none"> “Getting people to accept something new is difficult. If their existing problem is not addressed significantly by your solution you will just be burning a lot of cash and no customer will buy or subscribe to your service. That is the only significant challenge for me.” (Interviewee N) “Whether or not the market will accept your product is the biggest dilemma. Sometimes even after extensive research the market will just not patronise your products/services.” (Interviewee R) “Very difficult, due to the low level of education and media awareness in Africa.” (Interviewee B) “Credibility was always an issue and still is. We find ourselves fighting every day to enhance and at the very least maintain that image ... Yes, there were a lot of things that we did not know about prior to starting the business. We leaned on professionals to ‘regularise’ as much as possible where we fell short.” (Interviewee L) “Bringing product to the market needs a lot of research because in a country like Ghana they find it difficult to change their habits for new ones, especially things that are technology driven.” (Interviewee T4)

distinguished from the first because the second focuses on formulating a response to the threats or challenges posed by the long-term potential of operating and succeeding in the sector. As Interviewee L explained:

“Africa is still much unexploited in the technology sector. There is a lot of opportunity for technology to enhance industries and sectors across the continent. A lot of the technology that may even be considered irrelevant to other parts of the world due to modern developments is still valid and relevant in Africa.”

Another commented:

“We are a full-service digital marketing agency. This is one of our competitive advantages in Ghanaian marketing because most agencies only have the ability to execute social media campaigns. We go beyond social and offer our clients a holistic digital presence. Our company is a start-up made up of young creatives who are passionate about technology and marketing. The office culture is very results oriented but laid back.” (Interviewee Q)

The quote below highlights other issues:

“Before the start of the development, the biggest challenge was how we were going to market the product to the intended users since we have no previous experience in the field. After the business has started, the next challenge was how we were going to combine the development of the system with the marketing as well as the after-sales services.” (Interviewee T7)

In discussing the other untapped opportunities in the high-tech sectors in Africa, Interviewee N asserted:

“Almost every problem in Africa today can be solved wholly or partly with technology. The more we recognise problems with customer service, marketing, delivery services, routine and manual works, the more relevant technology becomes to us.”

Interviewee T4 noted:

“I always turn over money from the previous jobs into the present ones, making sure I don't compromise standards and adhere to safety rules, always maintaining a clean environment and good time response to issues popping up on every given site we complete.”

Based on the above, it can be deduced that perseverance and focus on the long-term motivates them to seek new ways to navigate the voids and constraints. In the next phase, we shed light on their responses.

4.3. Phase III: overcoming the constraints

Given the importance of valuable resources and institutionally conducive environments alluded to in the previous phase, during this phase the ventures focused on exploring “new” ways to innovate, and to acquire and utilise resources. After identifying the constraints and formulated approaches, the new ventures proceeded to this phase seeking to turn the constraints into advantages through innovation and efficient utilisation of resources. Phase III was characterised by the strong commitment by the interviewees not to be hamstrung by the constraints. An interviewee noted:

“Not many embrace new ideas in developing countries. Our key to

success is persistence.” (Interviewee D)

During this phase it became apparent that even in the face of resource constraints and institutional constraints, the firms have adopted different innovative approaches to circumvent problems. The data suggests that the key elements of strategies for overcoming the constraints include innovative work practices and ethos, innovating from regulatory uncertainty, innovative financing strategy, and leveraging new technologies. On meeting challenges, an interviewee noted:

“We at XXX aspire to see small and medium enterprises and organisations grow through making the production of goods and services a more enjoyable and relaxing experience. This we do by helping to automate operations, processes, and procedures to ultimately help companies satisfy their customers to the fullest. To this end, we create software and applications that minimise or eliminate completely manual intervention. We create and deliver, having in mind our customers' expected output for their customers.” (Interviewee D)

On leveraging new technologies, one explained how they overcame the constraints:

“The internet has come to be the core of our business: from using it for research and deployment, remote support all the way to powering infrastructure that we use to support our clients. This has always been a struggle but we have always made it a point to enquire from the designated authorities a clear policy concerning any of our business activities. We did encounter some scenarios where we had to change the business strategy to accommodate regulatory requirements. It has often been a factor for the delay of product/service delivery.” (Interviewee L)

Interviewee E added:

“The internet has been a lifeline for research and our favoured most means of communication with other partners in and outside of the country ... Yes, there are so many untapped opportunities that need to be tapped into such as the introduction of 4G/5G spectrum, coupled with the introduction of advanced IT (Information Technology) securities.”

Another summed up:

“Since we started the business we have not noticed high-tech firms closing down ... We have adopted innovative ways of delivering quality services and timely responses to customer concerns using all available means of communication including social media. We realise the changing trend in technology and always try to give our customers the opportunity to change their systems to newer global standards and cloud-based platforms.” (Interviewee T9)

One of the main constraints facing Africa's digital entrepreneurs is lack of access to financial credit which forces them to rely on family and community associations to obtain finance.

“The business started with little capital outlay most of which was re-financed by the clients ... Well fortunately the (big) high-tech companies are still in operation in as much as their market share may have dropped owing to the many competitors in the market.” (Interviewee I)

The data suggests that for many, there was a general tendency among the entrepreneurs to rely on their own resources in battling early turbulence. Table 2 provides a summary of the approaches taken to overcome the constraints. Thus, this phase was characterised by the adoption of different innovative approaches and models to respond to the constraints. Taken together, these quotations highlight the various mechanisms that the new ventures have sought to overcome the constraints, i.e. turning disadvantages to advantages.

5. Discussion and implications

Drawing on literature on resource constraints and institutional voids, the present study sought to examine the mechanisms and

processes that explain the contextual influences on start-ups' development. Essentially, this paper is based on the premise that harnessing the technology sector for development is predicated on eliminating the barriers to their development. Drawing on insights from 42 semi-structured interviews with technology-related entrepreneurs in an emerging economy, we developed a dynamic process model for overcoming entrepreneurial constraints. A host of environmental and organisational level forces were identified that have culminated in a three-phase model of how the different constraints manifest and their responses to them. We identified constraints such as lack of access to financial credit, inadequate infrastructure, and human capital and resource constraints in Phase I then formulated post-formation strategy in Phase II. Phase III focused on strategies for overcoming the constraints through innovations by leveraging new technologies and different financing models to outwit incumbents. Despite the existence of the constraints, these new technology ventures have adopted an innovative financing model and working practices and leveraged new technologies to outwit rivals to prolong their existence.

5.1. Theoretical and practical implications

In light of our findings, the study makes a number of contributions to technology and innovation literature. First, existing literature failed to provide a solid understanding of how new venture firms reconfigure their resources and capabilities to navigate and thrive in constrained settings. In that direction, our study adds to research on resource-constrained innovation (Pansera and Owen, 2015) by demonstrating how new technology ventures adopt approaches towards navigating around institutional voids and resource-constrained environments (Cavusgil et al., 2002; Karnani, 2007). Second, in light of the findings that technology can be harnessed to boost firms' development, one might expect abundant research on technology entrepreneurship and new technology ventures, but few studies have sought to contextualise influences on start-ups' development. We also developed a staged approach towards entrepreneurial development in developing countries to meet this challenge. Our study also shed light on how new technologies can be harnessed to enhance the effectiveness and competitiveness of firms in resource-constrained settings.

There are some practical implications of the study. First, although all of the firms analysed in the study only operate in their domestic market, it may be that the ability to navigate such institutional environments has actually equipped them to be able to internationalise to other countries in the sub-Saharan African region. For these entrepreneurial ventures, the experience of surviving early turbulence and navigating around the institutional voids can be considered an asset, allowing firms to expand to other countries with similar institutional environments.

Moreover, our analysis indicates that greater adoption of ICT across the value chain of the firms can enhance their capabilities to innovate and out-compete rivals. Such adoption represents a key juncture towards elevating and updating their technological capabilities. This is also a major step towards catching-up and possibly leapfrogging with rival firms in other developing nations. Besides the lower communication and operating costs that can be accrued from modern ICTs in contrast with old-fashioned communication tools, ICTs also enable such SMEs to exchange ideas, information and forge close relationships with domestic and foreign partners (Fu and Hou, 2015). In addition, the location specific advantages of developing countries such as availability of raw materials and low-cost labour would equip these firms to pursue low-cost strategy by offering their products or services at lower cost. For such resource-constrained firms, the ability to forge links and secure a government contract can also be a springboard to large scale operations and internationalisation (see Maksimov et al., 2017), thus enhancing their overall market competitiveness and driving job creation efforts.

From a public policy perspective, given that innovation is

Table 2
Strategies for overcoming the constraints.

Approaches	Representative quotes
Innovative work practices and ethos.	<ul style="list-style-type: none"> “Business is built by often self-generated principles and what has been done before. So in the absence of regulations we develop means to work within a reasonable framework. In the presence of regulations, we seek to clarify before proceeding. The future of the business hinges on one leg – integrity.” (Interviewee D) “Yeah, there are a lot even for developed countries who are retrofitting, new opportunities are discovered so yeah developing countries and a continent such as Africa have a lot of untapped opportunities but its biggest challenge is regulation/control and affordable services.” (Interviewee I) “A lot of them. New technologies like ‘internet of things’ which is introducing the idea of smart cities and is bound to happen any time soon.” (Interviewee R) “Africa is a virgin field when it comes to IT with an exploding population made up of the youth. This brings up many opportunities.” (Interviewee T8) “XXX Concept doesn't assume that organisations know what they want as far as ICT is concerned. One step we took as a company in exploiting opportunities available was through education. We approach companies with great proposals and offer to give them insight into why they need to use ICT in their daily business for productivity and growth. Many of these companies we approached embraced the changes and this got us many referrals too.” (Interviewee J) “We are 11 years into operations with staff strength of seven ... we are innovative, creative with youthful exuberance needing to be more innovative with a fashion brand that crafts authentic, handmade accessories designed with African print while focusing on the customer's solution ... An innovative company with the youthful exuberance needed to be innovative thinking about innovative solutions to everyday problems.” (Interviewee C)
Leveraging new technologies.	<ul style="list-style-type: none"> “Today, start-up firms have the advantage of funding from financial and investment firms, especially in the high-technology sector. As long as they continue to develop innovative solutions they will continue to access relevant funding and management assistance.” (Interviewee L) “My business exists because of the internet. The effect the internet has had on how people consume media, interact with brands, make and receive referrals, make purchasing decisions, conduct transactions, etc. My team does 80% of their work using the internet. Twenty per cent of the time we have to be on the ground at client events etc. but the majority of our work is one online.” (Interviewee Q)
Access to network of information.	<ul style="list-style-type: none"> “XXX started as a service provider in the area of user and application support. In the last half decade, our business has taken a deeper dive into the area of development and customisation in response to customer need as in keeping with the demands of the competitive market” (Interviewee I)
Innovating from regulatory uncertainty.	<ul style="list-style-type: none"> “Very challenging, I believed in employing some marketing tools like new product development and pre-testing. This must be done with customer involvement.” (Interviewee E) “We have introduced other products such as survey tools for large data collection ... Market penetration are always tough. It takes a long cycle for markets to respond to new IT products.” (Interviewee M) “We believe in business innovation and keeping up with changing global trends to ensure our customers are serviced with innovative technologies that suit their operation and provide the needed security.” (Interviewee T12) “Tremendous effect as everything from sourcing new ideas, communication to advertising is done via that medium ... Using the internet has given a larger customer base compared to the traditional way of marketing and advertising. It's the cheapest way to learn anything and everything. It's the fastest way to communicate or sell anything product – social media sites like Facebook, Twitter, LinkedIn, Instagram, Snapchat and WhatsApp offer companies a great free-of-charge platform to promote themselves, build their brand and their audience.” (Interviewee C)
Innovative financing strategy.	<ul style="list-style-type: none"> “As a start-up we did not see the banking sector as the place to get financial support from. Their interest charges are too high and they cripple businesses before they find their feet. Apart from our savings, family and friends and Angel investors are sources we use.” (Interviewee N) “We have constantly engaged our clients to ensure customer satisfaction even after work has been done and handed over. This is an area many companies don't pay attention to. Also, as part of our innovation, we created an IT services Eco system where anything IT can be found within our company.” (Interviewee J)

quintessential for new ventures' future success (Adeyeye et al., 2018), unearthing the contextual influences and constraints has enriched our understanding of how governments can create conditions to improve new firms' long-term survival. To foster economic development, there is a need for government policy to be geared towards developing and expanding the “motherboard” of economic development which is infrastructure such as reliable internet services and access to new technology to create conditions for new businesses to develop and expand not only nationally, but also across the continent.

Our study suggests that the creation of good infrastructure would encourage firms to break out of their geographically fragmented markets. To be able to innovate and do more with less within the African context, there is a need to invest in human capital development encompassing upgrading the skills of entrepreneurs to enable them to seize the opportunities in their local and regional markets. An effective attempt to improve small firms' competitiveness and foster innovation is partly predicated on understanding factors that constrain innovation activity (Hewitt-Dundas, 2006). Government policies aimed at fostering innovation also require a component geared towards eliminating obstacles and constraints on small firms' development whilst concurrently creating incentives for them to innovate.

5.2. Limitations and new research agenda

Regarding limitations, an important generalisability issue relates to our sample source. Given the focus on Ghana with its own unique institutions, and customs and traditions, the findings might not be generalised to other contexts. Another important generalisability issue relates to the sector-specific nature of the study. The focus on technology-related firms captures a small number of start-ups in the country. Future research could seek a much larger sample of firms across sectors and across nations to provide a more complete picture of entrepreneurial development in Africa. Another promising area for future research would be to explore how these voids and constraints further incentivise firms to innovate. The resource scarcity could incentivise firms to innovate, but few have opted to do so. A final line of research would be cross-national to explore how similar firms in different countries are able to innovate whilst others fail to do so.

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