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Exploring Entrepreneurial Innovation in Ethiopia

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Exploring Entrepreneurial Innovation in Ethiopia

Abstract

We explore the process of innovation as experienced by entrepreneurs in Ethiopia in order to gain new insights from a challenging setting for innovation that has been under-represented in the literature. Guided by two streams of literature – the contextual view of entrepreneurial innovation and the innovation process literature – we examine the accounts of entrepreneurial selection and strategic choices as narrated by 15 Ethiopian innovators pursuing diverse opportunities. Analysis of 77,000 words of text offers a rich data structure that adds substantive detail to the contextual view of entrepreneurial innovation. An emerging process model not only emphasizes economic with societal outcomes but also national citizenship reinforcement at the level of the individual entrepreneur. Policy recommendations are presented to deal with contradictions between government proclamations to encourage innovative new start-ups, and the actual accounts of the entrepreneurs as they deal with obstacles in different contexts.

Key Words: Entrepreneurial innovation; Context; Innovative process; Ethiopia

“A major problem regarding innovation is not giving due regard to local innovators. We often consider it innovative only when it comes from certain places. But innovation is everywhere. In fact, in my opinion, Africa is the most innovative continent” – Media education entrepreneur in Addis Ababa

1. Introduction

In 2014, *Research Policy's* Special Section on entrepreneurial innovation¹ set out to address the theoretical and policy implications of entrepreneurial innovation by placing a specific focus on the role of context (Autio et al., 2014). In contrast to the bodies of research on national innovation systems (emphasizing institutions that induce R&D and science-based innovation) and entrepreneurship (emphasizing individual-level cognition and experience as a basis for starting a new business), entrepreneurial innovation bridges the macro and micro, with the individual entrepreneur situated within multiple overlapping contexts². These contexts include the organizational, institutional / policy, social, industry / technology spheres as well as spatial and temporal dimensions within which innovative new ventures are conceived and pursued (Autio et al., 2014). Interestingly, the lead editorial noted how the most entrepreneurial nations (when measured using self-employment rates in GEM data) are economically poor while others show how high-impact entrepreneurship (measured through billionaire entrepreneurs) negatively correlates with this measure (Henrekson and Sanandaji, 2014)³. This presents a problem for understanding the role of context(s) on entrepreneurial innovation in economically poor countries where there are no billionaire entrepreneurs, where financial markets for VC investment are

¹ Innovation and innovative new ventures pursued by individual entrepreneurs in the economy as opposed to larger firms and corporations – “novel ventures that [break] with established development paths” (Autio et al., 2014: 1097)

² Mike Wright notes in Welter et al. (2016) [‘The context of contextualizing contexts’] how there has been an opening up of a search for the dimensions of context in entrepreneurship research. In the same Chapter, Friederike Welter calls for more attention to the multiplicity of contexts.

³ Isenberg (2011: 2) notes: “in some ways self-employment and entrepreneurship are diametrically opposed”.

underdeveloped, and there is arguably a more challenging environment for Schumpeterian entrepreneurship. The main articles in *Research Policy's* Special Section were either conceptual in nature, or utilized data from the advanced Global North, including innovative start-ups in Belgium (Clarysse et al., 2014), a biotech firm with actively publishing scientists (Liu and Stuart, 2014), and a case centered on waveguide physical modeling technology at Stanford (Nelson, 2014).

Yet a growing body of literature examines innovation and entrepreneurial performance in developing countries (e.g., Fu et al., 2011). This literature asserts that innovation should be approached somewhat differently in the developing world, as it encapsulates “processes of adoption and possibly modification of...technologies that have first been developed elsewhere” (Egbetokun et al., 2016). Fagerberg et al. (2010) highlight the resourceful nature of entrepreneurial firms in developing countries, pointing out that they are not passive in their use of imported technologies, and are very much involved in knowledge creation and innovation as they adapt foreign technology to fit the local context. Schot and Steinmueller (2018) describe a 3rd Frame for Science, Technology and Innovation (STI) that goes further: developing countries do not necessarily need to catch up with innovations in the Global North. They can pursue their own experiments and learning to pursue transformative change that addresses social and environmental challenges. Scholars have recently highlighted innovative trends in developing countries, drawing attention, for instance, to eco-innovation (Andersen et al., 2021) and intellectual property (IP) generation in Africa, albeit not at levels seen elsewhere in the world (Allard and Williams, 2020).

The contrast between the original literature on entrepreneurial innovation in the Global North and the literature on innovation involving start-ups in poorer developing countries appears stark. While the former emphasizes contexts of economically richer

countries and large-scale innovations (such as “biotechnology, the personal computer, and Internet search engines” – Autio et al., 2014: 1097; and high-impact billionaire entrepreneurs - Henrekson and Sanandaji, 2014), the latter is associated with smaller-scale indigenous innovation that often has a foreign technology component (Fu et al., 2011). The interesting feature of the contextual view is how it articulates the role of context in shaping the process of entrepreneurial innovation, and the different outcomes that might be expected in different environments (Acs et al., 2014). It highlights the complex and overlapping nature of multiple types of contexts, and places a spotlight on temporal dynamics involving individuals within these multiple contexts (Nelson, 2014)⁴. Nevertheless, we believe there remains a gap in our understanding of the process of entrepreneurial innovation in economically poorer countries, and how individual entrepreneurs experience this process at the intersection of contexts that are intrinsically challenging. Indeed, as noted by Bill Gardner in Welter et al. (2016: 7): “I think that when we introduce, for example, studies of firms in Africa, then, we have to celebrate the differences in cultural, political, regulatory, competitive ... ways that entrepreneurship occurs. What relevance does the Silicon Valley model have for anyone else? It is unique to that location” (sic). Similarly, writing in the field of social innovation, Rao-Nicholson et al. (2017) explicitly call for studies on the role of embedded agency and local conditions. While national-level studies cannot shed light on this, the contextual view of entrepreneurial innovation has potential to do so.

Our study addresses this gap by exploring the narratives of 15 entrepreneurs in Ethiopia. We chose Ethiopia as it is one of the economically poorest countries in the world

⁴ The entrepreneurial ecosystem approach also emphasizes the role of context, placing the entrepreneurial individual - as opposed to the large enterprise - in context (Stam, 2015). Isenberg (2011) sees entrepreneurial ecosystems consisting of six domains: a conducive culture, enabling policies and leadership, availability of appropriate finance, quality human capital, venture-friendly markets for products, and a range of institutional and infrastructural supports.

with one of the least developed innovation systems (Fagerberg et al., 2010). It has had one of the lowest rates of self-employment in Africa, according to GEM 2012 data: 12% compared to an average of 28% in Sub-Saharan Africa. Nevertheless, it represents an interesting context in spatial, institutional, social and industrial terms. The government has launched a series of policies and proclamations to foster and fund a knowledge-based economy with technology at its core. These policies include a Start-up Businesses Proclamation (2020) with a National Start-up Council and a Technical Advisory Board to advise and guide the allocation of resources. Entrepreneurial incubators were already in full operational mode before the proclamation, particularly in Addis Ababa⁵, and there was evidence of trade integration and financial inclusion, factors that have been shown to have a positive effect on innovation in Africa (Allard and Williams, 2020). However, the country has been beset by internal conflict and displacement, low internet diffusion, a low human development index and corruption; and many initiatives have been thwarted.

In this challenging setting, our study shows how the multiple contexts defined in the Global North literature (Autio et al., 2014) come into play in varying degrees, with the social context being the strongest and the organizational context the weakest. It also reveals a new context based on national citizenship that has not been discussed in the Global North literature. An emerging process model shows how innovators use strategic shaping and various forms of capital to deal with obstacles and the uneven distribution of resources across contexts. The study contributes, firstly, by revealing the nature of entrepreneurial innovation in a unique economically poorer country setting, showing variation in technological adoption and adaptation, alignment with UN Sustainable Development

⁵ Albeit few in numbers compared to other African countries: in 2019 there were only nine incubators and accelerators, compared to 85 in Nigeria and 48 in Kenya (Giuliani & Ajadi, 2019). Incubators focusing on early stage start-ups were Bluemoon (<https://www.bluemoonethiopia.com/>), Gebeya (<https://www.gebeya.com/>), iceaddis (<https://www.iceaddis.com/>), iCog-Labs (<https://icog-labs.com/>), Reach for Change (<https://ethiopia.reachforchange.org/>) and xHub Addis (<http://xhubaddis.com/>).

Goals, and changes in the way people relate to technology. Secondly, it demonstrates the usefulness of applying a contextual approach to understand entrepreneurial innovation in economically poorer countries, showing how forces that drive the process originate from multiple contexts but change over time. To answer calls for identifying new dimensions of context (e.g., Welter et al., 2016), our analysis uncovers a new context for entrepreneurial innovation in Ethiopia centered on a sense of national citizenship. We also identify a tension between the institutional (content of government proclamations for advancing a knowledge-based economy) and the national citizenship context (as narrated by the entrepreneurs themselves). Thirdly, it raises a number of policy implications not commonly discussed for harnessing entrepreneurial innovation, including how to support and incentivize entrepreneurs who end up as role models and policy influencers as a result of their entrepreneurial endeavors, and how to promote innovation by capturing a strong sense of national pride and commitment to overcoming national challenges.

2. Background

2.1 Entrepreneurial innovation: contexts and outcomes

The literature on entrepreneurial innovation places the entrepreneur at the heart of a set of different and overlapping contexts that shape the innovation process (Autio et al., 2014; Lettl et al., 2006). The formal institutional context – normally delimited by national boundaries - sets the ‘rules of the game’ in which innovation is encouraged or hindered (Allard et al., 2012). A technological context defines the possibilities and limits within a given industrial space or field, regardless of national boundaries (Breschi and Malerba, 1997). It reflects the extent of change, complexity and resource munificence facing the entrepreneur (Von Gelderen et al., 2000). A social context exists to provide new knowledge to the entrepreneur through their search efforts (Lettl et al., 2006; Leyden et al., 2014).

Other, perhaps more subtle, types of contexts exist too. Agarwal and Shah (2014) put an emphasis on knowledge contexts and how entrepreneurs from different domains (employee, academic, user) differ in terms of the nature of knowledge exploited and subsequent outcomes. Others reveal the importance of organizational context (Nelson, 2014; Shane, 2000). Nelson (2014) compared how a university and a subsequent start-up shaped the commercialization of a technology developed initially at the university. He notes how the meaning of context for entrepreneurial start-ups goes beyond the traditional institutional view, to include organizational systems and culture that influence individuals' decisions to develop technologies in ways that make them commercially viable.

The literature on entrepreneurial innovation considers the outcomes that entrepreneurs achieve within these different contextual conditions. A key focus is on financial performance, survival and growth of the entrepreneurial firm. Agarwal and Shah's (2014) literature review, for instance, illustrates how financial, firm growth and survival indicators of performance have been commonly used in the literature. Similarly, Nelson (2014) underscores maximizing financial returns. Others broaden the view of outcomes. For instance, in Von Gelderen et al.'s (2000) study of startup performance, a composite measure of success comprising economic and personal level (goals achieved) indicators is used. Garud et al. (2014) go further by showing how entrepreneurial innovation can help create the context in which subsequent entrepreneurial behavior is stimulated, such as attempts by entrepreneurs to build networks of innovators. Others have pointed to the need to appreciate the societal impacts that arise as a consequence of science commercialization into the process of entrepreneurial innovation (Fini et al., 2018).

Some criticize the failure to address how entrepreneurial innovation affects society, particularly as it relates to grand challenges and the issues faced in developing countries. While scholars distinguish between for-profit and social entrepreneurs as having divergent

characteristics (Shaw and Carter, 2007), reviews do highlight how social entrepreneurs often span for-profit and social objectives (Gupta et al., 2020). Gupta et al. (2020) explicitly call for research examining the role of innovation by social entrepreneurs.

2.2 Entrepreneurial innovation as a process

The literature treats entrepreneurial innovation as a process, an aspect that Autio et al. (2014) relate to as temporal context. Garud et al. (2014) review three main streams of work on entrepreneurial innovation (macro-micro approaches, multi-level approaches and constitutive approaches). The constitutive approach sees entrepreneurial innovation as an iterative process in which entrepreneurs and their contexts are co-created over time. The process is a ‘journey’ in which contexts are both the medium for and the outcome of entrepreneurial behavior. Garud et al. (2014) highlight a narrative aspect of entrepreneurial innovation: it is through narratives that entrepreneurs contextualize over time. Bruni et al. (2019) show how entrepreneurs use metaphors to describe the trial and error processes they pursue; entrepreneurial innovation is unpredictable and non-linear, and different metaphors may be used at different stages in order to sustain progress⁶. Berkhout et al. (2004) criticize early models of innovation processes for being too linear and for being linked too closely to company goals. They offer an approach of the innovation process that accounts for open innovation, interaction between science and business, complementarity among different types of knowledge, skills for managing networks and the role of entrepreneurship. Barbieri and Álvares (2016) review the field of innovation process models, placing an emphasis on process for incremental innovation. Such models recognize the adaptive and

⁶ Citing Takeuchi and Nonaka (1986), Bruni et al. (2019) refer to the relay race and the rugby scrum as different sporting metaphors for the process product development.

learning aspects of entrepreneurial innovation, and some also reflect on how the needs of society influence all stages of the innovation process (Rothwell, 1994).

Research designs that explicitly account for narrative and process demonstrate how different characteristics of context become relevant over time. Kline and Pinch (1996) show how rural users' relationship with the car before the widespread use of mechanized farming machinery helped shape the early development of the automobile. Nelson's (2014) case study of the commercialization of waveguide physical modeling technology invented in a university shows how aspects of the organizational context – such as conflict of interest regulation - shift between exploration and exploitation stages. Lettl et al. (2006) examine user involvement in radical innovation in healthcare, noting how users are part of the entrepreneurial context for innovation in this industrial space. This shows how social context involves access to critical resources (including the funds and time of specialists such as surgeons) and inter-disciplinary know-how at the early stages of the innovation cycle. Shane's (2000) eight cases of entrepreneurs exploiting a single invention show how the entrepreneur's prior knowledge is the key factor determining whether he/she discovers a new opportunity based on the new technology. Importantly, this prior knowledge is developed over time through individuals' "idiosyncratic life experiences" (Shane, 2000: 451), including prior work experience and education. It is influenced by the social, organizational, institutional and knowledge contexts (Autio et al., 2014; Agarwal and Shah, 2014) that the entrepreneur has been exposed to at different stages in life.

2.3 Differences between entrepreneurial innovation and innovative entrepreneurship

The aforementioned emphasis on contexts and process casts the construct of entrepreneurial innovation differently from that of innovative entrepreneurship, especially

as we consider developing countries. This distinction is a subtle but important one. Both entrepreneurial innovation literature (Autio et al., 2014; Garud et al., 2014; Manimala, 1992) and innovative entrepreneurship literature (Block et al., 2017; Low and Isserman, 2015; Malerba and McKelvey, 2020) acknowledge the importance of the entrepreneur as an innovator, i.e., the Schumpeterian view of an entrepreneur taking risks and generating new combinations for radically new products, services and processes (e.g., Leyden et al. (2014) [entrepreneurial innovation] and Malerba and McKelvey (2020) [innovative entrepreneurship]). They both underscore the importance of entrepreneurship and innovation to one another and to economic growth (e.g., Autio et al. (2014) [entrepreneurial innovation] and Block et al. (2017) [innovative entrepreneurship]). However, the innovative entrepreneurship literature places a strong emphasis on the innovative entrepreneur operating within a highly knowledge-intensive environment, including regional and national innovation systems (Malerba and McKelvey, 2020), being research-driven and producing inventions, patents and new business models (Block et al., 2017) and only existing within industries that are fundamentally innovative (Low and Isserman, 2015). Indeed, Low and Isserman (2015) delineate the innovative entrepreneur from necessity-based and mundane forms of entrepreneurship. The entrepreneurial innovation literature by contrast takes a slightly broader view that stresses the emergence of business opportunity (found or made) as part of a temporal process (Garud et al., 2014) that is not just about high-tech and radical product innovation. It also includes operational, market, organizational and boundary management innovation (Manimala, 1992). As noted above, entrepreneurial innovation literature emphasizes the complex interaction of multiple contexts in shaping “the course or process of entrepreneurship” (Nelson, 2014: 1146). This matters when focusing on poorer and developing countries which do not have advanced regional or national innovation systems or intellectual property regimes but which

nevertheless have an abundance of opportunity-seeking individuals keen to make an impact over time by bearing risk and innovating in different ways.

2.4 Entrepreneurial innovation in developing countries

Economically poorer countries often have higher rates of new business start-ups than richer countries, in part because they have fewer quality jobs (Autio et al., 2014). While scholars in entrepreneurship and development economics historically focused less on entrepreneurship in developing countries (Naudé, 2010), they more recently have brought these settings under the spotlight. They have noted how innovating firms are pervasive in Africa, and how their product innovations are associated with job creation, a vital mechanism for economic growth (Avenyo et al., 2019). In Latin America, environmental features have been shown to moderate the relationship between personality traits and entrepreneurial behavior, explaining why certain traits associated with entrepreneurial behavior in advanced countries may not apply in developing ones (Aboal and Veneri, 2016). In Asia, a continent with one of the largest populations of people living in poverty, scholars note how entrepreneurial innovation can alleviate poverty in ways that capital accumulation, public sector job creation and investment in infrastructure projects cannot (Bruton et al., 2015).

Africa, the economically poorest continent, is a vibrant space for entrepreneurship and innovative activity. While levels of formal innovation (IP applications, scientific publications, and high-tech exports) are low compared to the Global North, there is a great deal of variation across the continent. Entrepreneurial innovation is particularly strong in areas such as agriculture (Triomphe et al., 2013), tourism (Carlisle et al., 2013), and even mobile telecommunications and fintech (Lashitew et al., 2019). Allard and Williams (2020) find inter-state trade integration and financial inclusion to be the most consistent

drivers of national-level innovation in Africa. This literature highlights the importance of complementarity between innovation in the Global North and its adoption and adaptation in the Global South (Fu et al., 2011). Less developed countries apply indigenous innovation and entrepreneurial efforts to exploit inventions and technologies originally developed in advanced countries with established innovation systems (Egbetokun et al., 2016; Fagerberg et al., 2010; Fu et al., 2011).

Overall, the literature regarding entrepreneurial innovation in less developed countries is still evolving. It can be informed by both the contextual view, which includes temporality as a contextual influence (Autio et al., 2014; Nelson, 2014), and process views of innovation, which incorporate social, organizational and institutional aspects of context (Shane, 2000). The contextual view is particularly useful because it highlights the complex nature of influences that may enable and restrict entrepreneurs in their innovative behaviors. The process view is useful because it highlights non-linearity, feedback loops of learning through trials and experimentation, and the need to account for societal needs at all stages (Barbieri and Álvares, 2016; Rothwell, 1994). However, these literatures do not provide a clear answer to the question of how the process of entrepreneurial innovation unfolds in one of the world's least developed countries in terms of innovation systems (Fagerberg et al., 2010). In such a setting, the advanced institutional, industrial and organizational contexts that figure so strongly in the existing contextual view of entrepreneurial innovation (Autio et al., 2014) – as well as the knowledge-intensive view of innovative entrepreneurship (Low and Isserman, 2015; Malerba and McKelvey, 2020) – may be less enlightening.

3. Data and methodology

3.1 Research setting

The data for our explorative work consists of interviews with 15 indigenous entrepreneurs pursuing innovative projects through new start-ups in Ethiopia. With a population of more than 112 million people, Ethiopia is the second most populous nation in Africa (World Bank, 2020), with 52.3% of the population in the 15-54-years age group. It lags on most indicators of technological learning and innovation capacity, presenting a major obstacle for sustainable development (Shkabatur et al., 2021; UNCTAD, 2020). In 2012, mobile penetration was 25% (less than half the African average), internet access was 2.7% (half the African average), and broadband penetration was 0.1% (40 times less than the African average) (Adam, 2012). On the 2017 ICT development index (IDI), Ethiopia was ranked 170 out of 176 countries.

The government launched a National Science, Technology and Innovation (NSTI) Policy in 2010 to kick-start technological learning, innovation, and upgrading. Progress has been hindered by deficient implementation and evaluation practices (Shkabatur et al., 2021; UNCTAD, 2020). Current Ethiopian STI policy prioritizes the acquisition and adoption of technologies from abroad. Most product and process innovation in Ethiopia involves acquiring new technology or production processes from abroad or adapting existing technology and methods of production without engaging in R&D activities (UNCTAD, 2020). To develop tools to create jobs and promote private sector development, the government created a Job Creation Commission (JCC) in 2018 to promote high-growth, innovative SMEs. Other policy initiatives include the launch in 2020 of the Digital Ethiopia 2025 strategy, designed to implement projects to unlock the country's digital potential, and a Start-up Businesses Proclamation (2020) with a National Start-up Council and a Technical Advisory Board. In terms of education in STEM, the number of public

universities increased from 8 to 36 between 2005 and 2015 and the number of private higher education institutes also increased, to more than 100 institutions in 2017 (Salmi et al., 2017). The government's 70:30 higher education policy aims to train 70% of students in technology and science.

Numerous multilateral organizations have promoted entrepreneurship in Ethiopia: UNDP, UNIDO, UNCTAD, USAID and the World Bank support entrepreneurship training; Global Affairs Canada (GAC)'s Digital Opportunity Trust (DOT) project develops leadership and entrepreneurial skills with a focus on women entrepreneurs and addressing community challenges; and the European Union Delegation in Ethiopia launched a four-year program (RESET Plus Innovation Fund) in 2019 to help social entrepreneurs. Institutions such as the American Embassy and Japan International Cooperation Agency (JICA) have encouraged young start-ups to develop technology-based solutions to community challenges by organizing national innovation competitions. In terms of incubators and accelerators, Ethiopia is not an African leader: only nine incubators and accelerators were reported in 2019, compared to 85 in Nigeria and 48 in Kenya (Giuliani and Ajadi, 2019). Startup support facilities struggle with accessing finance, commercializing and establishing ties with the market, lack of mentorship, and other networking opportunities (Shkabatur et al., 2021). According to the Enterprise Surveys conducted by the World Bank (<http://www.enterprisesurveys.org>), the greatest obstacles for entrepreneurs in Ethiopia were access to finance and electricity. The finance obstacle was higher than the same metric for sub-Saharan Africa (23.7%) and Africa overall (14.4%). Interestingly, only 1.7% of firms identified an inadequately educated workforce as the biggest obstacle in 2011 and 2015, compared to 8.7% in Africa at large.

3.2 Data collection and analysis

Sample size in explorative social science research is a debated topic. According to Boddy (2016), determining an appropriate sample size is a highly contextual issue, and low sample sizes are acceptable when findings are rich, new and highly relevant. Saturation can be reached with a sample of 12 for populations that are fairly homogeneous. In our study, entrepreneurs pursued opportunities in different problem areas (e.g., cooking, education, job-seeking), but were quite homogeneous in terms of country, size and age. Similarly, Sim et al. (2018) argue that determining sample size a priori in qualitative research is “inherently problematic” (Sim et al., 2018: 619-620) and that the principle of saturation is key to allowing adaptation to the nature of the data, as opposed to an a priori statistical determination of sample. By conducting the interviews, translating, transcribing and analyzing one case at a time, we were able to discuss and document key emerging themes from each case in sequential order. This enabled us to closely monitor convergence around key themes. Saturation was first detected between cases 10 and 12, in line with Boddy (2016). By the time we reviewed the transcript for Case 15, all members of the research team concurred that no substantive new themes had emerged. Nevertheless, we produced a feedback report showing the main themes and insights and sent this to all participants with an invitation to discuss the findings in case any major themes had been overlooked. We also hosted a virtual focus group with three sample members following the interviews, in order to validate key emerging themes and identify any overlooked themes. Following the advice of Breen (2006), we approached the focus group as a discussion, facilitating dialogue between the respondents, and not as an interview. The focus group discussion was also recorded and transcribed with the agreement of the participants, and the 7,500-word transcript was used to validate our emerging data structure and process model.

We identified and contacted the founder-entrepreneurs in all cases through leads provided by incubators in Addis Ababa and subsequent personal networking. All respondents were interviewed locally in Amharic (the lingua franca in Ethiopia) by the second author using semi-structured interviews. We used the translated, transcribed data – 77,000 words in total - to develop (1) qualitative data structures (Gioia et al., 2013) and (2) a process view of the phenomenon (Langley, 1999). This approach of first developing a data structure with theoretical aggregate dimensions from an analysis of interview data, and then inductively creating a process view of the entrepreneurial phenomenon based on those dimensions, has been used before in entrepreneurship research (Wigger and Shepherd, 2020). Langley (1999: 692) describes process data as consisting “largely of stories about what happened and who did what when--that is, events, activities, and choices ordered over time”. Each of the case narratives were interpreted in this light: as stories about what happened and in which sequence. The semi-structured interview protocol captured events, activities and choices over time as expressed by the individuals involved in innovation (Appendix A), a focus that is emphasized by researchers in innovation studies (Bruni et al., 2019; Salaman and Storey, 2002). We also collected secondary data from company websites, from incubators in Addis Ababa that had been involved in some of the cases, and drew from the focus group transcript in the final analysis. The process model that emerged utilized a mix of narrative strategy and temporal bracketing (Langley, 1999) in order to account for aggregate themes within the main phases of the process as described by respondents.

3.3 Nature of the sample

Ten of our interviewees were male, five female. Their average age was 33.5 years, with a range between 24 and 57. All had received university level education in Ethiopia, 13 with

a bachelors degree and two with a masters degree. Eight were educated on STEM programs, while the others were in subjects such as accounting, architecture and law. The average age of their businesses was 5.2 years, ranging between 2 and 15 years. The average number of their full-time employees was 6.3, and six firms also employed part-time staff, with an average of 8.1 part-time staff. Four of the firms operated in the manufacturing sector, seven in services and four in agriculture.

All 15 cases aligned with one or more of the UN Sustainable Development Goals (SDGs) (Table 1). Cases 2 (coffee drying technology), 3 (digital payment platform) and 11 (cash machine software) aligned with one SDG each, namely responsible consumption and production (Case 2), and industry, innovation, and infrastructure (Cases 3 and 11) respectively. Others aligned with multiple SDGs. For example, Case 14 (eco-friendly shopping bags) aligned with sustainable cities and communities, and responsible production and consumption by virtue of the product produced. However, the entrepreneurial model in this case also emphasized employment for women, reducing inequality and providing women in rural areas with a decent working environment. Overall, entrepreneurs in the sample tended to address a small range of UN SDGs through the nature of the core offering as well as the business model.

Insert Table 1 here

Table 2 shows the innovative nature of the sample in terms of radicalness (Lettl et al., 2006), source of technology (Fu et al., 2011), and the extent of change in the way users relate to technology (Kline and Pinch, 1996). Cases varied on all of these dimensions. We used Lettl et al.'s (2006) multi-dimensional definition of radicalness to code this

dimension⁷. Five of the cases were coded as moderately radical for Ethiopia: Cases 1 (injera stove), 4 (mass online teaching), 8 (solar powered tractors), 9 (hydroponic systems), and 10 (seed ball manufacturing). Conversely, five cases were seen as incremental or moderately incremental forms of innovation: Cases 7 (financial advisory), 11 (cash machine register software), 12 (eco-landscaping), 14 (eco-friendly shopping bags) and 15 (automatic spray pumps for fertilizers). The vast majority of the cases (13/15) involved adapting technology sourced from abroad. Two cases, however, involved purely local inventions: Case 1 (injera stove) and Case 14 (eco-friendly shopping bags). In terms of how users relate to and use technology, most cases involved a high degree of change. For instance, Case 6 (mobile application to connect job seekers and employers) allowed the job market to continue even when the internet was down, a regular occurrence. And in Case 9 (hydroponics), small-scale farmers were able to learn how to develop crops without soil.

Overall, the sample is balanced between being incremental and radical for Ethiopia, relies mostly on technology sourced from abroad, mainly involves change in how people relate to and use technology, and tends to address a small range of UN SDGs. It is slightly weighted toward services, though all three sectors of the economy are represented; and it is balanced between lower- and higher-tech companies. It is a reasonable reflection of the structure of the Ethiopian economy, which in 2020 was 23.1% industry and manufacturing (28.4% in our sample), 36.4% services (46.7% in our sample) and 35.45% agriculture (26.7% in our sample). The entrepreneurs in our sample are not representative in terms of education, however. Only 8.1% of the population in Ethiopia has at least enrolled in tertiary education (World Bank), while 100% of our sample has some university education.

⁷ Radicalness = satisfying unmet need for the first time (market), creates new knowledge about the product architecture and components (technology), internal change experienced (organizational), changes to societal value systems (environmental)

Insert Table 2 here

4. Results

Table 3 shows the emerging data structure with resultant aggregate dimensions. Consistent with our interview protocol and attention to the respondents' experiences of the process they had been through (Appendix A), there was a temporal nature to the aggregate dimensions. Some dimensions reflected initial conditions and the formulation of the idea, others reflected events once the venture was launched, and others clearly related to outcomes. We then inductively created a process model containing each of these aggregate dimensions (Figure 1). This required a re-reading of interview and focus group transcripts to confirm discontinuity at the frontiers between brackets (Langley, 1999), particularly between initial conditions and ongoing strategic choices. The temporal bracketing approach led to three phases being identified. The first phase relates to selection effects: how entrepreneurial cognition is moderated by the individual's idiosyncratic experience within the country, and how this leads to opportunity identification, the decision to start a new business, and choices related to offering development (i.e., the first two aggregate dimensions in Table 3). Secondly, a post-entry / strategic choice phase occurs following the initial launch to the market of the new offering. The next three aggregate dimensions from Table 3 are at play here, these co-evolving over time: harnessing different forms of capital from different contexts (financial, human, social, institutional) to continually build and adjust capability, facing varied obstacles including societal attitudes as contextual barriers, and continually shaping strategy using internal and external influences. Thirdly, outcomes are seen in terms of the final two aggregate themes from Table 3. The first of these is a very strong sense of societal impact and satisfaction at contributing to the development of Ethiopia. There is also a sense of despair when trying to overcome

obstacles, and the emergence of the individual entrepreneur as an influencer and reinforcement as a ‘national citizen’. The final aggregate dimension categorized as an outcome relates to product success, this certainly being present in some cases despite obstacles, but much less conspicuous than national citizenship reinforcement. These three phases (selection effects, post-entry and strategic choice effects, and outcomes and national citizenship reinforcement) are described below.

Insert Table 3 here

Insert Figure 1 here

4.1 Selection effects

4.1.1 Idea origins in Ethiopian challenges

Individual cognition and concerns. The strong desire to address developmental problems and challenges for Ethiopia arose from various prior experiences within different contexts.

This included the daily use of technology in a domestic setting in four cases, e.g.,:

“I got the idea a while back. Almost 25 years ago, when I was at home reading, I noticed that whenever the injera stove is turned on the lights in the house get dimmer, their power decreases.” (Case #1 – Injera stove)

It arose as a result of engagement within the social context of traditional industries within Ethiopia:

“I decided whatever I did must be something that will have practical use in the future and solve the problems of society. Along these lines, I explored a lot of ideas and I finally went to visit some shemanes (traditional weavers). In my visit, I saw that they sit on the floor to do the whirling and witnessed what they did wasn’t productive on top of being tiresome.” (Case #5 – Thread whirling, spinning machine and weaving machine)

Cognition and concerns for Ethiopia also arose from prior participation in the higher education system as a student in eight cases:

“I did my paper on Lake Awasa. The paper assessed what the lakeside development in Awasa looked like in the last 50 years and the consequences it had on the natural environment..... it really had an impact on me.” (Case #12 – Eco-landscaping services)

There were plentiful and more general comments about the broader fate of the country, influences arising from growing up and living in Ethiopia. This sentiment was echoed in ten cases:

“There is no hiding it, our main focus is Ethiopia! We want to take the Ethiopian population out of hunger and the effects of climate change.” (Case #10 – Seed ball manufacturing)

Idea formulation. These concerns continue into specific idea generation and early-stage formation of ideas for addressing problems. These were also shaped by the entrepreneur’s embedment in specific settings, such as the domestic setting noted above as well as participation in projects at University:

“Especially a field called Sustainable Architecture helped me a lot, we had many discussions about climate change. In Landscape Architecture, we learned a lot about agriculture and related things. So when I left, I had already developed the interest for sustainable architecture.” (Case #10 – Seed ball manufacturing)

4.1.2 Preparing for launch

Variation in place and context. In addition to the University environment for idea formulation, two respondents talked of the importance of domestic settings for the initial design, experimentation and development work on solutions and offerings.

“I had one room vacated and the whole night I kept hammering and disturbing the whole family with the noise. I used to dirty up the whole house walking around with my dusty jumpsuit. This was basically how I was able to make this.” (Case #1 – Injera stove)

The domestic setting for experimentation was seen as important for gaining knowledge about the problem and the underlying technological solution.

“Since I didn’t know it was possible to grow plants by only using water, I was fascinated with the idea and started experimenting at home.” (Case #9 – Manufacturing hydroponic system)

Bringing initial idea to market. An important part of the pre-launch phase was awareness of the offering’s unique features and how it held a differentiated position within the Ethiopian market. This reflected an awareness of how technology would likely be used:

“Actually, had we designed the application in the way it is done abroad, I don’t think many people will be able to use it here. Our society’s capacity to make good use of technology is really low...we did the application using Amharic...because typing tends to take a long time, we made most of the items selectable.” (Case #6 – Mobile application and call center to link job seekers and employees)

In addition, 11 respondents discussed prototyping, testing and learning from early attempts at launching an offering to the market. This involved recognizing limitations and problems with new technology and devising a coping strategy when it failed:

“There was even a pump that stayed 3 or 4 years without being fixed. So we repaired its insides first and made it work using a solar [powered] system. Sometimes when the solar system is malfunctioning we use an electrical system. When we face problems that we can’t immediately fix, we shift to an electrical system.” (Case #13 – Solar powered water pumps)

4.2 Post-entry and strategic choice effects

4.2.1 Harnessing capitals

Financial capital. Respondents mentioned four different types of capital, first among them financial. Different sources of financial capital were drawn on by all of the entrepreneurs, including incubators in Addis Ababa:

“Ice Addis gave us a funding of [...] thousand Birr, which is a lot. It was to be used for hiring employees and for buying raw materials and a leather sewing machine. We qualified for the fund by pitching our idea and we got

our initial seed money from Reach for Change.” (Case #14 – Environmentally-friendly shopping bags)

Ten cases mentioned using their own personal savings and income from separate paid work:

“When I was doing this, I already had other work as a source of income. If that wasn’t the case, I would have abandoned this....Because I had other work for income, I was taking money from there to invest in this idea.” (Case #1 – Injera stove)

Informal social networks, including family and friends, were drawn on for funding in four cases, as was financial support from different partners in the business:

“Whenever one of us were lagging behind, the others would step up to financially support the business.” (Case #3 – Digital payment platform)

The role of national competitions was a prominent theme, occurring in ten cases. Entering and winning a national competition elevated the status of the entrepreneur within the entrepreneurial community and underpinned their motivation:

“...the Ethiopian City Development and Construction announced a nationwide competition. I competed in that privately and ranked 12th and got an award of [XXX] thousand Birr. They also promised to give us land and that made me a bit hopeful.” (Case #12 – Eco-landscaping services)

Human capital. The need for skills, training and expertise was addressed in different ways.

Five of the entrepreneurs were sensitive to the need to have appropriately trained staff within their businesses in order to gain reputation in the market:

“The fact that we have a really competent technical team makes things easy. The people who are working here are smart enough to work in Google and Facebook. So it is a very competent company that can deliver what is needed. Thus it is a huge deal that the market sees us in such a positive light.” (Case #3 – Digital payment platform)

Human capital was an issue not only for the more technology-intensive cases. Four of the entrepreneurs were also aware of their need for traditional Ethiopian skillsets in the relatively low-tech and incremental innovation cases:

“I get the clay parts made in the countryside. I have people producing it for me according to my own designs and I use them for my productions. I do the insides here and get the clay done with my own specifications.” (Case #1 – Injera stove)

Social capital. Two respondents mentioned the difference between informal and formal social connections in Ethiopia, and, interestingly, feeling uncomfortable being an ‘insider’ with the ‘right connections’:

“If you have the right connections to get something done for you and to tip you off about things, you will really benefit. If you take the formal route, you will not come out successful. I can only go about things formally. I don’t like doing things informally. That is one of my biggest hurdles.” (Case #5 – Thread whirling, spinning machine and weaving machine)

Others highlighted the importance of informal and casual acquaintances with actors already active in certain industrial spaces, including contacts through social networking and instant messaging sites:

“ You know how I got in contact with Reach for Change? One of our batch mates has a Telegram channel and he posts different things and I got to know about Reach for Change through one of his posts....And when I casually mentioned my interests to the person I met, he told me that Reach for Change announces advertisements for people working on such initiatives and I was happy to hear that. So I pitched my idea at Reach for Change and we got our very first seed fund” (Case #14 – Environmentally-friendly shopping bags)

Institutional capital. Despite institutional voids being a central theme in literature on developing countries, our data did not show a lack of institutional support for entrepreneurs. Nearly all (13) respondents mentioned the importance of non-financial support from institutions, for instance:

“There was a mentorship and training program there [at the incubation center] and they gave us the proper guidance. That’s how it became strengthened and that’s how the simple experiment turned into a business.” (Case #9 – Manufacturing hydroponic system)

There were also situations in which government departments provided support beyond advice, extending, for instance, to the social context:

“But ILO’s presence really helped us. They gave us good advice and since they had a lot of connections and networks...After we launched our application and started moving, the job creation commission was already established and they started helping us more. They were writing support letters for us and the like.” (Case #6 – Mobile application and call center to link job seekers and employees)

4.2.2 Facing obstacles

Formal obstacles. Eleven cases mentioned formal and government obstacles. In some cases encouragement was mixed, such as winning an award from the innovation ministry, but receiving no support whatsoever from the electricity company controlled by the government. Seven respondents expressed frustration over not obtaining desired actions from within the institutional context, even when individuals within that context listened to their needs:

“I wrote letters to all the concerned government offices saying I’ve made such and such a product and if it is produced on a nationwide level, it will have a huge impact. So I kept shouting and pleading. A lot of government offices listened but had no capacity for implementation.” (Case #1 – Injera stove)

This point is reinforced by indications that government representatives do listen to the needs of entrepreneurs, and even share their concerns, but they are powerless to help due to financial constraints:

“Most of the government stations understand what our project is all about. They know it is aimed at empowering and shaping society but sadly, they don’t have money/budget to offer.” (Case #4 – Media education)

Others were less accommodating to the constraints faced by governments and reported expressing anger towards government officials:

“I was the one who had to talk to government officials and make formal and accusatory statements like, ‘you are not doing your job properly! If there is

a possibility for doing things in a better way, the only reason we are lagging behind is because of your incompetence and laziness.” (Case #3 – Digital payment platform)

For higher-tech cases that sought a patent to protect an invention, there was also dissatisfaction with the competence of the administration:

“The IT intellectual property right is also another disheartening issue. When they can easily come, inspect and give us the patent we need, they drag their feet. The intellectual property administration is not fit to assess the current level of technology deployment systems.” (Case #3 – Digital payment platform)

Societal obstacles. A number of obstacles were raised related to attitudes in Ethiopian society. Three entrepreneurs expressed a general lack of support towards entrepreneurs because of their youth:

“The external environment including the government initiatives weren’t supportive for an up and coming technological business run by youngsters.” (Case #3 – Digital payment platform)

There was also stigma by association: by virtue of addressing societal challenges for certain parts of the economy, one entrepreneur faced critical comments from acquaintances:

“At the beginning, even my friends used to tease me by saying, ‘Why are you working on shemena?’ Because shemena is looked down upon in this country, they look down on me too.” (Case #5 – Thread whirling, spinning machine and weaving machine)

Eight cases had the benefit of international exposure to entrepreneurs in other countries, and some, because of this experience, were critical of a mindset within Ethiopian society that did not celebrate indigenous entrepreneurial culture:

“From what we saw when we traveled to other places like Europe, the only difference is, innovators elsewhere are really celebrated. Not only are they celebrated, they are also assisted.” (Case #4 – Media education)

We also detected diversity and inclusivity issues related to gender in the female respondents:

“Moreover, I faced challenges for being a female entrepreneur. Sometimes being a businesswoman is really difficult, especially in a position like mine, you face a lot of challenges. There are some people who try to harass you even while you hold a higher position than them.” (Case #10 – Seed ball manufacturing)

4.2.3 Strategic shaping

Internal shaping. All entrepreneurs described how they encountered these obstacles. Human and financial capital obstacles were often not addressed by securing skills (human capital) and funding (financial capital), but instead by shifting the focus of what was actually being produced in order to live within existing contextual constraints. We detected this in 11 cases. As one entrepreneur recounted:

“When it came to making the fabric bag, the issue of trained manpower was again a necessity. We’ll also have to set up the right sewing machines and that requires a lot of capital. So when we kept thinking what else we can use for making a shopping bag, the idea of thread bags came to us.” (Case #14 – Environmentally-friendly shopping bags)

Internal shaping was also at play during the COVID-19 pandemic. This required financial assets to be reallocated to pursue new opportunities arising as a consequence of lockdown restrictions:

“But that budget ended up being given to COVID projects...we realized the times are conducive for Corona-related ventures and started thinking of a time-relevant business for people who won’t leave the house.” (Case #8 – Solar tractor, innovation tutorial for children and e-commerce)

External shaping. A different set of strategic shaping decisions linked to external forces within the market were detected in five cases. Feedback from customers on the launched offering was one such force:

“After the product was available in the market, I started taking feedback from customers and continued improving upon it.” (Case #1 – Injera stove)

Another external source was the market situation in neighboring countries where some cases spotted export potential:

“Of course we will have to assess the environmental situation and export our products to nations that have a similar environmental condition as ours. You see, when the technology was developed here, it was done in a way that goes hand in hand with the situation in our country. And we assess how it can be sustainable when it is exported.” (Case #15 – Automatic spray pump for fertilizers)

The theme of external shaping extends to the ongoing learning about new market opportunities, and becoming involved in new networks to achieve that learning after the business had become established:

“Over 20 of us women won an international initiative called Impact as African women business leaders. You see, even today I am still learning....Impact helps me understand how I can break into the global market as a woman leader and as an African black woman.” (Case #4 – Media education)

Vision to grow. The final theme linked to strategic shaping relates to developing a view of how to scale the enterprise. This was detected in three cases and relied heavily on assets external to the business but nevertheless part of its extended organizational context:

“Our employees will be posted in every village. There will be one woman as a representative and one big tanker will be bought for her. She can then make all the sales needed and make profit for herself as well. This way, the cars can go and pour the water in every village. Thus, we are thinking of setting up a system like this.” (Case #13 – Solar powered water pumps)

Growth also involved shifting dependencies on actors who had been instrumental in the start-up phase. Entrepreneurs acknowledged the ‘internalization’ of capabilities from this broader organizational context in order to achieve this:

“[There was an] NGO established around this line of work and that is where we got most of the assistance we needed. Now we are getting used to the system and the way things work and we want to stop getting help and manage everything by ourselves. While working for a year with external assistance, we got to learn a lot and so now we say, ‘If we do this and this, we’ll be able to solve this and this problem’. Our aim is to stop getting any kind of external assistance and start handling things by ourselves.” (Case #13 – Solar powered water pumps)

4.3 Outcomes and national citizenship reinforcement

4.3.1 Product acceptance

Despite these formidable obstacles, seven cases reported that their core offering had achieved at least moderate acceptance in its target market. In three instances it was noted how success came as a surprise, possibly indicating a latent pessimism over outcomes brought about by the obstacles:

“The users are found in different locations but I am quite amazed how it reached to rural areas...the countryside. We didn’t do a lot of promotion for the countryside, we did most of it in Addis Ababa.” (Case #6 – Mobile application and call center to link job seekers and employees)

Others pointed to influential actors in the market context – including NGOs - that provided an outlet for early sales:

“We also work in collaboration with [NGO]. They have given us a bulk order and we have already delivered that.” (Case #10 – Seed ball manufacturing)

4.3.2 National citizenship reinforcement

Mixed emotional outcome (Sense of satisfaction/ despair). Non-financial outcomes were mentioned more frequently and in greater detail than financial ones. Nearly all (13) entrepreneurs were keen to share insight into their emotional state as a consequence of their entrepreneurial efforts. This included many comments relating to having a sense of satisfaction in helping to solve a critical problem for Ethiopia:

“Our main motivation right now is the satisfaction we get by seeing our happy customers. If a person could give you so much gratitude for drinking a mere glass of water, you are quite blessed!” (Case #13 – Solar powered water pumps)

On the counter side, four respondents talked about the ongoing desperation, particularly with the general business culture in Ethiopia and a sense of unfair treatment:

“I was just lost. I didn’t at all understand the game he was playing. When I graduated, I was working on construction and I left that world because I was so disgusted with the games played in the business world. So if I am also

getting similar treatment here, I will not be continuing with it!” (Case #14
– Environmentally-friendly shopping bags)

Becoming a role model and committed influencer. Another conspicuous non-financial outcome was the individual entrepreneur’s changing role within the entrepreneurial community in Ethiopia. These changing roles were detected in five cases and took different forms. In four cases, respondents reported becoming more influential in terms of shaping formal government policy:

“Now we work in collaboration with the Health Ministry, the Ministry of Women and the Education Ministry. We signed MOUs with them and work in unison to bring about systemic change.” (Case #4 – Media education)

In four cases, entrepreneurs demonstrated a sensitivity to stakeholder groups with an interest in entrepreneurial innovation, but not necessarily in the market for the specific product or service offered. This included reaching out to students and offering educational services in Amharic:

“We gave tutorials for students who want to work on innovation. We give detailed explanations in Amharic, like an educational service. Thus, we used to do this on the side. Even before we designed the tractor and got into e-commerce we were offering tutorials.” (Case #8 – Solar tractor, innovation tutorial for children and e-commerce)

Others also talked of evolving into a role model and visibly demonstrating to others the viability and benefit of entrepreneurial innovation in Ethiopia:

“We started this business to show everyone that it is possible to do the work if you put your mind to it and that innovation isn’t actually out of reach.” (Case #8 – Solar tractor, innovation tutorial for children and e-commerce)

Comments also showed that the initial cognition of the entrepreneur in terms of specific concerns for an Ethiopian challenge was still present at the outcome phase, but now accompanied by a tenacity to persist until a wider challenge was solved:

“It shouldn’t just be about supporting me personally. The focus should be on implementing the technology and benefiting the whole nation. Just because they gave an individual like me a piece of land and some money, it doesn’t mean we’ve reached the final goal. The point is, did what they give

manage to help the whole nation?” (Case #5 – Thread whirling, spinning machine and weaving machine)

Feedback loop to new idea formulation. Four entrepreneurs spoke of further technological diversification of the enterprise; starting to explore ideas while still attempting to exploit an existing offering. This diversification is seen as more than just internal shaping post-entry, but as a basis for exploration into new opportunity domains, solving different problems in different markets and for different end-users:

“When a new product comes to the market, it might take it up to 3 years to fully join the scenery. So when new ideas came about like the turmeric polishing machine, we got to explore other options. First, our company was only focused on producing a coffee drying machine but now, something new is also added which is the turmeric polisher machine.” (Case #2 – Coffee drying machine)

Table 4 shows our interpretation of the influence of the four main contexts described by Autio et al. (2014) by case. Using a 5-point scale, we coded higher values where the context was conspicuously influential in the narrative. The totals show organizational context to be the least influential. This is not surprising, as most in our sample acted outside an organizational setting. Institutional and industry / technology contexts occupy a moderate position. This is also not surprising given the higher level of criticisms directed at formal institutions compared to praise for them. Also many of the cases occupy a low- and medium-tech position, and only two of them are interpreted as purely indigenous inventions that sought IP protection. The strongest contextual influences are the social context and a newly identified one we describe as a national citizenship context (discussed below). The social context is very conspicuous in all cases and counter-balances the lack of formal organizational and institutional support. We identify the national citizenship context as distinct from the other contexts and capturing both the

cognition to address challenges facing Ethiopian society as an entrepreneurial opportunity, as well as the new roles that emerge for entrepreneurs in Ethiopia as a consequence of their participation in entrepreneurial innovation. Appendix B provides a detailed qualitative summary of all cases, the main contexts of influence for each one, and how the process of entrepreneurial innovation unfolded through the three phases.

Insert Table 4 here

5. Discussion

5.1 Contributions of the current study

Our point of departure was the observation that the contextual view of entrepreneurial innovation largely ignores the world's economically poorest countries, where, in fact, we find the highest rates of entrepreneurship (Autio et al., 2014; Clarysse et al., 2014; Liu and Stuart, 2014; Nelson, 2014), although not necessarily of the 'billionaire entrepreneur' kind (Henrekson and Sanandaji, 2014). There has been an increasing amount of research on entrepreneurship and innovation in economically poor countries, some of which has a sectoral bias, such as agriculture (Triomphe et al., 2013), tourism (Carlisle et al., 2013) or mobile money (Lashitew et al., 2019), but which has not taken an explicit contextual view. Indeed, there have been calls to more explicitly take context and local conditions into account (Schot and Steinmueller, 2018) as well as to identify new dimensions of context in which entrepreneurial innovation is moderated (Acs et al., 2014; Rao-Nicholson et al., 2017; Welter et al., 2016). National-level analyses (Allard and Williams, 2020) do not capture the rich detail of entrepreneurial endeavors at project level. Our study addresses

this and adds to the literature on the links between context and entrepreneurial innovation in one of the world's poorest countries with one of the least developed innovation systems.

Perhaps not surprisingly, we find all of the main contexts (organizational, institutional / policy, social, industry / technology) before, during and at the outcome stage of entrepreneurial innovation, regulating efforts at different stages of the entrepreneurial process (Acs et al., 2014). However, in addition to these we detect a strong sense of passion for people and country (rather than passion for profit) alongside commitment to the nation (rather than commitment to the self) in our sample. This is conspicuous in the initial cognitions and concerns at the outset, as well as in the new roles that emerge amongst the entrepreneurial community as a consequence of their experiences as entrepreneurs (i.e., 'national citizenship reinforcement'). We see a different type of context emerging that does not fit squarely into the organizational, institutional, social, or industry categories, addressing the call in Welter et al. (2016) for identifying new dimensions of context. This national citizenship context is not an organizational form per se, nor is it a formal or informal institution or policy outcome. It is not a social context either, because it is not possible for all entrepreneurs to know and relate to each other, and it certainly is not based on one industry or technology. It also does not fit neatly into any of the domains in the entrepreneurial ecosystem perspective (Iseberg, 2011). It may be rooted in nationalism in Ethiopia that has grown out of memories of past glory, independence and victory over a former colonial power, and which has served to transcend political, social, economic and cultural challenges (Gebrewold, 2009). Educated urban elites consider the fact that Ethiopia was never colonized as the core of its national identity (Gebrewold, 2009). What is notable is that the national citizenship context identified in the present study is reinforced through the process of entrepreneurial innovation. It interacts with - and influences - other

contexts, such as the institutional context, providing the basis for continued new idea formation and opportunity identification.

Our study also contributes to the debate on inventiveness in developing countries. Findings support the argument that indigenous innovation in less developed countries should be seen as co-evolution of invention in the Global North with adaptation and resourcefulness in the Global South (Egbetokun et al., 2016; Fagerberg et al., 2010; Fu et al., 2011). To some degree this counters the argument made by Schot and Steinmueller (2018) that the 3rd Framing for STI sees the developing world experimenting and learning without following the Global North. However, it does support their point regarding the need for “mutual learning”. The vast majority of our cases utilized inventions from more advanced countries to address concerns in Ethiopia (Table 2 and Appendix B). However, we did find two cases out of the 15 where invention was done on a purely indigenous basis. This suggests that thinking about the function of entrepreneurial innovation in less developed countries in an adaptive or complementarity sense should not *exclusively* assume an importation of technology from outside.

The analysis has implications for the process view of innovation, an approach borne out of many studies using case studies and field observations (Garud et al., 2014; Shane, 2000) as well as normative models that have evolved over time (Barbieri and Álvares, 2016; Berkhout et al., 2004; Rothwell, 1994). The evidence strongly supports the notion of societal needs influencing all stages of the process, as well as the process being highly non-linear (in one case the initial problem observation was made 25 years before the effort began to address it). The cognition of the entrepreneur towards challenges facing the country – which are personally, not vicariously, experienced – is also apparent, as both a trigger and an incentive to persist in the face of formidable obstacles. Strategic choice effects, including utilizing various forms of capital and making the strategic shifts that are

inevitable with any entrepreneurial venture, are not dissimilar to those one would expect in process models in developed countries. However, the incentive to persist should be seen in a different light, as should the outcomes that, as noted above, relate not only to product success and adoption, but also to a sense of satisfaction at helping the country advance. As noted by one respondent:

“These challenges don’t discourage us...instead we wish to see how we can turn them into opportunities for change...the challenges and opportunities are actually similar. The challenges are what we turn into opportunities.”
(Case #4 – Media education)

In this sense our findings resonate with Shane’s (2000) seminal work on how important it is for the entrepreneur to have prior experience in order to identify a new opportunity for a given technology. In many of our cases, the entrepreneurs had no prior entrepreneurial experience. However, what prior experience they did have (such as university study) did allow them to identify new opportunities by adopting or adapting existing technologies (e.g., hydroponic systems, seed balls, solar panels, and software platforms). Moreover, personal exposure to the critical challenges facing the country provided a bedrock of knowledge of the problem domain that was deeply entrenched in the memories of the entrepreneurs since their early childhoods. This is somewhat different from the cases described in Shane (2000). While our cases do highlight the importance of prior knowledge to opportunity identification for a given technology, they also show how this is embedded in the psyche of the entrepreneur and their motivation for the public good.

5.2 How the Ethiopian environment molds entrepreneurial innovation

Our analysis shows that the process of entrepreneurial innovation in Ethiopia is molded by the national environment (Appendix B). Firstly, national citizenship appears deeply rooted

in national identity and concern for the welfare of fellow citizens specific to the country, as discussed above. Ethiopia's collectivism (Hofstede) emphasizes collective achievement over self-fulfillment, a strong care and concern for others. Researchers note a prominent relationship between collectivism and entrepreneurship in countries with low-medium levels of economic development (Pinillos and Reyes, 2011). This appears to be a molding factor in the current study. Secondly, a young population is noted as a factor behind innovation in Africa at large (Adesida et al., 2021), and this is also conspicuous in our sample. However, indigenous knowledge – increasing with age - combined with a cognitive sharpening and problem-solving knowledge brought about through university study and project work with a societal purpose appear to be equally as important. Thirdly, national competitions appear as a molding force in the majority of our cases, drawing attention to how the institutional (e.g., government) and organizational (e.g., incubator) contexts influence selection effects. Where the Ethiopian environment plays less of a role is in the technological context. The majority of our cases do not constitute innovative entrepreneurship in the Schumpeterian sense of creating new technology, but instead import technological components from foreign sources to use as part of an innovative project within Ethiopia.

5.3 Policy implications

A number of policy implications arise from the present study. The obvious ones include the need to facilitate land access for new businesses, streamline bureaucracy, and provide low-cost or government-subsidized finance to aspiring innovators. Experts have extensively commented on these (e.g., Ejiogu et al., 2019), and our respondents consistently pointed them out as obstacles.

However, some less obvious policy themes emerge from the national citizenship context. Innovative entrepreneurs care about the challenges facing the nation and aspire to become role models and influencers over time. How could a government actively incentivize, encourage and support an entrepreneur's desire to innovate and gain influence for the nation? What policies could harness the national pride, awakened patriotic feelings, and concern for the country that emerge strongly from our analysis? One way this could be done is by establishing panels of innovators, either formal or informal, aligned with specific areas of national concern or with the UN SDGs. Being one of the few innovators selected for a formal panel would be highly motivating for young, patriotic entrepreneurs. Larger informal panels connected through mobile technology would provide a fast, inexpensive way to draw on the ideas of broader groups of innovators to refine national policy. Panels linking successful innovators would provide government departments with practical input on specific obstacles faced by themselves and their colleagues, and enable innovators themselves to vote on solutions. One World Bank report (IDA: Driving Innovation in Africa, 2012) details how a participatory budgeting exercise in Eastern DRC, where citizens voted on their spending priorities via mobile phones and received follow-up information on how the funds were being disbursed, built trust in government and enhanced tax collection, while empowering citizens in a region plagued by conflict. Ethiopia might pioneer such an approach to harness the passion of its innovators for addressing national problems, to gain support, and to better align its policy with the needs of its entrepreneurial community.

Such panels would help Ethiopia to transition from simply defining goals and promises, such as those set out in the government's 2020 proclamation (the 'Start-up Businesses Proclamation'), to practical implementation, as recommended by Haug et al. (2021). They could also be used to address societal obstacles that we see in our data, such

as attitudes toward diversity and inclusion, which go beyond the obstacles of formal institutions. A panel could help guide the government on how to overcome the issues that certain groups (being young, female or even Ethiopian) face pursuing entrepreneurial innovation. They would also provide the networking that some innovators in our study were seeking.

Our study uncovers stark differences between the contents of the government's 2020 'Start-up Businesses Proclamation' on the one hand and the narratives emerging from the interviews on the other. The proclamation emphasizes funding and stimulating high-tech development in the tradition of innovative entrepreneurship (Block et al., 2017; Low and Isserman, 2015; Malerba and McKelvey, 2020), while the narratives stress mission and a quest for solving the (sometimes low-tech) challenges faced by Ethiopia, mostly with technology brought in from abroad and integrated into the local context (Egbetokun et al., 2016; Fagerberg et al., 2010; Fu et al., 2011). While these differences reflect a chasm between government policy and real-world entrepreneurship in developing countries, our view is that these differences can be reconciled. We do see examples of entrepreneurship in the sample that align with the proclamation: high-tech, inventive and funding for new tech development and job creation. However, we also see low-tech, entrepreneurial mindsets and resourcefulness in projects that address basic societal needs. Both should be encouraged in an orchestrated, encompassing and cohesive policy for entrepreneurial innovation in Ethiopia. The panels approach could be used to structure different types of entrepreneurial activity in a way that increases visibility and acceptance for all.

The national citizenship context can be instrumental in shaping the implementation of policy in both low-tech and high-tech initiatives by panels working alongside the National Start-up Council. While we do see some opportunities for the entrepreneurs in our sample to help shape policy, this was not extensive nor harnessed in any systematic way

by the government. Entrepreneurs might help monitor the implementation of policy and become involved in transparency and budgetary control. Both high-tech and low-tech domains will inevitably benefit from each other through joint learning, and bodies such as the National Start-up Council could be used to bridge both domains. In this way, the National Start-up Council can operate at the interface between the formal institutional context and what we see as an entrepreneurial context based on national citizenship for ensuring effective implementation.

Yet another policy step is to enhance the university-industry collaboration that is often a key to a successful national system of innovation (Williams and Allard, 2018). In one of its policy notes, the International Finance Corporation recommended promoting domestic innovation with deeper university-industry collaboration in Africa, possibly by appointing leaders from private industry to university boards (EMCompass, 2016). Our study shows that university experience was very relevant to most of the entrepreneurs in our sample. Formal or informal roles in the university community for successful entrepreneurs and influencers would give them the recognition they aspire to, while drawing on their practical experience to strengthen the education of future Ethiopian innovators.

5.4 Limitations and future work

This study has some shortcomings, while it opens up new directions for research. Firstly, like all small-sample qualitative analyses in one country, care must be taken when generalizing to larger populations and other countries, even African states (Fini et al., 2018). We did not compare the process of entrepreneurial innovation in different national settings, although we did have heterogeneity in terms of low- and high-tech ventures, male

and female entrepreneurs, and product and service-oriented offerings. Future work could test or extend our model to other developing countries, examining the nature of the national citizenship context in greater detail - or with larger sample sizes - and how it influences and interacts with other contexts for innovative activity where there are severe resource and institutional constraints. Secondly, we did not capture perspectives from other actors in the innovation ecosystem, including users, universities, NGOs, government departments, and foreign actors in some instances. Future work could extend the analysis to include the ecosystem strategy perspective, and consider narratives from various domains including market, policy and finance actors (Isenberg, 2011). Work can also explore the extent to which entrepreneurs in developing countries – as opposed to governments - contribute to keeping their local entrepreneurial ecosystem healthy (Stam, 2015). Thirdly, many other parts of the innovation literature could have been used to frame entrepreneurial innovation in Ethiopia, including responsible innovation and innovation in larger organizations, such as foreign subsidiaries of MNEs operating in Ethiopia. These were not considered in the current analysis due to scope but could be included in future work. We hope such efforts can deepen our knowledge of the processes of entrepreneurial innovation in markedly differing settings, where different types of contexts than those highlighted in prior research play a prominent role.

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TABLES

Table 1. Cases and links to United Nations Sustainable Development Goals

| Case # | Offering | 1 – no poverty | 2 – zero hunger | 3 – good health and well-being for people | 4 – quality education | 5 – gender equality | 6 – clean water and sanitation | 7 – affordable and clean energy | 8 – decent work and economic growth | 9 – industry, innovation, and infrastructure | 10 – reducing inequalities | 11 – sustainable cities and communities | 12 – responsible consumption and production | 13 – climate action | 14 – life below water | 15 – life on land | 16 – peace, justice and strong institutions | 17 – partnerships for the goals |
|--------|--|----------------|-----------------|---|-----------------------|---------------------|--------------------------------|---------------------------------|-------------------------------------|--|----------------------------|---|---|---------------------|-----------------------|-------------------|---|---------------------------------|
| 1 | Injera stove | | X | | | | | X | | | | | X | | | | | |
| 2 | Coffee drying machine | | | | | | | | | | | | X | | | | | |
| 3 | Digital payment platform | | | | | | | | | X | | | | | | | | |
| 4 | Media education (TV) | | | | X | X | | | | | | | | | | | | |
| 5 | Thread whirling, spinning and weaving machines | | | X | | | | | X | X | | | | | | | | |
| 6 | Mobile job placement application | | | | | | | | X | | | | | | | | | |
| 7 | Financial advisory | | | | | | | | | X | | | | | | | | |
| 8 | Solar tractor + e-commerce + innovation tutorials for children | | | | X | | | | X | X | | | X | X | | | | |
| 9 | Hydroponic system manufacturing | | X | | | | | | | | | | X | | | | | |
| 10 | Seed ball manufacturing | | X | | | | | | | | | | X | X | | | | |
| 11 | Cash machine register software | | | | | | | | | X | | | | | | | | |
| 12 | Eco-landscaping services | | | X | | | | | | | X | X | | X | | | | |
| 13 | Solar-powered water pumps | | | X | | | X | X | | | | X | | | | | | |
| 14 | Environmentally-friendly shopping bags + training for women | X | | | | X | | | X | | X | X | X | | | | | |
| 15 | Automatic spray pump for pesticides | | | | | | | | X | | | | X | | | | | |

Table 2. Case value propositions and nature of the innovation

| Case # | Offering | Value proposition and goal | Incremental (1) – Radical (5) | Source of technology | Change in way people relate to technology: low (1) – high (5) |
|--------|--|--|-------------------------------|----------------------|---|
| 1 | Injera stove | Increased electricity efficiency for stoves | 4 | Ethiopia | 4 |
| 2 | Coffee drying machine | Husk used as source of heat to dry beans, making drying process more efficient | 3 | Abroad | 4 |
| 3 | Digital payment platform | Fast, secure, convenient payment platform suitable for use in local context | 3 | Abroad | 3 |
| 4 | Media education (TV) | Mass online teaching filling a gap not covered by government. | 4 | Abroad | 4 |
| 5 | Thread whirling, spinning and weaving machines | Saves time and energy in the weaving process | 3 | Abroad | 3 |
| 6 | Mobile job placement application | User friendly and has offline capability for when internet is down; business also includes a call centre | 3 | Abroad | 5 |
| 7 | Financial advisory | Specialist support for official development assistance and FDI | 1 | n/a | n/a |
| 8 | Solar tractor + e-commerce + innovation tutorials for children | Tractor using solar energy reduces energy consumption and costs | 4 | Abroad | 4 |
| 9 | Hydroponic system manufacturing | Building systems for growing plants without soil | 4 | Abroad | 5 |
| 10 | Seed ball manufacturing | Lightweight seed balls easy to make and sew, no chemicals, grows at a rate of 80%. | 4 | Abroad | 5 |
| 11 | Cash machine register software | Developing new software for a new generation of cash machines being introduced in Ethiopia | 2 | Abroad | 4 |
| 12 | Eco-landscaping services | Formal approach to internal and external landscaping and design that encourage people's interaction with the environment | 2 | Abroad | n/a |
| 13 | Solar-powered water pumps | Using solar pumps to bring broken boreholes back into use for clean water in Dilla | 3 | Abroad | 4 |
| 14 | Environmentally-friendly shopping bags + training for women | Solving problem of plastic bags accumulating in waste rubbish piles by manufacturing eco-friendly locally-made threaded bags + providing job opportunities for women | 2 | Ethiopia | n/a |
| 15 | Automatic spray pump for pesticides | Productivity and efficiency in spraying crops also with manual operating mode | 2 | Abroad | 4 |

Table 3. Emerging data structure

| 1st Order Concepts | 2nd Order Themes | Aggregate Dimensions |
|---|---|--------------------------------------|
| <ul style="list-style-type: none"> Concern for and desire to solve environmental, societal and developmental challenges for Ethiopia Entrepreneurial orientation, passion and mindset Prior business or related domain experience and capabilities Inexperience in running a business | Initial cognition and mindset of the entrepreneur | Idea origins in Ethiopian challenges |
| <ul style="list-style-type: none"> Identifying solution to problem while at Uni or Uni internship in Ethiopia Identifying solution to problem while at home in Ethiopia Identifying solution to problem through overseas experience or foreign entity Conducting research around the problem or issue, incl. feasibility and due diligence Experience gained through prior failure Knowledge of where others have failed / learning from others' failure in Ethiopia Reading and internet browsing | Idea formulation and development | |
| <ul style="list-style-type: none"> Developing idea and offering at home Initial development at Uni Incubation Centre | Place and context for development | Preparing for launch |
| <ul style="list-style-type: none"> Prototyping, testing and learning from early attempts Awareness of unique features and differentiated position of offering for Ethiopian market Understanding, segmenting and targeting the market | Bringing initial idea to market | |
| <ul style="list-style-type: none"> Funding openness and fit Ongoing funding and financing challenges Funding through own personal savings and personal funds from other sources and jobs Funding received or facilitated through an Ethiopian incubator Funding received from friends and family Funding received from international sources Entering into and winning national competitions and associated benefits | Diverse sources of financial capital | Harnessing capitals |
| <ul style="list-style-type: none"> Building human capital, skills and know-how in the entrepreneur and business | Building human capital | |
| <ul style="list-style-type: none"> Having good teamwork and supportive culture in the business Developing external social networks within Ethiopia to explore, develop and promote the innovation Nurturing international networks to develop and promote the innovation | Building social capital | |
| <ul style="list-style-type: none"> Non-financial influence (incl. advisory, support and training) from an incubator Receiving support or encouragement from government or state institutions Market created by NGO | Utilizing institutional capital | |
| <ul style="list-style-type: none"> General lack of support | Obstacles - formal | Facing obstacles |

| 1st Order Concepts | 2nd Order Themes | Aggregate Dimensions |
|--|---------------------------------|------------------------------------|
| <ul style="list-style-type: none"> • Problems accessing land and office space to develop business • Needing support from government that was not forthcoming • Institutional barriers to progressing innovation • Problems of access to raw materials • Dealing with corruption • Low initial demand for offering and sales challenges • Challenges faced to get license | | |
| <ul style="list-style-type: none"> • Problems facing younger innovators in Ethiopia • Problems arising due to age and young identity • Problems and issues of identity and recognition including gender and being local | Societal attitudes | |
| <ul style="list-style-type: none"> • Challenges faced due to Covid-19 | Obstacles – Covid-19 | |
| <ul style="list-style-type: none"> • Gaining knowledge from sources outside of Ethiopia including using internet • Direct engagement with and travel to user community / problem domain • Use of the internet for delivery, marketing and sales • Orientation and awareness to export markets (within Africa) • Preference for local sourcing in Ethiopia | External shaping | Strategic shaping |
| <ul style="list-style-type: none"> • Continuous improvement of the core offering • Perseverance, tenacity and resilience in the face of setbacks and adversity • Developing a way of working / organizing to support the business model • Careful cash control • Shifting focus, switching offering and changing the business model • Responding to Covid-19 • Focus on growth and learning over financial profit | Internal shaping | |
| <ul style="list-style-type: none"> • Preparing for / dealing with challenges of scaling up | Vision to grow | |
| <ul style="list-style-type: none"> • Assuming position of role model, thought leader and influencer • Developing opinions on how government can change or implement new policy | Becoming a committed influencer | National citizenship reinforcement |
| <ul style="list-style-type: none"> • Sense of satisfaction in addressing societal need • Feelings of despair in not addressing need as intended | Mixed emotional outcome | |
| <ul style="list-style-type: none"> • Product success even when least expected | Product success | Product acceptance |

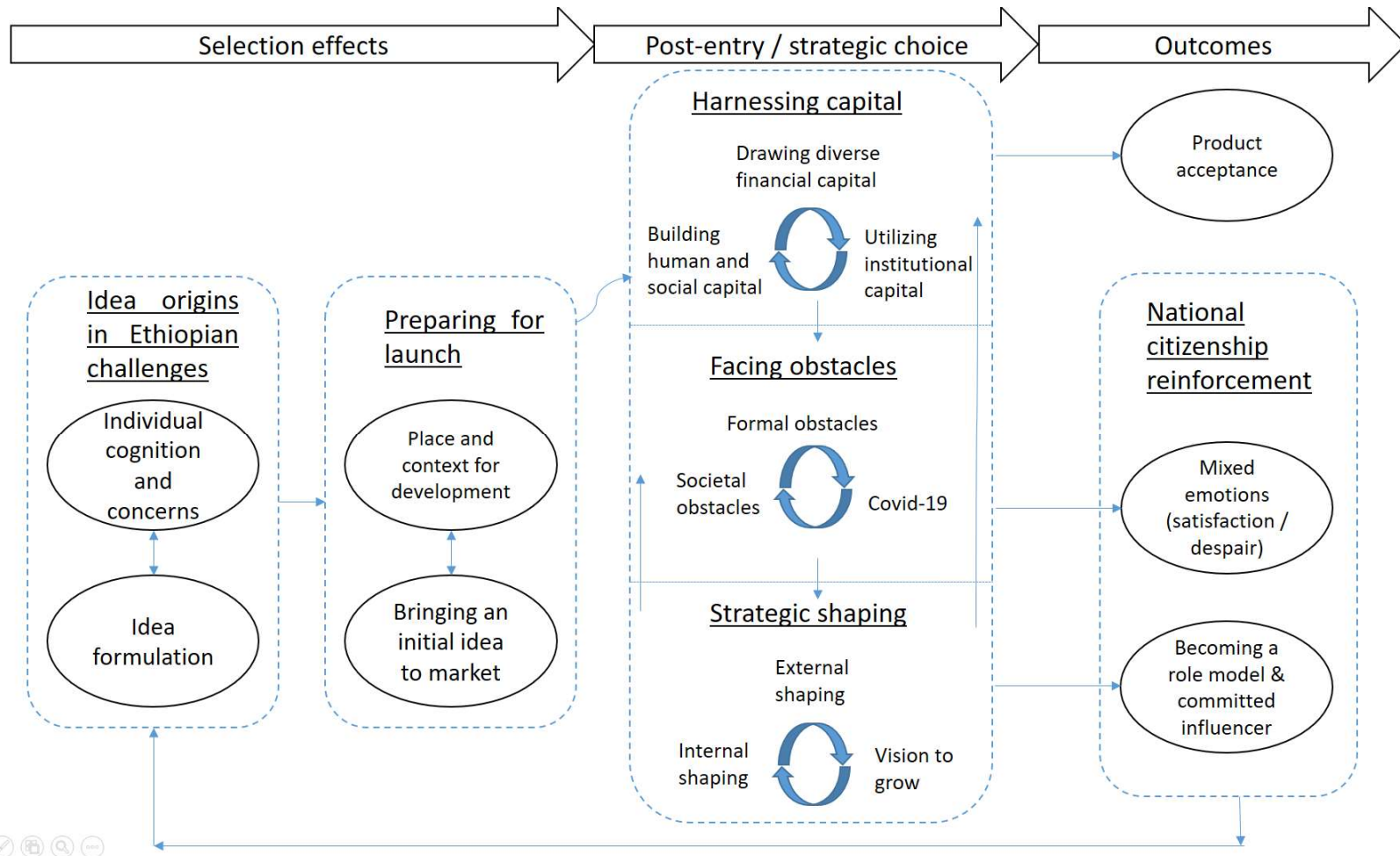
Table 4. Influence of context by case

| Case # | Offering | Organizational context | Institutional / policy context | Social context | Industry / technology context | National citizenship context |
|--------|--|------------------------|--------------------------------|----------------|-------------------------------|------------------------------|
| 1 | Injera stove | 1 | 3 | 5 | 4 | 5 |
| 2 | Coffee drying machine | 3 | 3 | 4 | 4 | 3 |
| 3 | Digital payment platform | 2 | 3 | 3 | 5 | 5 |
| 4 | Media education (TV) | 3 | 5 | 5 | 2 | 4 |
| 5 | Thread whirling, spinning and weaving machines | 3 | 4 | 5 | 3 | 5 |
| 6 | Mobile job placement application | 1 | 4 | 4 | 4 | 3 |
| 7 | Financial advisory | 2 | 4 | 4 | 1 | 4 |
| 8 | Solar tractor + e-commerce + innovation tutorials for children | 3 | 2 | 3 | 4 | 4 |
| 9 | Hydroponic system manufacturing | 3 | 3 | 5 | 5 | 4 |
| 10 | Seed ball manufacturing | 2 | 3 | 5 | 4 | 5 |
| 11 | Cash machine register software | 2 | 2 | 5 | 4 | 1 |
| 12 | Eco-landscaping services | 3 | 3 | 5 | 1 | 3 |
| 13 | Solar-powered water pumps | 2 | 3 | 3 | 5 | 4 |
| 14 | Environmentally-friendly shopping bags + training for women | 2 | 3 | 5 | 2 | 5 |
| 15 | Automatic spray pump for pesticides | 3 | 3 | 5 | 2 | 5 |
| | TOTAL | 35 | 48 | 66 | 50 | 60 |

Notes: 5 – context exerted high influence in all phases; 3 – context exerted moderate influence in some phases (indicated); 1 – context exerted little influence in any phase; National citizenship context involves concerns for societal and development challenges in Ethiopia + national citizenship reinforcement (changing roles of the entrepreneur, including becoming a role model and influencer) as an outcome

FIGURES

Figure 1. Emerging model



APPENDIX A – Interview protocol

| Main question / segment | Themes to probe during the segment |
|--|---|
| <p>OPEN</p> | <p>Purpose of study Confidentiality and informed consent Permission to record</p> |
| <p>BACKGROUND</p> <p>Can you tell us about your background and the background to your business / enterprise?</p> <p>Can you provide some examples of innovations pursued by your company / enterprise e.g., product / service / process / administrative</p> | <p>Individual level data (with agreement): Education / age / gender, origin, ethnicity</p> <p>Company: age, size, industry, performance, ownership, examples of innovations</p> |
| <p>FOCUS</p> <p>Can you identify one specific example of an innovation project that you have pursued?</p> | <p>Source of the idea In what ways was it innovative?</p> |
| <p>PROCESS</p> <p>Can you describe in your own words and in as much detail as possible what actually happened during the innovation project?</p> | <p>Key events over time Factors that helped / hindered the progress of the project Did these factors apply in different ways at different times during the project? What is the current status?</p> |
| <p>OUTCOME</p> <p>What kind of outcomes occurred? Why do you think those outcomes occurred?</p> | <p>Financial vs non-financial outcomes</p> |
| <p>ANY OTHER FEATURES</p> <p>Is there anything else you would like to share?</p> | |
| <p>CLOSE</p> | <p>Express gratitude Copy of transcript will be made available Next steps (feedback report, focus group)</p> |

APPENDIX B – How the Ethiopian environment molds entrepreneurship for the 15 cases

| Case # | Offering Problem to be solved | Contexts with high influence, i.e., score >3 in Table 4 | Selection effects | Post-entry / strategic choice | Outcomes |
|--------|---|---|---|--|---|
| 1 | Injera stove A need for a more energy-efficient stove to produce Ethiopia's staple food, injera. | Social, industry / technology, national citizenship | Studied the raw materials needed to make the stove; detailed research and visits to rural areas. Produced the clay and built the stove according to own designs. | Stove first produced and tested at home. Won national competition but difficult to get support from government for innovation. | Satisfaction from doing something for Ethiopia rather than 'making money fast'. Awareness of environmental impact and helping to solve one of the nation's problems. |
| 2 | Coffee drying machine A more energy-efficient approach to drying green coffee, one of Ethiopia's key export products, by burning husks as fuel. | Social, industry / technology | Entrepreneurs were mechanical engineers. Defined the problem by interviewing users and did internet research to find other methods of drying coffee beans. | Original drying machine was altered to increase capacity. Later, switched to a machine for polishing turmeric, which used similar technology but had a higher market demand. Challenges: breaking into the market, finding space and land, obtaining raw materials. | Sense of satisfaction with the innovation journey; awareness of support needed for young innovators |
| 3 | Digital payment platform A fast, efficient payment platform adapted to the Ethiopian market (limited internet access). | Industry / technology, national citizenship | Piloted payment infrastructure in own networks; built on pre-existing and open technology. Ideas and solutions imported from outside Ethiopia. | Developed solution that was still usable when internet failed. Invested own savings. Challenges: finding suitable manpower, getting a license; resistance due to youth and inexperience. Lack of support from/confrontation with government. | Awareness of contribution to digital economy. Built a community of developers; passion for the technology |
| 4 | Media education (TV) A need to make childhood education more accessible even in rural areas. | Institutional / policy, social, national citizenship | Explored the idea of media / TV to address poor primary education system. Researched how other countries reached this target group. | Used social networks to identify target groups and designed content to address issues of importance to this group. Traveled throughout Ethiopia to gain feedback about the product. Covid made the needs of target group more urgent. Used platform as part of ecosystem for delivery of content. Used own house and finance in early stages. Challenges: lack of government support even though need for product was recognized. Overcoming perceptions of government and wider society | Won international awards and recognition. Greater level of inspiration through seeing impact and a clear sense of purpose. Continual questioning of how to help society. Learned how to expand internationally as a leader. |
| 5 | Thread whirling, spinning and weaving machines Modernizing thread whirling, spinning and weaving which was | Institutional / policy, social, national citizenship | Wanted to solve societal issue of hard labor and low productivity; developed initial project while at university. Won national competition and award, plus a government loan and space for workshop provision helped get started. | Initial failure due to limited business knowledge and lack of government support. Evolving business model (first output, then machines). Challenges: obtaining sufficient volume of resources; ongoing problems with finance and corruption; image issues because innovation was in a low-tech, traditional industry. | Helping to solve issue of child labour. Not profitable due to thread shortage. Greater awareness of export opportunity and benefit to nation. |

| Case # | Offering Problem to be solved | Contexts with high influence, i.e., score >3 in Table 4 | Selection effects | Post-entry / strategic choice | Outcomes |
|--------|--|---|---|---|--|
| | mainly done with centuries-old, labor-intensive technology. | | | | Detected some good support points within government. |
| 6 | Mobile job placement application High unemployment, difficulty in obtaining qualified workers and limited internet access led to a need for a mobile application to use for job search. | Institutional / policy, social, industry / technology | Overseas experience, own research provided groundwork for the idea. Understood the problem from both sides of the job market (job seekers and job takers). | Differentiated product from anything else available; addressing slow internet speeds and connection issues and providing simple user interface. Technology developed continually as feedback was received and solutions used in other countries were adapted. Challenges: reputation issue of being young (overcome with partnerships). Government departments lacking knowledge in application area. Lack of support from telecoms company provider / partner. | Unexpected success in rural areas. Persevering despite lack of financial returns. Awareness of new opportunities. |
| 7 | Financial advisory Providing foreign investors and aid providers with better information on needs and opportunities in Ethiopia to invest effectively. Need for infrastructure to encourage digitalized companies. | Institutional / policy, social, national citizenship | Interest in finance; previous experience in handling foreign investments and trade relations; awareness of scarcity of qualified professionals. | Created forum for dialogue among policy makers, investors and entrepreneurs. International network of syndicated investors provided funding, and established networks provided investment knowledge. Challenges: problems related to startup capital management and developing business strategy; shortage of good professionals in equity, debt financing and handling investment opportunities. Difficult to obtain capital for startup costs and working capital. Government plans to fund startups still not implemented. | Successes: creating job opportunities, helping foster incubators in Ethiopia and contributing to nation building. Project success in terms of closing new deal on factory. |
| 8 | Solar tractor, e-commerce and innovation tutorials for children The need for an affordable solar energy tractor that also acts as a way of educating children about innovation within Ethiopia. | Industry / technology, national citizenship | Researched problems of farmers and built a prototype of an affordable solar energy tractor, which won a competition. A sponsor in Jimma promised funding to start the business. | Own resources used for funding. Phone ordering system used due to unstable internet service and lack of client experience with internet. Moved into training due to lack of funding for original product; then stopped this activity due to Covid. Challenges: promised funding was diverted to Covid project. More features were added to the prototype but production had to stop due to lack of funds. No support from family and community; lack of education and social awareness promoting technological solutions. | Being a role model. Satisfaction from running innovation training. Parents of children attending tutorials expressed satisfaction. |
| 9 | Hydroponic system manufacturing Making it easier for farmers to produce with | Social, industry / technology, national citizenship | Entrepreneurs were inspired by a book on farming in Africa. They had prior business experience including family's restaurant business. | Focused on pilot project. Partnered with Norwegian Refugee Council (providing sustainable income for refugees) and pastors' association, who provided some labor, technology transfer, financial aid, buying shares and resources. Used interns to reduce labor cost. | Satisfaction from contributing to job opportunities for farmers. Satisfaction from having own project; enjoying |

| Case # | Offering Problem to be solved | Contexts with high influence, i.e., score >3 in Table 4 | Selection effects | Post-entry / strategic choice | Outcomes |
|--------|---|---|--|--|--|
| | scarce water, using hydroponic technology. | | Began experimenting at home. Entered competition on new startups focused on farming; won and started to develop business model. Supported by mentorship and training from incubation center, grant offering competitions. | Challenges: government bureaucracy to obtain space/land (decided to rent instead). | challenges. Pride at finding one's country as an equal to global players in a growing field. |
| 10 | Seed ball manufacturing Addressing farming problems with lightweight seed balls which are easy to sow with high success rate. | Social, industry / technology, national citizenship | Researched climate change solutions. Moral support from mother, friends and family. German partner provided idea and US embassy gave support. Applied for a USAID grant rather than looking for investors. Won a grant from a Jumpstart Accelerator program. | Used own and family funds. Experiments led to different technical solutions and ingredients for seed balls. NGO made bulk order which helped start production. Museum agreed to sell the product. Plan to export products to other African countries. Challenges: getting a business license due to new technology; prejudice against female entrepreneurs and new ideas; Covid. | Increasing influencing and lobbying for changing the way agriculture is done in Ethiopia. Focus on eradicating hunger and offsetting effects of climate change. Protecting Ethiopia. |
| 11 | Cash machine register software A new cash register system that would be endorsed and implemented by the government. | Social, industry / technology | Entrepreneurs had prior experience in family business and teaching. Grants for young innovators were offered to commemorate the Ethiopian Millennium 2000. Being financially secure was a top priority. The first idea of software development came with a government call for software work on a cash register system. | Used own money and income from other work to finance company; later obtained a bank loan. Established a computer training center with own computers; developed free websites to promote the business among potential clients. Wider use of mobile phones opened new opportunities. Collaborated with hardware company. Moved from POS to challenging system ERP, providing after-sale service. First-mover advantage / few competitors. Challenges: no prior experience in own business, no proper market study or business plan; prejudice against young entrepreneurs. People not aware of the need for use of software applications. Difficulties in selling. | Obtaining financial security with good results. Became well-known for cash register system. |
| 12 | Eco-landscaping services Promoting an approach to landscaping that encouraged people to interact with the environment. | Social | Idea occurred while studying for Master's degree. Joined national competition and spent three years bringing the vision to fruition. Conducted experiment on family home. Anticipated benefits for self and for boosting the economic prospects of Ethiopians, which gave a sense of mission. Awareness of differentiated product. Awareness of untapped | Borrowed money and received loan payments from another business, but went bankrupt. Received training from incubator and some financial support, but less than promised. Continued to fund through other projects. Relied on word of mouth for marketing. Improvised, produced new technology for irrigation. Challenges: little support from banks. | Feeling of satisfaction with entrepreneurial project. |

| Case # | Offering Problem to be solved | Contexts with high influence, i.e., score >3 in Table 4 | Selection effects | Post-entry / strategic choice | Outcomes |
|--------|--|---|--|--|---|
| | | | market, some experience exporting to East Africa. | | |
| 13 | Solar-powered water pumps Using solar power technology to bring broken water pumps back into production, and supply clean water to a city with dire problems of water access. | Industry / technology, national citizenship | Entrepreneur conducted internet research on water solutions and met with US NGO and water scientists to find the best solution for his city. NGO provided grants for all startup costs. Prior business ownership and experience. | Started with idea for clay water filters for homes. Changed when government offered him wells with broken pumps for a water business. Repaired existing pumps with solar technology, which needs little repair and solves problem of irregular electricity. Differentiated product with sanitized jerry cans provided at well site. Scaling up from initial pilot; ready to begin water delivery to areas farther from pumps. Early approval and support from government and NGO key to success. Emphasized learning over short-term profit. Hoping to transition from NGO assistance to self-sufficiency. | Sense of satisfaction from providing service and being able to help solve the local water shortage problem. Recognition as local water expert. Wanting to contribute to solving the water problem at a national level. |
| 14 | Environmentally-friendly shopping bags + training for women Addressing the environmental problem of plastic shopping bags by manufacturing environmentally friendly ones and providing jobs for women. | Social, national citizenship | Problem of plastic bags and the environment identified during Master's studies. | Social networking to find funding. Incubator helped with marketing. Explored different solutions one at a time (paper, fabric, thread). Thread initially used disappeared from market, forcing production to stop. Decided to find a local supplier of environmentally friendly thread. Obtained IP protection. Tried to use formal business practices. Challenges: obtaining space and capital; learning how to select and train female workers; government slowness and bureaucracy. Business grants hurt by Covid. Money shortage a consistent problem. | Awareness of satisfaction among female employees. Vision to expand and leave a legacy. Creeping disillusionment, followed by satisfaction with making an impact. Inspired to change people's attitudes towards plastics through training. |
| 15 | Automatic spray pump for pesticides Boosting farm productivity by making it easier to use pesticides. | Social, national citizenship | Entrepreneur had the original idea in 3 rd or 4 th grade. Had multiple innovation projects and some personal experience in farming. Entered and won competitions sponsored by embassies, obtaining funding. Created own company to develop and commercialize 'traditional' innovations, with technologies appropriate to the needs of Ethiopia. Listened to needs of farmers and provided them with prototype. Desire to change indigenous mindsets. | Incubators helped prepare business plan and training for scaling up. Pilot product was provided (free) locally to farmers. Social media and YouTube channel used to promote product. NGO expressed interest in distributing product. Began seeking export markets similar in terms of need and development levels; formed an organization to develop these markets. Challenges: Funding and capital for raw materials. Challenges of scaling up and automating production. Lack of support from government. | Personal engagement in community. Sense of satisfaction in working to solve a societal problem. Awareness of potential and desire to solve problems for wider region. |

