Sustainable entrepreneurial ecosystems in developing economies: A conceptualisation of complex adaptive systems approach

Mofoluke Akiode

Funding: No specific funding was received for this work.

Potential competing interests: No potential competing interests to declare.

Abstract

The entrepreneurial ecosystem concept is a generalised abstraction reflecting real-world occurrences. In many developing economies, the concept has often been approached metaphorically with little or no connection to tangible phenomena. Consequently, it has remained a structural representation of interrelationships among actors and elements within the entrepreneurial space. Although entrepreneurial ecosystems have significant poverty-alleviation consequences in developing economies, there remains limited understanding of the complexities and processes underlying the emergence of sustainable entrepreneurial ecosystems that foster productive entrepreneurship. Understanding the constitution of such ecosystems and how they align with established entrepreneurial ecosystem frameworks is crucial. This understanding involves exploring the specific circumstances driving sustainability within entrepreneurial ecosystem and how these circumstances influence entrepreneurial activities and ecosystem output. The paper aims to contribute to the literature on sustainable entrepreneurial ecosystems by developing a conceptual framework. This framework facilitates empirical assessments, allowing for the operationalisation of concepts using complex adaptive systems approach.

1. Introduction

The entrepreneurial ecosystem concept presents a real-world phenomenon as an abstracted idea (Wurth et al., 2022). However, in many contexts, the concept has been studied as a metaphor used to map interrelationships between actors and components within an entrepreneurial space without reference to real-world phenomena. As a result, little is known about the complexities and emergence of entrepreneurial ecosystems (Roundy et al., 2018), the localized conditions, and the agency of entrepreneurial actors to create and transform their own contexts (Wurth et al., 2022). Based on the premise that a metaphorical entrepreneurial ecosystem framework consists of actual ecosystems, understanding the complexities within that structure helps us comprehend not only how entrepreneurs are affected by their broader context (Gnyawali & Fogel, 1994) but also how they influence their broader context. Therefore, this paper develops a framework using a complex adaptive systems approach, for exploring sustainable entrepreneurial ecosystems from the context of developing countries.

2. Literature review

2.1. Entrepreneurial ecosystems

Entrepreneurial ecosystems literature seeks to understand productive entrepreneurship from a systemic perspective that encompasses multiple actors, institutions and processes (Wurth et al., 2022; Roundy et al., 2018; Brown & Mason, 2017). The focus of entrepreneurial ecosystems research continues to shift more towards productive entrepreneurship rather than considering the whole of new venture creation and innovation (Wurth et al., 2022). Productive entrepreneurship is "any entrepreneurial activity that contributes directly or indirectly to net output of the economy or to the capacity to produce additional output" (Baumol, 1990, p. 30). Entrepreneurial activity contributes directly to net outputs through the discovery of new attributes, opportunities and procedures (Suaka, 2008), and indirect contributions could be through "catalyst ventures" or failed enterprises that have provided a fertile breeding ground for subsequent ventures or inspired them (Stam, 2015). Previously, entrepreneurial ecosystems research probably too exclusively narrowed entrepreneurship down to "High-growth start-ups" or "Unicorns", a position that risks losing the bigger entrepreneurship picture (Cavallo et al., 2018; Stam, 2015; Mason & Brown, 2014). Empirically, innovative start-ups or entrepreneurial employees can serve as forms of productive entrepreneurship (Audretsch et al., 2023; Baumol, 1990). The actors and factors affecting productive entrepreneurship in developing economies differ from those in developed economies (Sautet, 2013). One reason for these differences is that the institutional quality in various countries significantly impacts productive entrepreneurship (Audretsch et al., 2023). By implication, the need for research based on specific contexts and specialties becomes more evident.

In developing economies, ecosystems have significant poverty-alleviation consequences and productive entrepreneurship is proxied with firms that have the potential to facilitate growth, poverty alleviation and employment creation (Murimbika & Urban, 2020; Bruton et al., 2015; Sautet, 2013; Reficco and Márquez, 2012; Ramachandran et al., 2012). However, productive entrepreneurship in developing economies remains a complex puzzle that needs unravelling (Sautet, 2013). This can be attributed to the failure to recognise that not all components of entrepreneurial ecosystems can be managed top-down (Kuckertz, 2019). This stresses the importance of adopting grassroots or bottom-up perspective (Akiode, 2021: Mack & Meyer, 2016; Prahalad, 2012). It also highlights the importance of understanding the specific circumstances that sustainability orientation of ecosystems supported by an increase in institutional quality, may level up growth in developing countries (Audretsch et al., 2023).

2.2. Sustainable entrepreneurial ecosystems

Sustainable entrepreneurial ecosystems are defined as an interconnected group of actors in a local geographic community committed to sustainable development through the support and facilitation of new sustainable ventures (Cohen, 2006 p.3). The community becomes a centre for entrepreneurial innovations and focus on fostering sustainable entrepreneurship (Bischoff, 2019; Cohen, 2006). Sustainable entrepreneurship is defined as, "the discovery, creation, and exploitation of opportunities to create future goods and services that sustain the natural and/or communal environment and provide development gain for others" (Patzelt and Shepherd 2011, p.632). It differs significantly from traditional

entrepreneurship in terms of its intended and realized impact and entrepreneurial success depends on the support that entrepreneurs receive from other individuals (Volkmann et al., 2021). It stems from the need to address critical contemporary societal challenges such as, climate change and social inequality (Pankov et. al., 2021).

Sustainable entrepreneurial activities tackle fundamental societal challenges consistent with the UN's Sustainable Development Goals, embracing the economic, ecological, and social dimensions of sustainability (Volkmann et al., 2021). Sustainable entrepreneurs actively strive to avoid negatively affecting the environment and society. Although the sustainable entrepreneur has a profit motive, there is also a strong sense of social responsibility driven by a strong need to connect with others and make a difference in the world (Pankov et. al., 2021; Bischoff, 2019). Although from a developed country context, a prior study among sharing ventures showed that sustainability-related practices include: establishing networks between different actors in their ecosystem to exchange knowledge, expand sustainable businesses, and promote sustainability (Pankov et al., 2021). Conducting empirical investigation of sustainable entrepreneurial ecosystems from developing economies would help to advance our understanding of the concept, and to identify important factors for developing strong sustainable entrepreneurial ecosystems that facilitate and foster engagement in sustainable entrepreneurship and growth (Audretsch et al., 2023; Bischoff, 2019).

2.3. Complex adaptive systems

The entrepreneurial ecosystem is more complex than the biological ecosystem because agents in the former have aspirations about how the system should function (Cavallo et al., 2018; Roundy et al., 2018). Its complexity is underscored by seemingly unpredictable patterns, behaviours, and structures. The patterns of action produced at one level both emerge from and are influenced by processes operating at different levels, and by the behaviour of the overall system (Roundy et al., 2018; Midmore & Whittaker, 2000).

Conceptualising a complex adaptive systems approach for understanding the processes and mechanisms which lead to individual and collective beneficial outcomes (Audretsch et. al., 2019) would help to guide our knowledge towards, the emergence of and the conditions under which, sustainable entrepreneurial ecosystems contribute to productive entrepreneurship (Audretsch et al., 2023).

A complex system is a collection of elements – two to hundreds of thousands, even millions of elements – interacting with one another in more or less simple ways (O'Sullivan, 2009a). A core concept in studies of complex adaptive systems and the economy is co-evolution, it focuses attention on reciprocal cycles of adaptation among one or more elements of an economic system (Moore, 2006). That is, entrepreneurial ecosystem elements are mutually interdependent and co-evolve in a territory (Stam & van de Ven, 2021).

Complex adaptive systems share six properties: self-organization, open-but-distinct boundaries, complex components, nonlinearity, adaptability, and sensitivity to initial conditions (Roundy et al., 2018). Self-organization describes the emergent outcomes a system exhibits when structured in such a way that it can be organized into a number of interacting subsystems. As a complex adaptive system, the borders of an entrepreneurial ecosystem are ill-defined, however, both geographic and socio-cultural borders exist. Complex components describe the interactions between diverse actors and

elements. The nonlinearity of ecosystem dynamics describes how the effects of interdependent interactions in turn depend on other features of the elements interacting. It creates feedback loops, when an activity feeds back on itself either directly or after intervening processes. Adaptability refers to the ability of a system to alter itself in response to changes in its environment so as to preserve its own existence and operation. Sensitivity to initial conditions describes the small initial competitive market conditions in a region which may through positive feedback, lead to enormous differences in outcomes between regions (O'Sullivan, 2009a; O'Sullivan, 2009b; Stam & van de Ven, 2021).

Grounded in complexity science which highlights the intricately structured interconnectedness of the world, complex adaptive systems approach holds a place for both qualitative and quantitative empirical entrepreneurial ecosystem research (Roundy et al., 2018; O'Sullivan, 2009a). This would help move past studying attributes of components and provide a framework that can be used for studies that connect micro- and macro-level research in entrepreneurship (Roundy et al., 2018). The next sections discuss the conceptualisation of sustainable entrepreneurial ecosystems in developing economies context using a complex adaptive systems approach.

3. Conceptualisation of complex adaptive systems approach

Entrepreneurial ecosystems are characterized as complex, multi-level interactions that emerge over time through multiple components and processes (Roundy et al., 2018). The development of an entrepreneurial ecosystem is restricted to geographic boundaries and is highly influenced by local geographical environments (Cohen, 2006). In complex adaptive systems, the localized context of the actions of individual elements in a system is recognized as a key aspect of how system behaviour unfolds and requires different models for each level if entities and interactions of different kind emerge at each level (O'Sullivan, 2009a). Even though ecosystems actors are heterogenous, there is enough homogeneity in agent-types so we can assign actors in the same sector to a single category based on similarities in intentions, behaviours, and activities (Roundy et al., 2018).

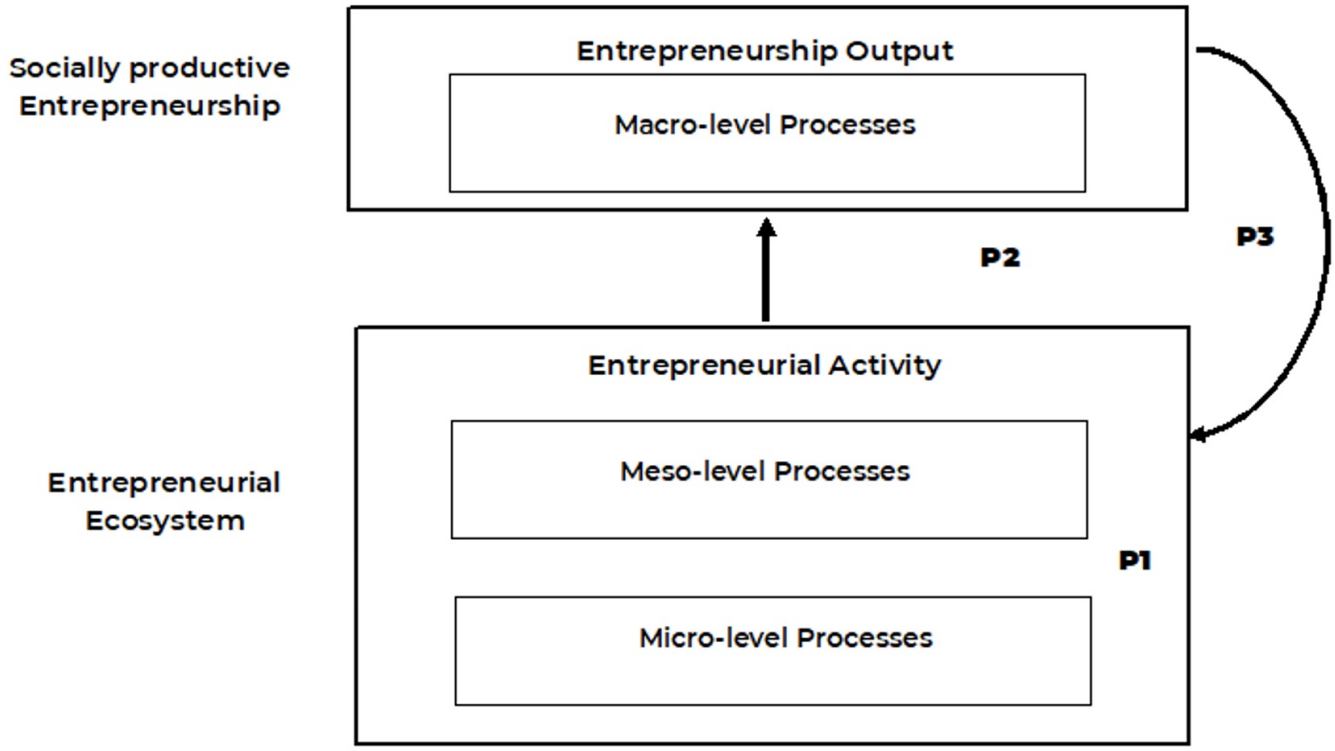

Figure 1. A conceptual model of sustainable entrepreneurial ecosystems

Adapted from: Stam & van de Ven (2021)

3.1. The conceptual model

A scenario for the conceptual framework is based on “a sustainable entrepreneur” who introduces a new business into a rural area as a way to boost their business and the local economy. What specific circumstances drive the sustainability orientation of the entrepreneurial ecosystem? How do those circumstances influence entrepreneurial activity, and ecosystem outputs and outcome?

A gap in the entrepreneurial ecosystem literature is a lack of consistent explanation of the coherence or the interdependent effects of ecosystem factors on entrepreneurship (Stam, 2015). This conceptual framework (Fig 1.) of sustainable entrepreneurial ecosystems in developing economies, builds upon the integrative model of entrepreneurial ecosystems (Stam & van de Ven, 2021).

It presents three processes through which entrepreneurial ecosystems emerge namely: the micro-level processes, meso-level processes, and macro-level processes (Roundy et al., 2018). These processes depict types of entrepreneurial activity (Fig 2.), in relation to the conditions that drive these processes. These conditions are shown as the commonly pursued opportunities in settings of abject poverty namely: self-employment, discovery and creation opportunities (Alvarez & Barney, 2014). The ecosystem outputs comprise three commonly explored types of entrepreneurship in developing economies namely: subsistence entrepreneurship, local entrepreneurship and systemic entrepreneurship (Sautet, 2013). Socially productive entrepreneurship is the ecosystem outcome encompassing value creation through all entrepreneurial

activity levels (Stam, 2015; Stam & van de Ven, 2021). The aspects of the model are discussed in the next sections.

Figure 2. Process, opportunity type and entrepreneurship output

3.1.1. Micro-level processes

The entire entrepreneurial process evolves because individuals have entrepreneurial intentions, act and are motivated to pursue opportunities (Murimbika & Urban, 2020; Cavallo et al., 2018; Krueger, 2007). The sustainable entrepreneur acts as the focal person whose sensitivity to the initial location conditions, becomes the catalyst for the emergence of the ecosystem, and changes in entrepreneurial activity.

The entrepreneurial intention is to pursue profit motive with a strong sense of social responsibility (Bischoff, 2019) in a central place (rural) of distinct geographical boundary. The ultimate goal is to move an inefficient market towards general equilibrium through innovation and to do it in the most efficient, effective and profitable ways (Miles & Morrison, 2018).

The pre-existing systemic conditions and institutional arrangements show that self-employment opportunities are pursued and subsistence entrepreneurship is the output of entrepreneurial activities (Alvarez & Barney, 2014; Sautet, 2013; Akiode, 2021). External support of subsistence entrepreneurship (if available at all) is characterised by the strong influence of microlending, NGOs and government programs which does not yield a strong impact on poverty (Sautet, 2013).

Rural areas are typically environmentally and demographically unsustainable (Midmore & Whittaker, 2000). Developing rural areas are also economically unsustainable and lack seamless flow of resources and information (Akiode, 2021; Alvarez & Barney, 2014).

The sustainable entrepreneur's ability to initiate actions is affected by existing rural (socio-economic and embedded cultural) systems that is reflective of the natural resources, local production factors (labour and capital), entrepreneurial ability, knowledge and relational skills of local actors. Entrepreneur's intentions, location factors and institutional arrangements trigger adaptive tensions which results in formulating implicit and explicit action plans. These actions lead to reframing of normative structures, creating substitutes for the resource and institutional deficiencies such as, lack of infrastructure and basic amenities, poor financial resources, ineffective government regulations, ill-defined rights, and other uncertainties (Roundy et al., 2018; Feldman & Zoller, 2012).

- ***Proposition 1a: Entrepreneurial intention and adaptive tensions are the catalysts that shape sustainable entrepreneurial ecosystem around local conditions.***

3.1.2. Meso-level processes

The opportunities that drive entrepreneurial activity are strongly influenced by the entrepreneur's alertness and, industry and market experience (Alvarez & Barney, 2014). The introduction of a new business to a rural area creates an exogenous shock to the market through changes in technology, institutional arrangement, and changes in demographics, etc. (Shane, 2003). Rural systems develop in a sustainable manner, through effective transmission of information on changes in all relevant components for balanced adaptation (Midmore & Whittaker, 2000).

In developing economies, success is difficult and costly under discovery conditions but once achieved, it is easily observed and imitated (Mostafa & Klepper, 2017). The discovery opportunities being pursued requires the possession and transmission of information needed to expand and exploit new products and markets (Alvarez & Barney, 2014). When entrepreneurs transfer information to others about what the opportunity is and how to pursue it, this imitation might initially legitimate an opportunity but it also generates competition (Barney, 1991). The expansion and exploitation of opportunities support local entrepreneurship but does not lead to economies of scale and scope (Sautet, 2013). In addition, discovery opportunities require highly developed property rights, and sophisticated sources of financial capital (Alvarez & Barney, 2014).

The challenges of the discovery condition is that the continued survival of an ecosystem depends on its ability to adapt, to continuously alter itself in response to necessary changes in order to preserve its own existence and operation (O'Sullivan, 2009a). The first shocks that initially generated opportunity need to be replaced by other shocks that will open up new opportunities (Schumpeter, 1934). Therefore, the ecosystem needs to make changes such as, building a supportive environment, enforcing a sustainability paradigm through entrepreneurial culture changes. Additionally, it requires fostering cooperation and collaboration among ecosystem actors, and developing network connections with large companies and other external partners (Pankov et al., 2021).

A key characteristic of meso-level processes is the provisioning of resources to entrepreneurs from support organizations (Roundy et al., 2018). This happens because the ecosystem actors are building networks and linkages and establishing legitimacy which gives access to resources (Feldman & Zoller, 2012). The increase in entrepreneurial activities and interactions with diverse actors and elements help the ecosystem evolve from an uncoordinated or semi-autonomous state to having simple organizational structures (Stam & van de Ven, 2021; Roundy et al., 2018; Sautet, 2013).

- ***Proposition 1b: Effective transmission of information helps in establishing legitimacy, building new networks and linkages which leads to the injection of resources into the ecosystem.***

3.1.3. Macro-level processes

Systemic entrepreneurship (Sautet, 2013) is the output of entrepreneurial activity that exploits creative opportunities (Alvarez & Barney, 2014). It exists over an extended scope or space beyond the immediate community in which business is done. Systemic conditions are the heart of an ecosystem, comprising of elements and the interactions between them that predominantly determine the success of the ecosystem (Stam, 2015). Entrepreneurial activity involves engaging in large volumes of market transactions and leveraging substantial gains from trade and innovation. Complex organisational structures are required to effectively manage the scale and scope of activities. In addition, deep accumulation of capital, and impersonal and formal relations are needed.

Creation opportunities are the conditions that drive macro-level processes, and exploiting such opportunities requires the circulation of tacit knowledge and learning (Alvarez & Barney, 2014). Both are critical for managing the complex structures that emerge from increase in scale and scope of entrepreneurial activities.

The ecosystem takes the form of a hierarchical loosely coupled system despite its distinct boundaries, consisting of one or more levels of nested subsystems (Stam & van de Ven, 2021; O'Sullivan, 2009b). Systems and subsystems emerge where smaller parts are also part of a greater whole, which means that they can both be changed by other components, while themselves acting as a change agent (Midmore & Whittaker, 2000; Clayton & Radcliffe, 1996).

The different levels within the system function in different ways and it is important to understand not only the attributes of components at each scale, but also the 'rules of the game' that determine coherence of interactions among them (Midmore & Whittaker, 2000). The rules of the game guide how decisions are made and also determine how differences are settled among ecosystem actors (Roundy et al., 2018). The activities and interactions of change agents modify the rules of the game by refining existing practices, introducing new ways of doing business, providing environmental remedies, and seeking to protect social coherence (Akiode, 2023; Malecki, 2017).

In addition, evolution occurs as a result of interactions between the scales (Stam & van de Ven, 2021; Moore, 2006; Midmore & Whittaker, 2000; Weston & Ruth, 1997) and a socially constructed local culture emerges through the interactions (Isenberg, 2010). Local culture is not static, it can be influenced by the presence of successful, innovative entrepreneurs who can spur others to follow in their footsteps (Malecki, 2017). Despite the differences that exist across levels and scales, the coherence displayed between the components of an entrepreneurial ecosystem causes them to

coalesce into a group (Roundy et al., 2018). However, complexity also introduces the possibility of disorder in the ecosystem e.g., friction can occur when a component tries to secure its identity in competition with others at the same scale, yet the competitive process can destabilise other scales within the system on which it depends. Therefore, stability in the ecosystem refers to the ability of entities to maintain self-organisation while evolving (Midmore & Whittaker, 2000).

- ***Proposition 1c: The 'rules of the game' determine the coherence of interactions among ecosystem components.***

3.2. Socially productive entrepreneurship

The 'rules of the game' shape both the reward structure within an economy and the distribution of entrepreneurial activity. This is because entrepreneurship is not inherently productive or unproductive, it is the available rewards that make entrepreneurship socially productive or unproductive (Sautet, 2013; Baumol, 1990). Developing economies though are not uniform, may be characterized by some common markers such as, institutional voids, weak and less established markets, and unstable institutions specifically in terms of weak enforcement (Murimbika & Urban, 2020). Systemic entrepreneurship depends on a supportive institutional environment and governance mechanisms. These help to fill the institutional deficiencies, and gives access to the human capital, property rights, and financial capital needed for wealth creation (Akiode, 2021: Alvarez & Barney, 2014).

According to Sautet (2013), it is not that productive entrepreneurship does not occur in many poor countries of the world, the problem is that it does not generate much development. Also, the distinction between local and systemic is not clear-cut and the former must not always come before the later, some systemic entrepreneurial discoveries are systemic from the start. Therefore, the fundamental distinction between local and systemic entrepreneurship refers more to the scope of the opportunities available in the market than to their nature.

For example, the opportunities that are exploitable with the kinds of human capital, property rights, and financial capital available through subsistence or self-employment entrepreneurship provide rewards, but not the kind that are likely to lead to job creation and economic growth (Alvarez & Barney, 2014). Similarly, local entrepreneurship which dominates many African countries, refers to socially productive entrepreneurial activities constrained to serve a limited local market (Murimbika & Urban, 2020). Therefore, the difference is that systemic entrepreneurship has the capability to generate a level of wealth that would eliminate mass poverty, and the capability is shaped by the rules of the game that determine the allocation of entrepreneurial activity.

- ***Proposition 2: Entrepreneurship output describes the available rewards at each level of entrepreneurial activities.***

3.2.1 The integrative model of socially productive entrepreneurship

There is the need to adopt an integrative systems approach to studying sustainable development in rural areas (Midmore & Whittaker, 2000). Systemic entrepreneurship involves capturing opportunities that are wide enough to exist over an

extended space, one that goes beyond the immediate community in which the ecosystem is located (Sautet, 2013). The integrative model of the entrepreneurial ecosystem (Stam & van de Ven, 2021) adapted for this paper, shows the relationship between entrepreneurial activity and entrepreneurship output in developing economies (Alvarez & Barney, 2014; Sautet, 2013). The integrative model also presents socially productive entrepreneurship as the overall outcome of a sustainable entrepreneurial ecosystem. The outcome encompasses value creation through all levels of entrepreneurial activity and reveals changes in the region.

- ***Proposition 3: Socially productive entrepreneurship outcome covers the available rewards for all levels of entrepreneurial activity***

4. Discussion

The conceptual framework is a guide for operationalising empirical research on sustainable entrepreneurial ecosystems, particularly from developing economies context, using a complex adaptive systems approach. The questions that guided the framework sought to understand the specific circumstances that drive sustainability orientation of entrepreneurial ecosystems, how those circumstances influence entrepreneurial activity and output, as well as ecosystems outcome.

The framework highlights the following: the importance of the sustainable entrepreneur as being a focal person and an agent of change in the ecosystem, entrepreneurial activities take place within set geographic boundaries, and sustainable entrepreneurial ecosystems are rural systems with socially productive entrepreneurship outcomes.

The paper contextualises sustainable entrepreneurial ecosystems as a complex adaptive systems and the propositions are that sustainable entrepreneurial ecosystems are influenced by three forces namely: entrepreneurs' intentionality and adaptive tensions, injections of resources, and coherence in interactions (Roundy et al., 2018).

Entrepreneurs' intentionality and adaptive tensions are the catalysts that shape sustainable entrepreneurial ecosystems around local conditions.

Effective transmission of information helps in establishing legitimacy, building new networks and linkages, and leads to the injection of resources into sustainable entrepreneurial ecosystems.

The ‘rules of the game’ determine the coherence of interactions among ecosystem actors. In addition, entrepreneurship output describes the available rewards at each level of entrepreneurial activity. Socially productive entrepreneurship is the outcome of sustainable entrepreneurial ecosystems and covers the available rewards for all entrepreneurial activities in that region.

5. Conclusion

The main contributions of the paper are: firstly, it develops a complex adaptive systems framework for exploring sustainable entrepreneurial ecosystems in developing countries context. Secondly, the framework makes a contribution

towards understanding the coherence or the interdependent effects of ecosystem factors on entrepreneurship, which lack consistent explanation (Stam, 2015).

Sautet (2013) points out that the entrepreneurship categories are ideal types and may be difficult to identify in reality, and suggested that it might be more preferable to think of entrepreneurship as taking place along a continuum rather being a binary distinction.

This framework addressed this by considering the entrepreneurship categories as indicative of entrepreneurial outputs and entrepreneurial opportunities as conditions that drive a dynamic and nonlinear sustainable entrepreneurial ecosystem.

Qualitative studies, including rapid ethnography, interviews with sustainable entrepreneurial ecosystem actors, and focus groups (Audretsch et al., 2023), can provide valuable empirical insights. They will particularly be helpful in illuminating various aspects of entrepreneurial activities, such as the nature of these activities, the networks facilitating resources access, innovation, growth, competition, collaboration, and the establishment of governance ('rules of the game') mechanisms that determine and regulate sustainable entrepreneurial ecosystems processes.

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