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Digital entrepreneurship and the emergence of coopetitive affordance

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Abstract

Purpose – By focusing on the contextual conditions of South African digital entrepreneurs and the affordances of digital technologies, we understand how connective affordances of digital technologies enable a collective approach to digital entrepreneurship.

Design/methodology/approach – We do so through an interpretive field study of South African digital entrepreneurs operating in resource-constrained settings.

Findings – The findings highlight how entrepreneurs appropriate digital technologies in collectives to achieve connective actions and cooperate and compete simultaneously, giving rise to what we call coopetitive affordance, reflecting a fresh perspective on coopetition in increasingly digital and resource-constrained realities.

Originality/value – This paper extends the connective affordance perspective by illustrating how the concept of coopetitive affordance brings to light how contextual conditions create a humanitarian bond between entrepreneurs and a digital bond created by their appropriation of digital technologies in collectives.

Keywords Digital entrepreneurship, Collective action, Resource-constrained settings, Coopetition, Connective affordances, Coopetitive affordance

Paper type Research paper

Introduction

Digital technologies enable entrepreneurial activities to allow collective actions between distributed actors, enabling entrepreneurs to develop, manage and support one another in their endeavours (Abubakre *et al.*, 2021). This collective endeavour is an emerging way of thinking about digital entrepreneurship (DE). In these new collective DE phenomena, entrepreneurs rely on their peers and the technologies (Srinivasan and Venkatraman, 2018), with the latter serving as facilitators for capitalising on business opportunities (Kraus *et al.*, 2023). Digital entrepreneurs take on informal roles, build emergent and organic relationships, and rely heavily upon digital technologies (Ghobadi and Clegg, 2015) and embedded networks of participants with complementary resources (Du *et al.*, 2018). This collective approach contrasts the dominant meritocratic and heroic perspective to DE, focusing on the individual entrepreneur with distinctive features, capacities and endowments to run successful enterprises (Abubakre *et al.*, 2022; Li *et al.*, 2018). Furthermore, the cooperative approach highlights how a distributed nature of agency

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rather than a sole agent approach enables entrepreneurs in a resource-constrained environment [1] to have a humanitarian approach to overcome the competitive demands of digital markets (Abubakre *et al.*, 2021).

Such a collective understanding of digital entrepreneurial activities emerges from attention to the cooperative use of information technologies (Cardoso *et al.*, 2019; Negoita *et al.*, 2018). Several studies have approached this collective dimension through the concept of connective affordances (Stohl, 2014; Vaast *et al.*, 2017). Therefore, we turn to the connective affordances of technologies literature to examine the use of technologies in enabling interdependence among the community of entrepreneurs as they engage in their entrepreneurial activities. The perspective of connective affordances highlights the collective use of technology when actors informally take on interdependent roles (Vaast *et al.*, 2017). This perspective helps provide a framework for understanding how digital technologies afford connective actions that support interdependencies that help competing entrepreneurs collaborate, i.e., coopetition (Lee *et al.*, 2021). As Hoffmann *et al.* (2018) and Runge *et al.* (2022) argue, the competing digital entrepreneurs can collectively access resources that may be too difficult to obtain individually.

Despite this increasing interest in the collective perspective of DE, there has been little study of this cooperative approach and the implication for digital entrepreneurs collaborating and competing simultaneously, i.e., coopetition during entrepreneurial activities. Furthermore, we know little about how connective affordances of digital technologies enable coopetitiveness in entrepreneurship in a resource-constrained environment. Exploring this gap will provide attention to an alternative perspective on how enterprises can cooperate and compete simultaneously by complementing each other's limited skills and resources by taking advantage of the materialities of digital technologies and their affordances. Thus, this paper explores how connective affordances emerge through entrepreneurs' use of digital technology in resource-constrained settings to enable coopetition. To address this aim, we propose the following research question: How do the connective affordances of digital technologies enable coopetitiveness in DE in a resource-constrained environment?

This paper develops a coopetitive perspective of DE by building on a field study conducted in the Gauteng region (Johannesburg, Midrand and Pretoria) of South Africa. Studying South African digital entrepreneurs allows for understanding the contextual conditions of a community of digital entrepreneurs with a collective identity within an underprivileged setting of an emerging country. The digital entrepreneurs' community, enabled by digital technology and existing social relations, becomes a working space allowing members to access resources and discover their capacities to cooperate and compete during their entrepreneurial endeavours. This study draws on the connective action perspective to shed light on the significant technology affordances actualised by South African digital entrepreneurs based on their contextual conditions to create humanitarian and digital bonds. These bonds enabled them to compete and cooperate simultaneously, which we call *coopetitive affordance*s. We present coopetitive affordances as a theoretical concept of collective DE. It offers a connective perspective of how digital entrepreneurs' shared and interdependent use of digital technology based on their contextual conditions creates digital and humanitarian bonds as new ways to cooperate and compete in the new digital world.

The paper is structured as follows. In the next section, we discuss the extant literature on DE and the notion of coopetition. We then discuss the theory of technological affordance and collective affordances of digital technologies. Subsequently, we present how we collected and analysed the data and discuss our findings. Finally, we offer the discussion and conclusion sections.

Theoretical foundation

Digital entrepreneurship and coopetition

New digital technologies, including new types of digital infrastructures and platforms (e.g. 4/5G networks, cloud computing and social media platforms), offer computing, storage, communication and collaboration capabilities to support innovation and entrepreneurship (Abubakre *et al.*, 2021; Nambisan *et al.*, 2017). These digital technologies have disrupted the traditional boundaries within which businesses operate (Nambisan, 2017) based on creating new enterprises when relying on such technologies (Berman *et al.*, 2023; Sahut *et al.*, 2021). Digital technologies are a means of producing economic value at very little or no cost. Thus, it presents the view of entrepreneurship in a digital context, which enables the establishment of digital enterprises that are more accessible in today's world, especially to vulnerable groups (Pergelova *et al.*, 2019). The heavy reliance on digital technologies facilitates efficient access to the resources and expertise and overcoming the barriers (e.g. huge capital investment) required to engage in entrepreneurship (Steininger, 2019; Cavallo *et al.*, 2023). The new digital technologies afford the dismantling of information barriers and the experimentation of new ideas and solutions to give entrepreneurs opportunities to nurture their entrepreneurial solutions, which is essential in a resource-constrained environment. Therefore, entrepreneurs who traditionally compete can be inspired to cooperate due to the complex nature of their entrepreneurial activities to obtain critical resources to undertake the activities. For example, Abubakre *et al.* (2021) report that an indigenous value system in South Africa served as a basis for a community approach to DE. The community perspective is an alternative to prevailing views on DE, which prefers market values and centres entrepreneurship endeavours around the heroic individual entrepreneur(s). Similarly, Leong *et al.* (2020) have examined the entrepreneurial actions of Indonesian digital entrepreneurs who leveraged digital technologies to have an emancipatory approach to help one another overcome the constraints faced in their disadvantaged communities and equalise their entrepreneurial opportunities.

Market logic, a driver of economic competition, is the underlying principle for creating new opportunities for digital entrepreneurs to create economic value and gain a competitive advantage over their rivals. The economic paradigm of competition contrasts with the notion of coopetition, which a collective logic can drive. Coopetition occurs when individuals/groups simultaneously exhibit cooperative and competitive behaviours (Tsai, 2002). Individuals/groups who are competitors would compete for knowledge sharing as a practical means to pursue common interests. Although competing with one another, enterprises also cooperate to acquire new knowledge from one another (Tsai, 2002). This follows from Hamel *et al.*'s (1989, p. 134) argument, "Using an alliance with a competitor to acquire new technologies or skills is not devious. Instead, it reflects the commitment and capacity for each partner to absorb the skills of the other". Studies on coopetition highlight that organisations cooperate and compete to reduce risk and share costs, which resonates with the research on how enterprises form alliances (Bengtsson and Kock, 2000; Hoffmann *et al.*, 2018). The literature concerning the consequences of coopetition highlights increased innovation and performance, which highlights value creation and appropriation in alliances as the result of cooperation and competition (Hoffmann *et al.*, 2018).

Similarly, some studies acknowledge the conditions in which coopetition occurs. For example, Park *et al.* (2014) and Runge *et al.* (2022) argue that coopetition among parties typically occurs when the enterprise shares a similar technological knowledge domain, i.e., technological overlap and is in close physical geographical proximity, i.e., geographical overlap. However, competition becomes salient if the parties develop similar products or operate in the same market, i.e., product market overlap (Hoberg and Phillips, 2018). Digital technologies can facilitate coopetition between industry rivals to gain resources. Specifically, the unique features of digital technologies, such as their ability to transcend time and space

constraints, have made them a source of opportunities to pursue coopetitive digital entrepreneurial ventures. An example is Netflix, through its streaming platform, cooperating with Amazon to use Amazon's cloud infrastructure. These enterprises with technological overlap (appropriate similar technologies) and geographical overlap (i.e., operate in Silicon Valley) cooperate because they pursue joint and aligned goals while transferring and exchanging resources and capabilities to engage in shared projects. However, Amazon Prime streaming services are a direct competitor to Netflix Prime's content platform due to the product market overlap, thereby creating competitive tension and undermining the sustainability of the cooperation that allows for resource exchange. Such product market overlap between Amazon and Netflix is a condition that changes the nature of alliances from cooperation to competition. Runge *et al.* (2022) echo this view by suggesting that product market overlap fosters competitive tension within the alliance, indicating that market forces essentially underpin the conditions that drive coopetition.

Moreover, as described in the literature, the environmental and organisational conditions that influence coopetition between enterprises are mainly in settings that are characterised as economically advanced and ripe. However, research exploring the conditions in which coopetition occurs in less advanced economies, beyond purely market and economic forces to clan-based conditions based on shared beliefs, values and experiences, especially in a highly resource-constrained environment, is limited. Furthermore, the DE studies in resource-rich contexts that portray DE success as mainly on the individual abilities of the entrepreneurs limit our understanding of how digital entrepreneurs operating in resource-constrained settings could cooperate while also competing at the same time by complementing each other's limited skills and resources by taking advantage of the materialities of digital technologies and their affordances. Thus, this paper explores how digital entrepreneurs can collectively use digital technologies in resource-constrained settings to realise the coopetitive potential of DE. To link the connective use of technologies to DE, we need to account for the unique properties of digital technologies as a basis of entrepreneurship. The theory of technology and connective affordances is an integral perspective to achieving this objective without falling into technological determinism (Leonardi, 2011; Faraj and Azad, 2012; Volkoff and Strong, 2013). Therefore, we review the literature on technological and connective affordances to guide our inquiry.

Theory of technological affordance

Gibson (1977) developed the affordance theory, which he drew from the field of psychology. The theory describes the action potentials offered to an individual based on their use of an artefact. Affordances indicate what people can do with the features of technological objects. The theory of technology affordances presents a relational view of the dynamics between human agents and technological artefacts. This relational view depicts the actor's use of the artefact as an enactment of affordances emerging from the goals of the actor and the features of the artefact (Nambisan *et al.*, 2017). As such, the emphasis on technology affordances is not on which features the technology possesses but on how actors' goals become intertwined with the material features of the technology. Leonardi *et al.* (2019) argued that affordance, i.e., perception of utility, is the intersection between the materiality of an artefact and the user's socially shaped goals. For example, the features in a cloud-based platform enable users to engage with the tool in various ways based on users' capabilities and goals. Information systems studies have built on affordance theory to analyse the relationship between information technology and users (e.g. Treem and Leonardi, 2013; Vaast *et al.*, 2013).

Affordances enable us to explore how digital technology features shape entrepreneurs' activities. This view is consistent with scholars like Meurer *et al.* (2022) and Nambisan *et al.* (2019), arguing for an improved understanding of the implications of emerging technological

affordances when undertaking DE. The type of affordances manifested by an entrepreneur's use of digital technologies can depend on the entrepreneur's needs and motivations. For instance, entrepreneurs operating in a resource-constrained environment would perceive the need to harness the affordances of digital technologies to support collaborative work despite competing against each other to obtain critical resources to overcome the complex nature of their entrepreneurial activities.

The connective affordances of digital technologies

Leonardi (2013) highlights that the materiality of using simulation technology within an organisation engendered shared affordances. His study shows that actors who shared similar technology applications based on their goals and objectives had reciprocal interdependence in the technology use, which actualised the shared affordances. Thus, the conditions for collective action were actualised due to pooled interdependence in technology use. Similarly, to understand the socialised affordances of social media, Zheng and Yu (2016) studied a charitable programme in China based on the microblogging platform Weibo to highlight the dynamic relationship between the material features of the technology and socially derived practices and processes that created possibilities for collective action.

Vaast *et al.* (2017) propose the concept of connective action as a new form of collective engagement enabled by digital technologies. Their study investigated how social media, explicitly microblogging, afforded organising and collective engagement. They analysed microblogging use during the Gulf of Mexico oil spill to understand how actors coproduced and circulated content based upon an issue of mutual interest, engendering various forms of collective engagement.

It is helpful to view DE as a collective phenomenon that harnesses affordances to facilitate the pursuit of opportunities and innovation in a resource-constrained environment. More specifically to entrepreneurship, we suggest that the ubiquity of digital technologies and infrastructures are producing affordances like generativity (Majchrzak and Markus, 2013; Nambisan, 2017) that stimulate the organisation of collective DE. Affordances, like generativity enabled by digital platforms, enable entrepreneurs to coordinate geographically dispersed audiences and open new ways to pursue and build new business models (Autio *et al.*, 2018; Nambisan, 2017; Yoo *et al.*, 2012) collectively.

Studies have highlighted that mobile platforms facilitate the interaction of various actors in connective action to achieve co-creation and co-distribution (Bennett and Segerberg, 2013; Kwayu *et al.*, 2018). For example, Kwayu *et al.* (2018) show how employees of telecom companies in Tanzania informally took advantage of the WhatsApp messaging services' ability to congregate loose networks to achieve connective action as new forms of collective engagement amongst the employees. This conceptualisation of connective action is particularly useful for our study because the actors' use of digital technologies to fulfil their entrepreneurial practices and objectives is based on social or norm-emphasising situations related to societal values. That way, when interacting with technology, entrepreneurs can utilise the materialities of digital technology to achieve specific connective affordances and undertake coopetition in their resource-constrained contexts. Put differently, the affordance perspective fits the DE context as it allows us to unpack how entrepreneurs may use technology to achieve action goals, experience success and solve the entrepreneurial challenges they face (Majchrzak and Shepherd, 2021).

In this paper, we, therefore, seek to extend recent theorising in the DE literature that has sought to unpack how affordances emerge (Autio *et al.*, 2018; Meurer *et al.*, 2022; Nambisan *et al.*, 2019). The connective affordances of digital technologies are resources that carry the potential to overcome the constraints that entrepreneurs face and thus influence their ability to undertake collective entrepreneurship. We seek to add evidence to the recent findings that

a community perspective on DE is essential in a resource-constrained environment (Abubakre *et al.*, 2021; Leong *et al.*, 2020). To do so, we study digital entrepreneurs harnessing technologies to have an emancipatory approach to help one another overcome the constraints faced during their entrepreneurial endeavours.

Research methods

This study adopted a qualitative approach in the interpretive tradition (Walsham, 1995) to address how connective affordances of digital technologies enable a collective approach to DE. As Walsham (1995) argued, the exploratory nature of our study rather than confirmatory supports the need for an interpretive approach. Interpretive methods stress the social construction of reality and focus on the intersubjectivity of the actors' engagement with the world (Klein and Myers, 1999; Walsham, 1995). Through the meanings people give to their activities, we tried to make sense of the entrepreneurs' individual and collective experiences as they engage in DE.

Research context

Our study is anchored on data from three major innovation clusters, The Innovation Hub (Pretoria), Tshimologong Digital Innovation Precinct (Johannesburg) and Softstart BTI (Midrand), which are at the centre of DE activities in the Gauteng region of South Africa. The contexts are appealing because the digital entrepreneurs embody the experience, backgrounds, and race reflected in their collective attitude and artefacts for entrepreneurial and innovative purposes. Although the province is the smallest in the country, its digital entrepreneurial activities have enabled economic growth in the Gauteng province through job creation, enhanced industrial efficiency and innovation (DoC, 2012; Lotriet *et al.*, 2010). Therefore, it remains the wealthiest, boosts vibrant economic activities from various key trades to the Johannesburg Stock Market and hosts some of the leading universities in the country.

The Innovation Hub is a science park established by the Gauteng Provincial Government to foster economic development and competitiveness in Gauteng through digital innovation and DE (DoC, 2012; The Innovation Hub, 2018). As the only and first science park, the Innovation Hub offered us a fertile environment for exploring how collective actions enable entrepreneurs' activities.

The Tshimologong Digital Innovation Precinct is located in the high-tech zone within the vibrant inner-city district of Braamfontein, Johannesburg. The University of The Witwatersrand established it. The precinct incubates digital entrepreneurs, supports research commercialisation, and develops high-level digital skills for students, working professionals, and unemployed youth. It is a space where digital innovators can meet, connect, collaborate and share knowledge.

Softstart BTI provides a space for digital entrepreneurs to nurture their concepts and develop technology-driven solutions to help them survive and grow during the start-up period. As an incubator space, Softstart BTI provides an integrated workspace package, shared office services, access to specialised equipment and connection to a network of people with diverse skills but similar goals.

Data collection

We collected empirical material from South African digital entrepreneurs over ten months (September 2020 to June 2021) across the three major innovation clusters of the Gauteng region. We started the interviews with a small initial group of digital entrepreneurs we found through personal networks and identified subsequent ones through a snowballing approach.

We conducted 41 semi-structured interviews with tech founders, chief technical officers and programmers whose accounts of communal entrepreneurial activities gave us rich insight into collective and coopetitive affordance dimensions. The chief technical officers and programmers we interviewed were also entrepreneurs. They were also co-founders and involved in the top management team to provide strategic directions for their enterprise. They are also involved in the tough decision-making. Moreover, they could solve business problems through their technological and organisational skills and understanding of customers, which were crucial for them to have the ability and willingness to take the risk to design and launch new products or services to market.

We used the interviews to prompt and solicit insights from the digital entrepreneurs. The interview guide was inspired by the growing call for insights on the conditions that influence collective perspective (Leonardi, 2013; Zheng and Yu, 2016) and the implication for entrepreneurs collaborating and competing simultaneously in a resource-constrained environment. The duration of the interviews ranged from 30 to 75 min. The interviews were recorded, later transcribed and shared with participants to review content for the integrity and authenticity of our data. Following the discussions, we carried out further telephonic and MS Teams conversations with some digital entrepreneurs to clarify and corroborate findings as deemed necessary. The participants of our studies share the same previously disadvantaged backgrounds and the same black ethnic group. Moreover, they come from underprivileged communities (e.g. townships or rural areas) as spaces with low access to quality education, high unemployment, a relative lack of basic amenities and a lack of opportunities. Therefore, we argue that our participants are suitable for studying how digital entrepreneurs collectively pursue their entrepreneurial opportunities in a resource-constrained environment. Table 1 provides a summary of the interviews that were conducted.

Data analysis

Our data analysis followed an interpretive approach (Klein and Myers, 1999). To help structure our analysis, we draw on the DE literature (e.g. Abubakre *et al.*, 2021; Nambisan *et al.*, 2017), connective affordances of digital technologies literature (Bennett and Segerberg, 2013; Vaast *et al.*, 2017). We also adopted Park *et al.* (2014) and Runge *et al.* (2022) elaboration on coopetition. Consistent with Klein and Myers' (1999) principle of abstraction and generalisation. We iterated between our initial set of concepts and the existing literature to understand the digital entrepreneurs' activities and their collective attitude towards digital entrepreneurial activities. Firstly, by taking a collective attitude towards digital entrepreneurial activities and engaging with our data, we increasingly began to understand how central the relationship between a collective approach and developing digital solutions was for understanding the role of digital technologies in connective DE. By carefully tracing and examining the trajectory of both the collective attitude and the role of technology, we found that DE activities by the South African participants generated three main affordances: connecting, collaborating and knowledge creating. We particularly questioned the data for the role of digital technology to help sensitise us to how digital entrepreneurs simultaneously exhibit cooperative and competitive behaviours during their DE activities. This step of our analysis provided us with the overarching conceptual dimensions leading to coopetition during DE, highlighting the digital entrepreneurs drawing on their capabilities, resources and opportunities to cooperate despite competing against each other.

To achieve the evaluation, we performed three rounds of analysis – open coding, creating categories and theoretical development. First, the analysis began with a data-reduction process to make the volume of transcripts and notes more manageable. Then, after reading the interview transcripts several times, like Pratt *et al.* (2006), we began by identifying joint

Table 1.
Summary of interviews

Digital technology type	Interviewee titles			Company profile		Innovation hub	Informant location		Total
	Founder	Chief technical officer	Programmer	Operating period	Size		Tshimologong digital innovation precinct	Softstart BTI and other	
Social media platform	4	1	1	0–5	M	5	0	1	6
Crowdsourcing platform	6	3	1	0–5	M	4	2	4	10
Mobile application and cloud	5	4	2	0–5	M	3	2	6	11
Artificial intelligence	7	4	0	0–5	M	6	3	1	10
Internet of things	2	0	0	0–5	M	2	0	0	2
3D printing	1	0	0	0–5	M	0	0	1	1
Total	*25*	*12*	*4*	*0–5*	*M*	*21*	*7*	*13*	*41*

Source(s): Authors own work NB: *M* = Micro (0–9 employees)

statements regarding our participants' views of their collaborative approach to DE in South Africa via open coding and then drew on joint statements to form first-order codes. The second phase was creating categories, where we aggregated the codes to draw connections between them and their relation to literature. For example, we first coded our transcripts for examples of DE activities to identify the emerging categories – "Individual interdependence to create digital products" and "Technology interdependence to jointly produce digital services" – upon combining multiple codes.

Similarly, we coded our transcripts for examples of affordances. At this stage, we identified three categories of affordances: "connecting", "collaborating", and "Knowledge creating". Finally, we coded our transcripts for examples of digital entrepreneurs cooperating and competing simultaneously. Two categories: "cooperation during DE" and "competition during DE", emerged from our data. The co-authors independently reviewed a sample of coded transcripts and discussed coding decisions to reach an agreement. Consistent with Venkatesh *et al.* (2013, p. 26), we achieved confirmability by reviewing each other's codes and categories to ensure that the interpretation of data could be confirmed or corroborated by others to attain inferential validity.

As we merged the developed categories, they became more theoretical and abstract to generate aggregate theoretical dimensions (Strauss and Corbin, 1998). To develop the aggregate theoretical dimensions, we followed a grounded approach (Strauss and Corbin, 1990) involving an iterative approach by analysing the qualitative data by going back and forth between the data and the emerging coopetitive affordance-based conceptual framework. We combine the categories – "Individual interdependence to create digital products" and "Technology interdependence to jointly produce digital services" to develop the "Collectively develop digital solutions" theoretical dimension. Similarly, for our second developed dimension – Digital technologies in connective entrepreneurship, we combined the three theoretical categories "connecting" and "collaborating" and "Knowledge creating". Finally, we combine the categories – "cooperation during DE" and "competition during DE" to highlight the theoretical dimension – coopetition during DE. Our theoretical developments sought to reflect the participants' understanding of their DE activities to reveal how collaborativeness leverages the affordance of digital technology to foster coopetitve dynamics in DE". We clustered the theoretical dimensions into a higher-level category to present the theoretical concept of *"coopetitive affordances"*. Gioia (2013) recommended providing the complete set of first-order codes, second-order categories, and aggregate dimensions to present a data structure (see Table 2). The data structure allows us to configure our data into a sensible visual aid for progressing from raw data to theoretical categories and aggregate theoretical dimensions to demonstrate rigour in our analysis (Pratt, 2008; Tracy, 2010).

As our study adopted a qualitative approach in the interpretive tradition (Klein and Myers, 1999), our findings are contextualised within the resourced-constraint context of undertaking DE in South Africa. We considered the unique social and cultural aspects influencing DE through the theoretical lens of affordances. That way, our findings are generalised to the adopted affordances theory. Therefore, we achieve analytical generalisability (Yin, 2009), also called generalising from empirical to theoretical statements (Lee and Baskerville, 2003).

Case findings

A collective approach to developing digital solutions

We identified that the mindset of progressing towards a common goal plays a very significant role in the daily lives of most South Africans. Most of the digital entrepreneurs we spoke to come from disadvantaged communities. Individuals from such communities need

First-order code	Theoretical category	Aggregate theoretical dimension	Theoretical concept
The need to work together when creating digital products/services	Individual interdependence to create digital products	Collectively develop digital solutions	Coopetitive Affordance
We cannot individually tackle this problem but work together through our digital practices			
Relying on digital infrastructure to enable shared efforts	Technology interdependence to jointly produce digital services		
Digital technology is an external enabler of opportunity for entrepreneurs			
Digital technologies stimulate interaction and information seeking	Connecting affordances in DE	Digital technologies in connective entrepreneurship	
Coordination of interactions enables communication			
Transferring valuable information	Collaborating affordances		
Division of tasks to acquire specialised capabilities			
Shared space via technology serves to grow imagination	Knowledge-creating affordances		
Experimentation to check and reflect on processes that work			
The digital platform supports receiving suggestions from each other	Cooperation during DE	Coopetition	
Using technology to help entrepreneurial endeavours			
Innovation costs money, so we still must be economical with others	Competition during DE		
We also use technology to contest with others			
We must make profit in this aggressive environment			

Table 2. Overview of data structure

Source(s): Authors own work

more technical skills, information poverty and adequate healthcare systems. Therefore, digital entrepreneurs have a common interest that propels collective digital approach solutions due to sentiments geared towards eradicating their common impoverishment. Founders of a digital platform to link developers and programmers operating in the township articulated their perspective of their DE activities by stating:

> We can never operate alone. Our *[digital] entrepreneurial activities* are because of somebody else or others. [Informant #11]

> What we are doing is about collective recognition. In that sense, indeed, what we are doing is facilitating and enabling our collective attitude to our *[digital] entrepreneurial activities* [Informant #22]

This collective attitude highlights the communal mindset and belief of South Africans that plays out in the daily lives of these entrepreneurs. Furthermore, the collective attitude reflects

a sense of joint responsibility and a view of one's identity through relations with others. Thus, the digital entrepreneurs' identity is formed through connections with others and not only for profit. A technologist who built a platform to get high school matriculants with university entry points expressed this:

> As South Africans, we are brought up to believe in collectiveness. It is not just about developing *digital solutions* to make money [Informant #12]

With the increasing availability of the Internet and mobile phone technologies in the African continent, South African entrepreneurs tapped into the digital infrastructures enabled by the Internet to develop value-adding digital products/services that address various problems, i.e., insufficient technical skills, information poverty, and inadequate health care systems in their local contexts. The entrepreneurs understand that they cannot tackle this problem individually but can work together through their digital practices as a viable alternative to solve their common problem. The layered architecture of telecommunication infrastructure and mobile Wi-Fi routers interacted to provide reliable, affordable Internet access to the people who could not afford it. Ultimately, this assembling of layers brought about Internet generation during transit. Third parties pay for the free Internet the entrepreneurs provide to customers, e.g. retailers, to advertise their products/services to the Internet users. The retailers' ability to advertise their products/services through the Internet highlights technology facilitating the entrepreneurial practice of matching potential consumers and retailers. An informant offering free Wi-Fi through his technological infrastructure highlighted this:

> By piggybacking on mobile telecoms, we install *mobile Wi-Fi technology* in buses and a thousand buses to offer free *Wi-Fi* on vehicles. *Wi-Fi* by nature, you cannot roll it out large-scale immediately. You can almost roll out piecemeal. That is why we use the buses; many people use the buses. This free *Wi-Fi* to communities is funded through advertising. The big brands, the banks, the telcos, the brewery, and the retailers. They want substantial captive audiences. [Informant #19]

South Africans draw on their togetherness and collectiveness as an impetus to form connections. The rationale for South African digital entrepreneurs' establishing collectiveness is related to individual and technological interdependences in producing DE goods and services. The digital infrastructure (e.g. telecommunications infrastructure, mobile Wi-Fi routers and the Internet) was an external enabler of entrepreneurship opportunity for digital entrepreneurs through the digital capabilities of openness, distributedness, combinatorial and generative potentials of the digital artefacts. While the entrepreneurs use the digital infrastructure as an economical medium to reach their local markets, their understanding to exploit the digital infrastructure capabilities to target their local markets was also crucial, as expressed by one of the mobile applications and cloud-based Wi-Fi technologists:

> We realised there was a need for people to connect, and the *data* price here in South Africa is prohibitive, and the access to the *internet* access to information is (offline). [Informant #9]

The entrepreneurs' activities were underpinned mainly by their understanding and knowledge of their local context (i.e., the expensive nature of Internet access) and the use of digital technologies. Thus, the local insights developed on the ground became incorporated into DE. In addition, entrepreneurs have used the distance-bridging potential of digital technologies to identify and exploit opportunities to provide specific digital solutions. For example, they offer free Internet access to connect consumers to retailers. In sum, digital entrepreneurs could embed their digital technologies in their local context, which, in turn, used this embeddedness to create value for their markets. The entrepreneurs' use of digital technologies strongly influenced them to have a collective mindset and help each other.

Therefore, while the goal of each digital entrepreneur is to use the technologies to benefit their entrepreneurial activities, the purpose of each participant was to partake due to their strong principles of collectiveness. A programmer who developed an e-grocery crowdsourcing platform articulates this:

> *[Digital] technology* must be inclusive and not exclusive in terms of participation because the ideals of *technology* should be guided by how this *technology* draws people closer together. We cannot feel comfortable in our entrepreneurial endeavours while the next entrepreneur struggles in their ventures. The features of the *crowdsourcing platform* allow us to connect and collaborate while we compete [Informant #14].

The South African digital entrepreneurs' appreciation of the value of helping one another facilitated a collective effort while undertaking their entrepreneurial activities. They shared the principle that there was value in their interdependence in achieving collective goals and objectives.

The role of digital technologies in connective digital entrepreneurship

Digital entrepreneurs utilise the digital technologies available to them to generate some affordances for enhancing the communal dimension of their entrepreneurial activities. In what follows, we discuss three main affordances from our fieldwork: connecting, collaborating and knowledge-creating affordances.

Connecting affordances

Digital technologies were helping South African entrepreneurs link up with each other irrespective of their locations. They use social media technologies to overcome spatial and temporal constraints to human action by enabling them to form virtual teams of diverse members from different enterprises. The distance-bridging potential of mobile technology powered by the Internet allowed the South African digital entrepreneurs, through their use of the technology, interdependently and independently of their location to link up. They were helping them build communities that transcend established boundaries of organising. Their collective desire drove digital entrepreneurs to connect with mobile and digital applications. A technologist who uses mobile platforms to connect coders and developers across Africa notes:

> We create a community [. . .] via *mobile technologies* from a technical aspect. These *technologies* offer capabilities to have *digital collaboration* beyond borders to enhance our productivity. [Informant #15]

Digital entrepreneurs use technology to stimulate interactions with each other. They use digital technology to facilitate individual-level interactions organised to realise collective-level goals, considering that digital entrepreneurs have diverse experience designing and developing digital products/solutions. The entrepreneurs' use of digital technology enabled the coordination of interactions and regular communication, forming relationships and information seeking. For instance, various technologies, such as social media, messaging and crowdsourcing platforms, enhanced the entrepreneurs' communication levels. Therefore, they could connect in ways that facilitated their "digital bonding", which helped overcome the increasingly essential challenges of face-to-face connections in modern urban settings. One entrepreneur expressed his perception of these affordances by stating:

> *[Digital] technology* draws people to engage, interact, and start relationships so we can know each other more, be affiliated [. . .] and pursue information. [Informant #35]

The above example also shows that digital entrepreneurs appreciate the input of others in undertaking their entrepreneurial activities. Therefore, they relied on the collective enactment of entrepreneurship in which they spread efforts across their community rather than taking an individualistic approach. The connecting affordances of digital technology enabled entrepreneurs to uphold their collective mindset in their engagement with the market and each other. They were consequently empowering each other to enhance the communal dimension of their entrepreneurial practices. They formed interest groups and discussion forums for specific topics like developing software applications on digital platforms where information is posted and shared. Put differently, while undertaking their entrepreneurial activities, digital entrepreneurs have used platforms as the primary communications channels for staying in touch. A digital entrepreneur who developed a platform that aggregates information about different technologists in the township, including programmers, expressed his shared sense of connecting with others:

> We have an online community public *[digital] platform* to connect with other digital entrepreneurs in Mamelodi. If you need to know how many people can write software for you in Mamelodi, their software should be able to provide that information, but not only that, they should be able to interact. [Informant #25]

Being digital entrepreneurs, they had the skills and understanding to apply the broad capabilities that digital technologies provide. Most importantly, the digital nature of the entrepreneurial service creates a fertile ground for harvesting and mining data. Therefore, digital entrepreneurs serve as the information hubs crucial for businesses intending to reach the pyramid's base. The information fulfils marketing initiatives such as offering new and complementary services, understanding demand and supply, discovering emerging customer trends, and credible customer intelligence. One participant opined on this approach among the entrepreneurs when recalling the motive for assisting each other in developing their social media marketing:

> Some people have deeper knowledge about *[digital] technologies*, which helps a lot because they post almost every *technology-related information on social media* that comes into a public space. Then, you can check it and see how you can improve your advertising and marketing. [Informant #27]

The emergence of connecting affordance is the digital entrepreneurs using features of digital technology that offer them possibilities for goal-oriented actions such as enabling interactions, communicating and forming relationships. That way, the connecting affordance diminishes the peculiarities of their local context, such as insufficient technical skills and information poverty among the collective, which may prevent the entrepreneurs from successfully running their enterprises. This allowed them to stay true to their collective approach, which provided them with the valuable benefits of adaptiveness and stability in the dynamic-paced environment of digital markets.

Collaborating affordances

While connecting affordance spotlighted that South African digital entrepreneurs can stimulate digital interactions and commence forming relationships, the emergence of collaborating affordance helped them achieve the goals of sharing information and transferring valuable viewpoints among digital entrepreneurs.

> After developing connections with your counterparts through *digital technologies*, we can exchange valuable viewpoints for collaboration. [Informant #15]

Digital entrepreneurs in our study were building on various web-based collaboration tools to join efforts and support each other on their respective projects. As the interaction and the enhancement of the emerging relations occur within the larger groups of digital

entrepreneurs, a connective action structure to help one another develops. Collaborating affordance describes how digital entrepreneurs achieved the goal of employing highly interactive digital platforms as a shared space to utilise each other's skills and capabilities. The cooperative principle of DE serves as an enabler that stimulates the interplay with the collaborating nature of the mobile platforms. A digital entrepreneur who leverages collaborative technology platforms to advance supplier management systems shared this:

> These *[digital] technologies'* collaborative nature helps me think about how best to collaborate with others, not operate in silence and give back. Hence, as I have illustrated, you see how I have shared my *[digital] platform* with other technopreneurs so we can remotely combine tasks [Informant #31].

The above quote highlights that the entrepreneurs were drawing on platforms that enabled them to join efforts on projects without the need to be physically present in the exact location. Digital entrepreneurs collectively use technologies to depend on each other's inputs by sharing information automatically. They talk and work collaboratively to aid the complete development of digital products/services. For example, digital entrepreneurs would use the instant messaging feature of mobile technologies to provide updates on an individual task that serves as input to the overall project. That way, they prevent duplication or override individual efforts when completing a joint task. One of the programmers who leverages artificial intelligence technologies to develop smart healthcare systems expressed this view by stating:

> Through *mobile platforms*, I can automatically send an instant message to another entrepreneur whenever a code repository is updated or when a version is released to avoid the mistake of duplicating or erasing one another's work. [Informant #3].

The above example highlights how collaboration through information sharing organises and coordinates the tasks of the entrepreneurs working on a project. They put the information to use to start the creation of their digital innovation. Further, the available technologies were helping them build communities that transcend local limitations. South African digital entrepreneurs appreciate the collective construction of their enterprises and draw on the principle of division of labour to join efforts on task-related exchanges such as developing digital products. In addition, the entrepreneurs' understanding of their activities and limitations emphasised the need to split and separate all cognitive aspects of their functions. This helped them justify their judgments to allocate different parts of their activities to others. This approach is suitable because many enterprises do not have all the required specialised or technical skills for developing each software process. Hence, someone would come up with the design, another would be responsible for writing the code, and another would be responsible for testing. While each is involved in different processes, they still have a deep connection to developing the final product, which is enabled by the capabilities of digital platforms, enabling cooperation. For instance, for the digital entrepreneurs that rollout fibre cables to township and rural areas, the collaboration can be substantial:

> We do not have the *[digital] resources* of the big tech giants. We individually cannot hire the business analyst, developer, tester, maintainer etc., so we must embrace the division of labour, but through a shared *technological platform*, we are not in silos or the hierarchy during the process but as a unit, and we can acquire specialised capabilities in the long run. [Informant #1].

Many digital entrepreneurs felt that a common goal brought them together to work collectively. Therefore, digital entrepreneurs use the platforms to extend their reach and build and strengthen relationships, providing a base for knowledge creation. In other words, the entrepreneurs' connections and collaborations are communicative, interactive, and action-oriented to create knowledge. In summary, collaborating affordance extends the connecting affordance by giving digital entrepreneurs a sense of belonging, enabling a working relationship through information sharing and division of labour.

Knowledge-creating affordances

While connecting and collaborating affordances were prerequisites for the knowledge-creating affordance, knowledge-creating affordance is distinct from connecting and collaborating affordances. The digital entrepreneurs went further to employ highly interactive digital platforms as a source of creativity and innovation to experiment with new ideas and co-create products/services. While the shared space allowed skills and capabilities concentration, where collective knowledge was created, the digital entrepreneurs' shared experiences and reflections on others' experiences were also crucial. The knowledge-creating affordance that emerged from the collective gathering of digital entrepreneurs matches the expectation that interactively using digital platforms improves users' access to the resources they need to develop digital products. Furthermore, the platform acted as a sounding board for testing ideas. Through this engagement, an idea for an invention is experimented with and shared with others on the platform. This was helpful for the digital entrepreneurs lacking the advanced technical skills and conviction to get suggestions for improvements and knowledge on how to pursue their goals successfully. A digital entrepreneur of the community-based platform highlights this:

> Because not all of us have the required sophisticated technical skills but just the average, we can use *[digital] platforms* to help others. We can do trial and error to experiment with different methods to learn from each other and develop our expertise. Then, we take the knowledge and confidence to develop our ideas and approach our projects. [Informant #25]

The technological strength of the platforms and the technical expertise of some of the entrepreneurs were significant to the learning opportunities available to the collective. This space allowed the construction of situations that enabled digital entrepreneurs to enact their propensity towards exchange, thus allowing them to create conditions that foster individuals' confidence to pursue their entrepreneurial agendas. That way, the value of helping each other as a motivation for a community mindset became integral to surviving the intricate nature of DE. For digital entrepreneurs, working on mobile platforms is extremely valuable for knowledge creation and harnessing their collective intelligence to test and improve their ideas. The ability of digital entrepreneurs to use the several features (store, retrieve and analyse data) of digital platforms to contribute, edit and analyse content on platforms had a wide variety of benefits in supporting the design of software and experimenting with ideas. A social media digital entrepreneur note:

> *A [digital] platform like Nuclino* facilitates togetherness between us. In real-time, we synthesise and analyse information each party brings to the platform to know how software can be developed. You do not always have to make an input, but you can observe and learn from the review and *recombination of codes and the testing procedures that produce useable software*. [Informant #27]

The example above highlights those tasks involving the simulation of new software products; due to the entrepreneur's interdependence, the simulation result is for the benefit of the group. Their subscription to a community system, specifically the shared anticipation of learning from each other, was essential in their ability to get help developing a product. In addition, the mutual expectations allowed them to get help from each other, appreciating that individual learning does not necessarily have to contribute to their expertise. Further, the digital platform allowed them to push the limits of the possibilities in their design space by creating new knowledge that can expand their entrepreneurial reach. The entrepreneurs actualised the affordance of the digital platforms to realise emergent organising. They crowdsource for expertise to enable the development of their digital enterprise. Given their familiarity with the technologies, they can enact a platform for information gathering and dissemination to regularly share project-related ideas and brainstorm creative concepts based on each others' skills and domain knowledge to create the knowledge that would spearhead initiatives across different sectors:

> The beauty of *technological platforms* for us entrepreneurs is that we can manage knowledge content in a single location, so everyone can easily access solutions and get updates — you can even use the *[digital] platform* features to share project plans and collect opinions and feedback. [Informant #13]

With the limited resources associated with entrepreneurs' context, they leveraged their collective attitude and use of digital technologies to unlock opportunities to create knowledge and innovations to overcome the challenges associated with the complex task of DE. Their efforts to focus on the digital aggregation of resources and opportunities are necessary to give rise to digital skills and amplify economic opportunities for one another. Their digital practice and approach further illustrate how technology reflects the digital entrepreneurs' value systems while affording knowledge to each other. The digital entrepreneurs offering crowd logistics platforms support each other highlights that their entrepreneurial mindset was a dedication to the overarching act of helping and sharing skills, even when seeking market-based goals:

> You would take a *crowdsourcing platform like Android*. While you are interacting to create new ideas and new business models to build better products, you are also manifesting the collective spirit of helping each other despite operating in the same markets [Informant #8]

In conclusion, while each affordance is based on the features of digital technologies, the altruism and liberality engendered by the digital entrepreneurs' context (e.g. poverty as a capacity or opportunity deficiency) were crucial. Such relational attributes highlight a context favouring collectiveness over individualism, developed through a consciousness of joint responsibility and a view of one's identity as created through relations with others. Furthermore, digital entrepreneurs with disadvantaged backgrounds had a common interest in driving a collective approach to developing digital solutions due to the sentiments geared towards eliminating their common impoverishment. Figure 1 shows the distinction between each affordance and their prerequisite relationship.

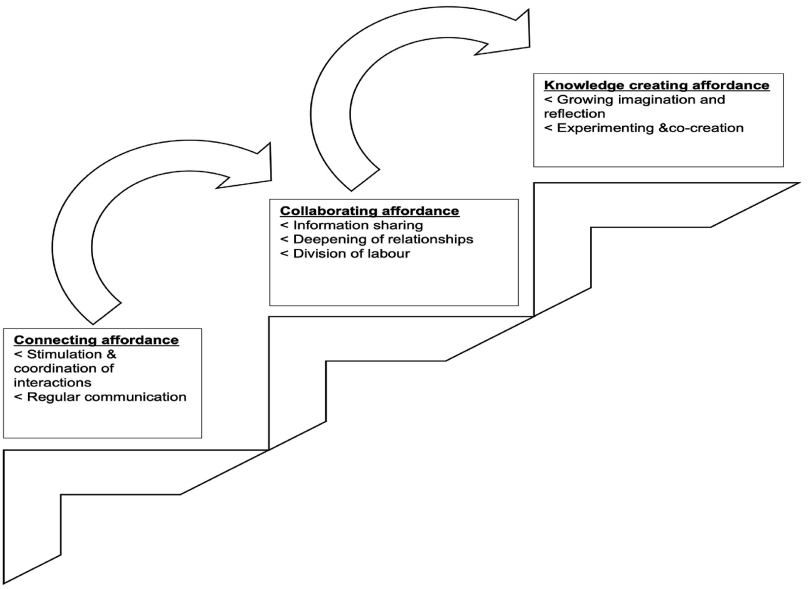
Coopetition during digital entrepreneurship

Despite the entrepreneurs' collective attitude, they were also in competition, thus creating a coopetitive environment of DE in which digital entrepreneurs pursued their own competitive goals while cooperating with others who pursued similar goals despite competing in the same market. This attitude to competition helped digital entrepreneurs draw on capabilities, resources, opportunities, or complementary skills to align their interests and take advantage of emerging opportunities. A digital entrepreneur who rolls out fibre cable expressed this:

> To accomplish our goals independently, we compete with companies such as Vumatel and Link Africa in the same telecommunication market, which is capital-intensive but with limited infrastructural resources. We work together through available *digital platforms*. Our competitors even support us with marketing and technical skills. This is very common with us. [Informant #39]

The above quote emphasises that despite the digital entrepreneurs having an attitude to collaborate, they also realised the need to have a competitive mindset to allow them to individually pursue resources to enable them to stand out in the market. However, despite the coopetition among the South African digital entrepreneurs going beyond technological and geographical overlaps to product market overlaps, competition did not overcome their collaboration attitude. On the contrary, their strong collective mindset allowed them to continue to show their humanitarian side; hence, they continued to espouse their community spirit and be forthcoming with support to each other while still competing. A technologist who leverages 3D printing technology to produce statues states this:

> To be honest, competition is essential. How else can you differentiate yourself in our market? However, sharing *digital platforms* enables us to help each other. [Informant #18]



Source(s): Authors' own work

Figure 1.
Configuration of connective affordances during digital entrepreneurship

An entrepreneur who uses open-source platforms to develop IT risk, security and compliance solutions for organisations provides further evidence of the idea of collectiveness to support each other despite competing:

> Sometimes, business economics threatens our ability to collaborate through *open-source platforms*, but we always stay faithful to each other because we all come from the same place. [Informant #22]

Participants suggested that digital platform collaborating features enabled them to compete and collaborate simultaneously. The ability to use digital technologies to collaborate expanded opportunities for the entrepreneurs and enabled them to tap into the collective resources of their network to support their entrepreneurial activities despite competing against each other. Furthermore, these collaborative affordances were helping the entrepreneurs overcome the tensions of being cooperative and competitive simultaneously. A digital entrepreneur who develops enterprise systems for organisations expressed this view by stating:

> We ensure to collaborate through *digital platforms* [. . .]; that way, we have beneficial collaborations because we have an aggregation of *digital assets and capabilities* to cooperate even when we compete [Informant #24]

The data highlights that the entrepreneurs drew upon their "we" ideology to create and join chat rooms on Slack and WhatsApp to contribute to and share content. The creation of chat rooms and content results from social production by the users to consume information, enabling them to cooperate and compete with each other based on the information generated in the chat rooms. The appropriation of social media platforms to produce information and knowledge, i.e., social production collaboratively and in competition, is based on the entrepreneurs' beliefs that information should be free flow amongst all rather than asymmetrical. Aside from using the Slack and WhatsApp features, e.g. open for users to join

chat rooms, the digital entrepreneurs would have also used the social media platforms features to generate conversational threads of messages, e.g. texts, images and files to generate information and knowledge that facilitates their entrepreneurial practices. Further, they can use social media platforms to send messages to various people and engage in video calls during DE. Therefore, the new technologies, particularly those taking the form of digital platforms, were facilitating an environment of *coopetition* among the digital entrepreneurs:

> *Slack* allows us to collaborate and contest with other developers in the group. [Informant #11]

> We are using many *platforms, such as WhatsApp*, in conjunction with the *digital enablers*, to compete and collaborate with other techie guys to create a product you can monetise. [Informant #17]

Digital technologies web 2.0 features like "allowing live chats" and "direct messaging facility providing an affordance of interconnectedness is a blessing for digital entrepreneurs as it allows them to communicate, interact and collaborate in various ways. Mobile technologies underpinned by Web 2.0 features influence the entrepreneurs" interconnectedness behaviours. The nature of these digital platforms minimising the need for the digital entrepreneurs to be physically present in a specific location would significantly reduce their operational cost, a motivation to cooperate while competing, i.e., coopetition. The entrepreneurs with technical expertise and capabilities undertook their digital entrepreneurial activities, believing they needed to serve others even when constantly pursuing profit-based motives. An entrepreneur who develops mobile applications for the retail market stated this:

> We are in it together, and our bond as brothers is key [. . .]. Our access to *digital technologies* and *technological abilities* supports the help. [Informant #23]

The fundamental value proposition of having this shared benefits mindset is that it creates an environment of *coopetition* among digital entrepreneurs. In this environment, they can use technology to pursue their own competitive goals while cooperating with others pursuing similar goals.

Discussion

This paper answers the research question, "How do the connective affordances of digital technologies enable coopetitiveness in DE in a resource-constrained environment?" We studied how South African entrepreneurs use digital technology and how these actors use the affordances of technology to work in collectives to cooperate and compete simultaneously. The collective approach provides a perspective by emphasising a mutual approach to DE. Furthermore, our findings highlight the crucial role of digital technologies in identifying partners' interactions and accessing resources (Abubakre *et al.*, 2021) to stimulate and foster fluid entrepreneurial activities across a community of entrepreneurs. The generativity and disintermediation of digital technologies enable entrepreneurs to build products and services that often require limited resources (Nambisan, 2017). This paper shows how digital technology appropriation for entrepreneurship activities is linked to the affordances actualised by the technologies. Our data revealed how digital entrepreneurs engaged in digital technologies to connect and collaborate by sharing information and creating knowledge to help each other's entrepreneurial cause. These affordances underlie the emergence of connective action amongst South African entrepreneurs operating in a resource-constrained environment by shaping distinct and interdependent patterns for using technology features in their entrepreneurial activities.

Specifically, the digital entrepreneurs initiated and guided the connective action by using social media, mobile media and crowdsourcing platforms to post and share content. The

entrepreneurs were able to actualise the affordances of digital technology by using the features of digital platforms (including free web spaces, visibility of each other's information and "analytics") to connect, collaborate, allow experimentation and knowledge creation. The emerged affordances in our study are consistent with the literature (e.g. Faraj and Azad, 2012; Leonardi, 2013) as they are based on the features of a technology that are perceived by the digital techs as it offered them possibilities for their goal-oriented actions to connect, collaborate and knowledge creation during DE.

Our findings reveal that the connective action afforded by the South African's use of digital technologies to undertake their entrepreneurial activities is based on their capabilities, resourcefulness, and social interactions. Like Zheng and Yu (2016), we argue that "socialising" is enacted in the social practices but performed in the connective action because, in our case, the organisation and coordination of connective actions rely more on social or norm-emphasising strategies enacted by the actors and not the forms of collective action that relies on formal organisational objectives (Stohl, 2014; Vaast *et al.*, 2017). The DE activities in ways that could be conceptualised as pooled and reciprocally interdependent (Leonardi, 2013) because the digital entrepreneurs understood they needed to use the technologies to support their weaknesses and vulnerabilities due to their resource-constrained context. Indeed, like Cardoso *et al.* (2019), the entrepreneurs' collective mindset and resourcefulness facilitated the pooled and reciprocally interdependent connective actions. Further, the digital entrepreneur's contextual conditions of operating in a resource-constrained environment, coupled with having disadvantaged backgrounds, enabled a collective attitude supported by affordances of digital technology to allow members to access resources and expertise during their entrepreneurial endeavours. Our findings emphasise the constitutive role of collectiveness and digital technology in DE activities as bonds for the entrepreneurs to draw resources from their formed community.

The connecting, collaborating and knowledge-creating affordances from the undertaking of DE implicitly highlight prerequisites between them. For example, connecting affordance needs to be accomplished before collaborating affordance can emerge. Similarly, collaboration needed to be achieved before the entrepreneurs could collectively engage in knowledge creation. The prerequisite of the affordances highlights the high interdependency of digital entrepreneurs due to operating in a resource-constrained setting. The identified affordances highlight a digital bond underpinned by elements of altruism, which also made a humanitarian bond. This humanitarian approach to collaboration differs from the standard approach described in the extant literature, which describes the formation of partnerships as mainly driven by market mechanisms and competitive objectives (e.g. Bengtsson and Kock, 2000; Hoffmann *et al.*, 2018). The humanitarian bond identified in our study enabled the entrepreneurs to collectively utilise digital technologies to cooperate and learn from each other to enhance their expertise and experience and respond to the fluidity in the digital arena. This finding contrasts with previous studies that emphasise the individual entrepreneur as heroic, with distinctive features, capacities and endowments to run successful enterprises (Abubakre *et al.*, 2022; Li *et al.*, 2018). We provide fresh insights into how contextual conditions influenced the collective usage of digital technology.

Our study explores the context of South African digital entrepreneurs by capturing how technology-mediated humanitarian actions allowed a collective attitude towards the undertaking of DE. The collective-based mindset drove cooperation and competition, i.e., coopetition between the South African digital entrepreneurs. Furthermore, our study has shown digital and humanitarian bonds to include cooperative relationships and partnerships grounded in their technical expertise, mutuality and respect (Abubakre and Mkansi, 2022), elements we classify as the relational dimension of DE and coopetition. The collective approach enabled by social connections comprises community connections, and the technological affordances present a dualistic connection that entails cooperating but

competing (Hoffmann *et al.*, 2018; Runge *et al.*, 2022). As the digital and humanitarian bonds determine what opportunities through collaboration can be created in an impoverished context, it also provides insights into how competition in these deprived emerging markets can be enacted. We argue that coopetitive opportunities through the connective actions that emerged from DE are contextualised in resource-constrained settings and are collectively determined.

Contributions

This paper makes several contributions to knowledge. Firstly, by building upon what our findings mean for digital technologies enabling a coopetitive approach to entrepreneurship in a resource-constrained environment, we contribute to the technology affordances literature (e.g. Leonardi, 2013; Vaast *et al.*, 2017; Zheng and Yu, 2016). We introduce a new type of affordance, which we call coopetitive affordance. Coopetitive affordance corresponds to connective-level affordances of digital technology that are actualised as entrepreneurs who take humanitarian roles and display collective use of technologies to highlight how they undertake coopetition during their entrepreneurial endeavours in increasingly digital and resource-constrained realities. While connective affordances focus on mutual dependence among technology users for a shared goal (Vaast *et al.*, 2017), coopetitive affordance relates to the interdependence of actors competing with one another but are also motivated to continue cooperating and working collectively. If the digital entrepreneurs' collective and interdependent use of technologies does not allow them to cooperate and compete simultaneously, coopetitive affordance may not be actualised. The categorisation of coopetitive affordances is based on actors' shared and interdependent patterns of digital technology use, which created a digital bond and the actors' contextual conditions fostering a shared humanitarian bond. Coopetitive affordance is crucial because it reflects how entrepreneurs utilise the connective actions afforded by the South African entrepreneurs' appropriation of digital technologies to create humanitarian and digital bonds as new ways to cooperate and compete in the new digital world. Coopetitive affordance offers a community perspective of how entrepreneurs recognise and undertake their entrepreneurial activities in the underprivileged context of South Africa and the role of contextual conditions fostering a community-centred approach. It thus highlights the need to explain how digital technologies become entangled with local value systems, thus providing a refined conceptualisation of collective appropriation of technologies and coopetition. Drawing on such a collective perspective is particularly important in understanding how a collective approach to DE can help address the socioeconomic issues of underprivileged communities.

Secondly, our study contributes to the DE literature. We respond to the calls to extend recent theorising in the DE literature that has sought to unpack how affordances emerge (Autio *et al.*, 2018; Meurer *et al.*, 2022; Nambisan *et al.*, 2019). This paper responds to this call by showing how the enacted affordances also depended on the digital entrepreneurs' resource-constrained context to take a community approach in their DE. Our study focuses on the local conditions (e.g. insufficient technical skills and information poverty) in South Africa that influenced the emergence of the three connective affordances – connecting, collaborating and knowledge-creating. Moreover, much IS research has focused on enacting DE in resource-rich contexts, highlighting entrepreneurs' meritocratic and heroic individual abilities (Abubakre *et al.*, 2022; Li *et al.*, 2018). So far, there has been little research on how digital technology shapes new, informal forms of a collective undertaking of DE. However, these new collective undertakings of DE that go beyond established individual roles and organisations are particularly significant when investigating digital technology use, given their characteristic of affording altruism and liberality engendered by the digital entrepreneurs' context (e.g. poverty as a capacity or opportunity deficiency). This research

addressed this gap in the IS literature on DE by focusing on digital technology use in collective endeavours occurring beyond an individual's unique abilities and talents. We do so by spotlighting a collectiveness approach to digital technology use developed through a consciousness of joint responsibility and a view of one's identity as created through relations with others. This way, we respond to calls for IS research to examine the interaction between humans and digital technologies and the emerging impact on collective organising (Young *et al.*, 2019) for DE and to recognise the diverse opportunities of digital futures (Faik *et al.*, 2020).

Thirdly, our study contributes to the coopetition literature. The coopetition phenomenon, an essential strategic tool for enterprises to simultaneously engage in cooperation and competition, has been adopted in general Management and strategy literature (e.g. Hoffmann *et al.*, 2018; Park *et al.*, 2014; Runge *et al.*, 2022). Our study highlights the role of coopetition in DE. We reveal how connective actions through affordances of digital technologies created digital and humanitarian bonds to sustain coopetition between the entrepreneurs despite having a product market lap and facing the pressures of operating in a digital goods and services marketplace. The literature argues that coopetiton becomes pure competition when enterprises have a product market overlap (Hoberg and Phillips, 2018), which can be rewarding and challenging (Runge *et al.*, 2022). We provide evidence that coopetition during DE does not become latent to the saliency of competition; thus, reducing the chance of enterprise exploitation. This is due to the changing response to the need to have a distributed agency, as opposed to a sole agency imposed by contextual conditions unique to resource-constrained settings and the increasing spread of digitalisation. That way, we fill the gap in the knowledge of the conditions under which coopetition occurs in less advanced economies by focusing not only on the market and economic forces but also on clan-based and digital forces.

Also, our study has practical implications. Firstly, our study brings insights that help shape the use of digital technology for connective action during the undertaking of DE in resource-constrained environments. It is essential to highlight the operating connective affordances and the interplay between humanitarian and digital bonds created by their appropriation of digital technologies in collectives. Understanding this aspect is important from a policy perspective. Policymakers must adopt novel approaches to stimulate entrepreneurial activities in resource-constrained environments that differ from developed industrial and already established settings (Autio *et al.*, 2018). This research revealed emerging, informal roles enacted through digital and humanitarian bonds from entrepreneurs using digital technology to have cooperative and competitive relationships.

Secondly, it can help digital entrepreneurs who wish to engage in coopetition through connective action by taking relational and altruistic views on using technology. Our findings could also inspire digital entrepreneurs with limited skills or access to resources to have the confidence to collectively appropriate technology to overcome the risks and uncertainties they face in undertaking DE.

Thirdly, having a better sense of the different affordances for DE can help digital entrepreneurs be more mindful of their goals and the features of digital technologies when enacting connective action. Entrepreneurs operating in resource constraints settings willing to cooperate in or mobilise others to cooperate for connective action via the use of digital technologies could, in particular, be aware of the logical prerequisite nature of affordances, i.e. connecting affordance is required for collaborating affordance and attaining the two affordances that are required for knowledge-creating affordance. The identified affordances were also stimulated by the contextual condition, i.e., the collective identity the entrepreneurs shared when undertaking their DE activities that highlighted their interdependency of actions. Entrepreneurs could also leverage their contextual condition while using digital technologies to offer them possibilities for their goal-oriented actions to connect, collaborate

and knowledge-create, allowing them to cooperate and compete simultaneously during their entrepreneurial endeavours.

Finally, in conjunction with entrepreneurial activities, the societal mindset of collectiveness should be interpreted, adhered to and embraced by society in ways that motivate economic goals. This can offer helpful insight into how policymakers and entrepreneurial hubs can model society's ideals towards the economic and national imperatives necessary to ensure a broader and more diverse inclusion.

Conclusion

By focusing on the collective attitude of the entrepreneurs, this paper examines how connective affordances of digital technologies enable a cooperative approach to DE. This paper sought to depart from the understanding of DE from the enterprising individual to an understanding of DE as a collective process by considering how the concept of connective affordance serves as situational opportunities that influence the behaviours of South African digital entrepreneurs. Hence, we also examine the role of digital technologies (i.e., social media, mobile media and crowdsourcing platforms) and the South African context socialised in connective actions for entrepreneurial pursuits in South Africa. This enables us to add to a developing IS literature on collective and connective affordances (Leonardi, 2013; Vaast *et al.*, 2017; Zheng and Yu, 2016). Our research examined how actors use digital technologies to compete and cooperate due to the collective approach afforded a new type of affordance, which we call coopetitive affordance. Conceptualising coopetitive affordance as connective-level affordances actualised when actors collectively undertake entrepreneurial activities helps us understand how digital technologies afford coopetitive action.

We acknowledge some limitations in our study that allow exciting future research opportunities. Firstly, this study focuses on how technology affordance perspectives influenced collective DE activities. Our approach enables us to answer scholars' calls (Fang *et al.*, 2016; Nambisan *et al.*, 2017) to construct accurate explanations of innovation processes in an increasingly digital world. Nonetheless, we could not identify the influence of these perspectives on DE outcomes – success or failure. Hence, future research can explore the role of collectiveness and technology affordance perspectives or other suitable perspectives on DE outcomes. Secondly, despite focusing on the analyses of the use of different digital technologies (i.e., social media, mobile technologies and crowdsourcing platforms), we did not observe the complimentary use of digital technologies. Future research could study how complementary use can actualise new forms of affordances, particularly related to connective and collective actions.

Notes

1. We define a resource-constrained DE environment as one characterised by insufficient technical skills and information poverty. Hence, digital entrepreneurs operating in such an environment need to collectively tackle the challenges they face.

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Appendix 1
Interview guide

We include three sections for the interview with digital entrepreneurs.

Experience in digital entrepreneurship

(1) How did you become a digital entrepreneur?

(2) Can you describe your digital entrepreneurship activities – digital entrepreneurship (i.e., joining traditional entrepreneurship with an emphasis on new digital technologies to create new business forms)?

(3) How do you undertake your digital entrepreneurship activities?

Affordances in digital entrepreneurship

(1) Which digital technology (ies) do you use for your entrepreneurial activities?

(2) How do you use them? Why do you use them?

(3) Is there an unexpected consequence of using the technology (ies)?

(4) How easy would you say it is to access? How easy is it to use? Do you need any special knowledge to use it?

(5) How motivated are you to use it? Do you think it is useful? Is it worth the effort?

(6) How would you describe your knowledge, expertise, and experience utilising the technology (ies)?

(7) How does digital technology (ies) enable you to achieve your entrepreneurial objectives?

(8) What is your approach to experimentation?

Competitive nature of digital entrepreneurship

(1) Does your digital enterprise rely on the network in your environment?

(2) How useful are digital technologies for dealing with the competitive nature of digital?

(3) Do you use the network in your environment to overcome the competitive nature of your digital entrepreneurial activities?

(4) How well would you say the network works?

(5) How easy would you say it is to access?

(6) Do you feel your network enables you to achieve your entrepreneurial objectives?

Appendix 2

Sample quotes	Frequency of affordances in the interviews Terms related to the affordance	Number of mentions	Resulting affordances
"Technology draws people to engage, interact, maybe exchange valuable viewpoints"	Digital technologies stimulate interaction and information seeking	24	Connecting
"Digital Innovation has given a number of engagements beyond being physical."	Coordination of interactions enables communication		
"Digital platforms also allow us to simplify sharing and accessing documents"	Transferring valuable Information	22	Collaborating
Our technology skills enable us to use computer-based technology to complete different tasks and gain other technical skills"	Division of tasks to acquire specialised capabilities		
"Open-source enables us to germinate our ideas within the industry"	Shared space via technology serves to grow imagination	18	Knowledge Creating
"We entrepreneurs use digital platforms to run algorithms to know what works"	Experimentation to check and reflect on processes that work		

Source: Authors own work

Table A1. Additional insights into the dataset

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