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Article

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MANAGEMENT | RESEARCH ARTICLE

Mapping the needs and challenges of SMEs: A focus on the city of Johannesburg entrepreneurship ecosystem

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Abstract: Entrepreneurship ecosystems have increased in popularity to foster more entrepreneurial activity and, hence, spurring economic growth and employment creation. To explore the state of the City of Johannesburg's entrepreneurship ecosystem and identify the gaps and weaknesses that cause the ecosystem not to function optimally. This is through the lens of the challenges and needs of entrepreneurs in the city This research was a propagation of this phenomenon within the context of Africa and focusing more specifically on the City of Johannesburg in South Africa. This was a cross-sectional, quantitative study with a sample of 1099 entrepreneurs. Data analysis included aggregating and analysing the data through descriptive statistics, simple observation, comparison, and pattern recognition. The study's findings showed a map of the City of Johannesburg's entrepreneurship ecosystem's issues and how entrepreneurs across different regions are not affected differently by the geographic region. The key challenges were access to markets, equipment, and suppliers, and the critical needs identified were investors, suppliers, and entrepreneurship education. After mapping the challenges and needs of entrepreneurs to the ecosystem framework, it was evident that the three entrepreneurship ecosystem domains which represent the most significant barrier for entrepreneurs in the City of Johannesburg were access to markets, finance, and human capital. It is also found that the spatial divide effect in the city lowers access to markets for entrepreneurs. The study recommends that COJ need to support entrepreneurs in a more structured way taking an integrated approach, so support is not fragmented as it is evident that all is linked within the ecosystem and they all affect each other in tandem, i.e. access to markets, finance and human capital.

Subjects: Business, Management and Accounting; Entrepreneurship and Small Business Management; Entrepreneurship

Keywords: Entrepreneurship ecosystem; complex theory; entrepreneurs' challenges; entrepreneurs' needs

1. Introduction

Scholars have studied the entrepreneurship phenomenon from numerous perspectives, each with its merit, making it challenging to define entrepreneurship distinctly or generally (Moroz & Hindle, 2011). Entrepreneurship literature is increasingly being applied to market-orientated phenomena. This is particularly the case in academia through academic capitalism because this is becoming a unique university contribution to economic development due to the relationship recognised

between entrepreneurship and sustainable economic growth (Audretsch et al., 2015; Figueroa-Armijos & Johnson, 2016; Mars & Rios-Aguilar, 2009; Martinez-Fierro et al., 2016).

However, these studies fail to go further and investigate the link between what entrepreneurs need and face as challenges and the non-functional entrepreneurship ecosystem or the environment in which the entrepreneurs operate (Sheriff & Muffatto, 2015). The current reality of the entrepreneurial ecosystems is that they are neither well understood nor well defined (Theodoraki et al., 2017). However, more research is required to expand and contribute to the knowledge because sustainable entrepreneurship ecosystems play a crucial role in sustainable regional economic development (Stam & Spigel, 2016; Theodoraki et al., 2017).

Entrepreneurship ecosystems are becoming increasingly popular in public and private institutions worldwide as more governments, universities, corporations, and communities have realised the importance of a holistic and integrated approach to foster regional entrepreneurial activity and enable innovation (Simatupang, Schwab & Lantu, 2015). The study's contribution to literature is an extension of the nascent field in the context of Africa, South Africa and Johannesburg, which is not often studied. The contribution is in the form of more data and a Johannesburg entrepreneurship ecosystem map and model that is produced. This study contributes to the considerations of entrepreneurial ecosystems and how they can be understood as regional contributors to entrepreneurship development because literature emphasises this contextual nature (Theodoraki et al., 2017).

The paper highlights the importance of networks for entrepreneurial economic development and how South Africa's past may have created institutional and "cultural" network limitations. This study adds to the literature in this context with outcomes that have implications on South African socio-network settings.

The study aids entrepreneurs to identify the entrepreneurship ecosystem gaps they face and gives them guidance on how to navigate these gaps. This study helps policymakers guide their decision-making to implement practices and policies that lead to effective entrepreneurship ecosystems. Scholars are given more clarity into the determinants and performance variables of the entrepreneurship ecosystem within the City of Johannesburg.

If the economy is an interplay of value creation and exchange between legal entities known as firms, then it can be considered that the firms are nodes within a network. This behaviour is mimicable to the relationships that organisms have within a habitat. This concept is known as an ecosystem, and one can take the notion of an ecosystem seriously for entrepreneurship and the economy (Auerswald, 2015). The economic system has entrepreneurship embedded in it because, to establish the value of exchange brought about through a transaction, an opportunity needs to be identified. This process of opportunity recognition is also recognised as entrepreneurship. Therefore, entrepreneurship becomes a unit of the economic ecosystem. This is parallel to how the basic units of nature also form the broader and complex ecology system. However, one can argue the model of the entire earth and universe is to be an ecosystem composed of ecosystems as units (Auerswald, 2015). Therefore, it becomes important to consider the ecosystem as a multiplexity of ties between economic agents where total entrepreneurial activity and innovation result from the economic agents interacting in the ecosystem (Ferrary & Granovetter, 2009).

We can consider the entrepreneurship ecosystem to be a complex network of stakeholders, capital support systems (financial and intellectual), and entities that serve different roles and purposes that represent integrated policies, structures, programmes and processes that enable the entrepreneurial process and behaviour (GEN, GEDI and Sea Africa, 2017; Ferrary & Granovetter, 2009; Isenberg, 2011; Levin, 2017; Simatupang, Schwab & Lantu, 2015).

The study's primary objective is to examine the state of the City of Johannesburg's entrepreneurship ecosystem and better understand the gaps/weaknesses that cause the ecosystem not to function optimally. This is subdivided into three sub-aims which are

1.1. Sub AIM 1
To identify the challenges and needs of entrepreneurs in the City of Johannesburg's entrepreneurship ecosystem.

1.2. Sub AIM 2
To map the challenges and needs of entrepreneurs according to the six domains of the Entrepreneurship ecosystem framework

1.3. Sub AIM 3
To formulate a model that can be used to understand and address the challenges and needs of entrepreneurs in the City of Johannesburg's entrepreneurship ecosystem.

2. Literature review
Drawing from Daniel Isenberg's entrepreneurship ecosystem domain concepts and network theory, this study investigates the state of the City of Johannesburg's entrepreneurship ecosystem. The ecosystem approach is influenced by a theoretical framework known as the network theory, a theme with exponentially growing citations over the years (Borgatti & Halgin, 2011; Halgin, 2012). Network theory can be considered the processes and dynamics involved when network structures interact and bring about outcomes in an ecosystem (Borgatti & Halgin, 2011).

Complexity is one of the characteristics of networks, where the nodes within a network are defined by the context that is not only state-dependent but also path-dependent and where the outcomes and dynamics form the nature of a network's complexity (Borgatti & Halgin, 2011; Ferrary & Granovetter, 2009; Jen, 2005). When entrepreneurship is considered through the lens of complex network theory as an ecosystem, one can then align with the notion that functioning entrepreneurship ecosystems promote economic development (Audretsch et al., 2015; Ferrary & Granovetter, 2009; Mars & Rios-Aguilar, 2009; Martinez-Fierro et al., 2016). This is because economic complexity correlates with growth and innovation at a country level (Stangler & Bell-Masterson, 2015).

The entrepreneurship ecosystem models that have been developed across various modes and categories speak to systems and network theories about entrepreneurship (Auerswald, 2015; Cohen, 2006; Isenberg, 2011; Stam & Spigel, 2016; Theodoraki et al., 2017). Entrepreneurship ecosystem research and literature in the context of Africa is limited. When considering that economic development and youth unemployment are often referenced as the purposes and motivations for entrepreneurship research, the exogenous factors that are contained within entrepreneurship ecosystem theory should be considered more (Mahmood, Wang Botchie , 2017; Sheriff & Muffatto, 2015)

The primary considerations in this study are the systems approach and the systems-network approach, and the configurational approach (Auerswald, 2015; Cohen, 2006; Isenberg, 2011; Stam & Spigel, 2016; Theodoraki et al., 2017). These schools of thought are applicable in the regions where they were developed in the global north; however, the extent to which they apply in Africa is still unclear. This is important to contextualise as this study seeks to inform the communities and policymakers for the African context.

3. Theoretical framework: Daniel Isenberg's entrepreneurship ecosystem
Isenberg (2011) proposes a six-part framework to discuss entrepreneurship ecosystems, which comprises six domains that are made of another twelve elements. Figure 1 portrays these elements, which are discussed in detail below:

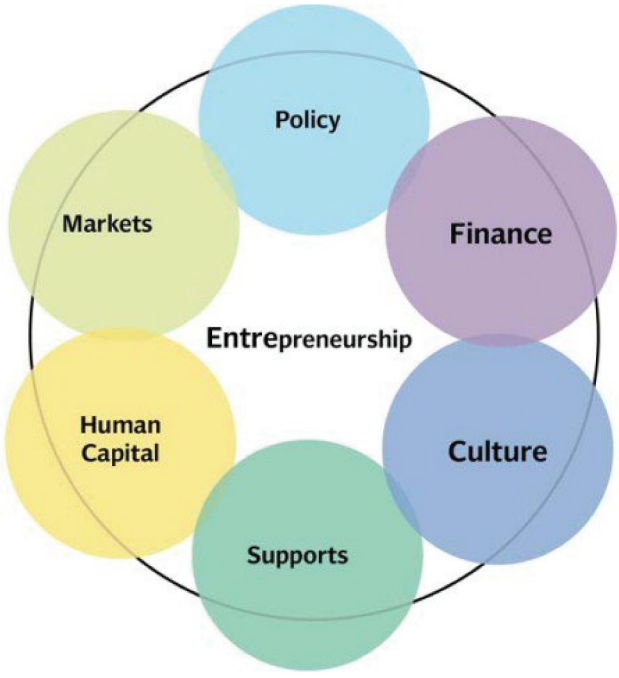

Figure 1. Six domains of an entrepreneurship ecosystem (Isenberg, 2011).

3.1. Finance

Finance is the backbone of the economic concept and hence the backbone of an economy. Financial systems affect economic growth in numerous ways and one of those ways is in how they affect entrepreneurship. An entrepreneur can only access appropriate finance depending on the evaluation on which the financial system categorises and processes their business (King & Levine, 1993). The efficiency of the financial system is based on its ability to mobilise savings in such a way that allocates them to productivity-enhancing and innovation-based activities (King & Levine, 1993).

SMEs contribute the most to the economic system; however, they face the most challenges in operation and growth (Beck & Cull, 2014). Finance becomes an important factor in this issue because all businesses need finance to access resources so that they may start or grow. However, SMEs are faced with numerous challenges in accessing appropriate financial support. Financial institutions inherently deem them to be high risk (OECD, 2016). Additionally, there is an information asymmetry between financiers and SMEs, causing financial institutions to lend at higher interest rates than big businesses (OECD, 2016).

Access to finance and financial resources are considered a vital impediment and issue within Africa and South Africa (Chimucheka & Mandipaka, 2015; Leboea, 2017; Makina et al., 2015). High levels of access to finance have been proven to positively influence the performance of entrepreneurs in attaining more revenue and growing the number of employees (Leboea, 2017; Makina et al., 2015).

Most studies attribute the challenge of access to external finance, particularly in developing economies and South Africa, to the information asymmetry and credit market inefficiencies that exist for SMEs (Leboea, 2017; Makina et al., 2015). There is, therefore, a finance gap between funding supply from banks and SMEs accessing the funding which then results in most SMEs resorting to informal finance which has less impact on firm growth (Chimucheka & Mandipaka, 2015; Leboea, 2017; Makina et al., 2015).

Hypothesis 1a & 2a—Funding is one of the challenges and needs of entrepreneurs in the entrepreneurship ecosystem

3.2. Policy

There has been an increased focus on entrepreneurs by policymakers. This is because entrepreneurship has been shown to aid economic progress. Therefore, regulatory frameworks should catalyse the entrepreneurial spirit to drive a productive economic state and create new market formations (Kreft & Russel, 2005). Such policies could directly address the entrepreneur's needs, including business development programs (Rigby & Ramlogan, 2013). Alternatively, pro-entrepreneurship policies may be through broadcast methods such as addressing the education policy (Rigby & Ramlogan, 2013).

The government's role must be to support entrepreneurs to grow to a critical mass across various industries and sectors. However, because of resource constraints, government support may need to be focused on. This is an unavoidable factor of SME support in emerging markets because it would make it more likely to succeed as it becomes simplified administratively and financially (Wattanapruttipaisan, 2003).

Moos (2014) has found that it is possible, and it does happen, that entrepreneurship policies fail, even the best ones, purely because of the complexity of factors at play. In South Africa, the small business policy needs to become more sophisticated in categorising the different types of businesses in terms of high growth startups and small businesses (Moos, 2014). This sophistication allows the policy to be impactful for more types of businesses to create more diversity in the ecosystem because it is currently only impacting small businesses and not startups which could develop into a venture or high growth business (Moos, 2014; Stangler & Bell-Masterson, 2015).

Hypothesis 1b &2b—Policy is one of the EE domains that cause challenges for entrepreneurs in the entrepreneurship ecosystem and is a need in the ecosystem

3.3. Culture

Scholars have researched the relationship between entrepreneurship and culture to differing degrees. However, there have also been empirical patterns and significant relationships between the two elements (George & Azahra, 2002). Culture is seen as an enduring set of shared values within a nation, region or organisation. These values may strengthen or weaken the social norms towards entrepreneurship, such as the value of entrepreneurship as a career (George & Azahra, 2002). However, an entrepreneurial culture is also a theme that transcends national borders and, in a way that isolates the culture of entrepreneurs as being unique in terms of how they think (George & Azahra, 2002).

In countries where the society has developed a national culture, the entrepreneurship culture in that country is one dimensional, following the national culture, however in a Sub-Saharan Africa perspective and arguably other emerging economies where ethnic cultures are still differentiable from the national culture, the national entrepreneurship culture is more complex (Mungai & Ogot, 2012).

Hypothesis 1c & 2c—Culture is one of the challenges and needs of entrepreneurs in the entrepreneurship ecosystem

3.4. Support

Support systems for entrepreneurs come in soft and hard forms. The hard form refers to the infrastructure that entrepreneurs need to operate and grow, including roads, internet access, and

water. The soft form refers to support mechanisms that directly give additional support to entrepreneurs in the form of incubators, technology centres and universities (Roig-Tierno et al., 2015). The combination of these supports has been shown to have positive results on the performance of young firms (Roig-Tierno et al., 2015). In addition, the collaboration of universities with NGOs and other local entrepreneur supports can increase entrepreneurial skills (Ceptureanu & Gabriel, 2016).

Hypothesis 1d &2d—Support (lack or inappropriate) is one of the challenges and needs of entrepreneurs in the entrepreneurship ecosystem

3.5. Human capital

Human capital demonstrates the capability of an individual or a firm. It can be considered through several constructs (Marvel et al., 2014): work experience, education, entrepreneurial experience, and demographics.

3.5.1. Work experience

It can be considered the most critical human capital element because it is the most investigated human capital construct concerning entrepreneurship (Marvel et al., 2014). This is considered as the number of years that one has spent working in the industry through a series of tasks, projects or activities with outcomes or years of management positions previously held, the industry in which one gained the experience, whether it was international or not (Unger et al., 2011).

3.5.2. Education

This is represented by the formal qualification and training that one receives. These may be technical in a specific profession or trade. Additionally, they can be broader knowledge and cognitive skills such as a Master's in Business Administration (Unger et al., 2011).

3.5.3. Entrepreneurial experience

This is a human capital element that is considered as previous startup experience or prior business ownership (Marvel et al., 2014).

3.5.4. Demographics

These are the less frequently measured and considered elements of human capital, which entail factors such as age, gender and family entrepreneurial experience.

Human Capital is a construct that is more useful in its practical application than its mere presence. It, therefore, becomes important to distinguish it across levels of analysis such as the level of task relatedness and investment vs outcome-based human capital. The level of task relatedness measures how practical and useful the human capital is to the current tasks at hand for the startup (business skills, technical skills, startup experience, and industry experience). However, they are not always readily measurable, so non-task related human capital constructs (formal education, work experience) are usually used as indirect indicators or proxies for the probability of task-related human capital (Marvel et al., 2014). The same applies to the notion that investment based human capital is measured and represented by years of experience or formal education; however, it may not translate to realised or applicable knowledge (Marvel et al., 2014; Unger et al., 2011).

Hypothesis 1e& 2e—Human capital is one of the challenges entrepreneurs deal with in the entrepreneurship ecosystem

3.6. Markets

Markets in the entrepreneurship ecosystem primarily consider two things. The first is access to markets, and the second is the network of entrepreneurs (social capital). Social capital is a significant factor in increasing the innovative capability of firms and thus resulting in sustainable growth (Khurram Ali et al., 2014). Consequently, there has been a big cry in South Africa for government to create an enabling environment for entrepreneurs to access markets.

Hypothesis 1 f &2 f—Markets is one of the challenges and needs faced by entrepreneurs in the entrepreneurship ecosystem

The study will identify the challenges within each of the six domains and establish which of the six are not functioning optimally in the ecosystem as supposed to by mapping these challenges, including the needs on the COJ entrepreneurship ecosystem.

Hypothesis 3—Entrepreneurs in the outer city regions face more entrepreneurship ecosystem challenges and have more needs.

Hypothesis 4a & 4b: A contextual framework can be used to understand and address the challenges and needs of entrepreneurs in the City of Johannesburg's entrepreneurship ecosystem.

4. Research methodology

The study is a quantitative, cross-sectional exploratory research study of the entrepreneurship ecosystem in the City of Johannesburg. The exploratory design is ideal as there is a limited structure in the research material and limited data (Burns & Bush, 2010). There is also limited literature that can be found regarding entrepreneurship ecosystems, especially in emerging economies, in South Africa and Johannesburg. Therefore, an exploratory research design is meant for gathering information in an informal and unstructured manner (Burns & Bush, 2010; Reiter, 2017). The research paradigm that guided this study was the post-positivist philosophical orientation, which takes a deductive approach (Creswell, 2013).

The study population is entrepreneurs in Johannesburg because they are the main actors of the entrepreneurship ecosystem, and they have the most holistic experience of how the entrepreneurship ecosystem performs to serve, enable or inhibit them from achieving their ambitions (Audretsch et al., 2015; Isenberg, 2011). This study sample was based on a multi-stage cluster sampling strategy and random selection because there were several stages during the sampling phase of the populations of entrepreneurs in the Johannesburg regions (Greener, 2008).

Table 1 indicates the connection between the constructs that are measured by the research instrument in the form of a survey and the theoretical constructs that inform the study's foundation. It illustrates how the instrument is designed based on the research objective to map the ecosystem using Daniel Isenberg's (2011) six domains of the entrepreneurship ecosystem. They are shown in the first column with corresponding measured perspectives and items and the description of the challenges measured.

Primary data was collected using self-administered questionnaires. The questionnaire was sent to different entrepreneurs in their respective regions through various organisations that have entrepreneurs affiliated with them. The questionnaires were collected from the different organisations once completed. All the data was captured on an excel sheet and screened for any abnormalities to ensure data quality.

Table 1. Research instrument measurements and constructs

Ecosystem Domain	Measured perspective	Measured item	Description of issue/problem[1]
Policy	Challenge	Regulation	The city's entrepreneurship policies and level of intervention with the market
	Challenge	Compliance	The limited extent to which the city enforces regulation or has extensive requirements
	Need	supply chain	The rules and regulations surrounding how CoJ SMEs engage with the government of Johannesburg for business
Finance	Challenge	Expansion	Access to growth capital
	Challenge	Equipment	Access to asset finance
	Need	Investors	Access to equity finance
Culture			N/A[2]
Support	Challenge	Productivity	Access to enablers and support services and efficiency enabling infrastructure
	Need	Marketers and PR	Access to professional services
	Need	Incubators	Access to capacity development institutions
Human Capital	Challenge	Financial Management	Understanding of financial modelling and business financial literacy (Access to the talent)
	Challenge	Expansion	Application of business growth strategy (Access to the talent)
	Challenge	Productivity	Application of business administration and management (Access to the talent)
	Challenge	Processes	Application of business administration and management (Access to the talent)
	Challenge	Profitability	Application of business administration and management (Access to the talent).
	Need	Entrepreneur education (i.e. college or university)	Access to entrepreneurship education institutions

(*Continued*)

Table 1. (*Continued*)

Ecosystem Domain	Measured perspective	Measured item	Description of issue/problem[1]
Markets	Challenge	Access to Markets	Access to early customers and clients through a network
	Challenge	Suppliers	Access to sustainable supply contracts through networks
	Challenge	Expansion	Access to early customers, reference customers and distributor channels
	Need	Suppliers	Access to sustainable supply contracts through networks
	Need	CoJ supply chain	Access to information flows about CoJ supply chain opportunities through networks as well as partnerships for the bids
	Need	Marketers and PR	Access to distributors networks

Source: (Isenberg, 2011; Mason & Brown, 2014)

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The data, in this case, follows an exploratory process that does not seek to confirm pre-existing constructions of literature but to establish new perspectives on the literature (Reiter, 2017). The chosen ecosystem framework upon which the data interpretation and analysis was performed was based on Isenberg's (2011) work, representing the entrepreneurship ecosystem as six domains. The primary statistical technique used to summarise and interpret the results were descriptive statistics. Factor analysis was also performed to reduce the data dimension into components extracted for the mapping of the ecosystem.

5. Results and data analysis

A sample size of 1099, which is a good sample for the population of approximately 847,329 SMEs in Gauteng, was attained. The sample was characterised mainly by SMMEs that are micro and small in size. There were more males (55%) who participated in the study than females (30%), and the rest (15%) did not specify their gender. The largest age group amongst entrepreneurs is middle-aged respondents between the ages of 36–55; about 52% of the respondents. This could be due to the ability of these people with experience to identify and successfully exploit opportunities due to the human capital and networks gained over time compared to younger people (Unger et al., 2011). The youth entrepreneur category between the ages of 18–35 represented 34% of the survey, which is still a significant portion of the sample which is understandable when considering the average age of South Africans is 25–27 years old (Statssa, 2017)

The largest represented industry in the survey is the construction industry (39%), with more than three times the representation of the following sector, which is manufacturing (9%) while tourism (5%), cleantech/Greentech (4%) and urban agriculture (4%) follow closely on each other. The second element is that the most represented industry group (equal to the construction industry) is the "other". This means more than 50% of the entrepreneurs did not identify with any of the options provided in the survey.

5.1. Challenges of entrepreneurs

The respondents were given a list of challenges to choose from where they could select whether that specific challenge was pertinent to them or not. The data was then granularised to investigate the needs and challenges entrepreneurs face in different parts of the city of Johannesburg. This granularised representation shows the challenges in the various regions as a percentage of the sample from each region.

Table 2 shows the challenges being faced by entrepreneurs in a specific region of the City of Johannesburg. The heat map is aligned and coherent with the macro view in Figure 2 below, in the sense that the four most pressing issues are:

Table 2. Heat map of challenges experienced by entrepreneurs from different regions in the Johannesburg entrepreneurship ecosystem

	Region						
	A	B	C	D	E	F	G
Access to Markets	62%	58%	83%	65%	66%	66%	69%
Equipment	52%	59%	52%	62%	68%	51%	63%
Suppliers	53%	54%	48%	53%	55%	43%	64%
Financial Management	51%	42%	35%	46%	54%	47%	61%
Expansion	39%	25%	45%	35%	37%	31%	42%
Profitability	43%	36%	36%	30%	36%	32%	36%
Processes	34%	26%	33%	26%	28%	28%	30%
Productivity	31%	22%	21%	28%	22%	26%	40%
Regulation	32%	31%	29%	25%	25%	29%	33%
Compliance	44%	41%	21%	29%	0%	0%	40%
Other	13%	1%	0%	0%	0%	0%	10%

(1) Access to markets,
(2) Equipment,
(3) Suppliers, and
(4) Financial management.

The higher the percentage of respondents experiencing a challenge in the measured area, the redder the heatmap. For lower rates of experienced challenges, the greener the heatmap. Interestingly, on average, some regions seem to be greener, which means fewer challenges are faced. In other words, regions B, D and F show more green areas and fewer orange-red areas. These results can be controlled for age and industry and do not change.

5.2. The needs of entrepreneurs

Table 3 summarised the needs of entrepreeneurs in the greater Johannesburg. This metric is based on the needs of the entrepreneurs when considering which entrepreneurship ecosystem players and enablers they would like to engage with or engage more with.

When the needs of entrepreneurs are considered at a more detailed and granular level, one can investigate whether there is a relationship between the regions of the city and the needs for which the entrepreneurs are most in need.

Region F seems to be the best performing region by scoring relatively low needs for stakeholders than other regions, except for the "other" stakeholders' category. This is where region F has a significantly higher demand in comparison.

When one considers the needs faced by different entrepreneurs depending on their age and industry, they will find similar results. Therefore it indicates that they are not influencing factors on the needs of entrepreneurs.

5.3. Mapping the city of Johannesburg entrepreneurship ecosystem

Figure 2 represents how the needs and challenges of Johannesburg's entrepreneurs configure and fit into the entrepreneurship ecosystem framework per Isenberg (2011).

The challenges and needs faced by entrepreneurs are categorised into their related domains. See Table 2 and 3 for the summary of challenges and needs of entreptreneurs respectively. The challenges and needs rates averaged for each corresponding domain as finance (51%), access to markets (48%), human capital (36%), support (35%) and lastly, policy (27%).

Table 3. Heat map of needs of entrepreneurs across different regions in the Johannesburg entrepreneurship ecosystem

	Region						
	A	B	C	D	E	F	G
Investors	57%	56%	56%	65%	59%	56%	55%
Suppliers	44%	52%	52%	53%	47%	47%	51%
Marketers and PR	45%	38%	48%	45%	42%	38%	53%
Entrepreneur education (i.e. college or university)	40%	44%	41%	38%	46%	38%	46%
CoJ supply chain (please specify)	43%	45%	47%	33%	33%	22%	39%
Incubators	31%	36%	35%	28%	39%	29%	37%
Other	21%	2%	2%	5%	6%	14%	4%

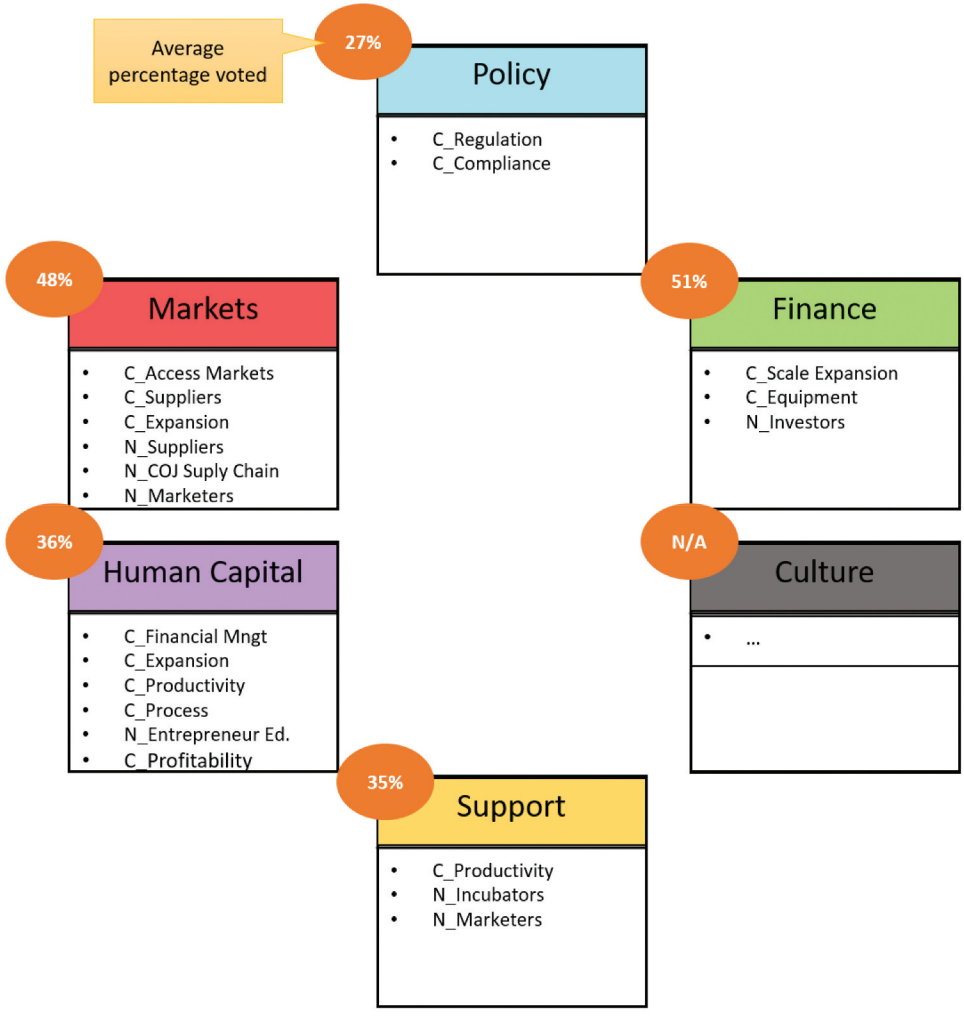


Figure 2. Entrepreneurship ecosystem framework to consider the challenges and needs of COJ's most pertinent challenges and needs (showing sample outcomes and outputs).

Source: *Primary data*

The most faced challenges and needs are mapped across Johannesburg's seven regions in Figure 3 below. These challenges and needs are represented as the top three factors for each domain.

6. Discussion of results

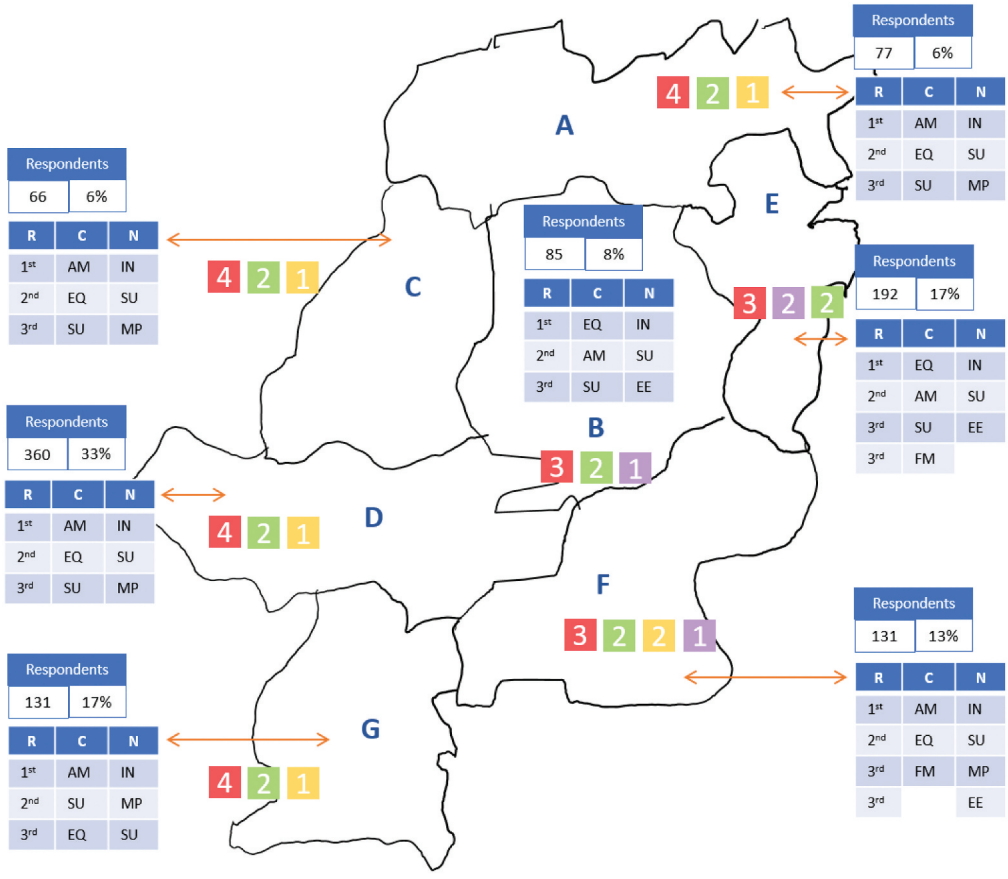
The study's objective was to explore and understand the needs and nature of challenges faced by COJ entrepreneurs, map them to the entrepreneurship ecosystem, identify gaps and propose a framework for a functional ecosystem at both regional and city levels.

6.1. What are the challenges of entrepreneurs in COJ?

The research was able to establish that the challenges that the sampled 1099 entrepreneurs are faced with the most are: access to markets (67%), equipment (60%), suppliers (54%) and financial management (50%).

The first component of the factor analysis was about challenges for entrepreneurs as per the research instrument. This means that these challenges are interrelated and interdependent. They form a collective challenge that ranges across Isenberg's (2011) entrepreneurship domains: human capital, policy, finance, and markets in order of representation. What also seems to be clear is that finance and markets are part of this component based on a single measure that similarly influences

Figure 3. Isenberg entrepreneurship ecosystem mapped across the research challenges and needs of entrepreneurs.



the entrepreneur in both domains and that is based on social capital when considering network theory and complexity theory (Borgatti & Halgin, 2011; Ferrary & Granovetter, 2009; Neck et al., 2004).

However, the inclusion of the finance and markets domain could also result from the factor analysis having selected the "challenge for the expansion" measure, which is shared between the three domains (human capital, finance, and markets). Therefore, the reduction component could only apply to the human capital and policy frameworks as being interrelated through residual yet unmeasurable factors between them (Fabrigar & Wegener, 2012).

6.2. What are the needs of entrepreneurs in COJ?

Investors (54%), suppliers (50%), marketers and public relations (45%) and entrepreneurship education (42%) emerged as the most important needs, respectively. The needs are consistent across various filters from other geographic regions, ages of entrepreneurs and industries of entrepreneurs. The driving force behind this need is important to the cleantech/Greentech industry, but it is a point beyond the scope of this study's objective but an opportunity for future research.

When considering the outcomes of the factor analysis for component two, it reduces to the measures defined as "needs for entrepreneurs". When these extracted needs are considered through the lens of Isenberg's (2011) entrepreneurship ecosystem framework domains, the following implies that Finance, Market and Human Capital are related and interdependent domains within the City of Johannesburg's entrepreneurship ecosystem based on the needs of entrepreneurs in this study.

6.3. How is the COJ entrepreneurship ecosystem mapped across isenberg's framework?

The framework of the research factors indicates that the leading challenges and needs faced by entrepreneurs within the City of Johannesburg are five entrepreneurship ecosystem domains in the following order:

(1) Finance (51%);
(2) Access to Markets (48%);
(3) Human Capital (36%);
(4) Supports (35%);
(5) Policy (27%)

The sixth "culture" framework element was not measured in this study.

This result aligned to the existing literature about the major challenges and needs of entrepreneurs in the South African context and other cities similar to the City of Johannesburg (Endevour, 2018; Endeavor & FNB, n.d.; Fal, 2013; Seed Academy, 2017).

The framework mapping also shows that regions B, E and F are less prone to suffer from the "access to markets" framework element. This might be due to the spatial divide effect in the city where regions B (Sandton) and F (Central Johannesburg) are the economic centres of the city and region E is very near to region B (Colenbrander & Gil, 2017; Harrington, 2017; Phasha, 2005).

6.4. What kind of entrepreneurship ecosystem framework is appropriate for COJ?

The fourth objective of this study was to build on the first three objectives by conceptualising a framework to consider when addressing entrepreneurs' challenges and needs in the COJ. The framework considers the most pressing challenges and needs and their interrelatedness to the domains of the entrepreneurship ecosystem. This means that by folding the elements into interdependent groups, the key challenges are considered in unison with their interdependence. Thus, the realisation of which challenges must be addressed simultaneously in the ecosystem; otherwise, efforts may not be effective.

The highlighted domains by the challenges and needs of entrepreneur's factor analysis are the policy, human capital, finance, and markets domains.

According to the factor analysis, Access to Markets, Finance, and Human Capital is closely interrelated to these four pressing challenges and needs. These three factors are commonly conceptualised and outlined by different scholars and distinctly incorporated within entrepreneurship ecosystem models provided within literature (Cohen, 2006; Isenberg, 2010; Spigel, 2015; Stam, 2015). This means that they are relatively core ecosystem domains to consider when examining the entrepreneurship ecosystem literature. In a more contextual sense, they are also elements that the literature outlines as one of the most important areas to focus on in Johannesburg, South Africa's and Africa's entrepreneurship ecosystem(s) and this is aligned to what is found in the literature (Endevour, 2018; Endeavor & FNB, n.d.; Fal, 2013;; Seed Academy, 2017).

- Access to markets* mapped to Isenberg (2011) model for Markets was represented 67%
- Equipment* mapped to Isenberg's (2011) model for finance was represented at 60%
- Suppliers mapped to Isenberg's (2011) model for Markets was represented at 54%
- Financial management* mapped to Isenberg's (2011) model for finance was represented at 50%

Similarly, for the needs

- Investors* mapped to Isenberg's (2011) model for finance was represented at 59%.
- Suppliers* mapped to Isenberg's (2011) model for Markets was represented at 50%.
- Marketers and public relations* mapped to Isenberg's (2011) model for Supports as well as Markets and was represented at 45%.
- Entrepreneurship education* mapped to Isenberg's (2011) model for Human Capital and was represented at 42%.

The Isenberg (2011) Market domain is represented in the challenges and needs elements by the following variables based on literature: N_Suppliers, N_Marketers, C_Suppliers, and C_Access to Markets.

The Isenberg (2011) Finance domain is represented by two variables: N_Investors, and C_Equipment.

The Isenberg (2011) Human Capital domain is also represented by two variables: N_Entrepreneurship Education, C_Financial Management.

Whereas Isenberg's Markets and Finance domains are primarily influenced by social capital in the ecosystem to exchange value and resources to expand each network agent, human capital is based on the entrepreneur's ability to access these networks through experience and know-how. Whether based on credibility, legitimacy, close ties and/or market understanding, the entrepreneur is the driver for their success in the human capital's domain of the ecosystem.

The study can then combine the six domains of the entrepreneurship ecosystem as described by Isenberg (2011) with the systems-network approach concept of the ecosystem (Stam, 2009, 2015; Stangler & Bell-Masterson, 2015). Finally, the study discusses the interrelatedness between entrepreneurs' key challenges and needs in COJ's entrepreneurship ecosystem.

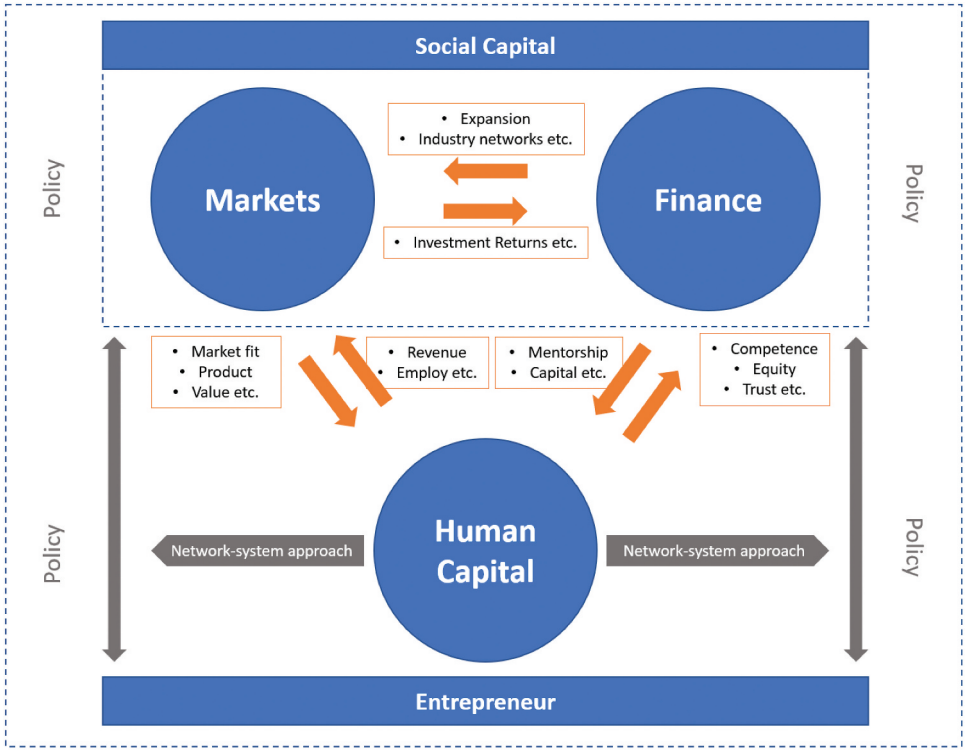


Figure 4. Mapping the critical challenges and needs of entrepreneurs in the City of Johannesburg's entrepreneurship ecosystem.

Where R is region; Challenges (C): (AM = Access to Market, EQ = Equipment, SU = Suppliers, FM = Financial Management) and Needs (N): (IN = Investors, SU = Suppliers, MP = Marketers & PR, EE = Entrepreneur Education)

The following Figure 4 signifies a framework based on this thinking, where the three most pertinent ecosystem domains representing the highest-rated challenges and needs by COJ entrepreneurs are nested in a system of layered formal networks, informal networks, social ties, interactions, and relationships that create ecosystem outcomes and outputs (Stam, 2009, 2015; Stangler & Bell-Masterson, 2015).

The systems-network approach to how these three domains interact can be further understood through the following factors of ecosystem dynamics: connectivity, density, fluidity, and diversity, where they represent the nature of economic interactions within the social capital nature of the markets and finance domains in the context of this study's framework (Harrington, 2017; Meyers, 2015; Stangler & Bell-Masterson, 2015; Theodoraki et al., 2017).

The policy is a holistic encompassing factor for entrepreneurship development, and its implications are broadly affecting, directly and indirectly, all elements of entrepreneurship ecosystems and hence the framework above (Moos, 2014; Wattanapruttipaisan, 2003). It is also one of the highest-rated factors from the challenges and needs in the COJ ecosystem. That is why the framework encapsulates the three domains cited as central to the critical challenges and needs faced by entrepreneurs nested in the policy domain.

The framework above can be used as a lens to consider a holistic approach to addressing the critical gaps in the entrepreneurship ecosystem in COJ by discussing the interactions and residual network effects between the most pertinent challenges and needs of COJ entrepreneurs. First, however, it is important to recognise that the framework is idiosyncratic because of the complexity and nature of network effects within entrepreneurship ecosystems (Borgatti & Halgin, 2011; Ferrary & Granovetter, 2009; Isenberg, 2011; Preisendörfer et al., 2012).

This framework aligns to the importance and role of social networks of interdependent economic agents that interact through a flow of capital, information, and labour (talent) similarly to typical successful and robust ecosystems that create innovations (Ferrary & Granovetter, 2009; Jen, 2005).

7. Conclusions

The conclusions are presented in three categories as they relate to the aims of the study, which are the identified challenges and needs, the mapping of the entrepreneurship ecosystem challenges and needs, and the mapped elements into domains of relatedness that reveal a COJ Entrepreneurship Ecosystem framework that can be used to identify and address the challenges and needs. Through these categories, the study uncovered how market access, finance, and human capital, encapsulated by policy implications, are the gaps in the ecosystem. Moreover, they are interdependent in a complex way that requires them to be simultaneously considered to address the issues.

The study uncovered a representation of the City of Johannesburg's entrepreneurs in terms of who they are, where they are, and what they do. In addition, the sample characteristics showed that certain groups of the population are participating in entrepreneurship more than others across groups such as age, gender, race and region of residence.

7.1. The challenges and needs of entrepreneurs in the ecosystem

The challenges and needs of entrepreneurs in the ecosystem can be seen as gaps represented by negative experiences of entrepreneurs. The challenges that are identified are access to markets, equipment, suppliers and financial management. The needs and challenges for investors, suppliers, marketers and public relations support and entrepreneurship education. These are the major challenges and needs entrepreneurs face that can be condensed to market access, finance and human capital domains.

The existing literature supports these findings in a broader South African context but is not conclusive for the City of Johannesburg's entrepreneurship ecosystem (Endevour, 2018; Endeavor & FNB, n.d.; Fal, 2013;; Seed Academy, 2017). Nevertheless, this is an important element of strengthening the theory by contesting its application in different contexts, especially because entrepreneurship ecosystem theory is regionally based in nature (Theodoraki et al., 2017).

7.2. Entrepreneurship ecosystem mapping

Entrepreneurship ecosystem mapping The study revealed the challenges and the areas of need for the City of Johannesburg's entrepreneurs. This enables the researcher to understand where the gaps in the entrepreneurship ecosystem, from a geo-position perspective, are nestled on top of the entrepreneurship ecosystem framework.

The mapping also identifies a unifying pattern about the challenges experienced across the City of Johannesburg. This conclusion is supported by the literature that outlines how entrepreneurship ecosystems develop and are best considered at a regional level, such as a large city, due to the frequency and strength of systems interactions that happen at city level proximities and economic levels (Auerswald, 2015; Harrington, 2017; Stangler & Bell-Masterson, 2015). Furthermore, the distribution of the challenges and needs for entrepreneurs reveals a spatial divide effect in the city, where South Africa's cities were developed to segregate large segments of the population with large distances from economic centres.

7.3. Entrepreneurship ecosystem framework with COJ context

Entrepreneurship ecosystem framework with COJ context: The study reduced the challenges and needs into a model represented by four domains where a framework is conceptualised by taking the challenges and needs that are most critically faced by entrepreneurs and that are interrelated and looking at them through the ecosystem domains (Isenberg, 2011) and systems-network literature (Stam, 2009, 2015; Stangler & Bell-Masterson, 2015).

This framework also can be understood through the ecosystem literature that represents how money, information and labour can flow through value creation as products, services (for customers and suppliers), capital growth and returns (for investors; Harrington, 2017; Meyers, 2015; Stangler & Bell-Masterson, 2015; Theodoraki et al., 2017). However, the consideration of complexity theory and network theory behind this is explored and appreciated in the study and the framework (Borgatti & Halgin, 2011; Trend Compendium 2030, 2011). Finally, the domain related to policy becomes a useful consideration for policymakers to understand the pivotal role that policy implications have on entrepreneurship ecosystem development (Kreft & Russel, 2005; Moos, 2014; Rigby & Ramlogan, 2013).

7.4. Implications and recommendations

The research has revealed important areas of consideration with implications extracted from the demographics, mapping and ecosystem framework.

(1) There should be an increased focus on entrepreneurs who are considered older or non-youth. These are the age groups which are represented in 35 years old and above. This is important because research shows that these entrepreneurs are more likely to succeed due to their increased human capital as they get older (Unger et al., 2011).

(2) The challenges and needs of entrepreneurs in the City of Johannesburg's entrepreneurship ecosystem are relatively homogenous, meaning that the same approach could be applied across the city. These leading challenges and needs can be condensed into finance, markets, and human capital (e.g., Entrepreneurship Education), and these need to be addressed in unison

(3) The framework recommends applying network theory and complexity theory within the context of entrepreneurship ecosystems (system-network approach, density, connectivity,

etc.). Although difficult to predict the relationship function, the more social capital networks, the more effects may elevate the ecosystem's outcomes and outputs. Therefore, it is also a recommendation on human capital elevation as a multiplier effect on the intrinsic value of the interactions in the network.

7.5. Limitations of the study and future research

The following points represent the study's limitation, which creates a foundation upon which more research can be performed to understand better the issues and elements of the entrepreneurship ecosystem in COJ.

From an analysis perspective, there is a limitation in how the data is used to extract insights. The data is based on mean values, and this can be useful to simplify data, but it can also hide patterns and data points that cannot be revealed through averages. However, the study is an exploratory study aimed at uncovering and discovering aspects of the COJ entrepreneurship ecosystem that do not exist in the current literature.

Future research can be conducted by determining correlations of the challenges and needs with other variables that may influence the ecosystem. This study can also be expanded by making comparisons with other cities in similar economies around the world.

The framework is developed using limited statistical extractions of the data. The statistical model used to extract and reduce the data was not necessarily strong due to the cumulative model variance explained being less than 50%. However, having been bundled into a component (related variables), the factors allow researchers to focus on challenges that will affect each other.

This means that further research could focus on the reduced factors of this study that are interrelated. For example, to determine how they are interlinked and what levers influence the extent to which they enable and hinder entrepreneurial success, levers such as inequality, culture and communication barriers.

There is also an opportunity to strengthen the framework or falsify it by re-examining the relationships it concludes through an extended set of factors measuring similar entrepreneurship ecosystem concepts and constructs. This would also include an extension of profiling robustness to ground the data in better-understood sources of entrepreneurs or SMEs.

Moreover, the study can be replicated in the current COVID-19 context to identify changes that emerge due to the pandemic's effect on SMMEs in Johannesburg.

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