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Research Article

Establishing an understanding of the innovation process of informal micro-enterprises

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Innovation has been discerned as a catalyst that enables firms to remain relevant and sustainable. In recent years, the innovation discipline has been extended to the informal sector. Nonetheless, to date little is known about the process that is followed by informal micro-enterprises to execute innovation activity in each innovation phase. Thus, this study sought to establish an understanding of the process that is followed by informal micro-enterprises to execute innovation activity in each innovation phase. The study adopted a mixed-methods research design to sequentially collect and analyze quantitative and qualitative data from informal micro-enterprises that are based in the townships of the Gauteng province. The study revealed that credible customer assemblies are used to acquire knowledge and information necessary to execute innovation activity and to test innovations before they are launched in the market. Moreover, while informal micro-enterprises mostly use internal resources to transform innovative ideas into innovations, coopetition relationships aid to foster open innovation and limit the strain on internal resources. The findings suggest that informal micro-enterprises innovate differently from formal small businesses and there is a need for researchers and the government to introduce policies and initiatives to enhance open innovation in the informal sector.

Keywords: Gauteng province, informal micro-enterprises, innovation process, South Africa

Introduction

The informal sector is a salient feature of a substantial number of emerging and developing countries across the globe (Mendi and Mudida 2018). Although it has proven difficult to accurately capture the size and economic impact of this sector, the existing literature revealed that it substantially contributes to economic growth and job creation in many emerging and developing countries (De Beer and Armstrong 2015). Fu, Mohnen, and Zanello (2018) assert that in Africa, the informal sector contributes around 40% to the gross domestic product (GDP) and creates up to 80% of non-agricultural jobs.

In the South African context, it is estimated that small businesses in both the informal and formal sectors contribute 36% to the GDP and establish approximately 40% of employment opportunities (Kumah and Omilola 2014; GEM 2017; Yu 2017). Moreover, in terms of the South African National Development plan, small businesses are anticipated to contribute more than 60% to the GDP and create 90% of all new jobs by 2030 (The Presidency 2012; Kumah and Omilola 2014). We argue that this target is too ambitious as it is estimated that 70–80% of South African small businesses fail in the first year of their existence (Rogerson 2000; Nemaenzhe 2010; DSBD 2018; Mulibana and Rena 2021a). Small businesses' high failure rate diminishes their potential to increase their contribution to GDP and job creation.

Innovation has been discerned as a catalyst that can enhance informal micro-enterprises' probabilities to become sustainable and increase their contribution to GDP and job creation (Links, Hart, and Jacobs 2014; Mendi and Mudida 2018).

Unfortunately, previous empirical studies conducted in the informal sector focused on the identification and measurement of informal micro-enterprises innovations (La Porta and Shleifer 2014; Links, Hart, and Jacobs 2014; De Beer and Armstrong 2015; Mendi and Mudida 2018). These studies paid little attention to the need to determine how the existing informal micro-enterprises innovations took place throughout the key basic innovation phases (i.e., discovery to launch). Subsequently, previous related studies have not established an understanding of the process that is followed by informal micro-enterprises to engage in innovation activity. They do not adequately indicate how innovative ideas are generated, evaluated, and selected; how the selected innovative ideas are transformed into products, services, processes, marketing strategies, and other forms of innovations; how new products, services, processes, and so forth are tested; and how such innovations are introduced to the market.

Thus, this study sought to establish an understanding of the process that is followed by informal micro-enterprises to engage in innovation activity in each innovation phase. The establishment of such an understanding will fill the gap identified in the literature and the dissemination of this study's results will not only facilitate the sharing of knowledge with our peers, the government, and other role-players in the national system of innovation but will also familiarize the uninventive informal micro-enterprises with a suitable innovation process that they can adopt for their benefit. The results will also aid to highlight innovation areas in the informal sector that require attention from both the government and researchers. Several Scholars asserted that despite the notable growth in the literature on innovation, SMMEs studies have paid little attention to innovation activities in the informal sector (see Kumar and Bhaduri 2014; De Beer and Armstrong 2015; Rose, Jones, and Furneaux 2016; Kalitanyi 2019).

The objective of this study was therefore to understand how informal micro-enterprises in the townships of the Gauteng province engage in the innovation process in each innovation phase. To realize this objective, the study asks and explores the following research question: How do informal micro-enterprises in the townships of the Gauteng province engage in the innovation process in each innovation phase?

Literature review

The informal sector, its contribution, and views

There is no uniform definition of small businesses across the globe. Thus, the study's area and context inform the definition that is adopted for each study (Mulibana and Rena 2021b, 2021c). In South Africa, a small business is classified as an incorporated entity that is distinct from other firms in terms of its annual revenue, the number of people it employs, and the value of its assets. Moreover, small businesses are divided into micro, small, and medium-sized enterprises (Republic of South Africa 1996). This study focuses on micro-enterprises that operate in the informal sector. Micro-enterprises employ not more than 10 employees and earn up to R10 million per year (Republic of South Africa 1996).

Decisively defining the informal sector has been a major apprehension for most researchers, as there is no widely accepted conceptualisation of the informal economy (De Beer, Fu, and Wunsch-Vincent 2013). Subsequently, it is necessary to delineate what the informal sector means in each study's context. Accordingly, in this study, the informal economy/sector relates to the economic activities of unincorporated and often unregistered enterprises (WIPO 2013). In most developing economies, the informal sector accounts for a substantial share of the economy (Links, Hart, and Jacobs 2014; Mendi and Mudida 2018). Accordingly, in these economies, the informal sector offers employment opportunities to university graduates and other workers who struggle to get employment in the formal sector (Mulibana 2020; Mulibana and Rena 2021a, 2021b).

For instance, it is reported that in India, more than 90% of the workforce is employed in the informal sector (Kumar and Bhaduri 2014). In the African continent, it is reported that the informal sector contributes about 40% to the GDP and creates about 80% of non-agricultural employment (Fu, Mohnen, and Zanello 2018), whereas, in South Africa, it is reported that small businesses in the informal and formal sectors contribute approximately 36% to the GDP and create 40% of the jobs (Kumah and Omilola 2014; GEM 2017; Yu 2017). Subsequently, without the informal sector, unemployment rates and other economic challenges would degenerate in many emerging and developing countries (De Beer and Armstrong 2015). Thus, a flourishing informal sector could be a solution to emerging and developing countries' economic challenges.

There are two views about the informal sector: the old view and the new view. As pointed out by Kumar and Bhaduri (2014), the old view portrayed the informal sector as an undesirable sector that adds little to no value to the economy and would eventually perish as firms in this sector transform into formal firms. The new view, however, perceives the informal sector as a vital aspect of the economy due to its momentous contribution to GDP, job creation, and poverty alleviation.

The old view was accompanied by governments' attempts to formalise the informal sector. Nonetheless, the informal sector remained resistant, and its share continued to grow in many developing and emerging economies across the globe. Thus, the new view of the informal sector has emerged in recent years (Kumar and Bhaduri 2014). In cognisance of the new view of the informal sector, globally, the academic research and policy direction pertaining to this sector is gradually shifting from the need to formalize it to the need to aid it to flourish. Accordingly, in recent years, the innovation concept has been extended to the informal sector.

The innovation process

Innovation can be defined as the transformation of either novel, improved, or existing ideas into novel, improved or existing products or services that are launched in the market for consumption by customers. The innovation concept can also be manifested through the implementation of new or improved processes and marketing strategies (Ivers 2013; Smith 2015; Mulibana and Rena 2021c). There is a process that is followed by innovators to innovate.

Kahn (2018, 5) posits that a basic innovation process model depicts three stages, namely, 'discovery, development, and delivery'. During the discovery stage, a firm examines the environments for possible opportunities and evaluates the identified opportunities. Qualifying opportunities are referred to the development stage. At this stage, ideation and invention occur. Booyens, Molotja, and Phiri (2012) aver that innovative ideas can be developed internally through research and development (R&D) or externally as a result of innovation-oriented interactions with external role-players. Moreover, innovative ideas are usually generated using experts' knowledge (Barbieri and Alvares 2016; Geum and Park 2016; Lee and Walsh 2016; Brunow, Birkeneder, and Rodriguez-Pose 2017).

Notwithstanding the above, innovative ideas can also be generated through brainstorming, communities of practice, crowdsourcing, and knowledge obtained through experience (Geum and Park 2016; Callaghan 2020). In corroboration with this argument, studies on European firms revealed that, of the patented innovations surveyed, 12% were invented without internal R&D investment (Lee and Walsh 2016). However, the studies also revealed that businesses that invest in R&D continue to be more likely to develop a product innovation than businesses that do not (Lee and Walsh 2016). While R&D investment is ideal for all forms of innovation, Callaghan (2020) argued that there is a notable decline in returns to R&D investment. This suggests that in the near future other innovation methodologies will take precedence over R&D investment.

Lendel, Moravcikova, and Latka (2017) argued that as innovative ideas are being generated, they must be electronically recorded. From these ideas, one feasible idea

must be selected based on costs and benefits for implementation. Following this, an innovation team consisting of an employee who came with the selected idea must be established (Lendel, Moravcikova, and Latka 2017). The availability of an innovation manager and an innovation team in a firm sounds interesting. However, informal micro-enterprises may not have these luxuries.

The aforementioned phase is followed by the development phase. During the development phase, the innovation manager designs the implementation roadmap and distributes tasks to the innovation team (Lendel, Moravcikova, and Latka 2017). Technical specifications are determined and relevant designs are made. The designs are then transformed into prototypes and prototypes are improved into something better when innovation funds are secured. Once a desirable product is developed, then the delivery stage follows (Bell et al. 2013). While the existing literature explains how innovation development happens in the formal sector, it reveals little to nothing about how informal micro-enterprises transform innovative ideas into prototypes and desired innovations.

Lastly, there is the delivery phase; this phase is also regarded as the launch phase and/or the innovation diffusion phase. The delivery stage is a crucial step in the innovation process, and it is what differentiates innovation from ideation and invention. Without the delivery stage, a firm has not achieved innovation (Kahn 2018, 5). For the innovation to be widely spread and adopted in the market, there must be intensive communication through various media platforms (Rogers 2003). This study determines the communication channels that are used by informal micro-enterprises to announce their innovations.

Salerno et al. (2015) argued that although the innovation process has traditionally been understood as predefined sequence phases (i.e., idea generation, selection, development, and launch/diffusion/sales), there are other several ways of innovating that do not follow a linear process. The other innovation processes referred to here are open order, closed order, and public or private call. In these instances, the client or the customer requests the firm to tailor-make a product or service for them (Salerno et al. 2015).

What the existing literature reveals about the informal micro-enterprises' innovation process

As mentioned earlier, in recent years, the innovation concept was extended to the informal sector. Although this initiative was faced with resistance (see De Beer, Fu, and Wunsch-Vincent 2013; Phiri et al. 2016), there is a handful of empirical studies that focused on innovation in the informal sector. These studies conceptualized several terms to delineate new research and views on innovation in the informal sector, terms such as grassroots innovation, the base of the pyramid innovation, innovation for the poor by the poor, frugal innovation, jugaad innovation, and inclusive innovation (see De Beer, Fu, and Wunsch-Vincent 2013; Kumar and Bhaduri 2014; Phiri et al. 2016; Van Der Merwe 2017; Manyati and Mutsau 2021). Although this is welcomed, one wonders if the formulation of several and almost synonymous concepts that delineate innovation in the informal sector is premised on a quest to generate new knowledge or on attempts to distinguish informal sector innovation from that of the formal sector.

We argue that although the innovation process in the informal sector may differ from that of the formal sector, the outputs thereof can either be classified as incremental or radical innovation, which is the same as the classification of innovations in the formal sector. For instance, jugaad innovations can be classified as incremental innovations, whereas grassroots and inclusive innovations can be classified as either incremental or radical innovations depending on whether they are new to the world, new to the country, new to the customer, or just new to the firm. Thus, the rationale for the emergence of the aforementioned terms is questionable, hence in this study we focused on how innovations are introduced without concentrating on the aforementioned terminologies to avoid confusion.

La Porta and Shleifer (2014) argued that informal micro-enterprises often do not have access to crucial information necessary to innovate. Instead, customers and suppliers are considered an important source of learning; in addition, traditional knowledge is transmitted from one generation to the other, within the family or social groups (De Beer and Armstrong 2015). Innovations in the informal sector are often separate from large innovation programmes supported by key role-players in the national innovation system or other role-players involved in formal R&D; they are incremental and the innovation activities are informal (La Porta and Shleifer 2014; Links, Hart, and Jacobs 2014; Charmes, Gault, and Wunsch-Vincent 2016).

Since innovations among informal micro-enterprises are seldom driven by traditional R&D, Mendi and Mudida (2018) posit that the innovation probabilities of an informal micro-enterprise are highly dependent on the creativity of the owner. Moreover, a study by Fu, Mohnen, and Zanello (2018) revealed that ingenuity, which refers to someone's ability to think of clever new ways of doing something is regarded as a driving force of innovation activities in informal businesses. This suggests that informal micro-enterprises that are not owned by creative individuals would not be innovative.

In light of the above-limited literature on the informal micro-enterprises' innovation process, it can be argued that the previous related studies do not adequately describe how the contemporary information and knowledge necessary for innovation is gathered, how innovative ideas are generated, evaluated, and selected; how the selected ideas are transformed into products, services, processes, marketing strategies and other forms of innovations; how new products, services, processes and so forth are tested; and how such innovations are introduced in the market. Hence this study sought to establish an understanding of how informal micro-enterprises engage in the innovation process in each innovation phase.

Methodology

Study area, population, and sample

This study was conducted in four townships (i.e., Soweto, Katlehong, Soshanguve, and Vosloorus) of the Gauteng

province, which is one of the nine provinces in the Republic of South Africa. Gauteng province is discerned as the economic hub of the Republic of South Africa and it is home to the largest townships in the country. These townships harbour a substantial number of informal micro-enterprises. As reported by SEDA (2016), there were 1 497 860 informal micro-enterprises in South Africa, 465 100 (31%) of these enterprises are based in the Gauteng province, which sets apart the Gauteng province as an ideal study area.

Although there is a record of the number of informal micro-enterprises that exist in the Gauteng province, there is no sampling frame listing such enterprises and denoting which of these enterprises innovated between January 2016 and December 2018. Accordingly, due to this limitation, research problem, and question, this study employed the sequential explanatory mixed-methods research and pragmatism research philosophy to sample the most relevant participants, for illustration and completeness of data.

Following the principles of the sequential explanatory mixed-methods research, the quantitative phase preceded the qualitative phase. During the quantitative phase, the study used convenience sampling to sample 400 respondents from the aforementioned townships, whereas, during the qualitative phase, purposive sampling was used to sample 44 participants in the same research area. Moreover, in the quantitative phase, firms that met the definition of informal micro-enterprises as explained in the literature review section of this paper were sampled. The qualitative phase focused on sampling informal firms that innovated between January 2016 and December 2018 without formally investing in R&D or receiving innovation-related financial or non-financial aid from the government, large enterprises, or universities. In both phases, the sample was constituted of both owners and employees of informal micro-enterprises.

Data collection and analysis

In the quantitative phase, data were collected through a tailor-made questionnaire. The questionnaire was randomly administered to 400 informal micro-enterprises in four townships of the Gauteng province over two months. Following this, we received 207 completed questionnaires, which constitutes a 52% response rate.

The 207 completed questionnaires were reviewed, and the collected data were coded and captured onto the Statistical Package for Social Sciences (SPSS) version 25 software. Following this, the reliability of the questionnaire was tested using Cronbach's alpha (α) reliability coefficient. The results thereof are illustrated in Table 1.

As depicted in Table 1, Cronbach's alpha coefficient is greater than 0.7, suggesting that the administered questionnaire is a reliable research instrument.

To elicit patterns and meaning from the collected data, the data were analyzed using descriptive statistics, correlation, and factor analysis. The analysis of the quantitative data revealed that 44 respondents qualified to be considered for the second phase of the study.

In the qualitative phase, primary data were collected using contact semi-structured interviews. We considered the findings of the quantitative phase to review the interview questions and to sample appropriate participants for the interviews. As mentioned earlier, 44 participants qualified to be considered for interviews. Thus, we intended to interview all of them but during the study, we attained the data saturation point at participant number 21 and stopped the interview accordingly.

Interview proceedings were recorded mechanically and by way of transcribing notes. Following this, the collected data were analyzed through a thematic and constant comparison method. This involved summarizing interview notes into short sentences, reviewing and comparing them to elicit themes. The elicited themes were manually quantified and interpreted accordingly.

Ethical considerations

Since the study focused on the innovation process of informal micro-enterprises and sampled owners and employees of these enterprises as respondents and participants, ethical requirements were pertinent to the research process. Accordingly, ethical clearance was obtained, and the study was conducted ethically.

Findings and discussion

This section presents the study's findings and discussion. Since the study adopted the sequential explanatory mixed-methods research, the quantitative phase is presented before the qualitative phase. This is followed by the integration of the quantitative and qualitative findings and discussion.

Guiding question

How do informal micro-enterprises in the townships of the Gauteng province engage in the innovation process in each innovation phase?

Quantitative phase

The existing literature revealed that a complete innovation process is constituted by a handful of phases. To understand how informal micro-enterprises in the townships of Gauteng province engage in innovation activity in each innovation phase, we had to obtain primary data on how informal micro-enterprises execute each innovation phase. Phases that could not be tested during the quantitative phase, were tested during the qualitative phase.

Table 1: Reliability analysis.

Subscale	Cronbach's alpha (α)	Number of items	Mean	Standard deviation	Internal consistency
Innovation activity	0.9	27	2.9	1	Excellent

***Source*:** Primary data

A) Innovative idea generation mechanisms

As depicted in Table 2, innovative idea generation mechanisms were tested to determine the mechanisms that are used by informal micro-enterprises to generate innovative ideas. Negative skewness values suggest that the respondents agree with the innovative idea generation mechanisms listed, whereas positive skewness values imply that the respondents disagree. Mean values greater than 3 indicate that the respondents agree, whilst mean values less than 3 indicate that the respondents disagree with the innovative idea generation mechanisms that were tested.

Respondents indicated that they rely on ingenuity, customers, and communities of practice to generate innovative ideas. Ingenuity is mostly used as it has the highest mean value of 4.3, followed by customers with a mean value of 4.0, and communities of practice with a mean value of 3.7. Respondents also indicated that they do not invest in R&D, among other things that they do not do. The existing literature revealed that firms with high R&D spending seem to be more innovative than firms with low R&D spending (Brunow, Birkeneder, and Rodriguez-Pose 2017). In contrast, in this study, informal micro-enterprises proved to be innovative without R&D investment due to the utilization of other innovation methodologies. We were curious about how the identified innovative idea generation mechanisms work. Thus, we sought clarity on this during the qualitative phase of the study.

B) Transformation of innovative ideas into innovations

Respondents were asked to indicate how they transform innovative ideas into innovations. As portrayed in Table 3, respondents indicated that they use internal resources to transform innovative ideas into innovations, as this mechanism has a mean value of 4.4. Respondents also indicated that they do not use the resources of other small businesses, large enterprises, government, or universities to transform novel ideas into innovations. Accordingly, these innovation development mechanisms have mean values of 2.8, 2.3, 1.7, and 1.7, respectively. This finding suggests that informal micro-enterprises practice closed innovation more than open innovation. Accordingly, we argue that when it comes to innovation development, it is every man for himself in the townships of the Gauteng province. Since the majority of informal micro-enterprises use their internal resources to transform innovative ideas into innovations, it became imperative to determine how this works. Subsequently, we clarified this during the second phase of the study.

C) Marketing of innovations

Respondents were asked to indicate marketing strategies that they use to market their innovations. As illustrated in Table 4, respondents indicated that they market their innovations through word of mouth, the internet, and social media platforms such as WhatsApp. These marketing strategies have mean values of 4.3, 3.3, and 3.7, respectively. Word of mouth and WhatsApp are used more than other marketing strategies. This could be because these are affordable and effective marketing strategies in the informal sector. Respondents also indicated that they do not use media platforms such as television, radio, and newspapers to market their innovations. This marketing strategy has a mean value of 1.7. Considering informal micro-enterprises' limited access to financial

Table 2: Innovative idea generation mechanisms.

No	Innovation idea generation mechanisms	SD (%)	D (%)	NS (%)	A (%)	SA (%)	Mean	Skewness
1	The business invests in research and development for innovation purposes	73.9	3.4	2.4	9.2	11.1	1.8	1.4
2	The business relies on ingenuity (creatively thinking) to innovate	1.9	5.3	1.9	37.7	53.1	4.3	−1.8
3	Customers provide the business with innovative ideas	4.3	13.5	2.4	36.2	43.5	4.0	−1.1
4	The business makes use of communities of practice to innovate	5.8	18.4	6.3	40.6	29	3.7	−0.7
5	Other small businesses provide the business with innovative ideas	23.7	26.1	3.9	30	16.4	2.9	0.0
6	Large enterprises and universities provide the business with innovative ideas	59.4	21.3	2.9	10.1	6.3	1.8	1.4

***Source*:** Primary data
Likert scale for means: 1 = strongly disagree, 2 = disagree, 3 = not sure, 4 = agree, 5 = strongly agree
Key: SD = strongly disagree, D = disagree, NS = not sure, A = agree, SA = strongly agree

Table 3: Innovation development mechanisms.

No	Transformation of ideas into innovations	SD (%)	D (%)	NS (%)	A (%)	SA (%)	Mean	Skewness
1	Internal resources are used to transform ideas into innovations	2.4	4.8	3.4	24.6	64.7	4.4	−2.0
2	Resources of other small businesses are used to transform ideas into innovations	20.8	33.8	2.9	28.5	14	2.8	0.2
3	Resources of large enterprises are used to transform ideas into innovations	42.5	27.1	1.9	16.4	12.1	2.3	0.8
4	Universities' resources are used to transform ideas into innovations	55.1	33.3	2.4	6.8	2.4	1.7	1.7
5	Government resources are used to transform ideas into innovations	62.3	24.6	2.9	4.8	5.3	1.7	1.9

***Source*:** Primary data

Table 4: Marketing strategies.

No	The following platforms are used to market innovations to customers	SD (%)	D (%)	NS (%)	A (%)	SA (%)	Mean	Skewness
1	Formal advertisement on media platforms such as TV, newspaper, radio, etc.	71	13	1.4	6.8	7.7	1.7	1.8
2	Word of mouth	5.3	5.8	0.5	29.5	58.9	4.3	−1.9
3	Online (internet) advertisement	18.8	24.6	1	19.3	36.2	3.3	−0.2
4	Usage of social media applications such as WhatsApp groups	14	16.9	1.4	17.4	50.2	3.7	−0.7
5	Public speaking	54.6	17.9	2.9	9.2	15.5	2.1	1.0

***Source*:** Primary data

resources, this is justifiable as placing an advert on television, radio and newspaper is often very expensive.

D) Intellectual property rights

Table 5 depicts that respondents use trade secrets to protect their innovations with a mean value of 3.7. A trade secret is a secret on how a firm produces its products. Such secrets make it difficult for competitors to emulate the firm's products, thereby affording the firm a competitive advantage. Unfortunately, respondents indicated that they do not apply for patent rights, copyrights, trademarks, and industrial design rights to protect their innovations. Accordingly, these innovation protection mechanisms have mean values of 1.7, 1.7, 2.2, and 1.6, respectively.

In light of the statistics displayed in Table 5, most informal micro-enterprises do not adequately protect their innovations, probably because their innovations have been incremental rather than radical. Moreover, the application for patent rights and copyrights is stringent. Thus, this could be a major contributory factor to the informal micro-enterprises' failure to formally protect their innovations.

Correlation analysis

To ensure that there is a rigorous analysis of the collected quantitative data, we further utilized Spearman's rank correlation to test the connection between the innovation process-related phenomena and respondents' demography. As illustrated in the following Sections, there is a tested innovation phenomenon that produced meaningful results:

A) Spearman's rank rho test

This test assesses the connection between variables X and Y. A statistically significant correlation is demonstrated by a p-value that is <0.05 level of significance.

The coefficient of Spearman's rank correlation is given by:

$$r = 1 - \frac{6\sum D^2}{N(N^2 - 1)}$$

where

D = differences of ranks of corresponding values of X and Y

N = number of paired values in the data $-1 \leq r \leq 1$

As depicted in Table 6, the p-value is < 0.05 level of significance, suggesting that the relationship between the respondents' views and their level of education on the listed innovation phenomenon is statistically significant. Negative correlation coefficient ($r < 0$) means that highly educated respondents disagree with the indicated innovation phenomenon, whereas their counterparts agree. The finding suggests that highly educated respondents execute innovation activities for reasons other than to improve processes. They could be more interested in increasing the product range and attracting more customers, among others, whereas their counterparts execute innovation activities to improve processes. This finding is portrayed in Figure 1.

Factor analysis

Table 7 illustrates the correlation coefficients of the seven extracted principal components (factors), percentages of

Table 5: Intellectual property rights.

No	Intellectual property rights (mechanisms used to protect innovations)	SD (%)	D (%)	NS (%)	A (%)	SA (%)	Mean	Skewness
1	Patent rights	63.8	23.2	1.9	4.3	6.8	1.7	1.9
2	Copyrights	58.5	29.5	1	4.8	6.3	1.7	1.9
3	Keep it a secret (trade secrets)	17.4	13	2.4	16.4	50.7	3.7	−0.7
4	Trademark	40.1	34.8	0.5	16.4	8.2	2.2	0.9
5	Industrial design rights	64.7	25.6	0	5.8	3.9	1.6	2.1

***Source*:** Primary data

Table 6: Spearman's rank correlation between the level of education and views of respondents about the innovation phenomenon.

Items		
The purpose of innovation is to improve processes. ($N = 207$)	Correlation coefficient (r)	−0.142*
	p-value	0.041

*Correlation is significant at the 0.05 level (2-tailed)

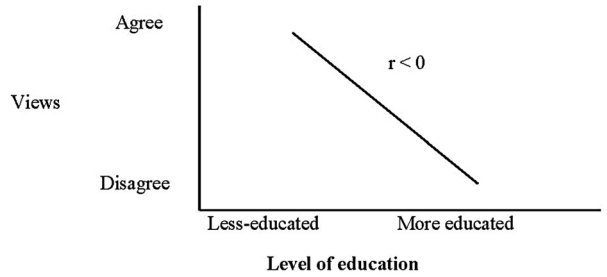

Figure 1: Views of respondents versus level of education (r<0).
Source: Primary data

the total variance, and cumulative percentages of variance. Components 1, 2, 3, 4, 5, 6 and 7 explain 25.25%, 10.79%, 10.04%, 5.32%, 4.44%, 4.08% and 3.74% of the total variance, respectively. The first two components account for 36.06%, the first three components account for 46.08%, the first four components account for 51.4%, the first five components account for 55.84%, the first six components account for 59.92% and all the first seven components account for 63.66% of the total variance. The first component is highly correlated with variables V5, V15, V16, V17, V22, V23, V25, and V26. Component 1 may be thought of as an open innovation limiting factor and innovation exploitation limiting factor, as variables V5, V15, and V16 relate to the limited to non-existent innovation-related cooperation between large enterprises, universities, government, other small businesses, and informal micro-enterprises, whereas, variables V22, V23, V25, and V26 relate to informal micro-enterprises' failure to formally protect their innovations and extensively market them. The second component is highly correlated with variables V6 and V11. Component 2 appears to be a sustainability factor because variables V6 and V11 pertain to the reasons for which informal micro-enterprises engage in innovation activity, including but not limited to the need to survive and increase their market share.

The third component is correlated with variables V2, V3, V12, V20, and V24. It may be thought of as a closed innovation fostering factor because the mentioned variables mostly relate to informal micro-enterprises' usage of internal resources to engage in innovation

Table 7: Component correlation matrix.[a]

		Component						
		1	2	3	4	5	6	7
V1	The business invests in research and development for innovation purposes	.544	.328	−.149	.053	.044	.305	−.086
V2	The business relies on ingenuity (creatively thinking) to innovate	.188	.390	.477	−.105	−.156	.303	−.115
V3	The business makes use of communities of practice to innovate	.412	−.188	.461	−.142	−.085	.228	.089
V4	Other small businesses provide the business with innovative ideas	.507	−.349	.178	.252	−.054	.333	.139
V5	Large enterprises and universities provide the business with innovative ideas	.605	−.133	−.163	.173	.322	.113	−.189
V6	In order to survive	.023	.606	−.201	.180	−.224	.384	.191
V7	To increase market share	.015	.524	.412	.272	.239	−.308	.095
V8	To enter new markets	.525	.037	.290	.435	−.192	−.324	−.166
V9	To improve product range	.337	.337	.344	.284	.379	−.046	−.130
V10	To improve processes	.504	−.027	.168	.408	−.379	.047	.046
V11	In order to increase profits	.038	.757	.207	.221	−.008	−.006	.130
V12	Internal resources are used to transform ideas into innovations	−.057	.343	.581	−.175	.266	.171	.067
V13	Resources of other small businesses are used to transform ideas into innovations	.488	−.447	.224	.317	−.132	.127	.025
V14	Resources of large enterprises are used to transform ideas into innovations	.541	−.427	−.100	.151	.373	.068	−.148
V15	Universities' resources are used to transform ideas into innovations	.804	−.076	−.250	.012	.273	.084	.051
V16	Government resources are used to transform ideas into innovations	.687	−.021	−.265	−.018	.218	.105	.216
V17	Formal advertisement on media platforms such as TV, newspaper, radio, etc.	.740	.115	−.221	−.278	−.044	.060	.098
V18	Word of mouth	.174	.176	.438	−.433	.285	−.019	.213
V19	Online (internet) advertisement	.516	−.324	.371	−.286	−.143	−.113	−.085
V20	Usage of social media applications such as WhatsApp groups	.481	−.211	.458	−.302	−.147	.018	.007
V21	Public speaking	.586	.122	−.099	−.111	−.304	−.039	.218
V22	Patent rights	.618	.335	−.426	−.210	−.031	−.042	.022
V23	Copyrights	.753	.211	−.262	−.119	−.070	−.143	−.093
V24	Keep it a secret (trade secrets)	.347	−.261	.492	−.050	.027	−.097	−.125
V25	Trademark	.625	.207	.064	−.120	−.180	−.431	.044
V26	Industrial design rights	.718	.193	−.292	−.034	.037	−.215	−.112
V27	Customers provide the business with innovative ideas	.013	−.358	.005	.187	.138	−.199	.770
	Percentage of total variance	**25.25**	**10.79**	**10.04**	**5.32**	**4.44**	**4.08**	**3.74**
	Cumulative percentage of variance	**25.25**	**36.04**	**46.08**	**51.40**	**55.84**	**59.92**	**63.66**

Extraction method: principal component analysis
[a]Seven components extracted

activity from discovery to launch. The fourth component is correlated with variables V8, V10, and V18. It may be thought of as a Growth factor because the mentioned variables relate to the engagement in innovation activity for efficient business processes and business expansion. The fifth component is slightly correlated with variables V5, V9, V10, V14, and V21. It may also be thought of as an open innovation limiting factor as among the mentioned variables, the meaningful ones relate to informal micro-enterprises limited to no use of external resources during the innovation process. The sixth component is slightly correlated with variables V4, V6, and V25. It may be thought of as a coopetition factor because the meaningful variable that is correlated to this component relates to the limited cooperation between informal micro-enterprises and their competitors during the innovation process. The seventh component is highly correlated with variable V27. It may be thought of as a customer factor because variable V27 relates to the critical role that customers play during the informal micro-enterprises' innovation process.

Qualitative phase

A) Information and knowledge

Information and knowledge are key inputs to the innovation process. For a firm to effectively engage in innovation activity, it has to be conversant with the existing problems in the market, among other trends. Participants were asked to indicate how they obtain the information and knowledge required to engage in innovation activity. The following themes were extracted from the analysis of their responses.

(i) Credible customer assemblies: About 67% (14 of 21) of the participants indicated that customers provide them with information about the existing problems in the market. As customers visit their premises, they discuss issues that are happening in the market that have the potential to affect the business. Among others, one participant explained that, during the listeriosis outbreak in South Africa, he learnt about it from customers. Listeriosis severely affected the *Kota* businesses in the townships as it was alleged that listeriosis was transmitted through processed meat such as polony. Polony and other forms of processed meat are key ingredients in *kota*. Thus, *kota* businesses had to prepare *kotas* differently after being aware that polony and other forms of processed meat were contaminated.

Participants also indicated that, while they listen to every customer, they do not consider information from every customer. There are customers that they trust, and these are the customers whose advice they take. We then asked a follow-up question to determine the criteria that are used to trust certain customers. The participants responded by explaining that certain customers earned their trust in the previous years through the provision of reliable and valid information. In light of their responses, we conceptualized a term to refer to these customers: credible customer assemblies, which means groups of reliable customers.

(ii) Social media and news platforms: About 33% (7 of 21) of the participants indicated that they acquire knowledge and information about the existing problems in the market through social media and news platforms. Social media and news platforms such as WhatsApp, Facebook, Instagram, television, radio, and newspaper are mostly used. Participants indicated that they mostly use these platforms because they offer up-to-date information and are affordable.

(iii) Coopetition: About 29% (6 of 21) of the participants indicated that they cooperate with their competitors, to obtain information and knowledge about the existing problems in the market. Among others, Participant 5 said the following, 'there is a group of about 12 of us, we are all small businesses owners. So, we meet regularly to discuss current issues in the market'.

B) Generation of innovative ideas

Participants were asked to indicate how they generate innovative ideas. The following themes were extracted from the analysis of their responses.

(i) Ingenuity: About 52% (11 of 21) of the participants indicated that they creatively think to generate innovative ideas. Participants further indicated that creative thinking mostly occurs in bed before falling asleep and at work during the day. The bed and late hours provide a peaceful environment that allows deep thinking to take place, while during the day at work, some events would inspire creative thinking.

For instance, Participant 11 said the following,

> When I am in bed before falling asleep, I meditate and reflect on what happened during the day. If I pick up a problem on the day's events or if I just want to expand my business, I then think deeply to discover solutions to the problem or ways to expand my business.

(ii) Credible customer assemblies: About 43% (9 of 21) of the participants indicated that they rely on customers to provide them with innovative ideas. They explained that as reliable customers visit their premises, they would make suggestions of new things to introduce into the business. In some instances, reliable customers would be in a group, and they would make innovative suggestions together.

(iii) Communities of practice: About 24% (5 of 21) of the participants indicated that they use communities of practice to generate innovative ideas. In this context, communities of practice are innovation-oriented gatherings that are constituted by the firm's employees. These employees would discuss business issues and formulate innovative ideas in the process. In the informal micro-enterprises' context, the participants indicated that the frequency of the gatherings ranges from once per week to once in two months.

(iv) Coopetition: About 14% (3 of 21) of the participants indicated that they cooperate with their competitors, for the generation of innovative ideas. Although this rarely happens, it seems that a few informal micro-enterprises do engage in coopetition relationships for innovation purposes.

C) Evaluation and selection of innovative ideas

Participants indicated that they use the mechanisms described below evaluate and select innovative ideas.

(i) Customers' priorities: About 67% (14 of 21) of the participants indicated that they evaluate and select innovative ideas based on customers' priorities. Innovative ideas that are crucial to the customers are selected and implemented, whereas innovative ideas that are less important to the customers are discarded or packed for later. This suggests that, when innovative ideas are evaluated and selected, there is less consideration of costs relating to the production of the innovation and benefits that will be accrued from the innovation for business owners.

(ii) Customers' affordability: About 24% (5 of 21) of the participants indicated that they evaluate and select innovative ideas based on customers' affordability. They consider the potential customers' financial muscle to purchase the subsequent innovation. Among others, Participant 21 said the following, 'Customers around here have limited disposable income. Thus, I consider their ability to afford potential innovations before introducing them'.

D) Transformation

Participants indicated that they use the mechanisms discussed below to transform the selected innovative ideas into innovations.

(i) Internal resources: About 90% (19 of 21) of the participants indicated that they use internal resources (i.e., human resources, financial resources, equipment, and so forth) to transform innovative ideas into innovations. Among others, Participant 5 said the following,

> after selecting the innovative idea, I worked on how the new service should look like and operate. After that, I saved profits until I had enough money to transform the innovative idea. When there was no adequate equipment, I purchased the required equipment using my savings.

Based on this finding, we argue that open innovation hardly takes place in the informal sector.

(ii) Coopetition: About 14% (3 of 21) of the participants indicated that they cooperate with their competitors, in particular, other small businesses to transform innovative ideas into innovations. The participants further explained that this mostly happens when the selected innovative idea is not in line with the business's core offerings, and outside expertise and equipment are required to implement it. Similarly, in instances where the firm does not have sufficient funds to innovate, funds are raised through *stokvel* also known as crowd-funding. In this study, we referred to this practice as metamorphosis *stokvel*, which refers to crowd-funding for innovation purposes.

Among others, Participant 16 said the following,

> I partner with my competitors when I do not have sufficient resources internally to implement an innovative idea. However, it is often difficult to find another small business that is willing to work with you. It is often every man for himself in the townships.

E) Testing

The following mechanisms are used to test prototypes:

(i) Internal testing by employees: About 38% (8 of 21) of the participants indicated that they test prototypes internally to determine if they are fit for their purpose. A prototype is assigned to one or two employees, these employees then use the prototype for a certain period, make an observation on how it works, and take some notes for discussion. Post the analysis period, if the prototype is deemed fit for purpose, it is then passed on to later innovation phases. The prototypes that fail the test are referred back to the transformation phase.

(ii) External testing by customers: About 33% (7 of 21) of the respondents indicated that they test prototypes externally to determine if they are fit for their purpose. Accordingly, in this instance, prototypes are offered to customers for free for them to test them and provide feedback to the firm. Unfortunately, there is no standard lead time that customers are given to test the prototypes. Customers would provide feedback as and when they are ready or when they are asked about their experience by the firm. Based on the responses received from the customers, the firm decides whether or not the prototype is fit for its purpose. A prototype that is fit for purpose is passed on to later innovation phases, whereas a prototype that fails the test is referred back to the transformation phase.

F) Marketing

Our analysis of the primary data revealed that informal micro-enterprises use the following platforms to market their innovations.

(i) On the shop display: About 48% (10 of 21) of the participants indicated that they place innovations on the shop display (including shop posters) to market them to potential customers. The participants further explained that as customers visit their premises, they further try to sell the innovations to them even if they visited the shop for something else.

(ii) Word of mouth: About 43% (9 of 21) of the participants indicated that they rely on word of mouth to market their innovations to potential customers. On one hand, internally, employees tell customers about innovations as they visit their premises and also explain to them how the innovations can benefit them. This is also done during the initial stages of the innovation process before the innovation can be displayed in the shop. On the other hand, externally, customers go around telling other potential customers about the innovation(s) and how it changed their lives. Among others, Participant 20 said the following,

> I was surprised by a visit from people who stay approximately 30 km away from here. They came to my shop looking for a traditional beer that I invented. When I asked them how they knew about it, they said there is a word on the street that I make traditional beer that brings a man on his knees after taking just two cups.

(iii) Social media: About 29% (6 of 21) of the participants indicated that they use social media platforms such as WhatsApp, Facebook, Twitter, and Instagram to market their innovations. The participants explained that social media is affordable and can reach targeted customers within a short period.

G) Introduction of innovations in the market
Participants were asked to indicate if they use any technique to make the innovations more appealing to customers during the launch phase. Two techniques stood out from the analysis, one, the participants indicated that they offer free samples to customers, and two, they place innovations on promotion to attract customers.

Integration of quantitative and qualitative findings and discussion
We compared quantitative and qualitative findings for similarities and differences to draw coherent conclusions. Consolidated findings are presented and discussed below.

Consolidated findings revealed that informal micro-enterprises gather information and knowledge required for innovation activity through credible customer assemblies, coopetition, social media, and news platforms. Among others, the involvement of a customer in the initial phases of the innovation process that would eventually benefit the customer lays a firm foundation for the later innovation activities. Such a practice is also a major contributory factor to innovation success. We also discerned that informal micro-enterprises also rely on social media to access information and knowledge required for innovation. While social media platforms are affordable and accessible, some of them have proven to be capable of spreading fake news at times. Thus, informal micro-enterprises have to validate the information they obtain from social media before applying it in the innovation process.

The study revealed that informal micro-enterprises rely on credible customer assemblies, coopetition, ingenuity, and communities of practice to generate innovative ideas. Moreover, the factor analysis results revealed customers as a crucial factor in both the early and late phases of the innovation process. Informal micro-enterprises do not consider innovative ideas from all customers, only innovative ideas from credible customers are considered. Some customers are considered credible due to trust earned over a certain period, often years. The existing literature revealed that the ability of informal micro-enterprises to innovate highly depends on the creativity of the owner (Mendi and Mudida 2018). This is not entirely the case as this study revealed that both owners and employees of informal micro-enterprises engage in creative thinking and subsequent innovation. Furthermore, creative thinking is not the only source of innovative ideas; credible customer assemblies, communities of practice and coopetition are other commonly used innovative idea generation mechanisms. While it is commendable that informal micro-enterprises use a handful of innovative ideas generation methodologies, unfortunately, they are not adopting novel innovative ideas generation methodologies such as crowdsourcing, which was scientifically formalized by authors such as Callaghan (2020).

This study further revealed that customers' priorities and customers' affordability of subsequent innovations are the factors that informal micro-enterprises consider when evaluating and selecting innovative ideas. Accordingly, if an innovative idea is a top priority for customers and they can afford the subsequent innovation, then such an innovative idea is referred to the innovation development/transformation phase. This suggests that there is less consideration of costs and benefits to the firm. At the development/transformation phase, if the informal micro-enterprise does not have adequate resources to cover the costs of transforming the innovative idea into an innovation, other means are explored to ensure that the customers get the innovation they want and can afford. For instance, the informal micro-enterprise can consider using cheap resources/ingredients to produce the innovation to ensure that the customers get what they want at an affordable price. Manyati and Mutsau (2021) corroborate this finding and argument when they posit that informal innovators are forced to do what the customers want, as informal sector customers are often domineering. The aforementioned practice is contrary to that of large enterprises and formal small businesses as they evaluate and select innovative ideas based on costs and benefits to the firm (Barbieri and Alvares 2016).

For instance, in the formal sector, if a firm does not have adequate resources to transform a certain innovative idea into an innovation, such an innovative idea will be deferred for later or discarded and alternative innovative ideas will be considered, especially in instances where the firm can't engage in open innovation with other firms that have adequate resources. In contrast, informal micro-enterprises are mostly concerned about satisfying the customer, whereas large enterprises and other formal small businesses are mostly concerned about creating wealth for the stockholders. Nonetheless, over-consideration of customers' priorities and affordability of subsequent innovations may limit radical innovation as radical innovations often come at a high cost and are often unexpected.

The analysis of both the quantitative and qualitative phases revealed that informal micro-enterprises use internal resources to conceptualize a scope for the transformation of innovative ideas into innovations and to transform such innovative ideas into actual innovations. Factor analysis results denote such a practice as an open innovation limiting factor. Accordingly, only a few informal micro-enterprises cooperate with their competitors (in particular, other small businesses) for scoping, design, and transformation of innovative ideas into actual innovations. Informal micro-enterprises should engage more in coopetition relationships as this can enable them to engage in radical innovation more often as radical innovations may require expertise and equipment that may not be available in the firm.

Concerning the testing of innovations, before they are launched in the market, this study revealed that internal testing is performed by employees and external testing is performed by customers. Unfortunately, informal micro-enterprises do not apply for patent rights, copyrights, and industrial design rights, among others, to protect their innovations, which is in line with the findings of other related studies (see Kumar and Bhaduri 2014; Charmes, Gault, and Wunsch-Vincent 2016; Manyati and Mutsau 2021). Nonetheless, informal micro-enterprises use trade secrets that are informally kept to protect their innovations.

Marketing is one of the integral aspects of the innovation process. This study revealed that informal micro-enterprises market their innovations through on the shop display (including shop posters), word of mouth, internet-based sites, and social media. Correlation analysis results revealed that the degree of usage of the identified marketing strategies differs among informal micro-enterprises, mostly depending on the demography of the respective informal micro-enterprises. However, for innovation diffusion to be successful which ultimately leads to innovation success, there must be intense marketing of innovations before and upon launch in the market. Thus, a combination of all the aforementioned marketing strategies can be effective to reach a wider market. Relying on one marketing strategy could be detrimental to an informal micro-enterprise. Lastly, the study revealed that during the launch phase, informal micro-enterprises place innovations on promotion and also offer free samples to potential customers to make the innovations more appealing.

Recommendations for future research

Although this study was able to establish an understanding of how informal micro-enterprises' innovation methods and techniques work, there is a need to explore further how the identified innovation methods and techniques can be fostered. For instance, in addition to fostering coopetition relationships, future studies should explore how ingenuity and curiosity can be fostered.

The study revealed that in the national system of innovation (demand and supply), there is a poor to non-existent transfer of innovation-related knowledge from universities to corporate entities. Thus, future studies should determine whether there is a relationship between poor innovation collaboration networks between universities and small businesses and the little to no existence of radical innovations among small businesses.

Conclusion

This study established an understanding of the innovation process that is followed by informal micro-enterprises to engage in innovation activity in each innovation phase. Based on the findings of this study, we conclude that the innovation process of informal micro-enterprises differs from that of large enterprises and to some extent that of formal small businesses.

Among other differences, we discerned that in contrast to the adoption of the traditional R&D for the generation of innovative ideas, other innovative idea generation methodologies, such as credible customer assemblies are used. Moreover, while well-established formal firms evaluate and select innovative ideas based on costs and benefits to the firm, informal micro-enterprises evaluate and select innovative ideas based on customers' priority and affordability of the subsequent innovations. In the innovation development or transformation phase, we noted with interest that a notable number of informal micro-enterprises engage in coopetition relationships to transform the selected innovative ideas into innovations. This study also revealed that workers and not just the owners of informal micro-enterprises were actively involved in the innovation process. This contrasts with the findings of the previous studies which found that the innovation probability of informal micro-enterprises is highly dependent on the creativity of their owners (Mendi and Mudida 2018).

The findings also suggest that informal micro-enterprises engage less in open innovation and engage more in closed innovation. Too much reliance on internal resources for innovation purposes can be detrimental to informal micro-enterprises as going concerns. Thus, there is a need for the government, researchers, and other role-players in the national system of innovation to introduce initiatives that can aid informal micro-enterprises to engage more in open innovation.

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