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Entrepreneurship Development, Innovation and Township Economy in South Africa

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Abstract

South Africa still grapples with high unemployment, poverty, economic exclusion, and inequality nearly three decades after apartheid ended. Available statistics suggest the presence of hydra-headed issues of poverty, inequality, and unemployment in townships and informal settlements in the country. One primary tool acknowledged by many stakeholders towards addressing these issues is the development of small, medium, and micro-sized enterprises (SMMEs) through entrepreneurship development. Thus, this study assesses the socio-economic impact of the eKasiLab programme in the Gauteng province, South Africa. In achieving this objective, a combination of qualitative (semi-structured key informant interviews) and quantitative (Propensity Score Matching (PSM) and textual analysis) approaches were adopted. Results from the analysis show that the ekasiLab programme has significantly improved the entrepreneurship development of beneficiaries – treated/control group, despite notable challenges. The impact could be observed in business growth, productivity improvement, job creation and welfare improvement of the control group.

Keywords: small, medium, and micro-sized enterprises, eKasiLab programme, township economy, innovation, propensity score matching, textual analysis, South Africa.

1.0 Introduction

South Africa is still grappling with high levels of unemployment, poverty, economic exclusion, and inequality nearly three decades after apartheid ended. In its latest report on inequality in Southern Africa, the World Bank regards South Africa as the most unequal country in the world, with race, geographical location, and gender bias identified as the main driving factors for the high level of inequality in the country. Available statistics also suggest that the hydra-headed issues of poverty,

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inequality and unemployment are more persistent in townships and informal settlements as well as in rural areas. The World Bank (2014) highlighted that 65.4 percent of the rural population in South Africa lives below the poverty line, which is higher than 25.4 percent of the population in urban areas. One primary tool acknowledged by many stakeholders towards addressing this issue is enhancing the development of small, medium, and micro-sized enterprises (SMMEs) through entrepreneurship development.

Across the globe, SMMEs are considered major productive drivers of inclusive economic growth and development. This position is also valid for the South African economy as the SMME sector is an integral part of the national economy and serves as an employment and growth source. This type of business accounts for forty percent (40%) of all South African businesses and is positioned to provide ninety percent (90%) of all new jobs by 2030 according to the country's National Development Plan 2030.

The historical background of SMMEs in South Africa has left them operating in various locations, such as cities and townships (Bvuma & Marnewick, 2020). However, there is a growing concern about the lack of innovation among SMMEs in townships. According to a World Bank study (2014), many households in South African townships live below subsistence levels and remain impoverished because of a lack of access to basic infrastructure, thus lagging in economic growth and development. Furthermore, the literature shows that in the post-apartheid era, geographical inequality in South Africa remains high, hindering the growth of township SMMEs. In the face of these factors, there is a need for a change in development policies to ensure inclusion and access to resources by SMMEs in segregated areas.

In recent years, there has been a growing interest in finding a long-term intervention to alleviate rural poverty in developing countries, as well as in entrepreneurship, which is regarded as one of the most critical drivers of economic growth in many nations (Acs et al., 2005; Gómez-Grass et al., 2010; Seuneke et al., 2013; Shane and Venkataraman, 2000; Thurik et al., 2008). Experience from these entrepreneurship-building programmes and interventions has shown that poverty reduction and sustainable development appear to have benefited from direct and indirect activities associated with these initiatives (Dhahri and Omri, 2018; Yanya et al., 2013). As a result, it is a popular government strategy to implement these programmes towards achieving similar goals.

The case of South Africa is not different from the government posture in other developing countries. In reversing the legacy of apartheid and promoting inclusive innovation in Gauteng province, The Innovation Hub (TIH) is saddled with the responsibility of ensuring that its services are within reach of most small businesses located in historically disadvantaged townships. These activities culminated in the establishment of the eKasiLabs programme² in 2014. Extending these services and facilities to Gauteng townships addresses the problems of access to modern infrastructure and promoting and supporting innovation. The government also seeks the programme to re-industrialise communities and create employment opportunities through skills and enterprise development.

Despite the fact that there is a large body of scholarly work on entrepreneurship and poverty in South Africa (Franke & Alexander, 2019; Mensah & Benedict, 2010; Fiseha, Kachere & Oyelana, 2019; Sall, 2022; and Agupusi, 2007), empirical findings on the relationship between The Innovation Hub, entrepreneurship development and poverty alleviation in South Africa appears limited. In addition, the ekasiLab innovation project has been a decade since the commencement of the programme. Still, there is a scarcity of studies exploring the role of this innovation hub in entrepreneurship development and related welfare-associated impacts. To close the existing knowledge gap, this study assesses the socio-economic impact of the eKasiLab programme in Gauteng province, South Africa. In achieving this objective, a combination of qualitative (semi-structured key informant interviews) and quantitative (Propensity Score Matching (PSM)) approaches were adopted. Results from the analysis show that ekasiLab has significantly improved the entrepreneurship development of beneficiaries – treated/control group, despite notable challenges. The impacts could be observed in business growth, productivity improvement, job creation and welfare improvement of the control group.

Also, there is an observed location-specific service demand and impact divergence across the location of the ekasiLab innovation labs. These location-specific factors contribute to the degree of effectiveness of the programme's implementation. The programme should consider including construction and manufacturing sectors in Mamelodi, the tourism sector in Sebokeng, and food and beverage in Ga-Rankuwa and Soweto. These sectors host most entrepreneurial activities in these locations, and focusing the programmes on these sectors could result in more impacts.

² The eKasiLabs programme is the TIH's vehicle to promote the culture of innovation and entrepreneurship in the townships, with a focus on new innovative output or business idea development in township communities

The subsequent section of the paper presents the conceptual framework for the eKasiLab Innovation project. Section two (2) presents the literature review, and the succeeding section details the approach and methodology for the study. Section four (4) shows the results from the descriptive and empirical analysis of the data. The last section presents the summary of findings, policy recommendations and conclusion.

1.1 How eKasiLab Innovation Project is Supporting Township Economy

In 2014, the Gauteng Provincial Government (GPG) adopted the Ten-Pillar programme to radically transform, modernise and re-industrialise (TMR) the Gauteng economy through the township economy. According to the Gauteng Township Economy Revitalisation Strategy Report (TER) (2014), township economy refers to enterprises and markets based in townships primarily set up to meet the needs of township communities. In reversing the legacy of apartheid in the country, The Innovation Hub (TIH) is established to accelerate and foster the growth of technology start-up companies to become sustainable businesses in the township economy (see Figure 1). Like other programmes, the eKasiLabs is one of the significant enterprise development instruments of the TIH.

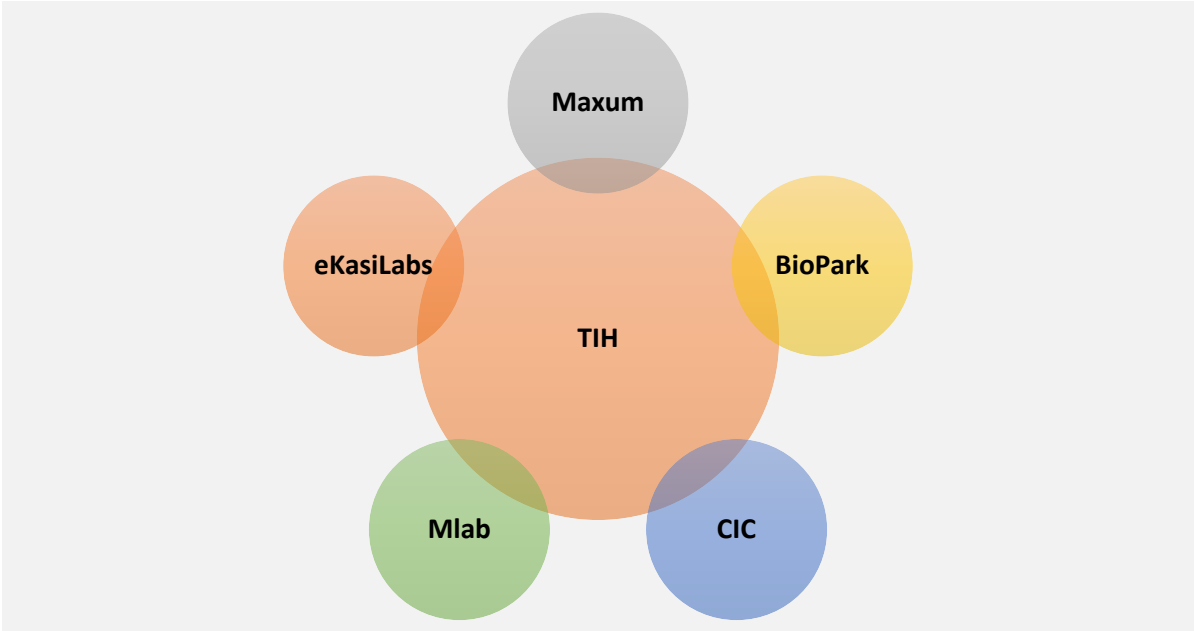


Figure 1: Programmes of the Innovation Hub

In response to the need for inclusive innovation, eKasiLabs was formed by TIH in collaboration with various municipalities and higher education institutions. It aims to be the key to building a culture of innovation-driven entrepreneurship in townships and developing innovations and technology, which are critical for modernising the economy and enhancing the sustainability of township-based innovation businesses. eKasiLabs offers the traditional programmes offered by TIH, which are closer to the communities and youth in the townships. These programmes mainly comprise co-creation spaces, working spaces, and prototyping facilities. The prototyping facilities include a FabLab to assist entrepreneurs who want to be part of Gauteng's re-industrialisation and mobile applications development factory. The Labs seek to promote skills development in innovative industries (ICT and advanced manufacturing), the green economy, bio-economy, the creative economy and multimedia. (See Figure 2 for the programme's focus sectors.)



<i>Green Economy</i>	<i>Bio-economy</i>	<i>Smart Industries</i>	<i>Others</i>
<ul style="list-style-type: none"> • Water and Sanitation • Energy • Waste Management 	<ul style="list-style-type: none"> • Health • Food Security 	<ul style="list-style-type: none"> • IoT • Advanced Manufacturing 	<ul style="list-style-type: none"> • Creative Industries • Skills development

Figure 2: eKasiLab Focus Sectors

These labs create conducive spaces in townships where local communities can access the same services and facilities offered at the TIH head office in Pretoria. Through such programmes, the township economy will eventually be integrated into the mainstream economy by formalising businesses and instilling a sense of business etiquette, allowing entrepreneurs to sustain their businesses. See Figure 3 for a detailed breakdown of the eKasiLab model.

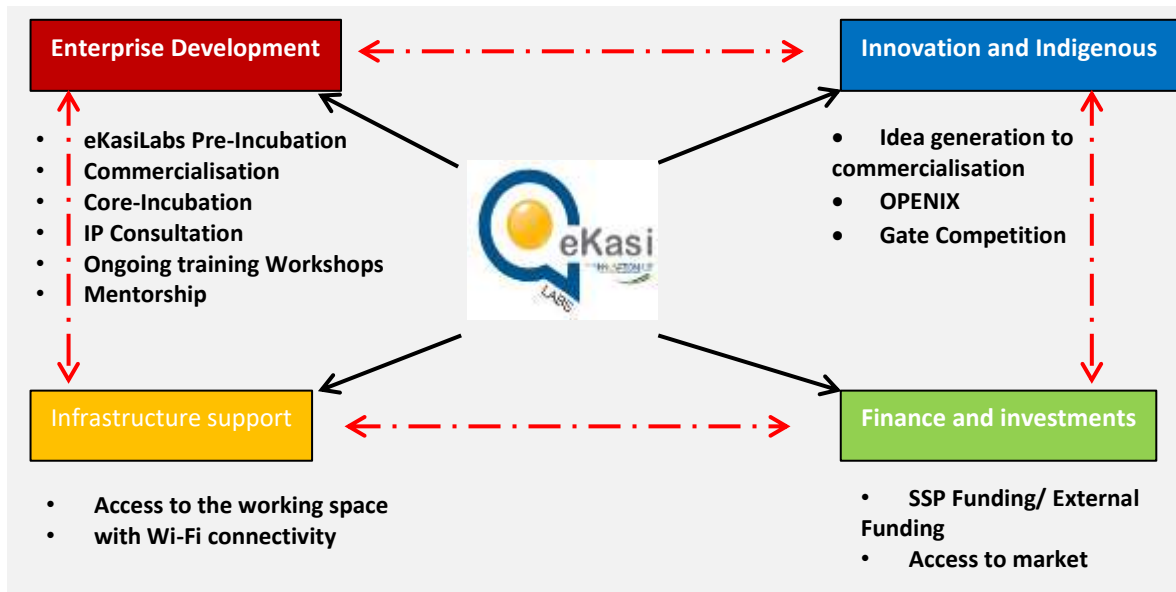


Figure 3: The eKasiLabs Model

Source: TIHMC annual performance plan (2022).

The business incubation service offerings of the eKasiLab programme are geared towards enabling, growing and fostering start-ups that will create jobs, commercialise innovative technologies and improve the competitiveness of Gauteng Province. A breakdown of the service offering to SMMEs is presented in Figure 3. This section examines the impact of the service offerings on the incubates' performance, efficiency, and productivity.

2.0 Literature review

There are numerous studies that investigate the success of small and medium-sized firms (SMEs) in both emerging and developed nations. While some studies assessed the effect of small and medium-sized enterprises (SMEs) on economic growth (Manzoor et al., 2021; Al-Afeef, 2020; Al-Haddad et al., 2019; Myslimi & Kacani, 2016; Mauritala et al., 2012), others evaluated its impact on poverty reduction (Nursini, 2020; Manzoor et al., 2019; Kowo et al., 2019; Zafar et al., 2018; Ali et al., 2014; Ali, 2013) Tax revenue (Nyamwanza et al., 2014) and unemployment reduction (Ogunjimi, 2021; Yasser & Abdelmadjid, 2021; Mascarenhas, 2021; Manaa et al., 2020; Al-Afeef, 2020; Al-Tamimi & Jaradat, 2019; Al-Haddad et al., 2019; Gukurume & Benson, 2018). Due to the structure and nature of the examined country or region, as well as the estimate procedures and other methodological difficulties, the results are diverse and inconsistent.

Different scholars have examined the effect of SMEs on economic growth/development. For example, Manzoor et al. (2021) employed the confirmatory factor analysis and structural equation modelling to investigate the SMEs' access to finance and their impact on rural development in Pakistan, and they found that, indeed, the evolution of small and medium-sized enterprises has an excellent and optimistic influence on rural development. Al-Afeef (2020) in his study confirms these findings when realising that about 95% of the change in economic development was explained by the SMEs in Jordan. Moreover, Al-Haddad et al. (2019) examined the role of SMEs in employment and economic growth generation in Pakistan. The results revealed that an increase in SMEs tended to increase the economic agents' income level. Along the same lines, Myslimi & Kacani (2016) investigated how SMEs affected economic growth in Albania. The study found that apart from other socio-economic indicators, SMEs in Albania were also responsible for boosting economic growth (see also Mauritala et al. 2012).

Likewise, economic growth and SMEs' impact on poverty reduction have recently been the focus of researchers' attention. To start with, Nursini (2020) investigated the impact of MSMEs on poverty alleviation in Indonesia and concluded the impact depends in major cases on the business scale first. Furthermore, apart from reducing poverty, MSMEs were also responsible for reducing the poverty severity in that country of analysis. Manzoor et al. (2019) also went a similar root. The study examined the development of poverty eradication agenda in South Asian Association of Regional Cooperation (SAARC) countries through small and medium enterprises (SMEs). The study argues that three primary variables are crucial for reducing poverty in the SAARC region: growth of small and medium-sized enterprises (SMEs), trade liberalisation, and social sector development. Kowo et al. (2019) conducted a similar study in Nigeria. The authors conclude that not only SME development that is crucial for poverty alleviation, but it must be accompanied by good strategies, only that way can they yield the expected results. Zafar et al. (2018) examined the magnitude of Small and Medium Enterprises' influence on eradicating poverty in Pakistan. According to the findings, small and medium-sized businesses have a negative and significant relationship with poverty. The results were confirmation of those found earlier by (Ali et al., 2014; Ali, 2013). These investigated the relationship between small and medium businesses and poverty in Pakistan, and both confirm that the performance of Pakistan's small-scale companies significantly relieves poverty.

Unemployment is also one of the social and economic problems that potentially is prone to a reduction with the SME development around the world. Therefore, different scholars have tried to investigate how this could be addressed through SME developments. More specifically, Ogunjimi (2021) assessed the importance of small and medium-sized enterprises (SMEs) in combating unemployment in Nigeria, focusing on the sustainability of employment created by this. The findings demonstrated the presence of a long-term association between unemployment and SMBs. Moreover, the results reveal that employment created in the SME subsector has a considerable positive influence on unemployment in Nigeria, indicating that the preponderance of SMEs has not effectively reduced unemployment in Nigeria due to the excess labour supply in the economy.

Similarly, Yasser & Abdelmadjid (2021), in their study examined the impact of SMEs on unemployment in Algeria, and they confirmed the previous results indicating that in the long run, SMEs do not reduce unemployment. Instead, they increase it. However, the short-run negative impact of SMEs on the unemployed was observed. Mascarenhas (2021), on the other hand, in their study on the evaluation of the SMEs' role in addressing the unemployment problem, points out that SMEs are negatively related to unemployment in Oman. The same findings had already been indicated by Manaa and Haq (2020) where in their investigation of the impact of SMEs on unemployment in the Kingdom of Bahrain, they concluded that a 1% increase in SMEs development would be responsible for a decrease in unemployment by 7% (see also Al-Afeef, 2020). Furthermore, Al-Tamimi & Jaradat (2019) studied the role of SMEs in reducing unemployment in Jordan. The results indicate that these improve Jordan's employment, decreasing unemployment in this country (See also Al-Haddad et al., 2019; Gukurume & Benson, 2018).

3. Approach and Methodology

3.1 Approach

This study investigates the economic impact assessment of the eKasiLabs programme in Gauteng. The study used a blend of qualitative and quantitative methods.

3.1.1 Qualitative Approach

For the qualitative analysis, we followed the empirical argument of Xiong et al. (2021) and Chirchietti (2017) that a qualitative approach is appropriate for testing innovation policy effectiveness. This study employed an in-depth semi-structured interview framework to obtain information from our target group, subject to their concerns and relevance (Dworkin, 2012).

According to Creswell and Creswell (2017) and Howard et al. (2016), an in-depth interview supports the selection of survey items, survey instrument development, and measuring them for content validity. However, some challenges, such as ambiguity of language and misunderstanding between interviewer and interviewee, affect the efficacy of an in-depth interview technique. In addressing the challenge of language ambiguity, interview questions were designed in English with a clear structure to minimise multiple interpretations. Similarly, for controlling interviews, the interviewer was "able to respond by moving away from the topic, rephrasing the question or, in some cases, pausing or ending the interview" (See Jolly, 2017; Ervo, 2016 for more).

3.1.2 Quantitative Approach

In quantifying the impact of the eKasiLab programme on businesses in Gauteng, we use the propensity score matching (PSM). In using this method, there are two treatment groups: (1) The treatment group— which includes businesses which benefitted from the programme, and (2) the control group, i.e. businesses which are still currently in the programme and are yet to graduate.³ In controlling for sample bias, applying the propensity score matching (PSM) method developed by Rosenbaum and Rubin (1983) is essential. Using this approach, we could obtain propensity scores (PS), which measure the extent of matching of the incentivised and control groups in multi-dimensions. The PS values are thus calculated as follows:

$$p(X) \equiv Pr[D = 1 | X] = E[D | X] \quad (1)$$

where X is the multidimensional vector of characteristics of the control group, D is the indicator variable, which equals one (1) if the businesses benefit from the eKasiLab programme, and 0 otherwise. Theoretically, if we can get the estimates of the propensity score $p(X)$, the average effect of treatment on the treated (ATT) can be estimated by the differences in the potential outcomes of the treated group and the control group (Becker & Ichino, 2002).

$$ATT \equiv E[Y_{1i} - Y_{0i} | D_i = 1] \quad (2)$$

$$\equiv E\{E[Y_{1i} - Y_{0i} | D_i = 1, p(X_i)]\} \quad (3)$$

³ This group was treated as control group although still ongoing the treatment. The intuition behind is that since they are still ongoing the treatment they are not putting in practice the knowledge acquired, therefore, they are not able to address problems that those that have graduated can.

$$\equiv E\{E[Y_{1i}|D_i = 1, p(X_i)] - E[Y_{0i}|D_i = 0, p(X_i)] | D_i = 1\} \quad (4)$$

where Y_{1i} and Y_{0i} represent the potential outcomes of the treated and the control group, respectively. To estimate the PS score, we followed Dehejia and Wahba (2002) and Becker and Ichino (2002) by using the Logit model. In summary, this methodology would allow us to estimate the impact of the eKasiLab programme on job creation, tax revenue to the government, gross value added, and poverty reduction in Gauteng. In addition to the PSM, this study used other matching techniques for a robustness check of our empirical estimates. These techniques include Nearest neighbour matching, Kernel matching, Inverse probability weighting, and augmented inverse probability weighting.

Nearest neighbour matching: The matching of nearest neighbours is also known as ‘greedy matching’. It entails examining the list of treated units and identifying the closest eligible control unit to pair with each treated unit. It is greedy in the sense that each pairing occurs without regard to how other units will or have been paired, and as a result, it does not seek to maximize any criteria. Nearest neighbour matching is the most prevalent form of matching and has been intensively explored via simulations. The specification of a distance measure is required for nearest neighbour matching in order to determine which control unit is closest to each treatment unit. The absolute difference between the calculated propensity ratings for the control and treatment groups is reduced using this strategy. Nevertheless, the order of the control and treatment subjects is arbitrary, then the first treated group and the control group with the closest propensity score are picked.

Kernel Matching: Differing from the Nearest neighbour, in the Kernel density, every group treated was compared to the weighted average of the individuals that served as controls in this procedure. The difference in propensity scores between the treated group and the control group is inversely proportional to the weights that were assigned to each group.

Inverse probability weighting: Inverse probability weighting (IPW) employs the entire dataset as the previous matching techniques but re-weights individuals in order to raise the weights of those who were exposed to unexpected events. This approach can be viewed as generating more observation for those portions of the target population with limited observations. It provides an effective pseudo population with near perfect covariable balancing between treatment groups. IPW adds weights equivalent to $1/PS$ for the treated groups and $[1/(1 - PS)]$ for the control groups.

Due to the substantial weight accorded to these observations, PS values close to 0 (for the treated) or 1 (for the control) may pose difficulties for IPW. Although all PS techniques seek to equalize all covariates between the treatment and control groups, the more common covariate adjustment tries to correct for covariate effects (confounding) using an outcome prediction model, and the IPW estimator can be derived by using the contrast function.

$$\hat{C}_{IPM}(X_n) = \frac{A_n Y_n}{\hat{e}(X_n)} - \frac{(1-A_n)Y_n}{1-\hat{e}(X_n)}, \text{ and the IPW estimator for the ATE is } \hat{\tau}_{ATE}^{IPW} = \frac{1}{N} \sum_{n=1}^N \left(\frac{A_n Y_n}{\hat{e}(X_n)} - \frac{(1-A_n)Y_n}{1-\hat{e}(X_n)} \right). \quad (5)$$

See Allan et al. (2020) for more on IPW estimator.

Augmented inverse probability weighting: The AIPW combines the properties of the regression-based estimator and the inverse probability weighted (IPW) estimator, and as a result, it is a ‘doubly robust’ method in the sense that it requires only one of the propensity models or the outcome model to be correctly specified, but not both of them. This is because the AIPW combines the properties of the regression-based estimator and the IPW estimator. Moreover, this augments the IPW by a weighting average of the outcome model, called the augmented inverse propensity weighted (AIPW) estimator:

$$\hat{C}_{IPM}(X_n) = \left(\underbrace{\frac{A_n Y_n}{e(X_n)}}_{IPM} - \underbrace{\frac{A_n - e(X)_n}{e(X)_n}}_{Augumentation} f(1, X_n) \right) - \left(\underbrace{\frac{(1-A_n)Y_n}{1-e(X)_n}}_{IPM} - \underbrace{\frac{A_n - e(X)_n}{1-e(X)_n}}_{Augumentation} f(0, X_n) \right),$$

$$\hat{\tau}_{ATE}^{IPW} = \frac{1}{N} \sum_{n=1}^N \hat{C}_{AIPM}(X_n). \quad (6)$$

See Kurz (2022) for more on AIPW specifications.

3.2 Data Collection

A total of five eKasiLabs Managers and Business Development Officers from the ten eKasiLabs spread across the province were interviewed. The interview guide,⁴ among other information, captured information such as the facilities provided by eKasiLabs, challenges that the labs are facing to ensure success in their programmes, mechanisms that are implemented, different ways

⁴ Not attached in this document, but available upon request

through which the provincial government can assist to ensure that labs work without too much limitation, and the impact of Covid-19. The interviewees responded to the questions and later filled in the Google questionnaire. The responses were solicited from eKasiLabs personnel in Mamelodi, Tembisa, Mabopane, Ga-Rankuwa, Kathorus, Alexandra, Sebokeng, Mohlakeng, Soweto and Kagiso.

For the quantitative analysis of this study, the study used a purposeful sampling from the register of the beneficiary enterprises and individuals obtained from the eKasiLab. The sample survey was designed to cover gender, race, the business sector and corridor⁵. The sample size for this study was 221. Out of this total sample, 89 of the business owners had graduated from the programme, while the remaining 132 were still at various stages in the programme, i.e. yet to graduate. The study used business owners who had yet to graduate as the control group for the impact assessment. Furthermore, data were collected through a telephonic survey using a semi-structured questionnaire comprising a mix of structured and unstructured.

4. Discussions of Results

4.1 Descriptive Analysis

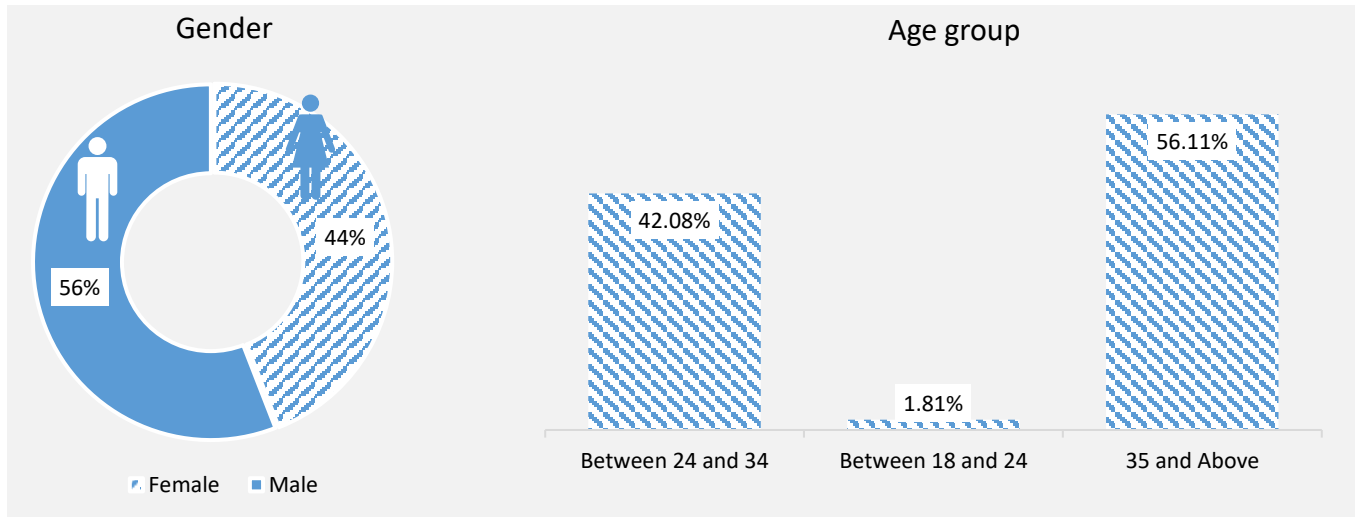
This section presents the results of the quantitative analysis of the study. The analysis covers the beneficiaries' demographic characteristics, the eKasiLab programme's impact on beneficiaries using the PSM, and possible recommendations for improving the programme using textual analysis.

4.1.1 Demographic characteristics of the respondents

Figure 4 shows that the majority of the respondents are male. Of those who responded to the survey, 56% identified as male, and 44% identified as female. This indicates a high presence of male entrepreneurs in the eKasiLab programme. Regarding the age group, 56.11% of entrepreneurs in the eKasiLab programme are over 35 years, while 42.08% are between 24 and 34, and 1.8% are between the age of 18 to 24 years.

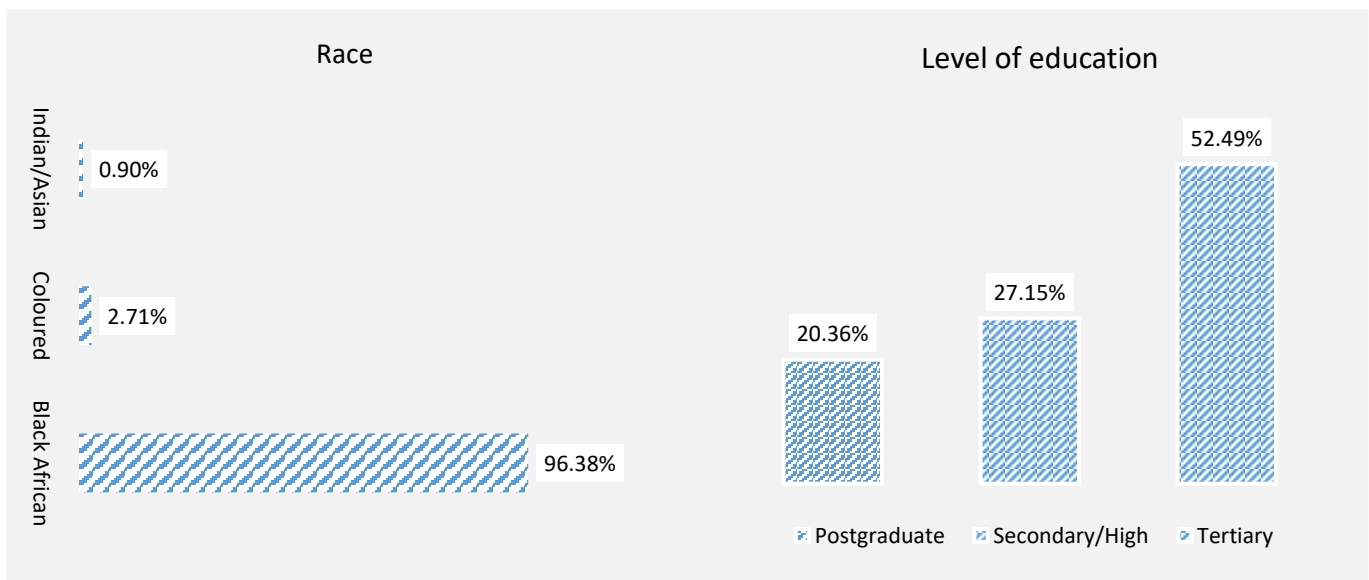
⁵ Business corridor is the areas the businesses are located.

Figure 4: Gender and Age group of the respondents



All races, except Whites, are represented in the eKasiLab programme. Compared to the national, racial demographic statistics, where 80.8% of the population are African, 8.8% are Coloured, 2.5% are Indian or Asian, and 8% are Whites,⁶ the demographic spread of people benefitting from this programme is nationally representative. As shown in Figure 5, black Africans make up the largest group that dominates the eKasiLab programme with 96.38%, while Indians make up the smallest group with 0.9%. The Coloured group comes in second with 2.71%. Figure 5 further reveals that 52% of entrepreneurs have tertiary degrees, compared to 20% with graduate degrees and 27% with high school diplomas.

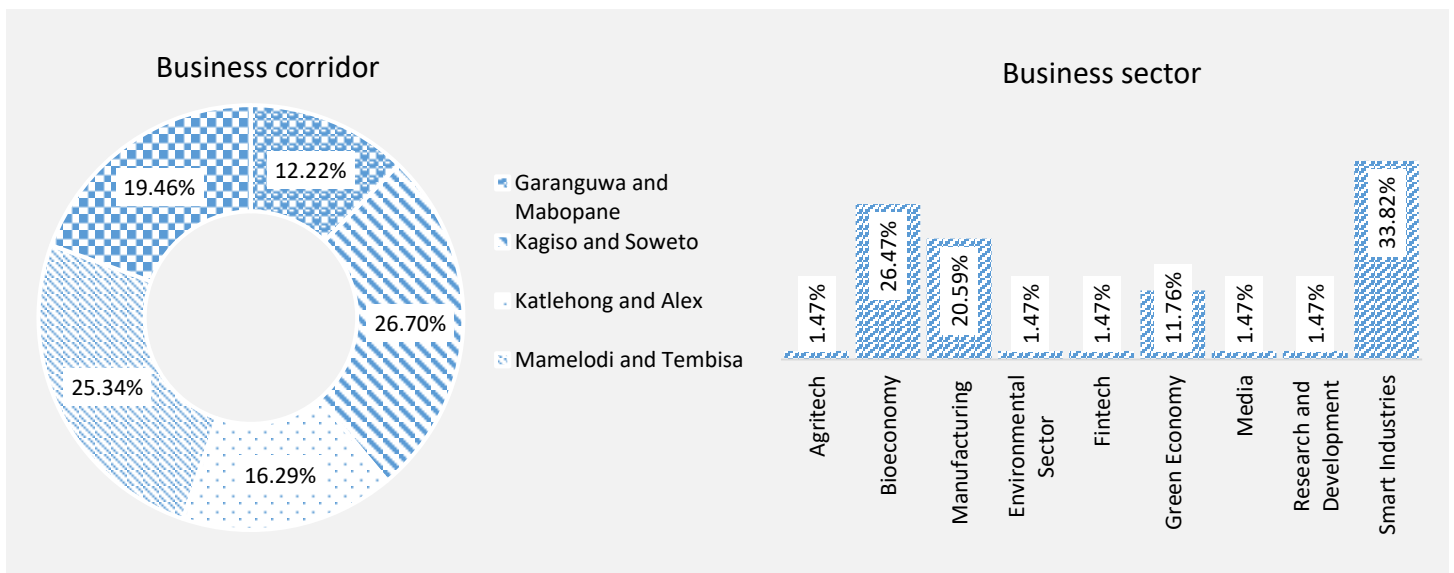
Figure 5: Race and level of education



4.1.2 Business Characteristics

This section analyses the sectoral characteristics of business owners in terms of the sectors and their corridors⁷. As shown in Figure 6, the eKasiLab programme spreads across all the critical sectors of the economy. For instance, the majority of the respondents are from the Smart Industries sector (34%), followed by Bioeconomy (26.4%), manufacturing (20.5%), and the green economy (11.76%) (See Figure 6 for more). According to STATs-SA, these sectors contribute about 25%⁸ to the aggregate economy. As there are ten eKasiLabs facilities spread across five business corridors, the response rate of the incubates across the Gauteng province was also analysed. The empirical outcome indicates that 26.70% of entrepreneurs run their companies in Kagiso and Soweto, 25.34% in Mamelodi and Tembisa, 19.46% in Mohlakeng and Sebokeng, and 12.22% in Ga-Rankuwa and Mabopane.

Figure 6: Business Corridors and Sectors



Before enrolling in the eKasiLab programme, most entrepreneurs (37.18%) were at the infancy stage (i.e. their companies were brand new), followed by 30.77% of businesses that were still at the idea stage (early steps in an innovation process), 20.51% of businesses were in the commercialisation stage (a process of introducing a new product to the market), and 11.54% of

⁷ Business corridor is the location of the businesses based on the TIH

⁸ <http://www.statssa.gov.za/publications/P0441/P04413rdQuarter2021.pdf>

businesses were in the growth stage (experiencing rapid sales growth). However, due to the programme's intervention, most business owners had moved to either fully operational or partially operational (68%), 20% had moved to the growth stage, and 11.31% were not operational. (See Table 1).

Table 1: Impact of eKasiLab programme on businesses' stage

Business stage before joining the programme		Business stage after joining the programme	
Commercialisation	20.51%	Fully operational	27.98%
Growth	11.54%	Growth	20.83%
Idea stage	30.77%	Not operational	11.31%
Infancy	37.18%	Partially operational	39.88%

4.2 Impacts of the eKasiLab programme on businesses

Following the outcome of Table 1 on the business stage of the incubates after joining the programme, we further probe the respondents to establish why their businesses were not operational. Some businesses were either partially or not operational due to a lack of funding or management and marketing skills, while some were still in the prototype phase (see Figure 7). The results also indicate that 71.88% of the entrepreneurs believe that the programme should be extended by at least two to three years since a year is not long enough, given that they occasionally do not obtain the necessary financial and non-financial help promptly. However, 28% of business owners think that the time frame is adequate if they obtain funding, mentorship, and other essential support from the programme.

Figure 7: Reasons for not operating and programme timeline

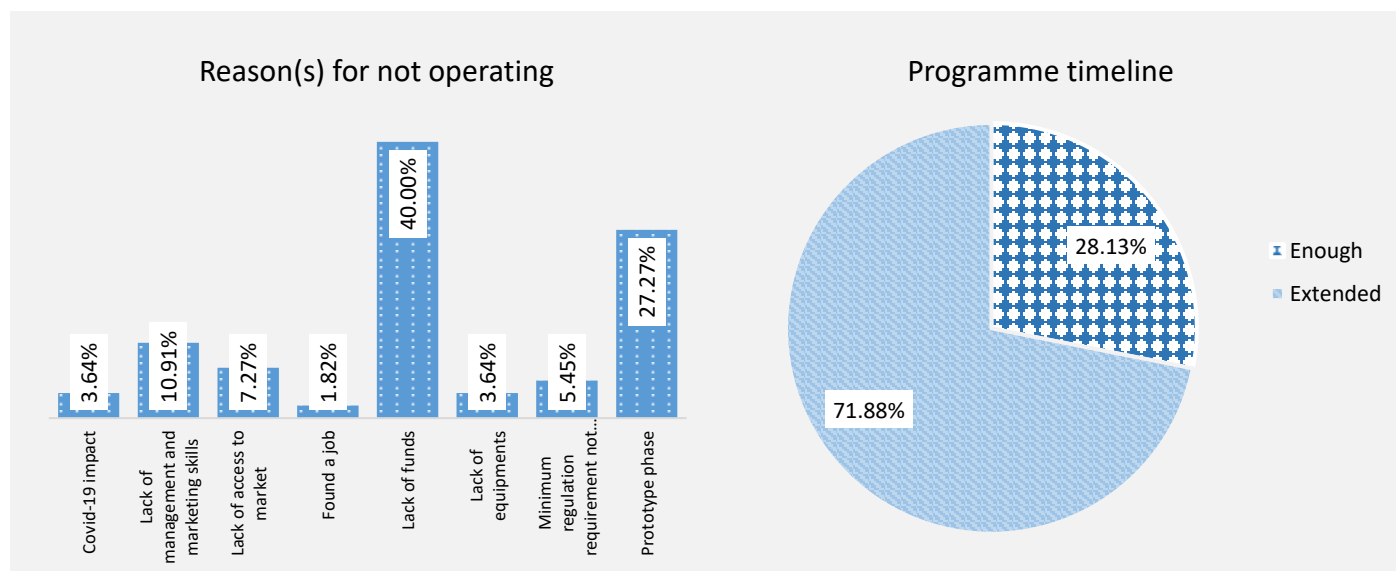
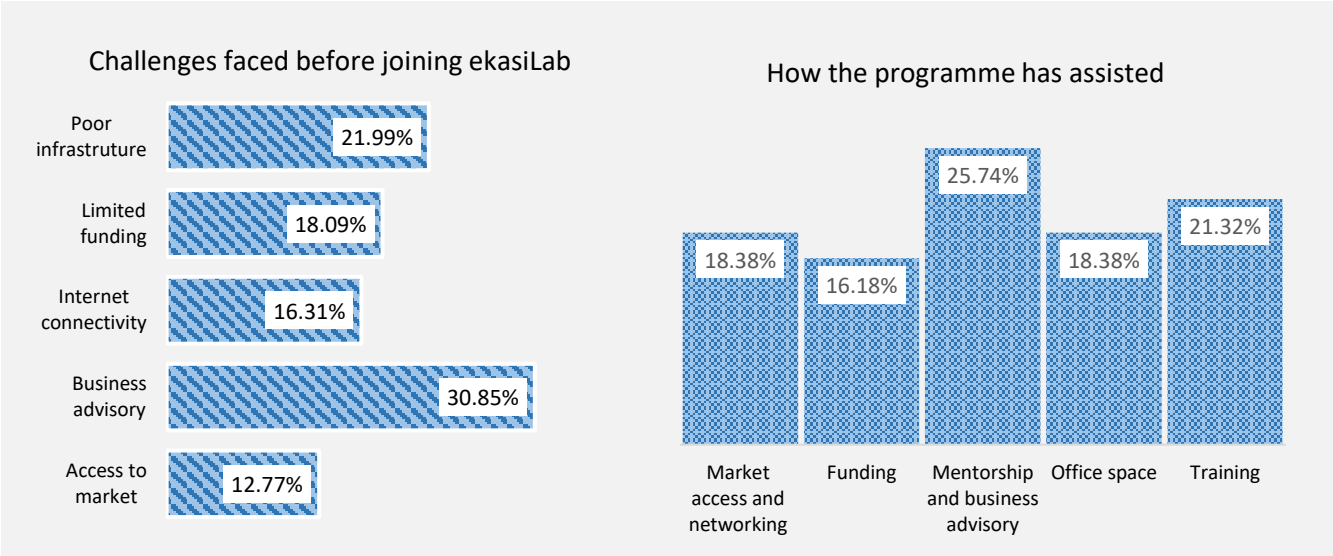


Figure 8 shows the difficulties faced by business owners before joining the eKasiLab programme. Surprisingly, most business owners (30.85%) indicated business advisory is their primary challenge. Some attribute poor infrastructure as a dilemma to their business development (21.99%), while 18.09% lacked the necessary funding, which forced them to suspend operations or shut down completely. 16.09% say that Internet connectivity is their major impediment because they could not conduct in-depth market research on their industry. 12.77% of entrepreneurs also lacked access to their market.

Figure 8: Impact of the programme on the business challenges

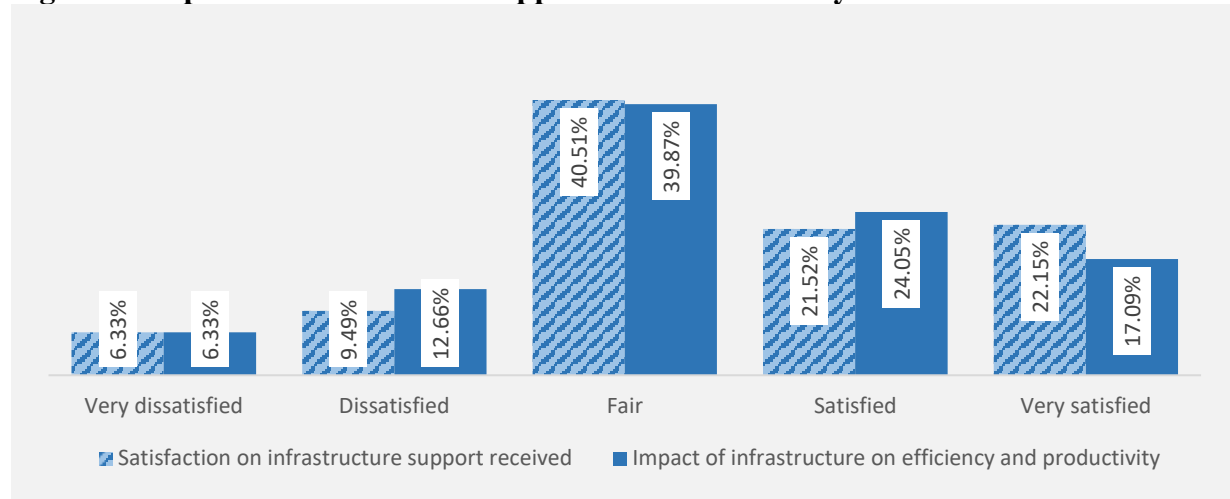


On how the eKasiLab programme has assisted entrepreneurs in mitigating business-associated challenges, most beneficiaries (25.77%) said they had received mentorship and business advisory services from the programme. These mentorship programmes have helped businesses become more knowledgeable about selling products and managing their business as well as finances. The eKasiLabs programme also provides infrastructure support to the incubates, such as office space, hot-desking space, boardrooms with video conferencing and facilities for meetings, as well as manufacturing and laboratory space.

Figure 8 displays the levels of satisfaction and the impact of the infrastructure received on the productivity and efficiency of the recipients. The graph indicates that 40.51% of the entrepreneurs are neutral regarding satisfaction with infrastructure delivery. 22.15% of the respondents were very

satisfied, while 21.52% were satisfied. However, the remaining 15.82% were either dissatisfied or very dissatisfied with the delivery of infrastructure by the programme.

Figure 8: Impact of infrastructure support on the Beneficiary



The graph (Figure 8) further reveals the impact of infrastructure on the productivity and efficiency of the respondents. Most respondents (39.9%) are neutral about the impact of infrastructure supply on their efficiency and productivity, 24.05% are satisfied, and 17.09% are very satisfied. Nevertheless, 12.66% are dissatisfied, and the remaining 6.33% are very dissatisfied.

Financing is perceived as challenging for incubates in environments where the business and financial support structure for start-ups and early-stage businesses is not well developed. Figure 9 shows that 44% received funding from the eKasiLab programme or its partners. However, 56% of the entrepreneurs did not receive funding from the programme and its partners. Similarly, for the beneficiaries who received funding, the figure depicts that most entrepreneurs (43%) received funding between R10 000-R50 000, followed by 20% receiving funding below R10 000 and 12% receiving funding above R100 000. Of the surveyed entrepreneurs, 20% to 35% said they had applied for funding but were still waiting on the eKasiLabs for small businesses and the government's Department of Employment and Labour or had already received benefits from corporate and private entities.

Figure 9: Funding status

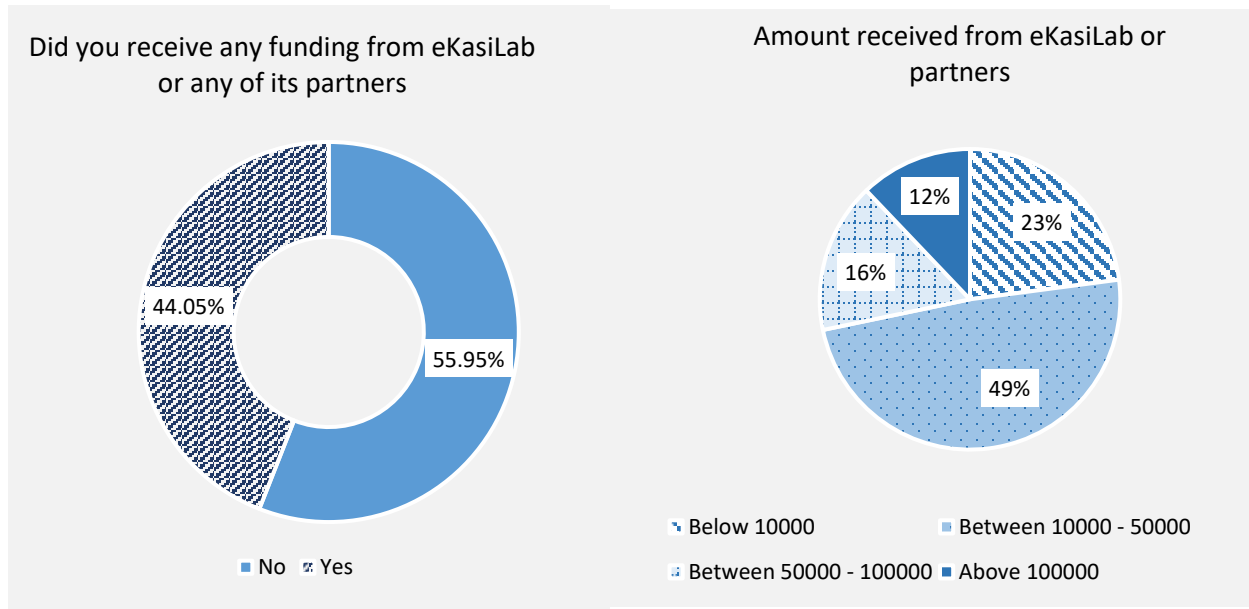
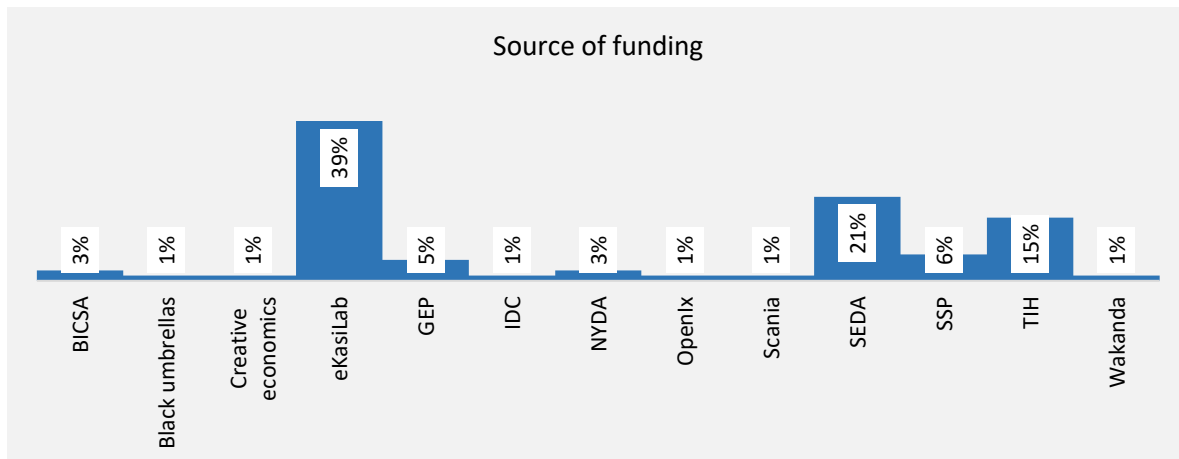


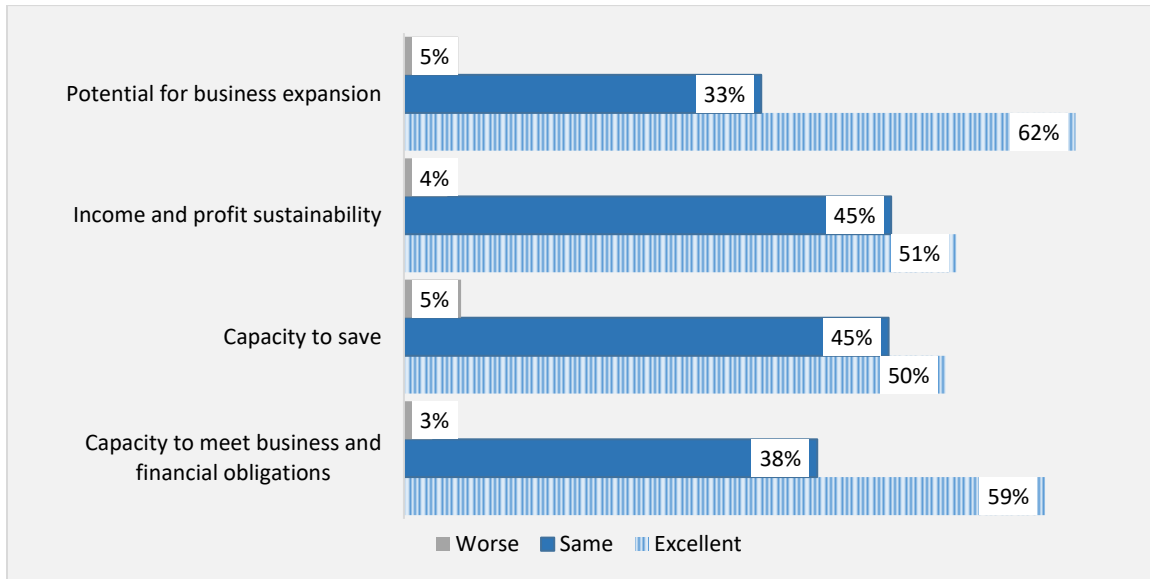
Figure 10 below shows the sources of funding for the incubates that indicated they had received funding. The figure reveals that 39% of the businesses received funding from the eKasiLab programme, and those remaining received funding from its partners such as the Small Enterprise Development Agency (SEDA) (21%), The Innovation Hub (TIH) (15%), Student Sponsorship Programme (SSP) (6%), The Gauteng Enterprise Propeller (GEP) (5%), and the National Youth Development Agency (NYDA) (3%), among others.

Figure 10: Sources of funding



SEDA is an agency of the Department of Small Business. The agency's mission is to develop, support and promote small enterprises. SEDA runs enterprise development and incubation programmes, while GEP supports SMMEs in Gauteng. The support includes financial support for start-ups, personalised services, business solutions, business planning and post-investment support.

Figure 11: Impact of funding on entrepreneurs



In assessing the impact of funding on the business health of the entrepreneurs, four (4) indicators related to both their business and personal life were considered. These indicators include (1) the potential for business expansion, (2) income and profit sustainability, (3) the capacity to save, and (4) the capacity to meet business and financial obligations. A Likert scale evaluation was adopted to judge the beneficiaries' business health post-intervention. The judgement scale criteria used was to determine whether, with these funds/grants, the business operations of the enterprises were worse off, remained the same (unchanged), became better or became excellent.

As shown in Figure 11 above, the results trend is positive, with 56% of the average counts across the four (4) indices showing excellent business health. Only 4.3% said their businesses were worse off, while 40.3% of businesses have remained the same. From the total of 221 small, medium and micro enterprises (SMMEs) in the survey sample, about ten said their businesses were worse.

Furthermore, the impact of funding on different dimensions of the four indicators was also analysed. As indicated in Figure 11, 16, 59% of the recipients highlighted that the funding

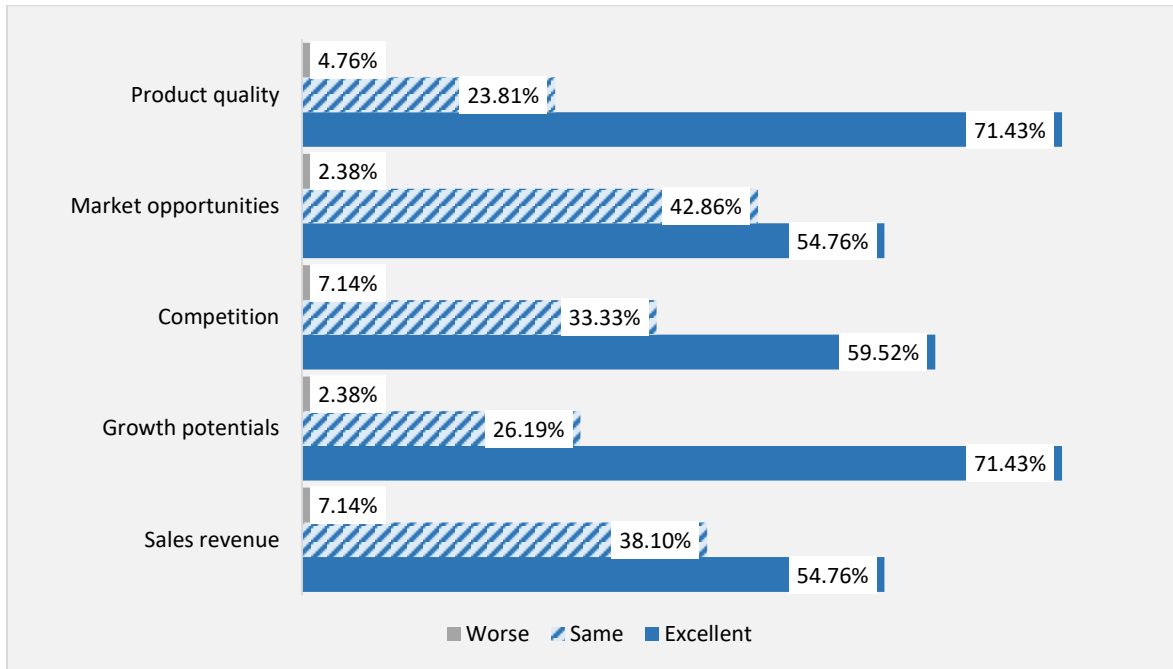
opportunity enhanced their capacity to meet business and financial obligations. In comparison, 38% said their businesses remained the same, and the remaining 3% said the funding opportunity had caused their businesses to deteriorate.

For the capacity to save, about 50% of the entrepreneurs said that the funding opportunity enhanced their capacity to save money for future capital and re-investment. In comparison, 45% said their businesses remained the same, and 5% said the funding opportunity worsened their savings obligations. Additionally, 51% of the surveyed entrepreneurs said that the funding improved their business health regarding income and sustainable profits, 45% believed that their businesses remained the same, and 4% said that the funding worsened their income level. For business expansion, 62% of the recipients emphasised that the funding helped their businesses expand, 33% said that their businesses remained the same, and 5% said that their businesses had worsened.

In assessing the impact of training on the business health of the entrepreneurs, two (2) indicators related to efficiency and productivity and the entrepreneurs' knowledge of their businesses were assessed (see Figure 12). The results yielded positive outcomes. About 59% of the average counts across the two indices showed that efficiency, productivity, skills and knowledge of products had improved. 39% of the respondents stated that their businesses remained the same, while 2% were worse off. A deep dive into the individual indicators revealed that about 60% of the trained entrepreneurs believed that the training programme impacted their business health in terms of improvement in efficiency and productivity. In comparison, 40% said that the training had not contributed to helping their business improve efficiency and productivity for business expansion.

Similarly, about 58% of the trained entrepreneurs believed that the training programme impacted their business health by improving their product skills and knowledge. In comparison, 42% thought that the training did not contribute to helping their business improve skills and knowledge of their products for business expansion.

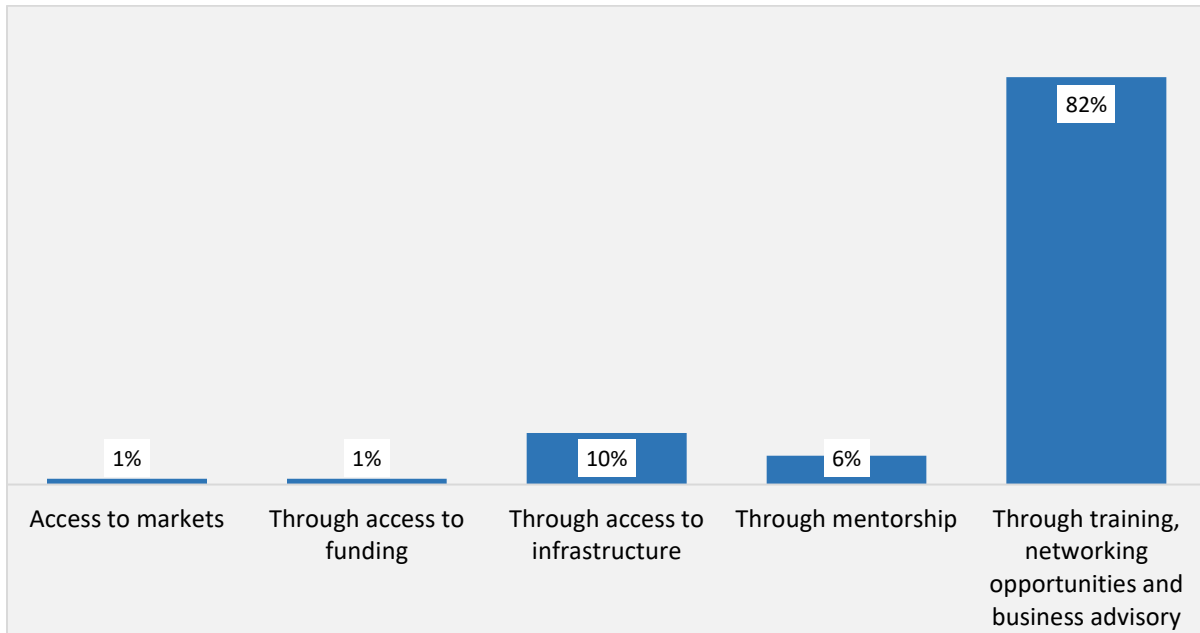
Figure 12: Impact of market access on Entrepreneurs



The eKasiLab programme provides access to market services through market and industry reports, networking opportunities, and assistance with market analytics and sector-specific reports. In examining the impact of this service on the business health of the entrepreneurs, five indicators, namely: (1) sales revenue; (2) growth potential; (3) competition; (4) market opportunities; and (5) product quality, were assessed.

Generally, the empirical outcomes produced positive results. For instance, 62.4% of the average counts across the five indices showed that the market access facility improved their business health, i.e., the majority of respondents alluded to the positive impact of the service on their business health. 33% said their businesses remained the same even after receiving the intervention, while 6% said their businesses were worse off. The outcome of the individual indicators can be seen in Figure 12 above.

Figure 13: Impact of the Programme on Innovation



Central to the functions of the eKasiLab programme is providing opportunities to talented township-based entrepreneurs, developing solutions aligned with the e-Government Department's priorities, and promoting the culture of innovation and entrepreneurship in the townships, with a specific focus on innovative outputs in the community. Empirically, the study also examined how the programme has improved culture innovation among SMMEs, as revealed in Figure 13 above. The results indicate that 82% of businesses suggested that the programme has allowed them to innovate new products through training, access to networking opportunities, and business advisory. 10% indicated that the programme enabled them to innovate new products through access to infrastructure support, and 6% of business owners highlighted the role of mentorship as the primary driver of their innovation. The remaining 2% said that market access and funding drive their innovation.

4.2.1 Quantifying the socio-economic impact of the eKasiLab programme.

Table 2 reports the main results of this study and the treatment effects of the eKasiLab programme participation by comparing the probability of achieving a specific outcome for the beneficiaries and non-beneficiaries. The sample consisted of 221 people who responded to the survey (132 non-beneficiaries and 89 beneficiaries). We used propensity score matching (PS-match) limited to one neighbour to increase the quality of the match. However, for the robustness check, we included

different matching techniques such as nearest-neighbour matching (NN-Match), inverse probability weighting (IPW), and augmented inverse probability weighting (AIPW). As expected, participation in the programme raised the probability of certain business owners generating more jobs and paying more tax than the non-beneficiaries. For example, our baseline regression shows beneficiaries paid 1.72% more tax than non-beneficiaries. This empirical outcome is consistent with the study of Karuppanchetty et al. (2014). Along the same lines, beneficiaries of the eKasiLab programme generated 0.5% more jobs than business owners (still in the programme) who did not or had not yet benefitted from the programme. This result implies that incubation programmes can be considered a great strategy to increase government revenue and reduce the unemployment rate in Gauteng (White & McLaughlin, 2006; Santarino, 2017).

Table 2: Average Treatment Effect Estimation

Variables	(1) PS-Match	(2) NN-Match	(3) IPW	(4) AIPW
Tax	1.7212*** (0.4433)	1.3991** (0.7813)	1.8720** (0.6178)	1.8661** (0.6193)
P0 Mean			6.6210** (0.4076)	6.6270*** (0.4121)
Employment	0.5034** (0.2082)	0.1411* (0.2917)	0.2215 (0.2148)	0.2031 (0.2514)
P0 Mean			0.8852*** (0.1189)	0.8910*** 0.1200
Revenue	0.4193 (0.3525)	1.050** (0.5359)	0.6760* (0.5652)	0.7430 (0.5733)
P0 Mean			10.9722*** (0.4270)	10.9047*** (0.4336)

Standard errors in parentheses, *** denotes significance at 1 %, ** at 5 % and * at 10%.

Although the results seem to increase the entrepreneurs' revenues, the benchmark results are statistically insignificant. For example, we found that beneficiaries increase their annual income by 0.41%. This means participating in the programme contributes to business revenue growth. See Busler (2011) and Hamauswa et al. (2017) for similar empirical outcomes. The outcome from the other matching techniques seemed to improve the quality of the results. For example, while the NN-Match seems not to improve the results due to inconsistent signs, the IPW and AIPW exhibit a significant PO mean for all the indicators. This result might be because the PS-Match and NN-Match use Weibull distribution for the outcome and logit models for the treatment assignment. The IPW and AIPW use the gamma and probit models for the outcome model, respectively.

As per the results, the average treatment effect of tax is 1.87%, implying that the average tax paid by people participating in the programme is 1.87% higher than those who did not participate or benefit. Furthermore, looking at the potential outcome means (POmeans), we found that the average tax paid by people who did not benefit from the programme is 6.62%. Moreover, we also found that poverty can be tackled by implementing the eKasiLab programme. For example, the coefficient of poverty (measured by daily income) is 0.93%, which means that the beneficiaries' daily income is 0.93% higher than their counterpart, the non-beneficiaries. In addition, the estimate of the potential average outcome for daily income is 7.63%, indicating that those who didn't benefit from the programme earn an average of 7.63% daily.

4.3 Qualitative Analysis

4.3.1 Key Informant Interview

This section presents the empirical outcome of the qualitative response from the site visit. We present this section by analysing the responses of the regional managers and business development officers in each Lab of the Gauteng business corridor.

Table 4: Summary of Key Informant Interview Sessions with Innovation Hub Managers

	Main challenges encountered when implementing the eKasiLabs programme	Aftercare programme	Existing mechanism to ensure a successful implementation of the programme	How does the TIH ensure uniformity of eKasiLab implementation across the labs?	How is the eKasiLabs programme implemented?	How does TIH ensure product innovation within the eKasiLab programme?	How can TIH improve the eKasiLab Programme?	How can the Gauteng Provincial Government improve on eKasiLabs Programme?
Kathorus & Alexandra	<ul style="list-style-type: none"> - Fund to rent space. - Scarcity of innovative entrepreneurs. 	√	<ul style="list-style-type: none"> - Enterprise Pitch Competition - Mentorship 	<ul style="list-style-type: none"> - Similarity in facilities and pitch competition 	<ul style="list-style-type: none"> - Enterprise pitch competition - Mentorship - Marketing 	<ul style="list-style-type: none"> - Enterprise pitch session - External consulting 	<ul style="list-style-type: none"> - Association with universities 	<ul style="list-style-type: none"> - Increase budget. - Improve marketing. - Participation of the private sector.
Mamelodi & Tembisa	<ul style="list-style-type: none"> - Limited commitment from enrollers - Non-appreciation of program 		<ul style="list-style-type: none"> - Relationships with TVET and the local community - Incubation programme 	<ul style="list-style-type: none"> - Business development services - Mentorship programmes 	<ul style="list-style-type: none"> - Community exposure - Business development services 	<ul style="list-style-type: none"> - Centralised coordination of programmes 	<ul style="list-style-type: none"> - Implementation of quarterly strategic engagements 	<ul style="list-style-type: none"> - Expansion of sectors coverage to Construction and manufacturing
Ga-Rankuwa & Mabopane	<ul style="list-style-type: none"> - Lack of entrepreneurial mindset. - Limited creative ideas. 	√	<ul style="list-style-type: none"> - Mentorship programmes - Relationship with universities 	<ul style="list-style-type: none"> - Development of Standard Operating Procedures (SOPs) 	<ul style="list-style-type: none"> - Enterprise pitch competition - Marketing 		<ul style="list-style-type: none"> - Collaboration with universities - Focus on a few sectors. 	<ul style="list-style-type: none"> - Increase market access. - Set up an entrepreneurship programme.
Soweto & Kagiso	<ul style="list-style-type: none"> - Limited access to land - Scarcity of innovative entrepreneurs. 		<ul style="list-style-type: none"> - Relationships with the local community - In-house programme 	<ul style="list-style-type: none"> - Centralised coordination of Program Managers 	<ul style="list-style-type: none"> - Enterprise development programmes - Pitch competition 	<ul style="list-style-type: none"> - Enterprise development session 	<ul style="list-style-type: none"> - Provision of sufficient resources 	<ul style="list-style-type: none"> - Patronage local businesses - Infrastructure development
Sebokeng & Mohlakeng	<ul style="list-style-type: none"> - Scarcity of fund - Limited innovative entrepreneurs. - Restricted entrance to SMMES 	√		<ul style="list-style-type: none"> - Similar recruitment process - Marketing approach 	<ul style="list-style-type: none"> - Enterprise development programmes 	<ul style="list-style-type: none"> - External consulting and collaboration with universities 	<ul style="list-style-type: none"> - Increase private sector participation. - Improve infrastructure. - More marketing roll-out 	<ul style="list-style-type: none"> - Increase budget. - Improve marketing. - Participation of the private sector. - Government patronage of local businesses.

4.3.2 Textual data analysis: Suggestions that could improve the eKasiLab Programme

The word cloud presentation in Figure 14 below captures some important sentiments about the programme as reflected in the data collected. It can be seen that improvement of the programme is essential to the interest of the beneficiaries, and we linked the word cloud to the other essential words, particularly *mentors*, *South Africans*, *communication*, *experts*, and *funding*.

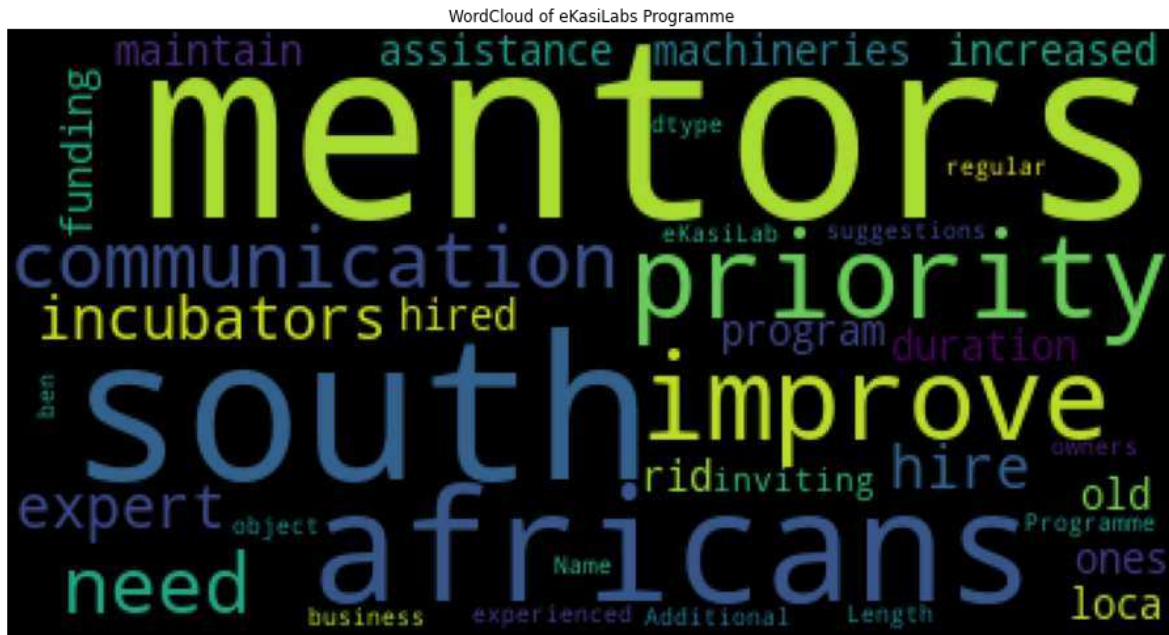
Our engagement with the programme implementers suggested that they work actively and systematically to identify appropriate mentors to match beneficiaries. The major word in the cloud suggests that improvement in the current mentoring arrangement should positively impact entrepreneurs. The mentoring programme is particularly needed by township entrepreneurs who seek to break into the formal economy and contribute their quota to the South African Agenda: The benefits of incubating and mentorship to the business success of disadvantaged entrepreneurs (particularly those who are discriminated against, have limited education and are from poor economic backgrounds) is confirmed by findings of Assenova (2020).

For a successful mentoring programme, there should be a deliberate effort to match mentors and entrepreneurs effectively. Audet and Couteret (2012) and, more recently, Schutte (2019) suggested the following vital elements for successful matching: (1) chemistry; (2) frequency of meeting; (3) independence of the entrepreneur to explore with minimum supervision; (4) moral contract for all parties; (5) short-term goals to measure success. Adopting these five elements should help to improve several of the critical sentiments raised by the beneficiaries. For example, matching parties with similar chemistry and improving meeting frequency should improve communication among parties. The use of *experts* as mentors is also highly mentioned as a factor that can help improve the programme.

We propose that the policy managers recruit more successful South African entrepreneurs, who will also serve as role models aside from their usual mentoring duties (i.e. providing wisdom, guidance and expertise). Deeb (2015) elaborates on the importance of expert mentors to the success of incubation in *Forbes* magazine. The article suggests that an excellent mentoring programme should involve experts on every aspect of the new entrepreneurs' businesses (i.e. experts who can mentor according to the specific business size, the specific industry, or a specific business problem on a case-by-case basis). Mentoring also provides networking and funding opportunities.

Funding access also appears essential, as suggested by the word cloud. Funding opportunities during and post-incubation periods should be well communicated to beneficiaries. Other vital words include maintenance of facilities and increasing the programme duration.

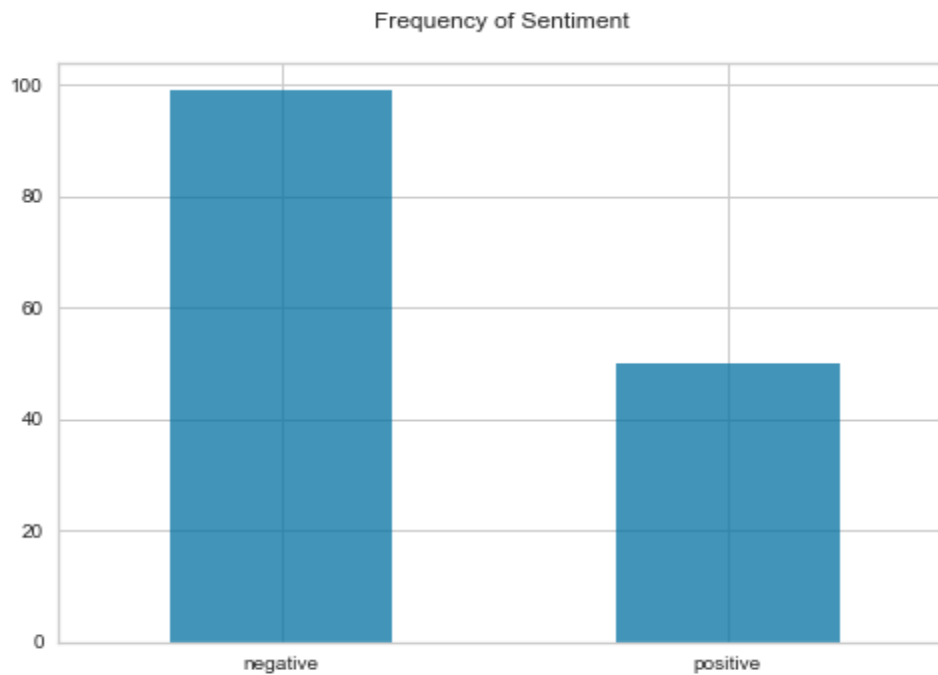
Figure 14: Word Cloud for additional suggestions that could improve the eKasiLab Programme



4.4 Sentiment analysis

Sentimental analysis (or opinion mining) – a natural language processing (NLP) technique, is also deployed to determine whether data is positive, negative or neutral. This analysis is often performed on textual data to help gauge the general sentiment of the audience. Figure 15 shows a bar plot for the sentiment analysis based on "additional suggestions that could improve the eKasiLab programme". The aspects of the programme suggested by the word cloud analysis as needing improvement contributed to us observing negative sentiments on the programme relative to how these factors contributed positively to the programme. This result further underscored the importance of re-examining the programme and implementing measures to improve on the concerns raised by the previous beneficiaries.

Figure 15: Sentiment Analysis



5.0 Conclusions

This study explores the importance of entrepreneurship development programme in improving local economy, township economy, in South Africa with a focus on the eKasiLab innovation programme. After a detailed review of the programme and related literature, a combination of qualitative and quantitative research techniques was adopted to achieve the study objective. The following are key outcomes of the study: (1) ekasiLab programme has significantly improved the entrepreneurship development of beneficiaries – treated/control group, despite notable challenges. The impact could be observed in business growth, productivity improvement, job creation and welfare improvement of the control group. (2) critical challenges facing the programme across all the business corridors include the following: (i) limited availability of innovative ideas from entrepreneurs; (ii) insufficient funding and infrastructure; (iii) majority of the enrolled entrepreneurs are only interested in funding and not the potential advantages of taking part in the incubation programme; and (iv) lack of understanding of the concept of innovation.

Following the key outcomes of this study, the policy recommendations below are important for both government and the programme implementers:

- It must be strongly noted that with TIH being a government agency and the sole funder of ekasiLabs, it limits the performance of the incubation programme. While partnerships have been identified in different aspects of the programmes, there is a need to strengthen such per service offerings and in this case, there is a need to upscale and strengthen partnerships with academia, business and international innovation agencies to support the programme.
- Interaction with beneficiaries indicated a strong need for production spaces in the Labs, which brings to the fore a need to turn eKasilabs into some sort of mini-industrial clusters that could consist of manufacturing, a co-location of research and development institutions, as well as retail activities to support manufacturing.
- With this kind of approach, the eKasilabs can also expand to incorporate the element of cloud zones to support those entrepreneurs who want to interact online. This kind of approach could easily bring life into the eKasiLab programme, particularly enhancing the model for those that are yet to be established.

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