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Skills ecosystems mapping: An analysis of installation repair maintenance by medium, small and micro-enterprises

PRESHA RAMSARUP (presha.ramsarup@wits.ac.za) Wits School of Education, School of Social Sciences, University of the Witwatersrand, Johannesburg, South Africa
ORCID LINK: https://orcid.org/0000-0002-6747-3094

KATE MLAUZI (kate.mlauzi@wits.ac.za) Wits School of Education, School of Social Sciences, University of the Witwatersrand, Johannesburg, South Africa
ORCID LINK: https://orcid.org/0000-0003-3866-6038

FRANCINE DE CLERCQ (Francine.declercq@wits.ac.za) Wits School of Education, School of Social Sciences, University of the Witwatersrand, Johannesburg, South Africa
ORCID LINK: https://orcid.org/0000-0001-9209-059X

GLEN ROBBINS (robbinsdgd@gmail.com) PRISM, School of Economics, University of Cape Town, Cape Town, South Africa
ORCID LINK: https://orcid.org/0000-0002-0445-1752

ABSTRACT

This article argues that, although skills policies and approaches have been located largely within a neoliberal paradigm, given the reality of African labour markets, a more place-based approach to framing skills development in building local economies is needed. Using the context of installation repair maintenance hubs in four South African townships, this article presents a framework that moves beyond the individual to organisations and systems. It uses skills ecosystem framing to examine the dynamics that underpin the skills needs of medium, small and micro-enterprises in the IRM hubs. By applying skills ecosystems framing, the article explores the interactions between stakeholders. This approach highlights the importance of skills development in building local economies and reflects the way in which it can systemically support economic growth. The article therefore indicates that decontextualised notions of skills and training cannot facilitate local transitions. Using a mixed-methods approach, our research combined qualitative and quantitative data-collection techniques, including interviews and surveys, exposing challenges.

KEYWORDS

Skills ecosystems; skills supply and demand; medium, small and micro-enterprises (MSMEs); local economic development; installation repair maintenance (IRM); skills development

Introduction

Formal vocational education and training (VET) systems in sub-Saharan Africa remain small, fragmented and disconnected from the labour market (Allais, 2022), with a continuing emphasis on wage employment (McGrath et al., 2020). The African reality of the informal economy, which is an important employer of youths across Africa, is not covered in VET and skills policy. This means that labour market realities in sub-Saharan Africa are at odds with the normative linear expectations of formal VET systems. In the African context of an extensive informal sector, creative solutions are needed to unlock the demand on a scalable basis by actively dealing with the barriers to broad-based enterprise growth. The installation repair maintenance (IRM) initiative,[1] central to this research, sought to unlock the full potential of artisanal industries across the industrial economy to enable skills development and employment creation. The IRM initiative operated on the hypothesis that the informal economy offers significant potential for employment creation.

Therefore, medium, small and micro-enterprises (MSMEs) have been identified as key components with which to advance inclusive growth and development to build local economies in South Africa (Bhorat et al., 2018). The National Planning Commission (NPC), which is responsible for compiling the South African National Development Plan (NDP), envisaged that 90% of 11 million jobs would be generated by small enterprises in 2030 (NPC, 2024). However, according to the Stats SA Quarterly Labour Force Survey (QLFS) (StatsSA, 2024b), the unemployment figure for Quarter 2 (Q2) in 2024 was 8.4 million, with 158 000 more unemployed individuals being added between Q1 and Q2. This increased the unemployment rate by 0.6% to 33.5%. Between 2014 and 2024, the proportion of long-term unemployed rose from 65.8% to 76.2%. The formal sector accounts for 68.9% of total employment. While the number of jobs in employment sectors decreased between Q1 and Q2 2024, employment in the informal sector increased by 48 000 jobs (Stats SA, 2024a; Stats SA 2024b).

MSMEs could possibly play a crucial role in local skills development by providing on-the-job training, apprenticeships and mentorship opportunities that equip workers and youths with practical skills. This could present an opportunity for technical and vocational education and training colleges (TVET) students to use MSMEs to gain workplace experience within the broader VET system. By fostering stronger relationships between these local institutions and small businesses, work-integrated learning (WIL) opportunities could be increased to better align skills development with industry needs. This would lay a foundation for stronger local economies. However, while MSMEs have the potential to drive skills development, many experience significant challenges that limit their ability to do so effectively. For instance, many MSMEs operate informally, rendering it difficult for them to engage with formal skills development initiatives (Rogerson, 2019). In addition, the high failure rate of MSMEs resulting from economic pressures, regulatory burdens and market competition, also hinders their ability

1 The IRM initiative is a programme that is run by the National Business Initiative (NBI), in collaboration with various stakeholders, focused on expanding and growing pathways for young people to access IRM occupations.

to invest in workforce training (Cant & Wiid, 2013; Molefe, Meyer & De Jongh, 2020). As a result, although MSMEs could be key players in skills development, the current reality often sees them struggling to fulfil this role at scale.

In response to this problem, the National Business Initiative (NBI) initiated a programme in 2019 that aims to unlock scalable income opportunities for unemployed youths and to support MSMEs in the IRM sector.[2] IRM-related MSMEs offer a wide range of services, including construction, the production of chemicals for cleaning and pest control, building maintenance and installation, and the maintenance and repair of various appliances and systems.

The research investigated the potential to establish IRM hubs at local technical and vocational education and training (TVET) colleges and to build strategic alliances and partnerships with local businesses in order to strengthen local skills ecosystems. By strengthening partnerships between MSMEs, training institutions and local economic development initiatives, this empirical work sought to contribute to both enterprise growth and employment outcomes. The integration of structured skills development in MSMEs not only supports their sustainability but also creates pathways for youth employment and self-employment, particularly in townships, where access to formal job markets is limited. Through these efforts, the initiative attempts to bridge the gap between skills supply and demand, fostering a more inclusive and resilient local economy.

The research explored the mapping of skills ecosystems in four areas: Atlantis (Western Cape), Mandeni (KwaZulu-Natal), Katlehong and Mamelodi (both in Gauteng). These sites have unique dynamics and their own local context. The skills ecosystem mapping sought to understand the opportunities and challenges associated with building a local skills ecosystem to support IRM MSMEs at these sites and to identify the skills needed to enable them to grow. Broadly speaking, the research sought to identify

- Areas of potential IRM demand;
- The challenges associated with unlocking latent IRM demand;
- The support required to enable youths to access this demand; and
- The barriers that may inhibit youths and MSMEs from accessing these demand opportunities.

After locating MSMEs within the local skills ecosystem, this article presents key findings from the skills ecosystem mapping across the four case studies. We then present recommendations from our findings and insights into what we learnt about skills ecosystem mapping. In addition, we reflect on the way in which the insights gained from the skills ecosystem mapping can be generated in an ongoing manner to make it possible for institutions to identify fault lines in the skills ecosystem and to intervene to optimise the functioning of these skills ecosystems.

2 The focus of IRM enterprises includes manufacturing, plumbing, electrical work, general maintenance, domestic appliance repair, autobody repair and cellphone repairs.

Understanding skills ecosystems

Skills ecosystems play a crucial role in shaping the ways in which skills are developed and deployed in specific regions or sectors. They are defined as regional or sectoral social formations in which a skill is developed and deployed; and they emphasise the importance of understanding the context in which skills are developed and used. The model therefore emphasises a more regional, place-based model for skills planning that focuses on the 'distributed agency' that is needed across individuals, organisations and systems (Ramsarup & Mohamed, 2022).

The concept of the skills ecosystems model has not previously been applied in southern African contexts. However, Lotz-Sisitka and McGrath (2023) highlight its relevance, especially given the complexities of work outside of formal employment and the urgent sustainability challenges. As a result, scholars have sought to understand the terrain better by using skills ecosystem mapping to strengthen the design of interventions (Wedekind et al., 2021; Ramsurup et al., 2022; Lotz-Sisitka & McGrath, 2023; Ramsarup et al., 2023; Ramsarup & Russom 2023; VET Africa 4.0 Collective, 2023; Spours, 2024).

The ecosystem model foregrounds a place-based model of skills development and has been used to map differing contexts in Africa (Wedekind et al., 2021). Using this approach in both Uganda and South Africa, researchers have concluded that the model helped to provide a rich story of the complexities in local skills ecosystems; and that the skills ecosystem mapping helped to identify limitations in, and opportunities for, strengthening skills supply and demand (Wedekind et al., 2021).

In this study, we drew on Spours (2019; 2024), who builds on his skills ecosystems work to enhance our understanding of learning and skills development by integrating a political economy perspective into the existing learning ecological framework. This was particularly crucial to analysing power relations, because the model enabled us to understand who gains access to resources, who participates in decision-making and whose knowledge is valued. The model identifies three core dimensions of a strong skills ecosystem:

- First, collaboration between a range of stakeholders, including key institutions and system leaders in a local area (horizontal connectivities);
- Second, the top-down policies, regulations and funding streams that enable or constrain the regional skills ecosystem (facilitating verticalities); and
- Third, the points where these two interact, often through a 45-degree mediation (Wedekind et al., 2021).

This model offers a useful conceptual and descriptive device for understanding and analysing skills ecosystems, focusing as it does on collaboration, policy and interaction to support effective skills development in a specific region.

In this research, we framed a skills ecosystem as being a dynamic and multi-layered network of stakeholders, intermediaries and policy enablers that are able to support MSMEs. The model (see Figure 1) is an adaptation of the Spours (2019; 2024) model by Ramsarup et al. (2022), contextualised to reflect the specific needs, challenges and opportunities in MSMEs, which are a central phenomenon in this research. Figure 1 illustrates the multi-scalar and temporal complexity of a skills ecosystem, indicating the way that different levels (individual, organisational, systemic and the broader political economy) interact over time to shape the skills ecosystem. This includes facilitating state verticalities, such as national policies, regulations and funding streams, that can either enable or constrain the regional skills ecosystem (Ramsarup et al., 2022). This multi-level framing informed our data collection and the design of the tools.

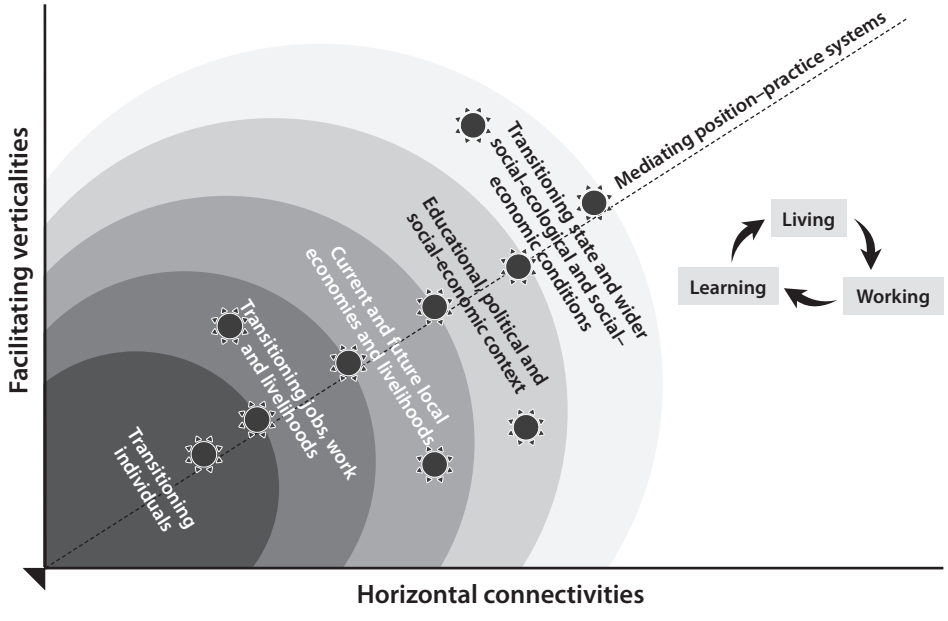

FIGURE 1: Multiple transitioning across work and societal contexts

*Note: * in the diagram indicates the position-practice systems of different agents and their networks that possibly contribute to relations of emergence in the system overall.*

Source: Adapted from Spours, 2019, Ramsarup et al., 2022 and Spours, 2024

Locating medium, small and micro-enterprises in the local skills ecosystem: The literature

MSMEs in South Africa encompass various categories based on employment size and economic activities, and they range from survivalist enterprises to medium-sized businesses (Marnewick, 2014; Wiid & Cant, 2013). The South African definition of MSMEs, according

to the amended National Small Enterprise Act (Act 102 of 1996), considers the total full-time equivalent of paid employees and annual turnover per industry category (Republic of South Africa, 1996). Medium-sized enterprises employ 51–250 full-time employees, small enterprises 11–50 and micro-enterprises 0–10. Turnover varies by sector, helping to shape interventions that respond to each category's needs (Department of Small Business Development (DSBD), 2022).

Many MSMEs are based in townships and face significant challenges that hinder their growth and sustainability compared with their urban counterparts. These challenges include limited access to finance and to larger markets, poor infrastructure and a skills gap that is attributed to inadequate access to education and training opportunities (Bhorat et al., 2018; Mabunda et al., 2023; Sibiya et al., 2023).

It is recognised in the literature that MSMEs could be part of a solution to South Africa's economic challenges and could contribute to achieving the NDP's target of a 5.4% annual economic growth rate (Wiid & Cant, 2018). As a result, significant attention and initiatives have been directed at MSME-related policy, as MSMEs are pivotal engines of economic growth and job creation. Public–private partnerships offer mentorships, funding and market access and the following policies and interventions demonstrate the targeted efforts being made to enhance competitiveness and access to resources for MSMEs in underserved areas:

- The National Small Business Act;
- The National Development Plan (NDP);
- The Integrated Small Enterprise Development Strategy;
- The Township and Rural Entrepreneurship Programme (TREP); and
- Support through special economic zones (SEZs) and industrial parks.

The effectiveness of interventions aimed at supporting MSMEs in South Africa has been the subject of considerable debate. Critics argue that many interventions suffer from inadequate implementation, a lack of coordination and insufficient monitoring and evaluation mechanisms (Mhlongo & Daya, 2023). Many programmes offer short-term financial relief but do not resolve the underlying structural challenges such as market access and business sustainability (Guloba et al., 2021). In addition, the one-size-fits-all approach, often employed in these interventions, does not account for the diverse needs of different types of MSME – which range from survivalist enterprises to medium-sized businesses. As a result, there is a growing call for a more rigorous assessment of these interventions to ensure that they contribute effectively to MSME growth and job creation (Tlou, 2017).

Methodology

The research began with a contextual analysis and profile of each site – Atlantis, Mandeni, Katlehong and Mamelodi – that was developed through an extensive desktop literature review. This contextual analysis offered an overview of the economic, social and environmental

dynamics and challenges that framed the broader analysis. The contextual analysis also involved extensive stakeholder mapping and supported the development of the research tools and the fieldwork plan.

The study investigated:

- The IRM services that are required by communities;
- The way in which these IRM services are secured;
- Which services are difficult to find in the local community; and
- Whether there are alternatives.

It also examined the types of qualifications and costs that are required to contract IRM services.

The key stakeholders identified are indicated in Table 1, with the table presenting the different stakeholder groups central to this research and indicating why they were selected.

TABLE 1: Stakeholder groups and purpose for engagement

STAKEHOLDER GROUP	PURPOSE IN THE ECOSYSTEM
Users of IRM (households, industry and business, public sector)	• Understand types of IRM service needed. • Identify required skills and qualifications. • Explore challenges in accessing services and skills.
IRM MSME providers	• Assess local MSME providers' role in the IRM economy and their access to work in public and private sectors. • Identify support required for growth. • Understand qualifications, skills acquisition and workforce sourcing and training challenges.
Strategic partners and MSME support providers	• Understand IRM skills demand, opportunities and challenges. • Identify support provided to MSMEs for local economic and skills development.
Education and training providers	• Gather information on IRM programmes (target audience, duration, qualifications, challenges). • Investigate work-based IRM training in industry, business and the public sector.
IRM learners	• Understand youths' goals and aspirations in IRM. • Explore how IRM-trained graduates can become economically active and set up MSMEs.

Source: Authors' analysis

The data were collected through interviews, a survey and focus-group discussions. One hundred and sixty-two stakeholders were interviewed; they comprised education providers, large companies, IRM MSME providers, strategic partners such as non-governmental organisations (NGOs), the provincial government and the local municipality. Furthermore,

10 909 IRM users were surveyed, including households, local government departments and informal businesses as users of IRM. Five focus-group discussions were held with Grade 11 and 12 learners and unemployed youths, during which information was gathered from 53 youth participants as potential entrants.

Snapshot of key findings: Cross-case analysis

As indicated, the skills ecosystem mapping sought to use the Spours (2019; 2024) skills ecosystem model to understand the opportunities and challenges in local IRM-related skills ecosystems. Using this lens, we were able to explore the wider context in which the IRM initiative is being implemented. We found that the success of the IRM initiative rests on a strong, evolving skills ecosystem with sustainable MSMEs.

Facilitating vertical factors and structures

As the skills ecosystem model suggests, the state plays a catalytic role through infrastructure spending, market regulation and education. Our research examined these vertical factors across the four case study sites (Spours 2019; 2024).

The literature indicates that, in order to create an environment that is conducive to MSMEs being involved in economic activities, provincial and local governments need to support the key enabling factors. These include:

- Providing an adequate infrastructure;
- Regulatory systems;
- Support and training programmes; and
- The mobilisation of public- and private-sector budgets to channel funds towards sustainable local development.

It is important that industrial policy promote labour-intensive industries and services and the provision of necessities, as they have the potential to expand customer demand for MSMEs. MSMEs cannot enter the supply chain easily in the capital-intensive mining, commercial farming or manufacturing sectors (Bureau for Economic Research (BER), 2016).

Our research across the four cases indicated that provincial and local governments have their own distinct economic programme initiatives and projects. These are derived from provincial and municipal agencies such as the:

- Western Cape government's Infrastructure Framework;
- City of Cape Town's Integrated Development Plan;
- Gauteng Industrial Development Zone Company;
- Ekurhuleni Community Enterprise Development Fund;
- City of Tshwane's Comprehensive Integrated Transport Plan;

- Mamelodi Framework for the Upgrading and Provision of Services;
- KZN Business Initiative; and
- iLembe Chamber of Commerce, Industry and Tourism.

These initiatives reflect a strategic multifaceted approach to promoting and supporting regional and local economic development, local employment, better infrastructure and MSMEs.

The four sites are located near major national economic projects known as special economic zones (SEZs). These SEZs are intended to act as external catalysts to attract investment and to stimulate regional or local economic development. The SEZs have the potential to stimulate economic activity beyond their immediate boundaries by offering investors incentives, a structured governance framework and institutional support. However, their success in stimulating economic activity remains constrained by infrastructure challenges, inconsistent government investment and policy misalignment.

The Atlantis SEZ benefits from its proximity to Cape Town, South Africa's second-largest city; and with its planned green manufacturing hub it already hosts several industrial plants. Given its national economic significance, the Atlantis SEZ is positioned to generate employment opportunities and to enhance local economic participation.

Similarly, the Tshwane Automotive (TA) SEZ presents promising prospects for Mamelodi, having attracted significant investments from companies such as Ford and its supply chain.

Meanwhile, the OR Tambo International Airport (ORTIA) SEZ has been in development for decades but has only recently gained momentum. Despite its strategic location in a major business hub, the ORTIA SEZ has yet to deliver the anticipated economic benefits to surrounding communities such as Katlehong.

The Mandeni region, near the iSithebe industrial estate, lies approximately one hour's drive from the Richards Bay (RB) SEZ but it falls within a different district. Like ORTIA, the RB SEZ has struggled to move beyond its initial phase, which has limited its economic expansion into both urban and rural areas.

Despite the potential of these SEZs, sluggish national and provincial investment in critical infrastructure and inadequate business incentives have hindered their effectiveness in driving skills development and small business growth.

The skills ecosystem mapping revealed significant constraints in the skills ecosystem. There are business environment and infrastructural challenges that have a direct impact on MSMEs, even those operating in SEZs. Stakeholders expressed serious concerns about inadequate service provision, including poor infrastructure maintenance and slow development. These limit business growth and consequently the demand for skilled workers. Such challenges are

compounded by a broader, depressed economic environment, which restricts business expansion and weakens job creation opportunities.

Poor infrastructure further disrupts the skills ecosystem by creating an unstable operating environment for businesses. For example, non-functioning street lights make it less safe for customers and businesses to transact in the evening. Poorly managed public environments – including those in business areas – can negatively affect business prospects.

The policy environment, particularly in the area of municipal service delivery, plays a crucial role in shaping these conditions. In the 2023/2024 financial year, the four municipalities' planned expenditure on repairs and maintenance varied significantly:

- Mandeni was allocated R19.9 million;
- Tshwane R974.5 million;
- Ekurhuleni R2.6 billion; and
- Cape Town R5.5 billion.

Of these, only Cape Town's allocation approached the 8% benchmark for maintenance relative to total operational expenditure. As at the third quarter of the 2023/2024 financial year, the other three municipalities lagged behind their expenditure targets (National Treasury, 2023). This underperformance in infrastructure investment constrains business growth, limits the development of a resilient skills ecosystem and weakens the facilitating verticalities necessary for MSME sustainability.

Another challenge for many small businesses is the fluctuating demand from provincial and municipal governments, which can render their work inconsistent and, at times, unsustainable. Government agencies often rotate MSMEs in and out of contracts and source different contractors from various local areas for different projects. As a result, MSMEs may secure work for one year but then go without another contract for several years, which can be discouraging, even for high-performing businesses. While this system can help to broaden access to government contracts, it also creates instability, rendering it difficult for MSMEs to build long-term sustainability.

Reflection: Facilitating vertical factors and structures

The analysis of the vertical structures across the four case study sites reveals how power dynamics shape the skills ecosystem and determine the extent to which MSMEs can meaningfully participate in local economies. Spours (2019; 2024) emphasises the catalytic role of the state in facilitating an enabling environment through infrastructure investment, regulatory alignment and support for training and research. Yet our findings suggest that this catalytic potential is often undermined by fragmented governance, uneven state capacity and a lack of alignment between national, provincial and local development strategies.

Power dynamics are especially visible in the way that provincial and municipal governments exercise procurement power. Although rotating contracts across multiple MSMEs is intended to democratise the process and to increase access for many MSMEs, firms with greater capacity and capital are more likely to win contracts and are often better positioned to meet the accreditation requirements. This reinforces the structural imbalances and limits upward mobility for smaller enterprises. Similarly, public infrastructure budgets, although critical to shaping an enabling environment, are not equitably distributed.

Regarding the concept of adaptive feedback, there is little evidence that local and provincial governments are systematically learning from implementation bottlenecks or MSME experiences. For example, the mismatch between SEZ policy intent and on-the-ground impact in places such as ORTIA and Richards Bay points to a failure to adjust strategies in response to observed constraints. Instead of creating virtuous cycles of investment, employment and skills upgrading, SEZs remain underutilised due to insufficient infrastructure, misaligned policies and unresponsive governance mechanisms. This lack of adaptive governance compromises the role of SEZs as engines of inclusive regional growth.

The concept of nested implementation, where national, provincial and local strategies are aligned and reinforce one another, is also not fully realised. Although each municipality or province has its own economic development plan or industrial initiative, these do not always connect to broader national objectives or to the needs of surrounding communities. For instance, although Atlantis and Mamelodi benefit from their proximity to active SEZs, the spillover effects on MSMEs are limited because of policy misalignment and infrastructure bottlenecks. This disconnection highlights the absence of an integrated multi-scalar governance model that is capable of coordinating investments and initiatives across institutional boundaries.

Collaborative horizontalities: Learning networks

Spours (2019; 2024) conceptualises the horizontal terrain as a multi-layered interlocking set of subsystems that produce inclusive economic and social growth in particular local environments.

The literature on MSMEs reveals significant barriers that undermine the resilience and sustainability of existing and emerging IRM-related MSME service providers. These include:

- A lack of entrepreneurial leadership skills;
- A lack of financial resources and/or finances;
- Limited financial education;
- Infrastructure constraints;
- A lack of training;
- A lack of technology; and
- Crime and corruption (Mhlongo & Daya, 2023).

Similar challenges were identified by MSMEs across the four sites. The following were pinpointed as the most prominent challenges: inadequate support from local government for IRM service demand, loans, assets, infrastructure, technology, equipment and tools, electricity supply and transparency; and, from big business, for start-up capital from banks, and IRM service competition versus partnerships and mentorships. In addition, the generally poor economic situation of townships and difficult access to dynamic urban areas make it difficult for MSMEs to expand their client base. Furthermore, there are also limited differentiated training programmes to help MSMEs to formalise, diversify and supply quality IRM services as they move upwards in the value chain. Other problems identified were restricted digital marketing strategies, corruption and late payments – all of which restrict the functioning of the skills ecosystem.

The skills ecosystem mapping also revealed another set of challenges related to the extent and nature of the demand for IRM. Sluggish economic growth with little real wage growth diminishes the purchasing power of many township residents, especially those without formal employment. This negatively affects the demand for IRM services and limits the client base of MSMEs; and it has a greater impact on those in poor townships than on those with access to a growing economy. MSMEs in the Atlantis suburb close to its industrial park and Cape Town were best placed to access clients. Katlehong and Mamelodi are not too distant from the Johannesburg and Pretoria economic hubs, respectively. However, those in Mandeni are at a greater distance from a large township and from a nearby developing urban economy despite there being a few large businesses (e.g. SAPPI) in the vicinity.

In the horizontal terrain, we assessed the demand for IRM services plus the demand for IRM skills and the IRM skills supply in all four case studies.

Understanding the demand for installation repair maintenance services

The skills ecosystem mapping found that the IRM demand varies greatly between stakeholders. Different types of employer and different types of IRM user, such as households and municipalities, require a mixture of personnel, from the highly skilled to the middle- to lower-level skilled. The demand for skills may be more or less labour-intensive and require different kinds of qualification to cater for the different levels of complexity and specialisation of tasks and activities, which can broadly be illustrated by Figure 2.

The horizontal axis of the diagram represents the continuum between the current reality of IRM services, where they service the formal and informal household market (on the left), compared with the desired state (on the right), where they would have formal contracts with government institutions and corporates.

There is also a differentiated IRM demand from different stakeholders for different IRM service providers, which can broadly be illustrated by Figure 3.

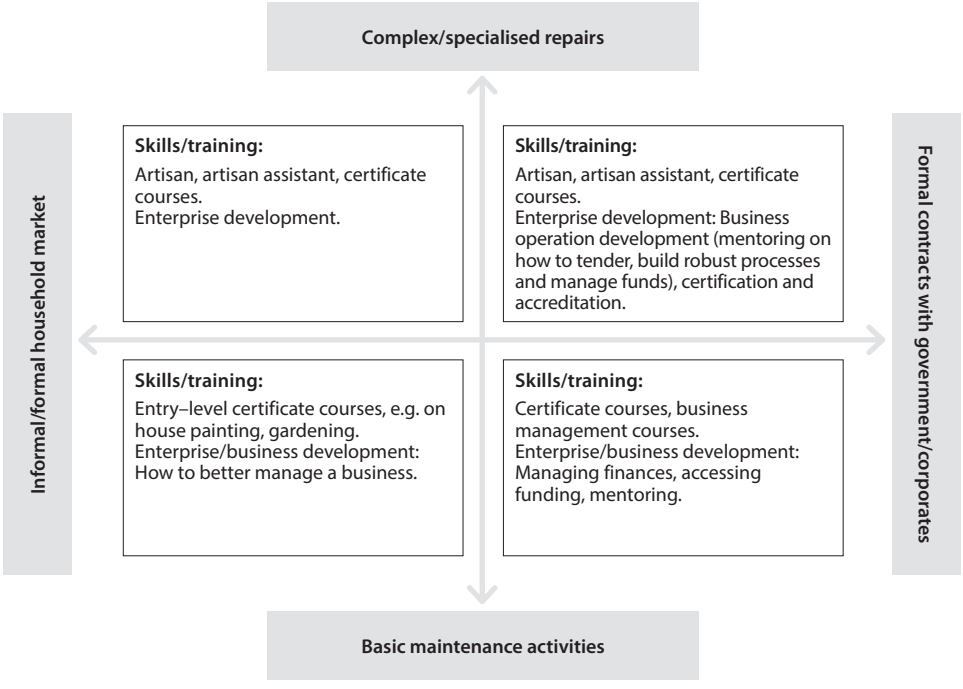

FIGURE 2: Different IRM services with various levels of skills demanded by different stakeholders

Source: Authors' analysis

The horizontal axis of the diagram represents the continuum between the current reality of IRM services in comparison with the desired state.

The demand for diversified IRM services from government and business can become significant, even if at times uncertain, if economic development takes place nearby; this is especially the case in the economic hubs of Atlantis and the Johannesburg and Pretoria regions. Big to medium-sized businesses require high- to middle-skilled personnel from established, qualified businesses for complex IRM work, such as machine-specialised maintenance and repair. There is less need for lower-skilled work such as basic painting, plumbing and repairs from lower-skilled IRM enterprises, including informal MSMEs. At the four sites, unfortunately, many large businesses use MSMEs only when they are accredited and have the financial and resource capacities to deliver what they consider good-quality services. This does not exist on a significant scale and is exacerbated by unfair competition from larger businesses that also supply IRM services related to the maintenance and repair of machinery and equipment.

Provincial and local governments at the four sites require a range of capital- and labour-intensive IRM services that rely on high-, middle- and low-skilled IRM personnel and technology such as industrial plumbing, machine repair, basic painting, plumbing, repairs

and weeding. These could unlock a greater and more diversified IRM demand if such entities could improve their service. Although 8% of municipalities' operational budget is allocated to repairs and maintenance, they often make uninformed decisions about their budget and priorities.

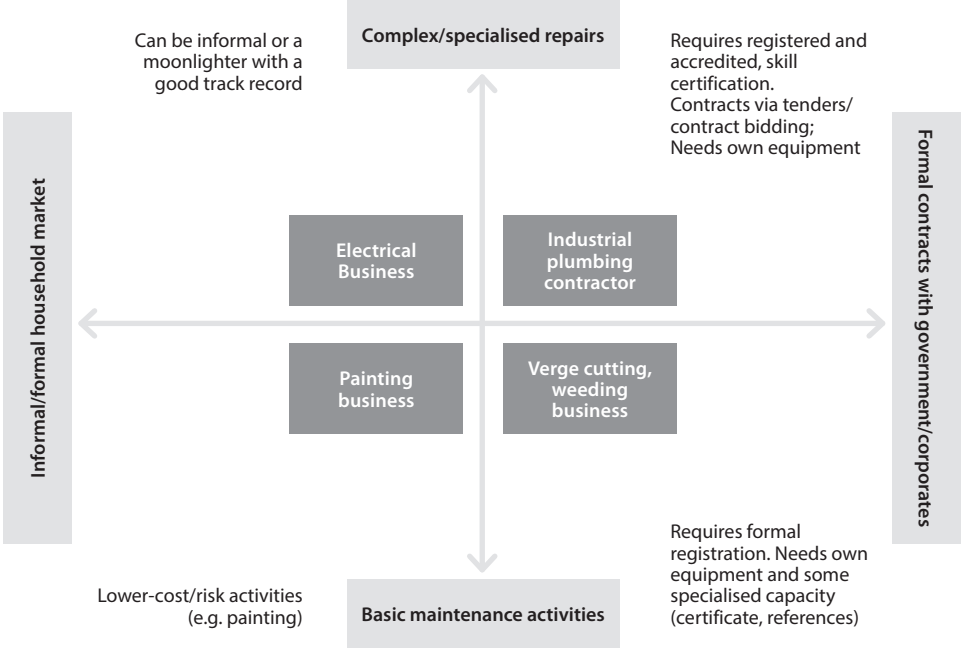

FIGURE 3: Different IRM services required by various stakeholders from different service providers

Source: Authors' analysis

At the other end of the IRM services' demand, informal businesses and township households require mostly lower-skilled work which can be met by entry-level survivalist MSMEs. Unfortunately, the demand for IRM services such as mechanical, electrical and plumbing services, and home-appliance and vehicle repairs and maintenance, remains relatively limited at the four sites. This is a result of poor township economic conditions, high levels of unemployment, meagre purchasing power and a reluctance to prioritise IRM tasks. These local factors, which are worse in Mandeni and better in Atlantis, place some MSMEs at risk of failure.

Moreover, market fluidity for IRM services makes it difficult to predict demand from one year to another, compelling MSMEs to search for new opportunities. However, some MSMEs may close if they find better business areas or formal employment. The four case studies point to a potential demand for diversified IRM services that could help some MSMEs to move up the value chain and satisfy some of the demand for medium- to high-skilled IRM services. This will possibly create an IRM skills pathway and promote the expansion of MSMEs.

Skills implications of the installation repair maintenance demand

The greatest labour shortage, related to meeting the needs of the technological evolution and its fast-changing skills ecosystem, is at the high- to middle-skilled level. With its green manufacturing hub status, the Atlantis SEZ requires artisans and technicians in the new renewable energy sector, whereas the TA SEZ requires engineers or technicians with high- to middle-level qualifications in the mechanical and electrical, chemical, civil construction and industrial fields. Artisans in plumbing, bricklaying and welding, and turner machinists, are also in demand in this automotive hub.

The ORTIA SEZ requires qualified electricians, mechanics, welders, and electronics and appliance repairers for the export-oriented, high-value-added and low-mass-production industries. This SEZ aims at the high-end skills in the processing, packaging and export of fresh food products, medicines, advanced component manufacturing, tertiary metals processing, minerals beneficiation, and jewellery and diamond manufacturing. The regional and local economic development around Johannesburg and Pretoria requires a range of high- to middle- to low-skilled personnel. In contrast, the less developed and more rural region of Mandeni needs less-qualified electricians, mechanics, engineers, technicians and supervisors to service the iSithebe industrial estate. To satisfy part of the more sophisticated IRM demand, MSMEs require formal accreditation as businesses with verified technical and business skills and competencies and a track record of work. However, there is also a demand for IRM skills for middle- to low-skilled personnel, especially, but not exclusively, from the township for mechanical and electrical services; home appliance and vehicle repair, and maintenance services; and also welding, plumbing, upholstery, cleaning and handyperson services. This demand can more easily be satisfied by MSMEs with the appropriate expertise rather than those with high-level qualifications, technology or equipment.

Given this diversified demand for IRM skills, different developmental and support processes need to be identified and designed to promote different kinds of MSME. There may be MSMEs that want to diversify and provide higher-order IRM skills and more complex work but which are struggling with, for example, accreditation and the qualifications required to move up the value chain. In addition, support is needed for entry-level MSMEs or those that are struggling to establish themselves and survive in the lower-order IRM work. Some MSMEs may fall into both of these categories.

Although the shortage of high- to middle-level skills is often mentioned, it is difficult to establish the breakdown of the skills in demand per sector or field, especially with future economic development being uncertain. Reliable skills audits do not exist in many sectors, whether from industry associations or from the Mechanical, Engineering and Related Services Sector Education and Training Authority (MerSETA). No adequate systems have been designed to anticipate skills requirements so that skills demand can adequately match skills supply. This highlights the need for SETAs to be better equipped to devise skills development plans and to be more involved in developing such plans for the different economic sectors.

Installation repair maintenance skills supply in the skills ecosystems

A number of post-secondary institutions, government agencies and NGOs exist at the four sites:

- Universities and universities of technology supply skilled engineers and technicians for the IRM sector and conduct research for socio-economic projects.
- TVET colleges are critical, producing middle-skilled graduates for MSMEs in the IRM sector. However, they face challenges such as underfunding, poorly qualified staff and outdated equipment, which hinders their ability to meet industry needs. Many training programmes lack the required quality and relevance to the labour market. While some colleges, especially those in Atlantis and Mandeni, have partnerships with businesses for WIL, students often report experiencing inadequate learning experiences. Employers prefer to supplement TVET graduates' skills with in-house training or to outsource specialised IRM work. The TVETs themselves need institutional capacity-building and better planning for demand-driven skills, led by employers and industry associations.

There are, however, a number of challenges:

- A key challenge is the focus on technical subjects over broader (and softer) skills such as problem-solving, critical thinking and communication, which are essential to success in the IRM sector.
- The TVET colleges face systemic challenges, including insufficient resources to upskill lecturers and update curricula, technology and equipment. Effective collaboration between education providers and businesses is therefore needed and this requires a commitment from institutional leadership.
- Short courses offered by TVETs, government agencies and NGOs are often too brief to provide adequate training for employment or entrepreneurship. Entrepreneurs need mentorship and ongoing support to develop their businesses, including accreditation, which many MSMEs struggle to obtain.

The reliance on post-secondary institutions varies across the sites. Atlantis depends on universities for research and skilled labour in green manufacturing, while the Tshwane and OR Tambo hubs require high-end engineering and technical skills for automotive and advanced component manufacturing. Mamelodi and Katlehong focus on universities of technology and TVET colleges for middle-level skills and Mandeni relies on TVETs, government agencies and NGOs for urban and rural development skills.

Reflection on the horizontal connectivities: Learning networks

Spours (2019; 2024) states that social ecosystems function optimally when this horizontal dimension is dominant, encouraging an open civil society terrain that promotes collaborative

social activity. In this context, collaboration involves the sharing of resources, knowledge and best practices, which can significantly enhance the capacity of MSMEs to respond effectively to market demands. However, the skills ecosystem mapping in Atlantis, Mandeni, Katlehong and Mamelodi revealed significant challenges that undermine these horizontal connectivities and the resilience of MSMEs.

First, MSMEs often lack the leverage to negotiate fair contract terms or secure long-term partnerships, particularly in those sectors dominated by large enterprises. This dynamic reinforces a dependency model where MSMEs are recipients of top-down support rather than co-creators in shaping local economic futures. Second, TVET colleges and NGOs often operate on the periphery of decision-making spaces, despite being crucial in shaping the skills supply. Finally, the four cases show that nested implementation is limited. For instance, SEZs require highly skilled IRM personnel, but local MSMEs remain under-supported in transitioning into these value chains. Moreover, institutions such as the SETAs, local governments and training providers work in silos, which practice prevents the emergence of integrated pathways for MSME development. This weakens the capacity of the skills ecosystem to act collectively and respond strategically.

Mediating factors within the skills ecosystem

In the Spours (2019) model of skills ecosystems, a 'common mission' is needed to ensure coherence between diverse social partners, each with their own specialisms and preoccupations. This requires mediation between the stakeholders. The role of 'ecosystem leadership' is to see the greater picture of the ecosystem, foster reflection and generative conversations, and to shift the focus from reactive problem-solving to co-creating the future (Spours, 2019).

The skills ecosystem mapping indicated that some alignment is needed between national, provincial and local policies and projects if MSMEs and local development are to enjoy better promotion. The financial assistance for, and the implementation of, these programmes should be monitored to assess who is included or excluded and what can be done to improve the strength and inclusiveness of such projects and programmes. It was not possible to establish whether these development projects, from different levels of government, have led de facto to closer vertical institutional collaboration and partnerships between these different levels.

At another level, the relationships between stakeholders can also play a pivotal role in shaping the dynamics and effectiveness of a skills ecosystem. Depending on the state of such relationships and the way in which stakeholders interact in providing IRM services and skills within the system, these can act as either enabling or constraining factors.

On this point, Atlantis and Mandeni appear to have enabling networks that bring organisations and people together to collaborate on past and present development projects, with some working better than others. The economic networks appear to be stronger in Atlantis because it has been targeted for economic growth, with a green manufacturing hub, for some time. In Ekurhuleni and Mandeni, several development organisations are contributing to the regional

and local economic growth, although on a smaller scale than in Atlantis. Examples of these include the Ekurhuleni Economic Development Department and its Community Enterprise Development Fund, the iLembe Chamber of Commerce, iLembe Enterprise and the iSithebe industrial estate. It was difficult to obtain an overall evaluation of the impact of these networks.

There are not many strong networks or forums for MSMEs to share their knowledge and learning, pool their resources and cooperate among themselves or with bigger businesses in order to access a greater number of market opportunities. We found that there are more active MSME networks and projects in Mandeni and Atlantis than there are in Mamelodi and Katlehong, for instance. Efforts must be made to minimise MSME competition and maximise their collaboration based on their comparative advantages, resources and expertise.

Although the relationships are stronger in Atlantis and Mandeni, there is a relatively loose relationship between businesses, government and skills development providers. But this, together with the uncertain economic future of the provinces and local regions, is insufficient to help with identifying the skills required in the future and how the supply of skills can be enhanced or increased.

Some partnerships are simply ineffective in promoting MSME development and local employment. Public- and private-sector incentives could serve to help large businesses and provincial and regional governments to develop better relationships with MSMEs. Moreover, incentives could encourage the public and private sectors to source more of their products and services through local IRM-related MSMEs and to offer effective assistance and mentorship while encouraging MSMEs to become formalised and compliant with various regulations.

In addition, it was found that the relationship between education and training institutions and MSMEs is also poor: the institutions do not focus sufficiently on the realities of operating as an MSME or on the working conditions of MSMEs. This needs to be taken into account when devising different institutional capacity-building programmes. Moreover, the hubs involved with MSMEs should be granted more government financial support and expert human resources for MSME training. In this regard, instead of a one-size-fits-all approach to training, training institutions should engage with different MSMEs to discuss their various concerns and needs; and then develop different forms of innovative upskilling and training programmes that will empower MSMEs to move up the value chain.

Local stakeholder hierarchies

Verticalities, state policies and regulations, and the horizontalities in the form of local collaborative networks do not function on equal terms for all stakeholders. MSMEs – particularly entry-level survivalist MSMEs – often lack the formal accreditation, verified technical and business skills, and track record that larger businesses and government agencies require for them to undertake complex IRM work. This structural requirement creates a hierarchy in which less-formalised or emerging MSMEs are marginalised from lucrative

contracts and are relegated to lower-skilled work for households or informal businesses. There are therefore not many strong networks or forums in which MSMEs are able to share their knowledge and learning, to pool their resources and to cooperate among themselves or with larger businesses. This lack of collective organisation and voice worsens their marginalisation and limits their ability to influence decision-making or to access larger market opportunities. In addition, the relationship between education and training institutions and MSMEs is also generally poor, as training institutions do not focus sufficiently on the realities and working conditions of MSMEs. This highlights the disconnection between the needs of the smaller, often informal, MSMEs and more formal educational power structures that do not prioritise the needs of smaller MSMEs.

Ultimately, these structural hierarchies, combined with the challenges of informality and poor economic conditions, marginalise MSMEs and severely limit their ability to influence the ecosystem.

Insights and recommendations drawn from the skills ecosystem mapping

The Spours (2019; 2024) model of skills ecosystem mapping was used to map the IRM skills in four South African townships: Atlantis, Mandeni, Katlehong and Mamelodi. The analysis revealed several insights regarding the collaboration, or lack of it, between the various stakeholders, the influence of policies and regulations, and the interaction points between these dimensions.

Vertical policies and regulations

The analysis shows that top-down policies and regulations play a significant role in shaping the skills ecosystem. Government initiatives aimed at supporting MSMEs, such as funding programmes and regulatory frameworks, can either enable or constrain the growth of an ecosystem. The regulatory landscape can either facilitate or hinder the operations of MSMEs. Policies that promote ease of doing business, reduce bureaucratic hurdles and provide clear guidelines for compliance can enhance an ecosystem's effectiveness.

Investment in improving the physical and digital infrastructure that supports MSMEs, including reliable access to utilities, transportation and Internet connectivity, could enhance their operational efficiency and competitiveness (Small Business Initiative (SBI), 2021; South African Institution of Civil Engineering (SAICE), 2022; Nthoana, 2024). While the rapid adoption of digital technologies is a global trend, in South Africa only half (52%) of the businesses in the entrepreneurship start-up stage plan to use digital technology to sell their goods and services. This is the lowest rate among developing economies (Bowmaker-Falconer & Meyer, 2022).

Another important factor to deal with is crime and corruption. These pose a significant threat to economic development and do not simply restrict the functioning of the skills ecosystem, but actively erode trust and resources, rendering sustainable growth exceptionally challenging

(Davidson et al., 2024). In support of this, recent reports indicate a rise in extortion practices targeting small businesses (South African Police Service (SAPS), 2024).

Access to funding is a critical factor in the sustainability of MSMEs. The skills ecosystem mapping reveals that the availability of financial resources, whether through government grants, loans or private-sector investments, has a direct impact on the ability of MSMEs either to succeed or to invest in skills development.

Recommendations to improve vertical policies accordingly include the facilitation of access to resources. Funding data show an increase in entrepreneurial activities and investment interests across different towns and provinces in South Africa (Davidson et al., 2024). Increased access to funding for MSMEs may be supported through innovative financing solutions such as e-commerce platforms. Moreover, providing training on writing business plans and financial management could increase the likelihood of funding applications being successful (SBI, 2021). In addition, government and private-sector initiatives should provide grants or subsidies for training and development.

Finally, the expectation that MSMEs will flourish near SEZs or benefit from public procurement ignores the structural challenges that many of these enterprises face. These challenges include limited access to finance, fluctuating work opportunities and the burden of navigating complex regulatory systems. These feasibility gaps must be acknowledged if policies are to move beyond mere rhetorical support and offer real developmental impact instead.

Horizontal collaboration

The skills ecosystem mapping exercise also highlighted the importance of collaboration among various stakeholders, including MSMEs, educational institutions, local government and industry associations. Effective communication and partnerships among these groups is essential to filling the skills gap and fostering a supportive environment for MSMEs.

Collaboration may facilitate the sharing of resources, knowledge and best practices, which could enhance the capacity of MSMEs to respond to market demands. For instance, educational institutions may align their curricula to the needs of local businesses, while MSMEs could provide feedback on the skills required in the workforce.

Creating networking opportunities and platforms for dialogue among stakeholders could strengthen relationships and foster a sense of community. This could lead to collaborative projects, mentorship programmes and joint initiatives that benefit the entire skills ecosystem.

Recommendations to improve horizontal collaboration include ongoing research and data collection. Comprehensive research is needed to gather reliable data on skills demand, market trends and the effectiveness of training programmes. These data could inform decision-making and help to tailor interventions to meet the needs of MSMEs more appropriately.

Education and training institutions should focus on the specific realities and working conditions of MSMEs so as to develop innovative upskilling and training programmes. Furthermore, partnerships between government bodies, the private sector and non-profit organisations are able to deliver targeted resources and expertise (Nthoana, 2024). What is more, mentorships and support for early-phase entrepreneurs are known to reduce failure rates (Makumbirofa, 2021). Mentorships, in particular, should help with recruiting and managing students who are entering the IRM pipeline with a desire to follow career pathways in this sector.

Mediation activities

The skills ecosystem mapping seems to indicate that mediation activities are the weakest domain in the IRM skills ecosystem. Greater collaboration between all stakeholders is needed to increase points of interaction between horizontal collaboration and vertical policies. These activities could include workshops, forums and collaborative projects that bring together stakeholders to discuss challenges, share insights and develop joint solutions.

The Spours (2024) model's emphasis on the dynamic and evolving nature of ecosystems provides a conceptual basis for discussing feedback loops and unintended consequences. The political economy–ecology perspective also stresses the immanent confluence of complex relations that can lead to diverse outcomes.

The effectiveness of interventions aimed at supporting MSMEs in South Africa has been a subject of considerable debate. Many interventions offer short-term financial relief but do not face the underlying structural issues such as market access and business sustainability head on. This is an example of an unintended consequence where interventions designed to help MSMEs fail to achieve long-term sustainability owing to a superficial approach and instead either create a cycle of dependency or result in failure.

The skills ecosystems mapping emphasises the importance of establishing feedback loops where MSMEs can communicate their needs and challenges to policymakers and local government. This interaction could lead to more responsive policies that are better aligned to the realities of the local economy. Ecosystem leadership is needed to engage with stakeholders and to ensure a comprehensive approach to responding to the needs of township economies (Nthoana, 2024). Mediation activities could also focus on capacity-building for both MSMEs and educational institutions. By facilitating training sessions, mentorship programmes and resource-sharing initiatives, stakeholders could work together to enhance the overall capabilities of the skills ecosystem.

What we learnt about the skills ecosystem mapping: value and limitations

The skills ecosystem mapping exercise revealed a number of important matters that must be attended to if the skills ecosystems are to promote the growth of the IRM sector in a meaningful manner: collaboration, continuous engagement, skills development, financial

and other support, the alignment of skills to local needs, and the easing of regulatory barriers being among them. These matters are elaborated on below.

Framework for collaboration

The skills ecosystem mapping revealed the relationships among MSMEs, educational institutions and local governments, highlighting the interconnectedness necessary to foster skills development and economic growth in the IRM sector. It provided a framework for collaboration, encouraging partnerships to deal with challenges such as skills mismatches and inadequate support structures. Insights from the skills ecosystem mapping could guide the development of policies that are better aligned with local economic realities and which ultimately support sustainable development and job creation.

Keeping skills ecosystem mapping dynamic

Skills ecosystems are dynamic and require continuous engagement to align with local economic needs. Spours and Grainger (2019) stress that skills ecosystem mapping is the first step in identifying problems, mapping existing relationships and assessing the potential of skills ecosystems. Collaborative networks of educational institutions, employers, government and civil society are essential to development, using open digital technologies for skills and to enable civic participation. Agencies, such as government departments, TVET colleges, universities, industry associations and NGOs, can assist in updating the mapping. A local anchor institution is needed to coordinate stakeholders and ensure that the mapping adapts to evolving economic conditions, skills demand and MSME landscapes. This process of ongoing evidence-driven skills ecosystem mapping is inherently complex and challenging, but the ultimate goal is to move towards 'inclusive, sustainable economic, social and educational development', which is an ongoing long-term project (Spours, 2024:2).

Limitations encountered in the skills ecosystem mapping

This research has limitations that may affect its comprehensiveness. Notably, it excluded interviews with municipal supply chain officials and those involved in interventions for people with disabilities, which could have provided valuable insights. A number of the participants struggled to provide precise quantitative data on funding and the impact of initiatives, leaving gaps in our understanding of the scale and effectiveness of support for MSMEs. Desktop research could not fully fill these gaps. In addition, the dynamic nature of skills ecosystems means mapping is subject to constant change, which limits its long-term applicability.

Conclusion

Our research emphasises that supporting MSMEs as important entities through which to grow local economies and foster more place-based skills development requires a comprehensive, multi-level approach to integrating skills development within the broader skills ecosystem.

This involves strengthening partnerships between TVET institutions and MSMEs, aligning training programmes with local economy needs, and improving access to capital, infrastructure and market visibility. Rigorous oversight and accountability mechanisms are critically needed to ensure that municipal budgets intended for infrastructure repairs and maintenance are fully utilised and that they achieve their intended impact, that is, directly supporting MSME operating environments and enhancing their market visibility.

Mapping the skills ecosystems in townships such as Atlantis, Mandeni, Katlehong and Mamelodi reveals the specific challenges and needs of local MSMEs. Our findings highlight the need for enhanced support structures, including increased capital, government procurement changes, and better marketing and management strategies. Resolving the skills mismatch and improving training quality through targeted programmes are crucial to the sustainability of MSMEs. The proposed recommendations are not easy fixes, but a coordinated effort by government, the private sector and educational institutions is necessary to create an enabling environment for growth, supported by rigorous impact evaluations and a bottom-up training approach. Achieving these recommendations will demand political will, sustained financial commitment and fundamental shifts in governance practices.

Based on Spours (2019; 2024), the skills ecosystem mapping exercise has shown that a successful IRM skills ecosystem relies on horizontal collaboration between stakeholders and vertical policies supporting MSME development. Strengthening these connections through effective mediation could lead to a more resilient skills ecosystem, one that contributes meaningfully to local economic growth.

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