URBAN DOMAIN

Guideline to cocreate digital hubs in informal settlements: lessons learned from international literature

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This policy paper highlights and discusses the guidelines to be used in co-creation of digital hubs in informal settlements. The guidelines are drawn from international literature discussing the various typologies of digital hubs and hub they are created and governed.

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1. Introduction

1.1. Introduction

The Kenyan government, through its Information and Communication Technology Agency (ICTA), has developed a 5-billion Euro digital master plan to roll out ICT throughout the country. This includes plans to set up 1,450 digital hubs within urban neighborhoods and villages. The government recognizes that digital hubs in informal settlements should respond to specific local challenges and opportunities. Considering the gap between those who have access to information and communication technology and those who do not, called the digital divide, such support is much needed.

However, international literature shows that most digital hubs fail, as they do not reach their target group, or computers and free internet services are not maintained after the project ended (Datta, 2019; Wamuyu, 2017). They often lack sustainable financial support to maintain operations and equipment (Bailey & Ngwenyama, 2013; Datta, 2019; Wamuyu, 2017). Rather than supporting those in need, they support better-off community members who are already employed (Taylor et al., 2023). They may also be located in formal buildings which informal settlers are afraid to access or cannot access due to limited opening hours or formal registration requirements.

This paper offers a literature review to describe the existing knowledge on digital hubs in informal settlements. It aims to offer a practical guide on how to co-create digital employment hubs, questioning what problems they address, what their objectives are, and what activities, and governance structures they employ. Following an outline of the research methodology, we discuss what digital hubs are, identifying their aims and objectives, target groups, activities and governance arrangements. We conclude by visualizing the key steps of the co-design process and summarizing the key issues to consider when co-designing a digital employment hub in the context of marginalized urban populations.

1.2. Methodology

We conducted a literature review of academic and grey literature on Scopus, Web of Science and Google Scholar as well as the websites of UNESCO, UNDP and the World Bank. The literature search was carried out in December 2023, which included both qualitative and quantitative studies that examined digital hubs and their impact on marginalized urban communities. To gather relevant literature, we included several search terms used in international literature for digital hubs:

- Tele center, community learning center, digital hub and/ or public access point.
- Informal settlements, low-income community, marginalized communities, inclusion and/or vulnerable groups

This search resulted in 46 publications. After deleting documents from before 2005 and those focused on technical requirements, we selected 18 papers for in-depth analysis.

Figure 1 offers an overview of key themes used in literature. The literature selected is representative of the search terms and topics. Most cases are from Brazil, South Africa and Malawi, but also include Bangladesh, Nepal, Ecuador, India, Zambia, China, Mexico, Iran and Mozambique. They discuss the sustainability, success and implementation of the tele centers as well as the various uses of these public access points such as entertainment, employment.

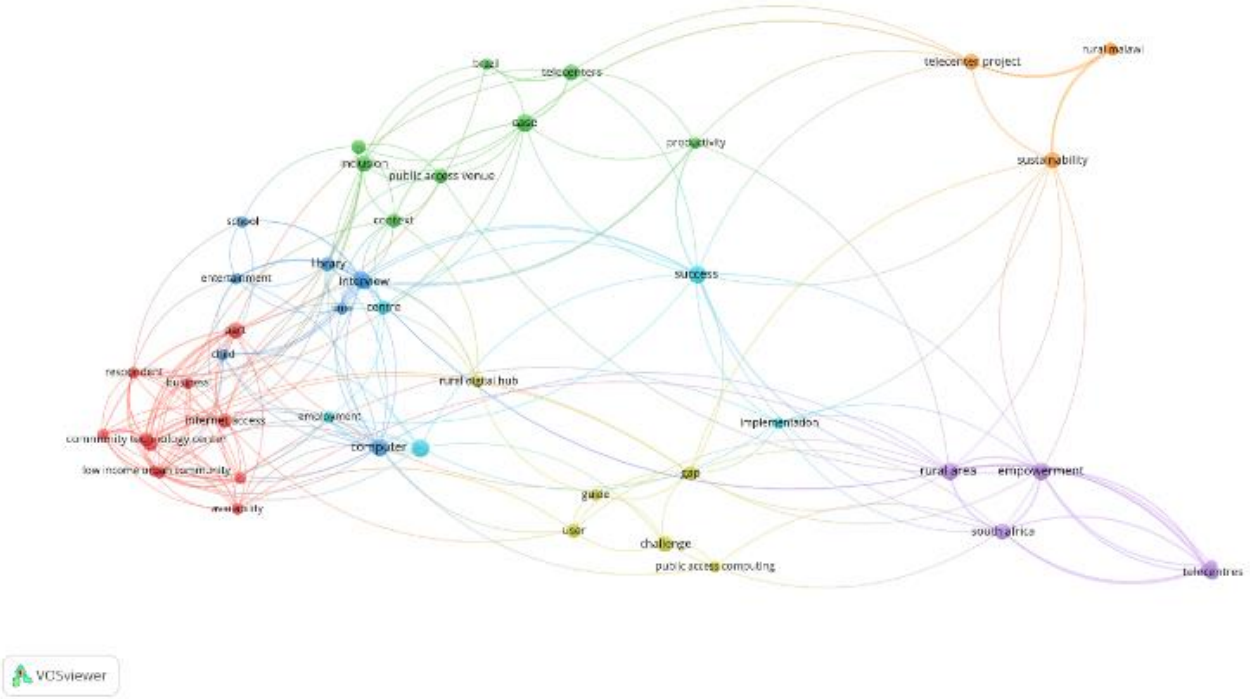

Figure 1: Vos Viewer visualisation of the literature on digital employment hubs

2. What problems do digital hubs address?

2.1. The digital divide

The digital divide describes "the gap between people who do and do not have access to forms of information and communication technology" (van Dijk, 2005). People with lower income and education are more likely to be digitally excluded (Gonzales, Ems, & Suri, 2014). Digital exclusion does not stand on its own but builds on top of the existing inequalities. If a digital hub addresses the digital divide in isolation of other social divides and forms of exclusion, it is unlikely to achieve success (Grossi & Pianezzi, 2017; Engelbert et al., 2019).

The digital divide includes four interrelated steps. The first is having the motivation to access digital sources. Especially elderly are often less motivated, but people may also be scared of their privacy or afraid to use, for instance financial apps. The next step is material access to computers, smart phones, printers and the like. The third element is having the skills to use digital platforms and to comprehend the massive amount of information available online. Finally, the question is how digital data is used or misused.

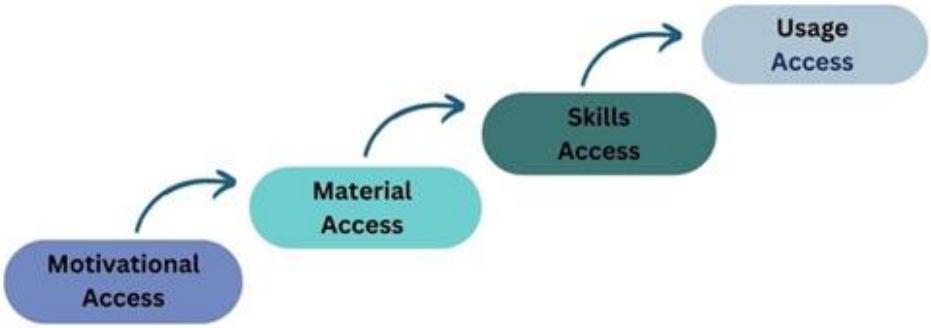

Figure 2: Digital divide

Source: van Dijk, 2005

2.2. The digital divide in informal settlements

Informal settlements expose residents to poor living conditions compounded by inadequate infrastructure and basic services (Wamuyu, 2018). On the physical side, poor infrastructure and services usually translate to bad connectivity for the residents of the informal residents, resulting in bad quality of the digital services. However, digital divide is not only about access to technologies, it is multi-dimensional. A "multi-dimensional" digital divide encompasses the interconnected influences of race, gender, culture, and social constructs on the use of digital technology (Sinha, 2018).

The trend towards digital smart cities potentially has three negative effects on informal settlements:

1. Digitalization replaces low-paid and informal labor and may thus add to un- and underemployment in informal settlements. Digitalization also creates new jobs, but these require more digital skills and access (Willis, 2019).
2. Digital smart cities are seen as modern cities in which street vendors and informal settlements have no place. These processes of spatial and social ordering often lead to the removal of informal street vendors and informal settlements (Sarkar, 2019).
3. Digital inclusion can be averse (Heeks, 2021), whereby informal settlements are digitally included but the multinational gig economy subsequently exploits low-cost labor in informal settlements. However, Keskinen et al (2022) show that informal settlers in Namibia are quite happy with digital work, even if it is lowly paid irregular work, with most profits going to multinationals based on the global North.

Whereas digital hubs may partially address the first two negative effects, it contributes to the third. This is a controversial issue in literature.

2.3. Digital divide in informal settlements in Nairobi

On the one hand, the Kenyan capital is dubbed 'Silicon Savannah' due it its leading position as a digital hub within Africa (Mann & Graham, 2018). On the other hand, Nairobi is plagued by a digital divide (Wamuyu, 2017). Our own and other research show that digital exclusion of households is caused by an intricate combination of factors:

- Poor and unaffordable access to internet, computers, and power supplies in informal settlements. These factors are partially spatial, as some settlements have poorer access than others; partially economic, as some households have more financial means; and partly motivational, as some households are more willing to spend scarce resources on digital means.
- Low awareness and capacity on digitalization. Public schools in Mathare do not teach about digitalization. Adults and youngsters mainly learn by doing, whereby higher educated people on average do better than others.
- Poor access to and awareness of digital employment platforms.
- Limited access to (digital) workplaces. There are a few internet cafés in combination with unreliable internet and power supply.
- Limited skills and knowledge on new digital markets.
- The cost of accessing a smart device/data (come out strongly in the case of Mathare)

The use of digital means varies considerably within informal settlements. Most people access digital information on old smart phones using unstable internet and electricity connections, while computers and Wi-Fi systems are very rare (Fransen et al., 2024). MPESA and other financial platforms are widely recognized as innovative and inclusive (Gikunda et al., 2014; Wambalaba et al, 2012), used by even people at the bottom of the pyramid (Fransen et al., 2024). Digital payments are also used to access water, electricity, or gas, but these services are wide apart and regularly destroyed by gangs protecting their informal means of income. However, specialized platforms are less used (van Tuijl et al., 2024).

3. Objectives

3.1. Overall objectives

The overall objective of digital hubs is to overcome the digital divide by availing access to internet and to digital services, skills and opportunities. They can create digital employment (Sabbagh et al, 2013), increase social capital (Nakano, & Washizu, 2021), create a sense of ownership over the future of the city (Masucci, Pearsall, & Wiig, 2020), reduce material inequalities (Kumar, 2017; Stoker, 2000) and provide reliable infrastructure (Chambers & Evans, 2020).

3.2. Digital hubs versus community learning centers

Literature offers different terms with two different objectives:

- The term “digital hub” primarily describes projects related to supporting SMEs and innovation in the European Union (Sassanelli et al, 2021). It tends to have economic and innovation-driven objectives.
- Literature on the global South and ICT4D, often talk about telecentres or community learning centres (CLC). Clark and Gomez (2012) define telecentres as a “non-profit publicly accessible facility that provides ICTs-related services and other activities to foster community development”. CLC is also the term used by UNESCO in their project in Nepal as well as by UNDP and USAID. The objectives often relate to community development and learning, with a greater emphasis on inclusion. Services are not only digital or aimed at employment generation but include access to information e.g. e-government or e-health.

3.3. Different objectives and target groups

Ashmore et al (2019) further detail the difference between the economic focus of a digital hub and social focus of community learning centres (figure 2):

- Public places such as libraries may offer public access to internet, training and a one-stop-shop to digital information. This targets local residents and function as CLCs.
- Larger spaces may offer more advanced advice, training and support spaces, often organized at a regional level.
- Digital hubs with a more economic focus may function as an incubator for starting companies and as co-working space in the digital economy.
- Finally, sector-specific innovation hubs offer digital support for a specific economic sector, which may be relevant if an informal settlement specializes in a specific economic activity.

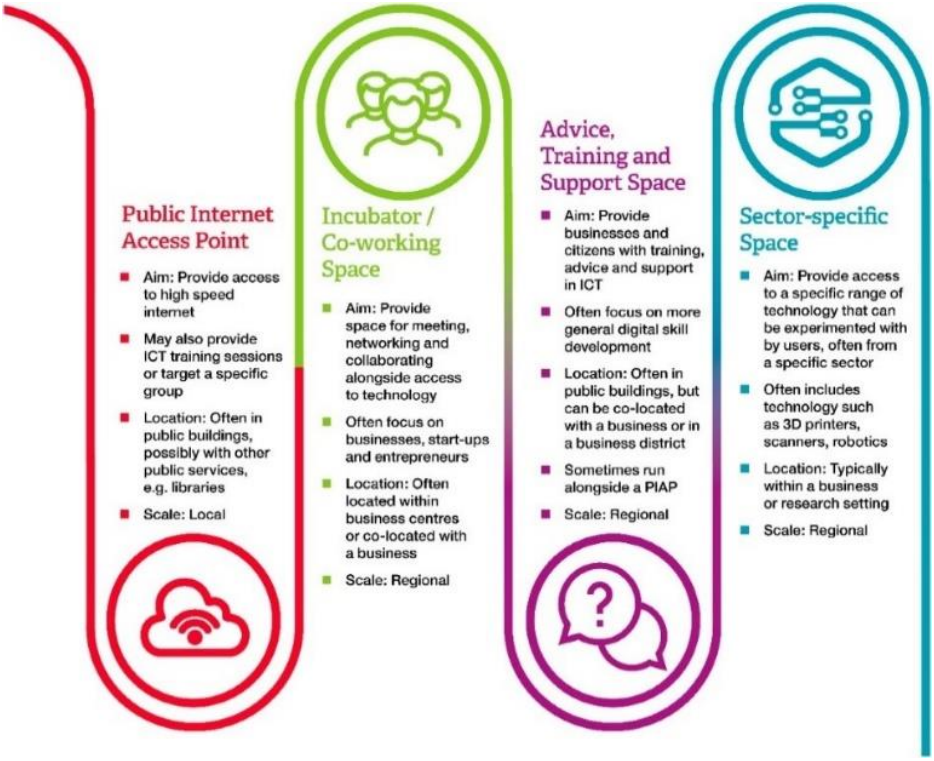

Figure 3: different objectives *and target groups*

Source: Ashmore et al (2019).

3.4. Aiming for inclusive development in informal settlements

In informal settlements, digital hubs often represent community learning centres which aim to contribute to inclusive development. Inclusive digital hubs identify and respect the interests of certain identified groups without unduly compromising those of others.

Digital hubs can improve inclusiveness by promoting entrepreneurship within marginalized communities (Subramaniam, 2011), enabling access to technology, and providing scientific information on livelihoods for farmers and fishing communities. These hubs empower marginalized groups (Pohjola, 2002; Kennedy et al., 2014; Senthilkumaran & Arunachalam, 2002; Vedavalli, 2015) and have the potential to scale across countries as large as India and South Africa (Mitra, 2005; Mukherjee-Das, 2014; Dangwal & Kapur, 2009). Digital employment hubs have the potential to establish right to information as part of and a precondition for the right to the city. Digital employment hubs can entail information on rights, where to access services and employment. Practically, the services can range from providing free internet services or free laptops, to offering training, coaching and digital business development support.

4. Services

4.1. Social survey

Digital hubs can attract diverse members with heterogeneous knowledge and needs (Toivonen & Friederici 2015). It is thus important to identify local needs (Jimenez and Foster, 2022). In informal settlements, people use digital platforms in different ways and for different purposes, including digital crime and other dark sides of digitalization (Fransen et al., 2024). Many people are not aware of digital opportunities and don't know if and how digital hubs can help them. Social surveys can offer information on what services are needed and can create local awareness and ownership of digital hubs.

4.2. A targeted service menu

Digital hubs can choose from a wide range of services for multiple target groups in informal settlements. However, with limited resources it is impossible to offer all required services to all target groups. Choices have to be made. The choices of which target group will be the beneficiaries is largely predetermined by the purpose of the digital center. This difference is explained in more detail in the latter sections.

The first rationale for a choice is the objective of the hub. Digital hubs often provide targeted digital services to citizens (Bohari et al, 2016), aiming for many residents to access employment. This often takes the form of information provision, training and coaching to online work. CLCs may offer four types of services (Rashid, 2017; Zainudeen et al., 2013):

- Government services, such as birth registration, examination results
- Information services, such as on health
- Employment services, such as job placements, online work and online business development support
- Commercial services, such as access to e-banking, life insurance, training, photocopying and printing.

Sometimes CLCs also offer non-digital services (Banda & Chigona, 2017). For example, in Malawi the local populations visited the CLC for stable electricity to charge their phones and for communal events.

In selecting which services to offer to which target groups, Smith (2015) argues that these depend on the level of digital equity to digital empowerment that the digital hub aims for. This is worked out in table 1.

Name	Level of inclusion	Description	Sources
Digital equity	Very high	Providing reliable but basic digital infrastructure and services for all	Gorski, 2009
Digital excellence	High	Promote digital awareness and basic IT skills and literacy	Ware at al.,, 1997
Digital opportunity	Medium	Advanced training, coaching and support in for instance e-commerce and ghost writing	Maiken, 2006
Digital empowerment	Low	Transfer skills to digital innovators and startups	Kanter, 1977

Table 1: digital hub services at different levels of inclusion

Source: authors.

5. Governance and Management

Literature argues that the governance and management are crucial in the success or failure of digital hubs. This relates to issues of ownership, cocreation and co-management, roles of actors, facilitative leadership, trust building and finance.

5.1.Public versus private digital hubs

Many digital hubs, also in informal settlements, are private (Rashid, 2017). They obtain revenue from charging for the use of the internet which, together with mobile top-up services, are the biggest revenue streams. People using these services are mainly men mostly looking for employment information, educational resources, health and government data.

Public digital hubs supplement the private ones. They can be managed by the government and/or as social enterprises. Training is the most popular service. Public digital hubs can, if successful, attract more marginalized communities, those governed as social enterprises are more likely to attract women as users, while private and government run hubs on average attract more men (Rashid, 2017).

5.2. Co-creation and management

A core challenge is that digital hubs are often not trusted by informal settlers. Informal settlers often have no title deed, registration cards and/or formal employment, which makes them hesitant to enter formal buildings. Histories of marginalization and conflict, in combination with power imbalances, create mistrust. Co-creation and co-management can create trust.

Scholars recommend that digital employment hubs are created and operated collaboratively, *meaning the involvement of different stakeholders who constructively manage their differences to produce joint solutions to common challenges.* Need for collaboration applies to management of a hub – that is "the process of planning, organizing, motivating, coordinating and controlling the activities of the digital hub" (Seitkan et al, 2024, p. 6).

Stakeholder participation ensures that there is support for the establishment of the hub and that the services that will be offered respond to the needs of the local community and users (Price et al, 2022). Burton (2003) and Sorensen and Sagaris (2010) add that community participation in service provision (e.g. digital employment hub as a service) may result in higher acceptability of this service (hub) by community members.

However, co-creation and co-management are far from easy. Communities might not be interested in joining the co-creation process (Uitermark, 2015; Taylor 2007). They may mistrust authorities due to past experiences, red tape and different backgrounds of the officials (Visser et al, 2021). Governments also exclude people, as they aim for efficient and effective processes with residents convinced of the benefits of digitalization and interested to work with governments. It is however crucial to actively seek the involvement of potentially "troublesome" stakeholders and marginalized groups (Ansell et al., 2020).

5.3. Roles of actors

The main managing actor depends on the type of hub. Cybercafes are for-profit by design, therefore, they are managed by private companies. These entrepreneurs may be trusted by the community, but the model is not inclusive. Public libraries as digital hubs are managed by local governments and enjoy more political support (Clarck and Gomez, 2012). When a hub is aiming to link to e-government or national programs (like employment programs), the government should be a key partner (Best and Kumar, 2008).

A management committee offers a sustainable way to manage a digital hub (NILE, 2017). It can represent different stakeholder groups and/or different subcommunities. In Thailand, for example, the hubs are embedded in the governmental structure under the Ministry of Education. The national guidelines for such centers state that they should be managed by "...a management committee, which consists of schoolteachers, retired professionals, community and religious leaders, the director of the district non-formal education centre, the non-formal education facilitator, and other community members" (Nile, 2017, p. 16).

5.4. Facilitative leadership

Price et al. (2021) argues that a capable and connecting manager in charge of day-to-day operation of a hub is of crucial importance (Price et al, 2021). We have also seen this in our own research (Fransen et al., 2024). A hub manager ensures inclusive participation of all parties, fostering a collaborative and productive environment (Lasker and Weiss, 2001). Morse (2010) further elaborates that facilitative leaders help create a shared vision among diverse actors, build trust, and promote mutual learning and exchange. Additionally, Van Meerkerk and Edelenbos (2018) highlight that facilitative leadership aims to establish a platform for dialogue and interaction among stakeholders, thereby enhancing the overall effectiveness of the collaborative process.

5.5. Trust-building

Whatever arrangement is created for governing and managing a digital hub, its primary goal is to ensure that it creates value for the community of users. Madon et al (2009) explains that digital hubs must generate continuous support from and acceptance by the participating community and stimulate communication among the relevant social groups. For that hub management should presume shared delegation of authorities between members of the group and a level of trust between the stakeholders which might be complicated in contexts where prior relations between stakeholders are fragmented (Ansell and Gash, 2008).

5.6. Finance

An important component of services is financial sustainability (Ahmad et al, 2011). A common reason for the hub to fail in its operation is the failure of attracting funds after a dedicated project/program funding has run out. Even when a hub will be supported by a government it needs some degree of financial autonomy. Therefore, some hubs choose to diversify their funding by offering some services for additional fee or request funding from various donors. Additional funding can come from private actors, regional development funds, national or international funding as well as renters of the hub space (Price et al, 2021).

5.7. Location of digital hubs

There are two types of discussions on the location of a digital hub. The first zooms in on the best physical location, often leaning towards publicly accessible spaces such as schools and libraries. Bohari et al (2016) recommend a proximity analysis (network buffer and spatial join analyses) to determine the spatial sustainability of the digital hub. Spatial considerations allow to better map available infrastructure as well as potential usability of the centre. Ahmad et al (2011) indicates that important location factors are proximity to public spaces such as churches, schools, post offices or markets. From a practical standpoint, CLCs should also have air-conditioning facilities, safe and easily accessible. Bohari et al (2016) add the importance of accessible information on the services, available in multiple languages and well-illustrated.

A second discussion is on the risks of having a specific physical space, which may not be accessible for all. Services can also be offered in other spaces, such as community halls or at schools or in public markets. And services can be offered digitally. Therefore, it may be more beneficial to

decentralise service provision rather than make one central hub (van der Linden & Laeven, 2024). Such an arrangement might help avoid bureaucracy and improve accessibility.

5.8. Acceptance and use of the hub

It is challenging to attract all target groups to the digital hub. Especially marginalized groups such as the poor people, people with disabilities, unemployment youth and female headed households are hard to reach. Women are more likely to face a digital divide than men (GMSA, 2019). Yet, digital hubs are more likely to attract men than women, and women may see the hub as exclusionary spaces which are not designed for them (Jimenez and Foster, 2022). Special attention to women, and other marginalized groups is thus warranted (Almira & van Eerd, 2021). People with disabilities deserve special attention, as informal settlements are not designed for disabilities while digitalization may open as yet unexplored opportunities.

Gollakota et al. (2012) describe four conditions for people to use telecenters: the center and its services must be accessible, its access should require limited effort, its' services must be useful, and it must be socially and ethically acceptable to enter the building and follow the services. Social acceptance relates to a community tolerating and valuing the digital hub, whereas ethical acceptance relates to moral issues related to for instance digitalization (Taebi, 2017). People may for instance not trust digital data.

A key indicator of a digital employment hub's acceptance is its perceived usefulness—the degree to which users believe it will aid their job search or career advancement (Venkatesh et al, 2003). Another possible factor is knowledge – it implies that users have the necessary skills, information, and facts about the hub and its services. It is essential that users have access to open and transparent information to engage meaningfully with the hub (Bosch et al, 2016). Public acceptability of digital employment hubs can also be influenced by subjective norms—how much individuals are swayed by their social circles' opinions on using such spaces (Choe et al., 2021). Sometimes public acceptability is also impacted by local organizations and CBOs who have a stake in the governance dynamics of informal settlements. The more innovative the hub, the more significant the impact of these social influences on individuals' intentions to use the service.

6. Conclusion

Digital hubs are not a panacea to address digital exclusion in informal settlements, Experiences show that they often fail, as these formal structures are often mistrusted by informal settlers, mismanaged and lack sustainable finance. It is however important to overcome the digital divide as the world is digitalizing. This guideline therefore aims to identify how to make digital hubs work better, whereby we recommend close collaboration with other local developmental initiatives.

We conclude that digital hubs should be collaboratively created and managed by a variety of stakeholders to address common challenges and ensure that the services offered meet local community needs. Objectives, services and effective governance models vary, but a common approach includes forming a management committee representing diverse stakeholders, supported by a capable manager who fosters inclusive participation and trust. This collaborative approach ensures the hub's sustainability and relevance to the community. Beyond that, a range of services that a hub can offer should depend on the needs of the local community and the resources available. Based on these the services can be digital or non-digital and can range from a simple infrastructure for digital access to job placement services, training, and educational resources. Financial sustainability is crucial, with diverse funding sources and possibly offering fee-based services to ensure long-term viability. Lastly, the acceptance of digital employment hubs hinges on

their perceived usefulness, knowledge accessibility, and social dynamics within the local population. Transparent and inclusive decision-making processes enhance community trust and support. Engaging local communities in the hub's development and ensuring services meet local needs can improve acceptability and inclusion.

This guideline is not a step-by-step cookbook that results in a successful digital hub in informal settlements. It rather reflects the challenges, and the conscious efforts and decisions required in the collaborative process, we strongly recommend taking time for collaborative processes to create awareness, trust and shared ownership.

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