

Defining ‘Smart Rural’ in the Framework of Regional Digitalisation

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Abstract: In this paper, we explored how a *smart development framework* could be harnessed for enhancing small and medium enterprise (SME) activities in rural communities. With this aim, this study considered and compared the landscape of the SME ecosystems in Ghana and Finland. Alongside with the deprived countryside or remote work context, it has become clear that the contemporary digital platforms and collaborative media represent an integral part in smart development. In addition, remote working possibilities help tackle the challenging times or even state of emergency, such as the ongoing COVID-19 crisis. We created our *Smart rural development model* (SRDm) to facilitate digital transformation of the SMEs and strategies in peripheral settings. Our SRDm was developed from the exploration of smart development literature in regional settings, and filtering numerous initiatives utilised within digitalisation and SMEs development context. The key target groups who can benefit from our research endeavour are the various strategic development organisations, financing authorities and of course regional stakeholders, policymakers, business clusters, SMEs and individuals.

Keywords: Smart rural, strategic development, digitalisation, regional policy, SMEs, smart development.

1. Introduction

In this paper, we explored how a smart development framework could be harnessed for enhancing small and medium enterprises (SMEs) activities in rural¹ communities. With this aim, the study considered and compared the SME ecosystems in Ghana, a developing country context and Finland, a developed country context. Alongside with the deprived countryside or remote work context, it has become clear that contemporary digital platforms and collaborative media represent an integral part of smart development. In addition, remote working possibilities help tackle the challenging times or state of emergency, such as the ongoing COVID-19 crisis. Centralised services and national migration are some of the most important negative factors accelerating the deprivation of the remote areas, and it has become clear that inhabitants as well as businesses suffer when regions are lagging in regional development [1]. Current circumstances present real challenges for policymakers, companies, and individuals alike. From these topical starting points, our aim is twofold: we ground the theoretical framework of *smart rural* by defining and assessing the smart development concepts within digitalisation context, and secondly, we proposed a strategic-level unified *smart rural development model* to promote regional decision making on smart rural implementations.

Oftentimes, the notion of smart is used to underline the contemporariness of the development aspirations in strategic policies, and when categorising the components or attributes of community development. Generally, the closely related terminology discourses

¹ It must be noted that in this paper we use the terms rural, countryside, periphery and sparsely populated areas synonymously.

about *smart development/specialisation* or *smart city/community/village* are well represented in policy texts and initiatives internationally, as well as in today's academic research (e.g., Foray et al. [2]; Giovannella [3]). The focal point in the current discussion is the increasing impact and relevance, which the knowledge economy represents in everyday life and business in the society [2]. To help rural communities achieve modern IT development aspirations, and SMEs to harness digital business tools, more effective knowledge transfer is needed to and within the regions [4].

In this paper, we first explored the common definitions concerning the notion of smart used in the terminology projected towards regional development, SME sector and peripheral areas. To narrow down the variables of our exploration, we have limited our scope towards digitalisation and learning capabilities as a guiding framework to understand and define *smartness* in an operational sense. Our aim was to define and unify the terminology that is involved when discussing both strategic policies and local level operations of the SMEs within the rural settings. This was accomplished by exploring the existing smart city models. Secondly, to investigate the differences among peripheral areas we compared the circumstances and starting points of regional business development between Ghana and Finland. Focusing this research of smart development towards the SME context is well justified as this sector represents in most cases the driving force of economic life in the countryside. Thirdly, we conclude by proposing some avenues for policy development and a model for defining the concept of smart rural.

2. Framework for Smart Development

2.1 Background and Contemporary Discourse

Urban planning became essential as a result of urbanization and urban growth. To improve living conditions in cities in the industrial era, a variety of development components, such as housing, land use, transportation routes, and various activities had to be planned and arranged meaningfully and effectively. As early as the 19th century, visions of how technology would change urban living were presented [5-10]. From those days on, the areas of community development have evolved. Emerging challenges, thematic and attributes have created new needs to update policies as well as concepts for smarter planning.

As digitalisation entered the picture, consideration began to be given to how digitalisation would make communities more vibrant and efficient. Related to the physical area, the concept of place and inclusion has been discussed; Digitalisation may fade physical distances between cities and the countryside (as in Naldi et al. [11]). One foundation for smart development in cities was introduced by Giffinger et al. [12] who meritoriously defined characteristics, factors and indicators for investigating smart communities; The researchers identified a set of six principal titles: economy, people, governance, mobility, environment and living - as overarching thematic [12].

The concept of a smart city has attracted a growing amount of interest in recent years [1, 2]. In addition to this concept, several other closely related notions have been used to give similar meaning for urban development with the help of ICT. These include, for example, digital city, creative city, smart community and wired city [1, 2]. Often the notion of a smart city is narrowly related to the use of virtual or concrete technologies to improve the city's various functions [4, 7, 13]. In general, the definition is often used to describe technologies such as IoT, sensors and robotics. On the other hand, in virtual context, this concept is often understood to include various information systems and big data that have been produced for public use (e.g., FastCompany 2013). However, smart has also been adopted to depict such areas of interest as e-governance, well-being, happiness, and general quality of life, so the functioning of the city or a community has been introduced to a set of softer values than before [12]. Thus, the aspects defining the concept of smart city can be

divided into two approaches: 1) the ICT and technology-oriented approach, and 2) the people-oriented approach [13]. Other approaches are hard infrastructures (i.e., transport, water, waste, energy) vs. soft infrastructure and people (i.e. social and human capital, knowledge, inclusion, participation, social innovation and equity) [1], or top-down vs. bottom-up initiatives [14], and supply vs. demand driven [1]. As the smart city definition varies, there are numerous ways to examine the components and attributes related to this framework. For instance, some scholars detach infrastructure and technology from one other; these kinds of hierarchical misinterpretations or adding synonymous components to the framework may lead to classification deadlocks (such as in Mohanty et al. [15]). In summary it can be stated that there are numerous divisions of factors and classifications in the contemporary literature related to smart development and smart city framework.

Some researchers have looked at the concept of smart city extensively, not only from a technological point of view, but also from the human role and sustainable development point of view [2, 3, 13, 16]. Nam and Pardo [3] identify three dimensions from a variety of definitions relative to smart city terminologies: technology, people, and community. Furthermore, the researchers suggest that the concept of a smart city arises precisely from the intersection of technology, human and institutional factors (see Figure 1). This division is also supported by Dameri [2] who suggests, based on an extensive literature review and empirical applications, that the smart city components include land, citizens, technology, and governance. More broadly, one can reflect on how any ecosystem can evolve through digitalisation. Similar to smart city, one can define what is meant by smart in the case of other ecosystems, such as smart region, smart village, and smart rural. Next, we discuss the strategic regional development policies perspective to define the notion of smart rural.

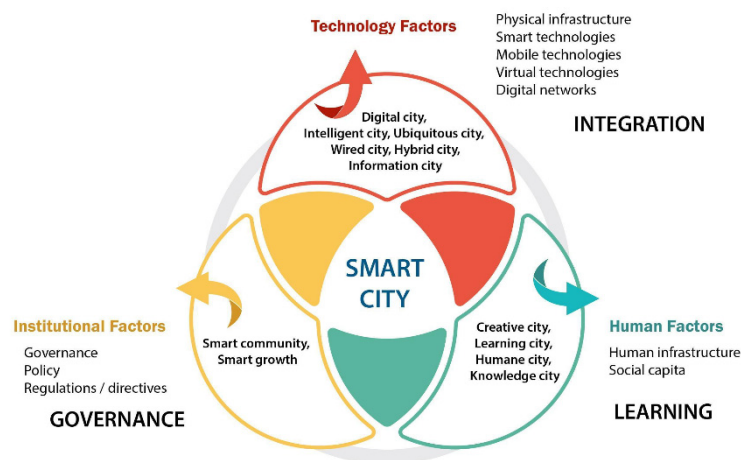


Figure 1: Fundamental components and strategic dimensions of smart city development [7]

2.2. Strategic and regional level development policies regarding digitalisation and SMEs

As the world gets increasingly interconnected, the global events, international agreements and unexpected changes affect the regional development. Economic changes add pressure on regions to harness regional development strategies and programs in order to achieve key regional policy objectives, such as ensuring equal services and living standards [17]. We argue that regional stakeholders who are willing to design smart development strategies will see improvement in the vitality among regional SMEs business. Research has already shown that smart development solutions within the scope of SMEs have transformative power to enhance the liveability, inclusion, and the quality of life in the rural communities [18]. The balance between individual local-level policies and centralised state- or alliance-driven strategic development goals has shifted, as new variables and directives have been introduced to regions somewhat top-down. Formerly independent local level policymakers

must or are advised to adhere to geographically set strategies or government-imposed ratifications. Some of the most prevailing policy needs are inter-regional strategies related to digitalisation. These include, for example, The Digital Economy for Africa (DE4A) initiative².

Contemporary regional policy often includes the notion of smart to development aspirations of the public sector, municipalities, or even smaller regions. These can be introduced for instance in a form of municipal or regional council level smart specialisation strategies³. When investigating policy development from operational perspective, sharing public data, and opening new big data repositories are important shifts in contemporary regional smart development policy⁴.

There are global initiatives to promote easier accessibility of data through open data and connectivity projects. Promoting digitalisation among the SMEs require historical data that can be horned for business decisions. By strengthening the SMEs in the rural communities required data support, which is often provided by the government through the open data initiatives. Hence, such centralised data repositories strengthened business decisions and understanding of the SME ecosystems in the rural communities. The level and amount of open data in a society can act as one relevant indicator of the level of digitalisation of capability within ICT.

3. Vision for Development Components within Smart Rural

Globally, regions in the countryside are facing considerably different challenges. We realise that it is challenging to generalise an overarching model to promote regional development aspirations. Therefore, we came to the conclusion to create an individual framework for enhancing regional digital policies. We present our smart rural concept via the challenges and opportunities arisen from the digitalisation of society. Our motivation is to explore the state of rural development in the framework of digitalisation in a global and somewhat polarised context. The peculiarities and differences arising from the SMEs landscape in Ghana and Finland were explored using the smart rural development model (see Figure 2). The knowledge of connected or mutual challenges were found to be interesting despite the obvious environmental differences and imbalance in scale between our focus areas. Our proposition for a unified development model is constructed on the characteristics of business landscape in the countryside, and it leverages contemporary digitalisation strategies.

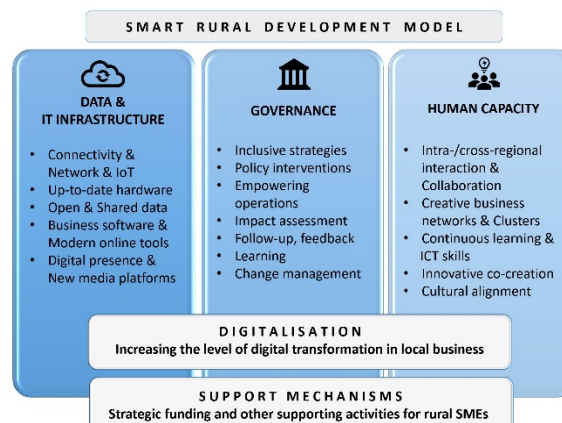


Figure 2: Unified model for facilitating smart rural development.

² Other programmes include: World bank [19], OECD [17]; *Measuring the Digital Transformation: A Roadmap for the Future*; EU's Digital Services Act and the Digital Markets Act (12/2020).

³ See e.g. *the Resource-wise Helsinki-Uusimaa strategy*, ref. Helsinki Smart Region initiative promotes smart activities - Uudenmaan liitto: https://www.uudenmaanliitto.fi/en/development_and_planning/regional_programming/smart_specialisation_in_helsinki-uusimaa_region

⁴ as seen in HRI initiative 2011: https://hri.fi/en_gb/hri-service/what-is-hri/

As indicated in Figure 2, the SDRm encompasses two overarching attributes (Digitalisation and Support mechanisms) and three critical components to smart rural development (Data & IT infrastructure, Governance and Human capacity). The essential part in the creation process of the SRDM is the identification of two cross-cutting drivers: digitalisation & support mechanisms. The various components were identified during the modelling process from a) the exploration of the smart rural, its features, definition, etc.; b) when exploring rural landscape from the SMEs perspective in Ghana/Finland, and; c) key drivers aroused within the creation of the model. From our model in Figure 2, we argue that smart rural initiatives could be realised by riding on the three components aided by the overarching attributes. Each of the components subsumes other key factors/tools that forms the fulcrum of smart rural development. While it is a common knowledge that smartness, in this context, is associated with Data and IT, our model manifests the relevance of human capacity and Governance in smart rural development.

Additionally, we argue that a notable distinguishing contributor between rural and urban context is the significance and alignment of cultural factors. Thus, smart development in rural settings include leveraging the peoples' knowledge and vision in co-design and development processes. This is understood to include learning and interaction dimensions. The increase in vitality can be achieved through business interaction motivation and dynamic knowledge sharing activities that facilitates both surrounding business networks and local SMEs. It is clear that this has to do with cultural traits, possible prejudice and lack of motivation that may be present and affect the interaction in the countryside. We propose that project or workshop environments can act as mitigating tools to get rural SMEs work together. Informal learning, shared innovation and inclusion as methodologies are key components in facilitating local networks and clusters. Continuous learning is a prerequisite for learning new ways of working and thus improving the competitiveness of companies.

4. Digitalisation of SMEs in Rural Communities

Every region has their own strengths that define the nature and liveability of the community. Some of the most obvious factors that dictate the operating environment are geographical location, natural resources, history (culture) and natural regional potential. In rural context, these factors play an essential part shaping the future and starting point for smart development. To set aside most of these concrete factors, we direct our vision especially towards the level of digitalisation and the readiness in IT among the SMEs. More specifically, our interest lies in development possibilities in ICT and challenges related to utilising ICT in e.g. e-commerce in rural regions where connectivity to the Internet may be a problem. These avenues of interest include various information systems and open data sources, the use of new business technologies, etc. which must be investigated more broadly in a separate study. In order to validate our vision, we decided to project our focus of investigation to two geographical settings differing from one another. The goal is to explore trade-offs in the digitalisation landscape and challenges between the developed (Finland) and developing country (Ghana). The policy regulating the activities of SMEs in Finland and Ghana are obviously different given their divergent context.

4.1 Business landscapes in Rural Ghana and Finland

Ghana is a country in West Africa with a population of about 28.83 million. The Ghanaian economy is largely driven by the informal sector where the Government only employs about 20% of the workforce [23]. The workforce in the informal sector is either employed by SMEs (90% of all companies) or are self-employed. The informal sector is bedevilled with underemployment, bad working conditions, uncertain work relationships and low wages [23]. The SMEs have been touted as the backbone of Ghana's economic and social development. The sector drives business development, employment creation, production of

goods and services and internal income generation in Ghana. It is estimated that the SMEs account for about 70% of Ghana's GDP. It is therefore worthwhile to augment the capacity of the SMEs in order to enhance economic development [20].

ICT is gradually changing the dynamics and landscape of business activities in Ghana and the globe at large. Businesses, in Ghana, are capitalizing the capabilities of ICT to strive for competitiveness in the business ecosystem. Digitalization of businesses and government organisations is tied to economic growth of which a massive digitalisation initiative has been initiated to reduce corruption. The manual processes in the government agencies breed corruption, of which the government loses quite a colossal amount of money. Although efforts have been made to promote digitalization in the business ecosystem, SMEs in the rural settings are being ignored and marginalized. Most of the rural SMEs are agricultural-oriented with daunting challenges to access and leverage the capabilities of ICT for enhancing growth. Notable challenges impeding smart rural initiative in Ghana, as indicated in Table 1, are the low internet bandwidth, low level of education, lack of IT skills inter alia. In Ghana, the SMEs are largely private which contributes to about 70% to the national Gross domestic product [20]. Quite recently, a new policy framework to enhance the competitiveness of Micro, Small & Medium-sized Enterprises (MSMEs) in Ghana was launched [21]. The overarching aim of the policy is to provide the administrative, regulatory, institutional and legal framework for the growth and stimulus development of the MSME sector [22].

Finland is a developed country and a Member State of the European Union with roughly 5.6 million inhabitants. The capital-region of Helsinki with its neighbouring Vantaa, Espoo and Kauniainen has a population of roughly 1.6 million. The majority of the population lives in cities, which are statistically attracting people and businesses away from the countryside [24]. Recent research has shown that Finland is perceived as a world-leader in quality of life and happiness rankings [25]. Finland is known for its good quality in education and relative IT-skills, reliable infrastructure, clean environment and versatile nature. The countryside attracts domestic travellers and urban workforce especially at the time of writing this article due to COVID-19 pandemic. Rural areas are popular with international visitors as well.

Statistics show that privately run companies are a cornerstone of employing the Finnish population; there are 395.000 businesses in the country which employ 1,6 million people, or roughly 30 % of the population [26]. Finnish rural areas often have worse employment opportunities than urban areas, so entrepreneurship is an important way of finding employment; over 40% of Finnish companies are located in rural areas, SMEs employ 80% of the people working in rural areas, and one third of farms also engage in non-agricultural business activities [30]. Information technology and ICT are relatively strong sectors of the economy, Nokia telecom company as an example, despite the size of the Finnish economy. Having that said, internet coverage and connectivity are at highest-level, according to the definition of the European Commission. Regardless of these positive starting points, Finland has developed inner peripheries which are losing population and thus livability because of lagging behind the neighbouring city-regions [1]. Regional success stories of companies have raised hopes every now and then about economic growth in the countryside, but the prevailing media environment has locked the discourse towards

Finland as a part of the EU adheres to the Smart Specialization strategic policy concept (S3), which is applied thoroughly among the municipalities. This model emphasizes prioritisation to favour some sectors within a region and aims to facilitate desirable areas for innovation policy intervention transparently for constructing regional competitive advantages [28]. The concept has been utilised effectively for instance to empower the northern part of Finland within the arctic development framework. Lapland's Arctic Specialisation Programme focuses on accessibility, sustainable utilisation of natural

resources and natural conditions, increasing value added, and harnessing the expertise accumulated in Lapland among other selected areas [27]. Numerous municipalities in Finland have projected their specialisation strategies towards e.g. industry clusters or to project support for selected key-areas. Rural Development Programme for Mainland Finland promotes Rural entrepreneurship. However, the funding is supported by the State budget and from the European Agricultural Fund for Rural Development (EAFRD).

4.2. Smart rural as an analytical framework

To set our framework in focus, we have analysed the salient contrast between the focus areas under investigation. Table 1 shows the components of smart rural development with clear reflections of the SME business landscape and the inference to digitalisation initiative in Ghana and Finland.

Table 1: Analysis of the setting in Ghana and Finland via the smart rural characteristics.

Components	Finland	Ghana	Inference to digitalisation effort
Digital Infrastructure	Reliable infrastructure, comprehensive broadband network.	Commended effort to bridge the digital divide and extend digital infrastructure to rural communities.	Mutual challenge: Capacity building in IT for both countries in the rural areas. There should be an extension of energy and internet bandwidth to the Ghanaian rural communities.
	Peripheral areas lag behind in digitalisation, minor coverage problems in rural areas; Lack of business ICT knowledge among SMEs.	Low internet bandwidth in rural areas; High cost of internet data; Lack of technical know-how in IT; Energy challenges, intermittent power outages; Ignorance of the role of ICT in society.	
Governance (Institutional, incl. community, finance)	Reliable governance; Funding possibilities to SMEs through government and EU policies.	Availability of regulatory institutions for the SMEs.	Mutual challenge: Promote stronger institutions in Ghana and build human capacity in ICT; Introduce a more flexible tax system for start-ups and SMEs in Finland.
	High level of taxation in government and local level; Entrepreneurship is considered risky and strictly regulated; Amount of bureaucracy.	Unreliable governance; Perceived corruption in the regulatory institutions; Challenges in accessing finance; Inadequate support for the SMEs.	
Human capacity	Good level of social security, benefits, education and general satisfaction; Special skills and business ideas among people.	Readiness for capacity building initiatives; Rich culture that promotes innovative ideas.	Mutual challenge: Capacity building is needed to promote digitalisation efforts; SMEs working in rural areas are considered to be action-oriented rather than research-oriented; Learning within ICT and business settings.
	Objection of change to new technology; Segregation affects the communities; Low self-esteem in business & IT.	Low level of education; Low IT skills; Bad attitude towards customers; Objection of change to new; Segregation.	
Environmental (incl. location, weather, safety, infrastructure)	Geographically and politically stable conditions.	Geographically stable conditions; Good weather to promote business activities.	Advantage in Ghana: stability in geographical conditions promotes businesses especially for external investors; Countryside in Ghana has security concerns; Weather conditions affect business.
	Harsh cold weather dominates; High usage of energy.	High risk of security; random movement of animals.	
Data (incl. data management, open data)	Ongoing initiatives related to make data more accessible.	Open data initiative; Passage of the right to information bill.	Mutual challenge: Ongoing open data initiatives with national rural policies to regulate development activities.
	Public statistical data is lags approx. two years behind.	Lack of support for the open data initiative.	
Collaboration	Regional SME networks; Interaction and learning possibilities with regional development organisations.	The spirit of Communism among the rural people.	Unlike individualism, good collaborative efforts enhance deep thinking. Interaction produces output. Mutual challenge: sharing attitude.
	Individualism is a dominant trait also within SMEs which can lead to seclusion.	Problem of trust among collaborators in business.	

As Table 1 shows, it is clear that in Ghana the most serious obstacle in business transformation to the digital economy is the lack of (stable) Internet connection in the countryside. This is in line with the recent scenario presented by the OECD 2020 regarding the divide of digital accessibility between urban and rural settings:

“Bridging the regional divide in access to fast broadband connections and terminal devices will become increasingly important as households, governments and businesses switch their activities to the digital terrain. [...] A closer look at the access to high-speed broadband reveals a clear urban-rural divide. [...] In order to seize the benefits of digitalisation, access to digital infrastructure needs to be accompanied by the widespread adoption of digital technologies and by minimum digital skills.”

It has to be noted that when investigating the factors from the peripheral scenario through the lenses of smart rural model we can see that unexpectedly factors related to digitalisation are surprisingly in line with each other: The main concern from the regional business development perspective is that the knowledge of new technologies and the starting level of intellectual property among the SMEs present an acute threat to local entrepreneurs. They seldom have excess resources, possibilities, or motivation to cultivate themselves or their business partners with contemporary technological solutions. Also, one challenge that may very well surface in digital environment is the availability of language versions of software or a service. These obstacles can be overcome via up-to-date regional digitalisation projects, informal learning activities such as translation opportunities or user interface workshops, and innovative service design [1]. Demographically, informal learning and grass-root projects have positive transformative power to the region as well as to business clusters.

5. Conclusions and Recommendations

There has been a global focus on leveraging ICT to promote smart city initiatives. While we view this initiative to be essential in achieving sustainable development goals (SDGs), we proposed a shared focus on smartening the rural communities with digital spearheads. To secure accessibility, develop inclusion and help regions reach the full potential of the digital economy strong initiatives must be made [29]. Oftentimes, the mechanisms introduced in strategies by governmental policy and political alliances are slow in producing concrete impact to the regions. Therefore, we argue that to support regional development, experimental projects and locally co-created operations will help strengthen the rural areas; The Smart rural development model SRDM addresses exactly this issue and takes notable strategic relationships also into account. SRDM's 'Digitalisation' and 'Support mechanisms' crosscut the model's governance and human capacity pillars' components. Hence, smart bottom-up development approach, which is created from the needs of local stakeholders and even individual clusters of businesses, creates faster experiences, feedback, and iteration. This is especially important for the SMEs in the rural communities; Relevant research has shown that SMEs still have a natural advantage in business compared to larger companies, as well as in launching innovations in sparsely populated areas [18]. Still, support is needed from the regional policymakers and from operational development experts to promote dynamic efforts, networking, business knowhow and personal development of the entrepreneurs in the countryside. In addition, it must be underlined that connectedness to the outside world from the region produces positive outcomes, both financially (export of goods and services) and via personal interaction (networking, co-designing, informal learning). We propose that SRDM's bottom-up approach offers positive avenues for agile development aspirations towards smarter countryside.

In this visionary paper, we understand the role that the rural communities play in national development, hence we have discussed and developed the SRDM explaining the attributes for implementing smart rural that seek to promote the SMEs activities. We argue that the two cross-cutting key drivers will be transformative to the development of the smart

countryside, its policy, businesses and eventually people's lives - regardless of the actual location. First, we underline the relevance of **increasing the local level of digital business** by: **a) utilising the combination of artificial intelligence (AI) and online business tools**, as this will help to erase the hindrances presented towards the market share, logistic costs and scale of rural SMEs (see e.g. OECD [18]), and **b) harnessing cost-effective mobile tools to empower digital presence**, increase revenue and eventually grow SMEs market share, and **c) learn to utilise Internet of Things (IoT) and the data that this generates**, that may be touted as the fulcrum for the economy 4.0 as well as regional business. This combination is proposed as the first key driver regarding smart rural development. Secondly, to discuss policy driven components also, we see that both horizontal and vertical **strategic support activities are essential for rural projects** because unequal possibilities affect the business development in the countryside. Thus, it must be noted that eligibility to join economic and political alliances vary by country and region. Therefore, we propose that smart development should leverage from both bottom-up actions and top-down support policies.

Depending on a country, regional development companies may also prove positive coordinating local forums for entrepreneurs to elaborate on funding, marketing, or business ICT related solutions. We argue that demographics and cultural traits play an important part in the mechanics of rural development operations. Especially, our previous experience has revealed that informal training of various mobile software, online applications or language skills is needed in rural settings [1]. Local, small-scale informal projects may turn out to be transformative to the SME's e-business knowhow and to the skills of individuals. Bottom-up efforts described in this article may be essentially impactful in certain cohorts, where peer-to-peer support is appreciated.

Key takeaways are both a) co-creation of supporting mechanisms for local businesses to network and innovate, and b) facilitation of the digitalisation efforts via ICT related knowledge transfer to and within the rural communities. SMEs are particularly important in rural regions because they make the vast majority of firms and employment in these regions [18]. SRDm can be understood as a baseline for regional development policy in the digital age within peripheral settings. The key target groups who can especially benefit from our research endeavour are the various strategic development organisations, financing authorities and of course regional stakeholders, policymakers, SMEs, and individuals.

In the future, we intend to evaluate the SRDm in different contexts by interacting with rural SMEs and validate our model to policy use more broadly. This bottom-up approach will be projected towards understanding and experimenting with the interdependencies identified in our model. By doing so we are promoting continuous learning and smarter development initiatives in both geographical settings, the north and global south. Our viewpoint is that both state/government/union driven regional funding programmes, together with locally and contextually co-designed projects help to strengthen the applicability of digital solutions, and hence digital leap in rural settings.

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