

## **THE INNOVATION POTENTIAL OF LIVING-LABS TO STRENGTHEN SMALL AND MEDIUM ENTERPRISES IN REGIONAL AUSTRALIA**

### **Subas P Dhakal**

School of Tourism and Hospitality Management, Southern Cross University  
Bilinga, QLD, 4225, Australia. Email: [subas.dhakal@scu.edu.au](mailto:subas.dhakal@scu.edu.au)

### **Muhammad N Mahmood**

School of Civil Engineering and Surveying, University of Southern Queensland,  
Toowoomba, QLD 4350, Australia. Email: [nateque.mahmood@usq.edu.au](mailto:nateque.mahmood@usq.edu.au)

### **Anna Wiewora**

QUT Business School, Queensland University of Technology, Brisbane, QLD  
4000, Australia. Email: [a.wiewora@qut.edu.au](mailto:a.wiewora@qut.edu.au)

### **Kerry Brown**

Centre for Tourism, Leisure and Work, Southern Cross University, Bilinga,  
QLD, 4225, Australia. Email: [kerry.brown@scu.edu.au](mailto:kerry.brown@scu.edu.au)

### **Robyn Keast**

SCU Business School, Southern Cross University, Bilinga, QLD, 4225,  
Australia. Email: [robyn.keast@scu.edu.au](mailto:robyn.keast@scu.edu.au)

**ABSTRACT:** The small and medium enterprise (SME) sector has been the major source of well-being and employment opportunities in regional Australia. Consequently, fostering the innovative capacity of SMEs in regions that are struggling to grow their economies and distribute the growth fairly while not degrading the environment has never been more important. While SMEs generally face more uncertainties in relation to resources (e.g. financial, human and social capital) when compared to larger businesses, collaborative, cutting-edge mechanisms to enhance innovation capabilities of regional SMEs are lacking. This paper responds to this gap and proposes a Living Laboratory – an open, multi-disciplinary and multi-stakeholder action research platform where innovations can be co-created, tested and evaluated in the every-day environment of SMEs – as a way to strengthen the SME sector in regional Australia.

**KEY WORDS:** Information and Communication Technologies, Innovation Policy, Living-Lab, Regional Sustainable Development, Small and Medium Enterprises, Social Capital

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## **1. INTRODUCTION**

According to the recent State of the Regions Report, regional Australia is no longer converging towards equality in terms of income, labour utilisation rates and economic prosperity, but is rapidly diverging (Australian Local Government Association, 2011). As a result, there is pressure for concerted efforts from government agencies, businesses and community stakeholders to deliver quality of life and opportunity to regions (defined here as non-capital cities) at parity with that experienced in capital cities. It is often argued that the small and medium enterprise (SME) sector has been the major source of regional well-being and employment opportunities in Australia (Keniry *et al.*, 2003; Australian Bureau of Statistics, 2012). As innovation is a key platform to strengthen the SME sector (Asheim *et al.*, 2011), fostering the innovative capacity of SMEs in regional Australia that are grappling with the economic, environmental and social challenges associated with the 'two-speed' economy is likely to make the sector more resilient in the long run. However, compared to larger businesses, SMEs generally experience greater barriers to innovation, and face more uncertainties in relation to resources, such as financial, human and social capital (Tödting and Kaufmann, 2001). More importantly, there is a lack of access to cutting-

edge mechanisms to enhance the innovation capabilities of regional SMEs.

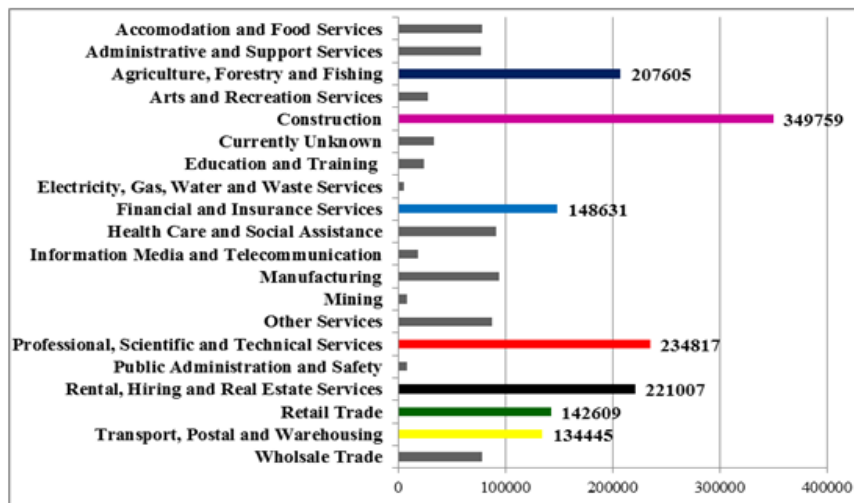
This paper responds to this gap and proposes the Living Laboratory (Living-Lab) – an open, multi-disciplinary and multi-stakeholder collaborative action research platform – as an approach to strengthen SMEs in regional Australia. While not exclusively focused on technology, the Living-Lab is an arena in which information and communications technology (ICT) mediated innovations can be co-created, tested and evaluated in the every-day environment of SMEs and their relevant stakeholders. The paper begins with a brief overview of the SME sector in Australia. Following this, the concept of Living-Lab is introduced and its utility for the SME sector is discussed. The paper concludes that the Living-Lab approach has the potential to enable the innovative capacity of SMEs and therefore present a policy framework for fostering regional sustainable development.

## **2. SMALL AND MEDIUM ENTERPRISE (SME) SECTOR**

There is no universally agreed definition of SMEs and the nature of SMEs varies from family enterprises (i.e. owned within the family) to lifestyle businesses (i.e. independent with little aspiration to grow into large enterprises). The Australian Bureau of Statistics (2002) categorises enterprises that employ 5 or more but less than 20 people as ‘small’ and those that employ 20 or more but less than 200 people as ‘medium’. Based on this premise, businesses that employ between 5 and 199 people are considered to be SMEs for the purpose of this paper.

SMEs have become an integral part of Australia’s socioeconomic fabric. There are over two million SMEs across 20 different industry sectors (Figure 1), ranging from accommodation and food services to wholesale trade (Australian Bureau of Statistics, 2002). In terms of aggregate numbers, SMEs made up 99.7% of businesses actively trading in Australia and provided 70.5% of the total private sector employment in 2009–10 or nearly 4.8 million people. Nearly one-third (32.4%) of these enterprises operate in regional areas (Department of Innovation, Industry, Science and Research, 2011). However, beyond the headlines of carbon tax, minimum wage increases and growing utility charges (The Chamber of Commerce and Industry Queensland, 2012), SMEs in regional areas are grappling with two major challenges. First, the long-running shift away from manufacturing towards service industries and the inability of regions to capitalise on alternative opportunities presented by globalisation is alarming (Agarwal and Green, 2011; Gray and Lawrence,

2001). Second, when compared to counterparts in countries of the Organisation for Economic Cooperation and Development, Australian SMEs are less likely to engage in an innovative capacity and more likely to invest in hardware but not software/intangibles (Department of Industry, Innovation, Science and Research, 2011).



Source: Australian Bureau of Statistics, (2012).

**Figure 1.** SMEs by Sector at the End of the 2007-08 Financial Year.

Recent indicators also suggest that the SME sector as a growth-engine might have stalled – a fact masked by rising terms of trade (Agarwal and Green, 2011). For example, court liquidations of SMEs rose by 7.7% and voluntary liquidations were up by 10.1% in the 2011 fiscal year when compared to 2010 (KordaMentha, 2011). In addition to the challenges relating to access to investment capital and management of cash flow (CPA Australia, 2012), SMEs are also not harnessing opportunities associated with collaborative arrangements (Spence and Schmidpeter, 2003; Johnston and Merdji, 2006). Having greater access to research and development resources, bigger businesses are more likely to be innovative than SMEs in Australia (Roos *et al.*, 2005). Overcoming these deficiencies necessitates a cutting-edge approach to innovation by exploiting the potential of ICT in order to foster social capital i.e. stakeholder relationships (Chung and Tibben, 2006; Wiesner *et al.*, 2007; Australian Communication and Media Authority, 2008).

The Australian Department of Innovation, Industry, Science and Research (2011) views the innovation process as being about people: the knowledge, technology, infrastructure and cultures they have created or learned; with whom they work; and the new ideas with which they are experimenting. Social capital, particularly collaboration and networking amongst stakeholders representing all three sectors – public, private and third sector organisations – is argued to be key to the innovative process (Bougrain and Haudeville, 2002; Sawang and Matthews, 2010). It is in this context that the cluster perspective has gained currency for strengthening the innovative capacity of the SME sector (Organisation for Economic Cooperation and Development, 2011).

### 3. CLUSTERS AND INNOVATION

Porter (1998) describes a cluster as ‘a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities’ (p. 4). However, clusters are defined not simply by their elements – the business and workers that comprise them – but by the connections among the enterprises that form them (Rosenfield, 1997). Clusters arise because enterprises are motivated to locate near each other to take advantage of external factors such as reduced transaction costs or government incentives. Inspired by the SME cluster-based economic growth of regions such as Third Italy (Asheim, 2000) and Silicon Valley (Fountain, 1998), countries around the world have been seeking to duplicate cluster success despite a certain level of cluster fatigue in academic and policy arenas (Martin and Sunley, 2003). Motoyama (2008) argued that the collaborative as well as competitive natures of SME clusters foster regional growth by: a) increasing productivity, b) driving the direction and pace of innovation, and c) stimulating the formation of new enterprises. This is consistent with Porter (2000) and Brown *et al.* (2010) who highlighted the role of intangible assets, such as building and maintaining network ties within a cluster of SMEs and their stakeholders, as necessary ingredients of innovative SMEs.

Innovation comprises two parts, a) generation of an idea or invention, and b) the conversion of that invention into useful applications. Roberts (2007) equates innovation with the harnessing of a discovery: Innovation = Invention + Exploitation (p. 36). However, innovation occurs only when actors within a cluster interact and collaborate with each other. As the innovation route involves the generation or adoption and application or adaptation of new products, processes or systems by organisations, it

follows that the capacity of SME clusters to derive benefits from innovation will be affected by the factors impacting upon these innovation processes. Nurturing higher levels of social capital through collaboration and networking and trust-based culture and knowledge-sharing ultimately results in innovative capacity and SME success (Zeleny, 2001). The increasing ubiquity of ICT in the business environment means that SME clusters are no longer confined by place (Porter, 2000), and instead are increasingly becoming virtual (Malakauskite and Navickas, 2009). While ICT-enabled innovation has the potential to deliver a competitive edge by networking SMEs and their stakeholders, Roberts (2007) found that the dynamics of this process are complex, involving the effective integration of stakeholders, organisational processes and extensive project planning.

Exploring ICT-mediated mechanisms through which regional SME clusters exchange information, foster innovation and influence capital flows can reveal useful information for policymakers and regional development bodies. However, it is argued that as each region's challenges and capacities are different, the enhancement of the collective innovation capabilities of SME clusters is hindered by a lack of tailor-made cutting-edge mechanisms relevant to individual regions. This paper responds to this gap, proposing a Living-Lab approach as a mechanism to strengthen the SME sector in regional Australia.

#### **4. LIVING LABORATORY (Living-Lab)**

A Living-Lab is relatively a new concept, and while the concept has gained acceptance overseas e.g. in Europe in the context of SME clusters (Konsti-Laakso *et al.* 2012), it remains overlooked in Australia. For these reasons, this section traces the origins of the concept, describes multiple meanings associated with it, and adopts a working definition for the purpose of this paper.

Living-Lab was first conceptualised during the nineties when the potential benefits of engaging users during the development phase of technological applications were realised by American researchers. William J. Mitchell, a Professor at the Massachusetts Institute of Technology often credited for inventing the term, saw value in doing research *in vivo* instead of *in vitro* settings e.g. monitoring and evaluation of the living patterns of smart home residents (Bergvall-Kåreborn *et al.*, 2009). Contemplating the innovation potential of Living-Labs, European countries were amongst the first to embrace the concept in order to

promote innovation on a societal basis and bolster growth in struggling regional areas by promoting creative industry clusters as a part of the 'Lisbon Strategy' (Følstad, 2008). However, despite its promise, the concept is argued to be an ambiguous one with multiple meanings in differing contexts.

According to Dutilleul *et al.* (2010), the concept of Living-Lab is associated with at least five of the following distinct meanings:

1. Innovation system consisting of organised and structured multi-disciplinary networks fostering interactions and collaborations amongst various actors;
2. Real world monitoring of a living social setting generally involving experimentation of new technological advances;
3. A business approach for involving potential users in the product development process;
4. Organisations facilitating the network, maintaining and developing its technological infrastructure and offering relevant services; and
5. Eponymous European movement (p. 64)

The common thread amongst these multiple meanings is the ICT-mediated relationships of various types of actors within network clusters. However, the 'Europe-centric' connotation is perhaps one of the reasons why the concept has struggled to gain currency outside Europe e.g. in Australia. Nonetheless, the basic idea behind Living-Labs is that, users of the technological innovations have the opportunity to be engaged in co-creation of innovation processes instead of being mere recipients of the outcomes of innovations (Eriksson, 2006). Consequently, the concept can be construed as multi-disciplinary and multi-stakeholder *in situ* space where innovations can be tried and tested in the every-day environment of users (see Third *et al.*, 2011).

Users can represent public and private sectors and civil society stakeholders (e.g. SMEs, state agencies, universities, institutes and individuals), and engaged in needs-based cooperation, coordination or collaboration through the use of ICT e.g. Web 2.0. Living-Labs are therefore a fertile ground for innovation where the needs of a particular 'community of practice' (Wenger *et al.*, 2002) intersect with the purpose that closely aligns with the field of 'social and community informatics', in that ICT-mediated social capital must be harnessed to empower various actors for regional sustainable development (Gurstein, 2007; Dhakal, 2009; Dhakal, 2010; Dhakal, 2011).

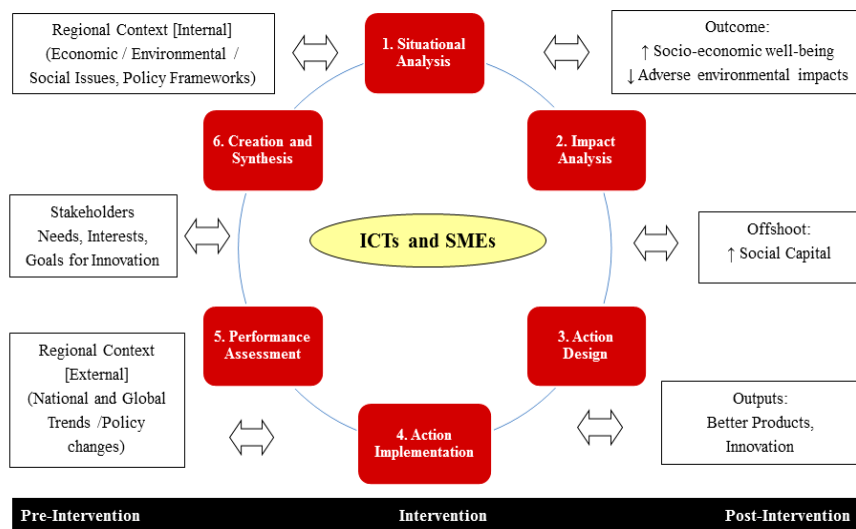
A key to the innovative process is the operating platform that optimises collaboration and networking opportunities (Bougrain and Haudeville, 2002; Sawang and Matthews, 2010) amongst SME clusters and their stakeholders. Drawing on Schumacher and Feurstein (2006), for the purpose of this paper, we interpret Living-Lab as “an open, multi-disciplinary and multi-stakeholder action research platform where innovations can be co-created, tested and evaluated in the every-day environment of SMEs”. This interpretation envisages Living-Lab as a collaborative space with the potential to effectively distribute problem-solving tools, capacity and responsibility to end-users with local knowledge to develop appropriate, sustainable innovations tailored to regions (European Communities, 2009; van der Valt *et al.*, 2009). These end-users are implicated and embedded in the innovation process – not just as recipients of innovated products but as contributors to and leaders of innovation (von Hippel, 1986).

This paper considers the potential of ICT to be a driver of equity – relative to the metropolitan areas – for the regions. The significance of this proposition applies not so much to innovation in the sense of high performing new products, but in the contextual understanding of the circumstances in which regional stakeholder(s) utilise ICTs. This approach may necessitate new models of policy support, collaborative enterprise (social enterprise, social ventures and social innovation) and ICT-enabled new business and social engagement models that leverage assets across private, public and not-for-profit sectors. For instance, Bamberry (2006) found that the innovative capacity of SMEs in regional Victoria was influenced by collaborative arrangements with stakeholders, both internal and external to the enterprise. This paper therefore proposes a structured framework in order to better understand the processes and socioeconomic dynamics which lead to the initiation and subsequent management of Living-Labs as a platform for fostering innovation amongst regional SMEs.

The starting point for this framework is to understand and utilise appropriate research paradigms for successful research design and its implementation. Living-Labs present opportunities for regions to utilise action research in order to take advantage of emerging technologies, particularly new ICT, in an increasingly networked society (Castells, 2000). Action research is a method whereby the research process seeks to describe, interpret and explain existing and emerging phenomenon whilst desiring to change them for the greater good of society (Avison *et al.*, 1999). It is also an ideal research method for assessing ICT-enabled



innovation, as the primary aim of action research is to combine intervention in real-world settings with theoretical enhancement. The principles of action research as described by Creswell (2005) match with the principles of Living-Labs (Bergvall-Kåreborn *et al.*, 2009) in that both emphasise: a) building trust and agreeing on joint goals amongst stakeholders, and b) identifying, intervening and resolving problems and needs of the real world. This accord has methodological implications in the way Living-Labs are conceived and managed.



Source: the Authors

**Figure 2.** A Living-Lab Approach for SMEs.

The ontological stance of a Living-Lab approach as an action research platform assumes that SME clusters and their stakeholders are willing to be an integral part of the innovation process. The process itself can be viewed as three distinct phases: pre-intervention, intervention and post-intervention (Figure 2). The pre-intervention phase feeds on the operating environment of SMEs, particularly in terms of the needs, interests and goals of the stakeholders. The intervention phase itself comprises six stages of Continuous Improvement and Innovation (CI&I) processes (Clark *et al.*, 2009) namely: i) situational analysis, ii) impact analysis, iii) action design, iv) action implementation, v) performance assessment, and

vi) creation and synthesis. The post-intervention phase evaluates the Living-Lab by assessing its outputs, outcomes and offshoots.

The intervention phase of CI&I enables the conception, management and actual innovation within a Living-Lab with a constant feedback loop from the stakeholders (Timms and Clark, 2007). The six stages of the intervention phase are described below.

### ***Stage 1 – Situational Analysis***

This is the most important step of the innovation process. It draws on the local, regional, national and global context, assessing the actual need for innovation as well as garnering stakeholders' commitment. The purpose and the scope of the intervention phase are agreed upon by all stakeholders of SME clusters at this stage.

### ***Stage 2 – Impact Analysis***

Stakeholders need to develop a clear vision of the innovation process and the likely impact at the end of the intervention. Impact analysis enables stakeholders to gain a collective understanding of the investment in innovation and its subsequent returns.

### ***Stage 3 – Action Design***

This stage draws on the assessment of the pre-intervention situation, for example a survey or other means of data collection, in order to shape the planning and design of appropriate actions plans.

### ***Stage 4 – Action Implementation***

At this stage, performance indicators are agreed upon by relevant stakeholders in order to implement, monitor and evaluate the intervention progress. A continuous feedback loop based on these indicators determines the way action plans are implemented and progress is made.

### ***Stage 5 – Performance Assessment***

This stage involves action on the monitoring and evaluation of the intervention progress. Consequently, continuous modifications and adjustments are incorporated as stakeholders discover what works and

what doesn't work. This involves using techniques such as the Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis.

### ***Stage 6 – Creation and Synthesis***

This is the last stage of intervention which involves systematic review and stakeholder consensus regarding the future course of actions. This is also a transition between the completion of one task and the beginning of another.

The primary purpose of any Living-Lab should be the development of integrated ICT-based tools for enabling innovation within SME clusters in terms of enterprise management, innovative service delivery and investment in infrastructure. Applying this three-phased approach to the Living-Lab framework has the potential to engage local stakeholders in fostering collaboration and generating knowledge and tools to co-create communities of interest capable of developing the innovative capacity of SMEs in regional Australia. In addition, the approach has the potential to allow for co-creating, prototyping, validating and refining ways to overcome challenges of the regional SME clusters in a medium- to long-term timeframe (van der Valt *et al.*, 2009).

An analysis of two Living-Lab case studies, one situated in South Africa and the other located in Hungary, is used here to illustrate the potential of the Living-Lab method to improve SME performance. These cases highlight the improvements in business approaches achieved by creating a collaborative environment amongst users in the mix. In each case, an institutional actor – a research centre (South Africa) and a university (Hungary) – was the locus of the Living-Lab and provided the supporting infrastructure. Each intervention site was focused on SMEs and sought to address a specific problem in the SME setting. ICT-mediated collaboration was based on a global information system (GIS) based interface and Internet/SMS-based information sharing.

Comparison of the two Living-Labs (Table 1) indicates that it is not the nature of ICT itself but the context of ICT adoption and utilisation that matters the most in fostering the innovative capacity of SMEs. The outputs suggest that ICT solutions can be better tailored to local conditions using local expertise and user-initiated and -tested ICT solutions.

**Table 1.** Comparison of Objectives, Methods and Outputs of Two Living-Labs.

	SEKHUKHUNE Living-Lab (South Africa)	HOMOKHÁTI Living-Lab (Hungary)
<i>Catalyst Institution</i>	CSIR/Meraka Institute	University of Szeged
<i>Objective</i>	To create an impact on operational excellence of SMEs	To build sustainable Farm-Market Linkages for SMEs
<i>Focus</i>	Incubation mechanisms to support retail-based SMEs losing customers because of fewer products at higher price	Information management to support farm-based SMEs struggling to make the optimum economic returns
<i>Methodological Approach</i>	Action Research/Software Development	Action Research/Open Business Model
<i>Outputs</i>	GIS-based User Interface with functionalities of customer registration, order tracking and processing, and business analytics  Enhanced Enterprise Resource Planning and Customer Relationship Management	Web- and SMS-based collaboration amongst producer association (mediator), SMEs (producer) and supermarkets (consumer)  Improved business opportunities by shifting from current local call-centre based transactions
<i>Source</i>	Merz <i>et al.</i> (2010)	Bilicki <i>et al.</i> (2010)

## 5. CONCLUDING REMARKS

This paper began by highlighting the significance of the SME sector in Australia. As SMEs achieve greater prominence, not only for creating economic growth but also for promoting socio-environmental causes (Sawyer and Evans, 2010; Murat *et al.*, 2012), enterprises with limited innovative capacity (Chung and Tibben, 2006) adversely affect a region's competitive advantage (Burgelman *et al.*, 2004). Regions provide the building blocks for national economic performance, hence it is argued that a regional approach to improving the innovative capacity of SMEs can deliver overall national benefits. Planning for regional sustainable development should therefore focus on tangible mechanisms to foster

innovation capabilities, increase entrepreneurial acuity and enhance the capacity for regional growth (Nauwelaers and Wintjes, 2003).

The purpose of this paper was to introduce the Living-Lab approach as an emerging framework for exploring a key element for improving the performance of SME clusters – the potential of ICT-mediated innovation amongst SMEs. The concept of Living-Lab has two simple but profound implications in regards to cluster proposition. First, geographical proximity of SMEs and their stakeholders linked by commonalities and complementarities is necessary but insufficient for driving innovation in clusters. Second, it is important to not only identify innovation as an aspiration but also operationalise processes and mechanisms that facilitate innovation in clusters. By outlining practice-based processes as a way to foster collaboration and interactions amongst SMEs and their stakeholders (either geographical or virtual); this paper made a case for the utility of Living-Labs as a policy tool to strengthen the SME sector in regional Australia.

There is considerable diversity across regional Australia e.g. between declining and growing regions, leading to variances in levels of service provision and in the local impacts of external shocks and changing policy environments. If the aim of regional innovation strategies is to ensure that the SME sector plays a central role in Australia's continuing prosperity, the policy-making itself should be innovative (Head, 2011) and conducive to the processes that foster innovation. As Eriksson *et al.* (2006) and Følstad (2008) suggest, Living-Labs allow the incorporation of contextual differences and provide a structural intervention platform in order to strengthen the innovative capacity of SMEs at the regional scale. The paper recommends; a) setting up Living-Labs in growing as well as declining regions under the existing and future institutional arrangements e.g. government-university partnerships in research and development, and b) building empirical case studies about how SMEs and their stakeholders can be mobilised to construct evidence-based advantage for localities and regions by seeding innovation.

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