

Research Report

Entrepreneurial Universities Engagement and Collaboration with Rural Communities

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1. Non-technical abstract

Entrepreneurial universities have expanded their mission focus beyond teaching and research to encompass technology and knowledge transfer. This also has meant that entrepreneurial universities have changed their organisational structures and culture to support technology and knowledge transfer activities. The challenge for entrepreneurial universities is how best to engage and collaborate with rural businesses and communities across all missions particularly in relation to technology and knowledge transfer.

We reviewed existing research and through our analysis identified three main themes namely, 1) *rural entrepreneurs and entrepreneurship*, 2) *challenges*, and 3) *technology transfer, knowledge management and exchange*. We asked a panel of experts nationally and internationally to identify main barriers, enablers and motivations for successful entrepreneurial universities' collaboration with rural communities. Through illustrative practice case examples we highlighted the variety of approaches that entrepreneurial universities have adopted. To overcome some of the challenges identified in entrepreneurial universities and rural engagement we developed the *NICRE RUEI Toolkit* that can be used to support the development of any type of university-based collaborations by any stakeholder. We provide practical recommendations for entrepreneurial universities, rural communities and policy makers.

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3. Non-technical executive summary

Entrepreneurial universities are institutions that along with their research and teaching missions seek to translate and transfer their knowledge and expertise to yield economic and societal benefits. Our study aimed to understand how entrepreneurial universities and rural communities engage in fostering and supporting innovation and entrepreneurship. We conducted a systematic literature review, undertook a Delphi study and reviewed some illustrative practice case studies.

Based on a systematic literature review we identified three main themes namely:

- Rural Entrepreneurs and Entrepreneurship
- Challenges
- Technology Transfer, Knowledge Management and Exchange

For our Delphi study we focused on these themes to identify barriers, enablers and key motivations for entrepreneurial university engagement and collaborations with rural communities – both with individual enterprises and broader communities. The main barriers identified by our Delphi panel for successful entrepreneurial university engagement and collaboration with rural enterprises and communities include:

- Lack of trust, alignment and mutual understanding concerning expectations and priorities
- Lack of support, expertise and skills to facilitate engagement and collaboration among stakeholders
- Differences between university knowledge and the needs of rural enterprises and communities
- Complicated and bureaucratic technology and knowledge transfer policies and processes
- Lack of general knowledge of technology transfer supports and expertise
- Lack of human capital to support collaborations.

Our Delphi panel members identified an array of critical enabling factors that support successful entrepreneurial university engagement and collaboration with rural communities These include:

- Organisation structure and research capacity
- Development and delivery of degree programmes that include student internships, visits and applied projects
- Targeted and tailored events for rural enterprises and communities

- Planning joint initiatives to develop creative methods with rural enterprises and communities
- Establishing and strengthening of trust and strong social connections
- Support from the technology transfer office and technology transfer executives
- Government incentives and supports
- Support from development agencies and public research councils

Our Delphi panel identified six main motivating factors for entrepreneurial university engagement and collaboration with rural enterprises and communities:

- Commercial opportunities
- Social entrepreneurship and innovation opportunities
- Potential impact on rural focused public policies
- Problem-solving opportunities
- Access to in-kind resources
- Learning opportunities

To address some of our study's challenges and insights, we designed and developed the *NICRE RUEI Toolkit for University Collaborations with Rural Enterprises and Communities*. Its purpose is to provide a practical approach and support for actors who want to pursue such collaborations and engagements with entrepreneurial universities or for entrepreneurial university to develop engagement with rural communities and enterprise. The NICRE RUEI (rural, entrepreneurial university interaction) Toolkit for University Collaborations with Rural Enterprises and Communities has been designed so that it can be applied to any form and type of university-based collaboration by any stakeholder. It follows eight steps as outlined below.

NICRE RUEI Toolkit University Collaborations with Rural Enterprises and Communities

- | |
|---|
| Step 1: Identifying your needs |
| Step 2: Requirements |
| Step 3: Outcomes |
| Step 4: Enabler and Barriers |
| Step 5: Collaboration Mechanisms |
| Step 6: Resource Requirements |
| Step 7: Action Plan Key tasks, timelines and key resource |
| Step 8: Critical Risks |

Overall Key Recommendations

For entrepreneurial universities there is a need for:

- Core institutional missions and strategies that acknowledge the value and importance of engagement and indicates their commitment to rural communities.
- Structures and organisational architecture across all missions aligned with rural communities' current and future unmet needs
- Relational engagement and co-creation models are designed to develop and build trust over the long term.

For rural communities there is a need to:

- Identify current knowledge and technology needs at the individual firm and at community level. This may be incorporated into an overall community resilience need mapping.
- Collaborate and engage with entrepreneurial universities in their region and beyond.
- Develop collaborative skills and build their absorptive capacity.

For policymakers this a need for a: Multi-annual capacity building programme to support

- Firm-level innovation in rural areas.
- Entrepreneurial university technology and knowledge transfer activities with rural areas.
- Entrepreneurial university supported entrepreneurship and entrepreneurial skills in rural areas.

4. Introduction and background

4.1 Entrepreneurial Universities

There is a paucity of research attention and focus on how entrepreneurial universities engage, support and collaborate with rural communities (see Tocco et al., 2025; Conlé et al., 2023). The missions of universities have expanded beyond the traditional ones of teaching and research to include technology and knowledge transfer. This mission expansion has been described as the 'third mission' of universities (Abreu, 2016; Cunningham et al., 2017; Marzocchi et al., 2019). This mission purpose and scope is focused on exploiting research and knowledge from universities through different technology and knowledge management mechanisms that can have economic and social benefits. Entrepreneurial universities as Cerver Romero et al. note (2021: 1175): "... are those that aim to maximise the potential of commercializing their knowledge while creating value for society." Entrepreneurial universities have some formal institutional level mechanisms for technology and knowledge transfer that support intellectual property protection technology licensing, start-ups, material transfer agreements, spin-ins, consulting etc.

Drivers of Mission Expansion

Drivers such as competition, the economic imperative, changes in academic work practices and human capital development have influenced the mission expansion of entrepreneurial universities (see Cunningham and Miller, 2021). This has resulted in changes to the culture and structure of entrepreneurial universities and the business models that supports technology and knowledge transfer (Miller et al., 2021). To develop their third mission (technology and knowledge transfer), entrepreneurial universities must fully develop an entrepreneurial culture, supportive organisational environment and dynamic capabilities (see Guerrero and Urbano, 2012; Guerrero and Menter, 2024; O'Reilly et al., 2019). Moreover, evolving societal and economic contexts influence how entrepreneurial universities pursue this mission, whereby they proactively lead and instigate stakeholder collaborations – industry, government and non-governmental organisations, - and become a driver for innovation and entrepreneurship (see Guerrero et al., 2016).

The contextual dimensions of entrepreneurial universities have been acknowledged in previous research (see Urbano and Guerrero, 2013; Guerrero et al., 2014). In particular, Audretsch (2014:314) notes that the: "...role of the university in the entrepreneurial society is considerably broader and more extensive..." At a micro level it requires individual members of entrepreneurial university communities to engage with society and how their activities contribute to benefiting society (see Klofsten et al., 2019). In essence, as Etzkowitz (2017:123) notes, it requires that entrepreneurial universities are: "open and

serve external society." More recently there has been widening of the empirical focus to consider societal dimensions and impacts (see Guerrero and Lira, 2023) beyond the economic impacts such as job creation (see Etzkowitz, 2004; 2014). For example, Menter (2024) argues for the need for a mission re-orientation of entrepreneurial universities that reflects social innovation given societal drivers focused on grand and societal challenges. This is reflected in the notion of 'the engaged university' (see Breznitz and Feldman, 2012; Whitmer et al., 2010; Benneworth, 2021) where there is a predominant focus on university engagement with society and vice a versa and the positive impact that engaged universities can have in realising social innovation for communities (Burke et al., 2024).

Against this background, the challenge for entrepreneurial universities at a strategic institutional level is how best to balance economic and societal considerations. This means how at an organisational level and through institutional policies do entrepreneurial universities formally support technology, knowledge transfer and other forms of engagement with external stakeholders -local, regional, national and international.

4.2 Entrepreneurial University and Engagement

Entrepreneurial universities have developed different internal organisational units to support industry and society engagement and collaboration for technology and knowledge transfer exploitation purposes. The creation and development of these internal organisational units can be ad hoc and responsive to the needs of internal and external stakeholders at a particular point in time. They represent tangible evidence of the entrepreneurial universities commitment to supporting technology and knowledge transfer (see Nelles and Vorley, 2010). There are units that focus on different stages of entrepreneurship that form the entrepreneurial architecture of entrepreneurial universities (see Figure 1) (Nelles and Vorley, 2011) (Cunningham et al., 2023). The unit configurations of this architecture are contextually dependent and can vary (see Martin et al., 2019). Some entrepreneurial universities have organisational units across all the stages of entrepreneurship while others might only have a focus on the exploration on technology and knowledge transfer.

Different collaborative arrangements are emerging between entrepreneurial universities, industry, policymakers and non-governmental organisations to pursue grand challenges for example focusing on health and environmental (Cunningham and Miller, 2021) and place-based innovation and entrepreneurship. These can involve large scale research infrastructure (see Rådberg and Löfsten, 2024), cross sectoral collaboration arrangements (see Mok and Jiang, 2020), and co-operative research centres (Dolan et al., 2019).

The challenge for entrepreneurial universities is how best to engage with rural business and communities in a way that aligns local needs with the university's resources, capabilities and expertise (see Charles, 2016). Similarly, the challenge for rural businesses

and communities is to identify how best, collectively and individually, to develop sustainable engagements with entrepreneurial universities and to accrue the resultant benefits of such collaborations.

Figure 1: The Organisational Architecture of Entrepreneurial Universities

STAGES OF ENTREPRENEURSHIP			EXPLORATION		EXPLOITATION	
			Latent	Emergent	Launch	Growth
MOTIVATIONS AND NEEDS <i>(Illustrative)</i>			<ul style="list-style-type: none"> Exploring entrepreneurial opportunities and potential Self-Employment Raising awareness 	<ul style="list-style-type: none"> Undertaking gestation activities to attempt to create a new venture Necessity- or opportunity-driven 	<ul style="list-style-type: none"> Assembling resources, team and networks Go to market Intellectual property protection 	<ul style="list-style-type: none"> Sustaining market viability Exploring further entrepreneurial opportunities
ACTIVITIES AND SUPPORTS <i>(Illustrative)</i>			<ul style="list-style-type: none"> Entrepreneurship education (tailored) and familiarization Orientation programs 	<ul style="list-style-type: none"> Market validation Business model development Financial planning (Business case) 	<ul style="list-style-type: none"> IP agreements Securing seed/angel funding Recruiting talent Market testing Brokerage 	<ul style="list-style-type: none"> Secondary funding Networking events Expanding networks – alumni Brokerage
ENTREPRENEURIAL ARCHITECTURE ORGANIZATIONAL UNITS	Exclusiveness on Exploration Stages	ENTREPRENEURSHIP RESEARCH CENTER	←	→		
		ENTREPRENEURSHIP CENTER	←	→		
	Selectiveness on Exploration and Exploitation Stages	COOPERATIVE RESEARCH CENTER	←		→	
		PROOF-OF-CONCEPT CENTER		←	→	
		INCUBATOR	←		→	
		ACCELERATOR		←		→
	Overarching focus on all Exploration and Exploitation Stages	TECHNOLOGY TRANSFER OFFICE	←			→
		SCIENCE PARKS	←			→

Source: Cunningham, J. A., Lehmann, E. E., & Menter, M. (2022). The organizational architecture of entrepreneurial universities across the stages of entrepreneurship: a conceptual framework. *Small Business Economics*, 59(1), 11-27. Available at link.springer.com/article/10.1007/s11187-021-513-5

4.3 Benefits, Enablers and Barriers of Entrepreneurial University Collaborations and Engagement

There is a growing corpus of empirical research that demonstrates the impact of collaborations and engagement between universities and industry (Perkmann and Walsh, 2009, Bramford et al., 2024; D'Este and Patel, 2007) and the barriers (Rossoni et al., 2024). Studies have demonstrated the positive economic impact of the combined three missions of entrepreneurial universities (Guerrero et al., 2015; Urbano and Guerrero, 2013; Guerrero et al., 2016).

Benefits

There is an array of benefits associated with university-industry collaborations (see Soh and Subramanian, 2014; Belini et al., 2019). For industry, collaborations with universities

open up new networks (see Guan and Zhao, 2013), enhance R&D expenditure and employment (Scandura, 2016; Sheehan and Wyckoff, 2003) They increase the likelihood of research commercialisation (Link and Ruhm, 2009), opens up access to new knowledge, resources and infrastructure (Lee, 2000), new innovations and technological scope (Anhrah and Omar, 2015; Petruzzelli, 2011). When it comes to university-industry collaborations focused on innovation, Østergaard and Drejer (2022) found that R&D capabilities and social capital were enabling factors for 'persistent collaborations'. Furthermore, university-industry collaboration contributes to supporting the competitiveness and the economic performance of firms (see Jacob et al., 2000; Tseng et al., 2020).

For universities, collaborative benefits include financial – grants and new revenue - access to technological resources and equipment, advances in knowledge creation and reputation (Autio et al. 1996). Universities can create, test and receive feedback on new ideas. They also strengthen student recruitment, enhance and expand subject areas, as well as support the employability prospects of students (see Fernandes and O'Sullivan, 2021). Collaborations can enhance the universities' ability to commercialise research (see Priigge, 2005).

Enablers

There is also a significant corpus of empirical studies that have examined how different factors contribute to stimulating and facilitating university-industry collaboration focused on technology and knowledge transfer (O'Dwyer et al., 2023; Sjöo and Hellström, 2019; Tootell et al., 2021; Cudie et al., 2022). These include macro, meso (at the university) and micro level (the individual) factors (see Table 1). Depending on the evolution of an entrepreneurial university and their context, some enablers will be stronger drivers in stimulating collaborations.

Table 1: Some Enabling Factors of University Industry Collaborations – Technology and Knowledge Transfer

Marco Level Factors
Levels of business investment in R&D in a region Industrial cluster proximity to universities Public development agencies Government support – national and regional
Meso Level Factors
Research tradition Institutional strategy, mission and objectives Executive level leadership and commitment Technology transfer office quality and reputation Scope of technology and knowledge transfer activities Institutional policies Researcher involvement Teaching and research mission synergies Trust – within universities between researchers and technology transfer professionals
Micro Level Factors
Dedicated time Prior commercial/industry experience Commercial acumen Technology and knowledge transfer know-how and experience Social capital Established networks – academic and industry Proximity to stakeholders

Source: Adapted from Cunningham, J., & Harney, B. (2006). *Strategic Management of Technology Transfer: The New Challenge on Campus*. Oak Tree Press.; Cunningham J., Harney, B and Fitzgerald, C. (2021). *Effective technology transfer offices: A business model framework*. Springer International Publishing; Cunningham, J. A. (2015). Technology Transfer from Universities. In *Concise Guide to Entrepreneurship, Technology and Innovation* (pp. 206-209). Edward Elgar Publishing Limited.

Barriers

Previous studies on university-industry collaborations have identified different barriers that constrain effective and sustainable collaborations (see Rossoni et al., 2024; Bruneel et al., 2010). Some barriers identified include: perceived and actual conflicts of interest; complicated university based technology and knowledge transfer processes and policies; overvaluations of intellectual property; lack of trust between collaborators; lack of support for SME based technology transfer; tensions between technology transfer and scientific production; lack of technology transfer expertise, know-how and support geographical distance; and cultural and alignment differences between stakeholders (see Cunningham



and Harney, 2006; Evers et al., 2014; D'Este et al., 2012; Nsanzumuhire and Groot, 2020; O'Dwyer et al., 2023).

5. Research design and methodology

To address the overall project aims a multi-method approach was used involving three phases.

Phase 1: A systematic literature review (SLR) considering how entrepreneurial universities engage and collaborate with rural communities to foster and support innovation and entrepreneurship. (see Appendix 1 for protocol used for the SLR)

Phase 2: Delphi Study

Given the paucity of research that specifically addresses entrepreneurial university engagement and collaboration with rural communities a Delphi Study was undertaken in February 2024. We invited fifteen panel members nationally and internationally who have expertise, experience and knowledge of collaborating with rural communities with nine participating. Informed by the literature review, the Delphi study was designed to focus on three main themes namely;

- 1) Barriers for effective engagement and collaborations
- 2) Enablers - antecedent factors that contribute to effective engagement and collaboration
- 3) Motivations for engagement and collaborations

Drawing on some of the factors that have been identified in general studies of university industry collaboration (see Appendix 5) we developed 45 questions to address each of these themes (see Appendix 6). For each factor Delphi panel members were asked to rate each factor in terms of being critical or not critical for effective engagement and collaborations.

Phase 3 Illustrative Practice Case Studies: Arising from Phases 1 and 2 some international practice case studies were identified on how entrepreneurial universities engage and collaborate effectively with rural communities in fostering and supporting innovation and entrepreneurship. The data collection for this phase utilised secondary data sources.

6 Findings

6.1 Systematic Literature Review Key Main Themes

Based on our systematic literature review three key themes emerged namely:

- Rural Entrepreneurs and Entrepreneurship
- Challenges
- Technology Transfer, Knowledge Management and Exchange

Overall analysis highlights the paucity of research that specifically addresses entrepreneurial universities and rural communities.

6.1.2 Rural Entrepreneurs and Entrepreneurship

We identified and analysed 37 papers that focus on entrepreneurial universities and rural (see Appendix 2). We identified a range of subthemes focused on *supports, entrepreneurial education and social capital*.

Supports

A cluster of papers focused on the supports that entrepreneurial universities can provide for rural communities, through illuminating different types of support along with supporting capacity building. Bedó et al., (2020) highlight the impact that entrepreneurial universities can have on their local environment through their activities and supports. Rural based entrepreneurs face different challenges to their urban counterparts. This means that their needs and supports required (Cowell et al., 2018). It also requires entrepreneurial universities to value and assess needs beyond an economic focus (Paunovic et al., 2022). Therefore, entrepreneurial universities should focus some of their supports to address the specific needs associated to the stage of development rural businesses (Gretzinger et al., 2018).

A set studies illustrated the variety of supports that entrepreneurial universities use to engage with rural entrepreneurs and entrepreneurship. A study set in Northern Uganda by Opolot et al., (2018) found how entrepreneurial university involvement in supporting farmers had a significant transformation impact on how they operate. Similarly, using four case studies drawn from Finland, Sweden, Hungary, and Scotland, Kolehmainen et al., (2016) highlight the support role entrepreneurial universities can play along with other actors in contributing to these communities. Using education and outreach approaches in Indonesia, Kumulyono et al., (2023) report positive impacts on participant knowledge and entrepreneurial competencies. However, Kolehmainen et al., (2016) also argue that all actors need to have a common vision and a proactive approach to address their place-based challenges and needs. Moreover, any collaborations between entrepreneurs and

researchers requires the building of trust and mutual understanding of learning and entrepreneurial behaviour.

Entrepreneurial universities can also support capacity building in rural communities with positive impacts (see Courtney et al., 2011). Part of the support can be about building the knowledge base of students with respect to entrepreneurial supports as Malebana (2014; 2017) illustrated in a study of final year undergraduate commerce students in South Africa. Likewise, Dharmi and Goel (2013) highlighted the role of entrepreneurial universities in providing support through their know how in Punjab India. In the UK based on a case study set in Lincoln, Solomaa (2019) highlighted the influence of support through using entrepreneurial architecture for the rural context. Furthermore, Solomaa et al. (2022) identified challenges around engagement and providing support and highlighted the need for universities to resource and incentivise these activities with rural regions. Similarly, with respect to supporting innovation, Charles (2016) illuminated the mismatch between universities and rural businesses and the difficulties this presents for engagement.

Entrepreneurial Education

Teaching is one of the core missions of an entrepreneurial university and entrepreneurial education supports the potential development and actualisation of the third mission among faculty, students, professional service staff and alumni. Entrepreneurial education can provide practical ways for university community members to explore the feasibility of commercialising their knowledge for economic and or societal benefits as well as enhancing their know how about entrepreneurship and innovation processes. For example Bednarihova et al., (2020) argue the need for entrepreneurial universities to be proactive in their missions to support young entrepreneurship, through for example entrepreneurial education

Papers from our review highlight the contribution and impacts that the teaching mission can have on rural communities. Papers address entrepreneurial education from the perspective of entrepreneurial intentions (see Nguyen, 2018; Dodescu et al., 2021, Joshi, 2023. Saleem et al., 2018; Kang, 2022; Rusu et al., 2022; Banerjee et al., 2020). When it comes to antecedent factors that influence university student entrepreneurial intention, Nguyen (2018), based on a survey of students in Vietnam, found that male students from rural regions with immigrant parents have high levels of entrepreneurial intention of being an entrepreneur. Similarly, Dodescu et al's., (2021) study in Romania found positive impacts of entrepreneurial education on entrepreneurial intent, while Joshi (2023) examined entrepreneurial intent from a gender perspective in India. However, Amara et al., (2022) found that professional development opportunities post-graduation increases the probability of younger workers going into self-employment, but in rural areas young workers are less likely to engage in self-employment than their urban counterparts.

Furthermore, Ademola et al., (2023) demonstrate some of the real challenges around using entrepreneurial education through entrepreneurial student projects in rural contexts to effectively support student learning. However, a study set in Spain Toledano and Urbano (2008) highlights the influence of university entrepreneurial learning on the mindset of entrepreneurial students and Bushe et al., (2017) found some positive impacts on experiential learning on entrepreneurial skills and knowledge development.

Social Capital

Social capital was a central focus of some papers. Set in Islamabad-Qarb County, Saadi et al., (2016) found that rural women entrepreneurs' social capital positively impacts their entrepreneurial orientation, while Rooks et al., (2012) examined social capital with respect to innovation performance and networks and found some tentative differences between rural and urban regarding networks and performance. According to Ararad et al's., (2010) study set in Western Norway they found entrepreneurs can overcome their own social capital constraints by engagements with other actors that have high levels of social capital and as well as imitating their networking patterns. These papers highlight the potential role that entrepreneurial universities can play is contributing to developing the social capital of rural based entrepreneurs and innovators.

6.1.3 Entrepreneurial Universities and Challenges

We identified several papers that addressed different dimensions about the challenges faced by rural communities (see Appendix 3). The predominant challenges are found at the individual level relating for example, to students, social and creative entrepreneurs. One paper (Reid et al., 2018) focused on the wider challenge of healthcare faced by rural communities and how working with a university can positively support addressing such challenges. Reid et al., (2018) highlighted the human capital challenge of rural health workforces and how collaborations with an entrepreneurial university helped address it.

We identified in other papers an array of specific standalone challenges. These focused on specific groups within rural communities, such as how to support growth for rural based creative classes (McGranahan et al., 2011), social responsibility and social entrepreneurial intentions among agriculture students (Yu and Wang, 2019), social entrepreneurship and marginalised communities (Pillay and Mitra, 2015). Other considered entrepreneurship education and entrepreneurial skills acquisition (Olumuyiwa et al., 2023) and individual and collective learning (Botane Horvath, 2015). Furthermore, a study set in China that focused on rural youth entrepreneurs identified some of the challenges they face in setting up a new venture (Yuan et al., 2022).

6.1.4 Technology Transfer, Knowledge Management and Exchange

While there is a significant body of academic studies on entrepreneurial universities and technology transfer (see Audrestch, 2014; Cunningham et al, 2019; Rådberg and Löfsten

et al., 2023) (see Appendix 4). Papers that focused on aspects of technology transfer in relation to rural communities using cases studies (Paunovic et al., 2023; Sa et al., 2018), action research Kusmulyon et al., (2023), quantitative approaches (He et al 2022, Wu, 2022; Padilla-Zakour, 2004). For example, based on a case study of Zhejiang University in China, Yao et al., (2018) demonstrated the positive role that a university can play with respect to rural technology transfer.

There is a significant body of academic research on knowledge management (see Idrees et al., 2023). Papers on knowledge management focused on the role of students, academics and other stakeholders in supporting entrepreneurial university-based knowledge management and how it is embedded in teaching and research missions of entrepreneurial universities. Taking an action research approach set in Indonesia, Kusmulyon et al.,(2023) demonstrated how entrepreneurial universities through "entrepreneurial-orientated communities' development" not alone could support student development but also have an impact on communities. Similarly, a study by Whitshier and Edwards (2014) set in Wirksworth in Derbyshire in the UK of knowledge transfer partnerships, highlighted some of the benefits to students, academics and other stakeholders included new knowledge and learning. This is further reflected in studies set in the Gambia and Tanzania by Carlisle et al., (2013) and in Portugal by Sa et al., (2018) who also highlighted the important institutional roles that entrepreneurial universities play in creating new networks, partnerships facilitating knowledge management between different stakeholders. A study set in the Cauca, in Colombia by Theodorakopoulos et al., (2012) found how coffee and fish producers overcame some of the barriers to knowledge and technology transfer and realised some benefits such operational and productivity improvements and financial savings along with enhancing their own firm innovation capabilities. Similarly, other papers highlight the benefits of university engagement. Harrington and Maysami (2015) illuminate the some of the benefits of university-based collaboration on rural areas as does Padilla-Zakour (2004) of food entrepreneurs in the USA. However, Makkoenen (2012) has a cautionary note about the presence of a university. Based on a case study set in Finland Makkoenen (2012) argues that is not enough for university just to have presence, they need to engage in the local economy.

6.2 Delphi Study

For our Delphi study we focused identifying barriers, enablers and key motivations for entrepreneurial university engagement and collaborations with rural communities – enterprises and communities. For the main barriers there was clear consensus regarding the critical barriers highlighted in Table 2.

Table 2: Main Barriers for Successful Entrepreneurial University Engagement and Collaboration with Rural Enterprises and Communities

<p>Lack of trust, alignment and mutual understanding concerning expectations of priorities</p> <p>Lack of support, expertise and skills to facilitate engagement and collaboration</p> <p>Differences between university knowledge and the real needs of rural enterprises and communities</p> <p>Complicated and bureaucratic technology and knowledge transfer policies and process</p> <p>Lack of general knowledge on technology transfer supports and expertise</p> <p>Lack of human capital support for collaborations</p>
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An array of main enabling factors that support successful entrepreneurial university engagement and collaboration with rural communities were identified as critical (see Table 3). Planning joint initiatives, targeted and tailored events and trust and strong social connections were key enabling factors that achieved the highest level of consensus among industry partners.

Table 3: Main Enablers for Successful Entrepreneurial University Engagement and Collaboration with Rural Enterprises and Communities

<p>Organisation structure and research capacity</p> <p>Development and delivery of degree programmes that include student internships, visits and applied projects</p> <p>Targeted and tailored events for rural enterprises and communities</p> <p>Planning joint initiatives to development creative methods with rural enterprises and communities</p> <p>Trust and strong social connections</p> <p>Support from technology transfer office and technology transfer executives</p> <p>Government incentives and supports</p> <p>Support from development agencies and public research councils</p>
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As highlighted there is a significant body of research that examines motivations surrounding university industry collaboration. Our Delphi panel members identified six main factors for entrepreneurial university engagement and collaboration with rural enterprises and communities (see Table 4).



Table 4: Main Motivations for Entrepreneurial University Engagement and Collaboration with Rural Enterprises and Communities

Commercial opportunities
Social Entrepreneurship and innovation opportunities
Potential impact on rural focused public policies
Problem solving opportunities
Access to in-kind resources
Learning opportunities

6.3 Illustrative Practice Case Studies

Our final phase was focused on some illustrative practice case studies from the global north that highlights the different types of entrepreneurial universities and engagement with rural businesses and communities. We have drawn these illustrative practice case studies based on recommendations from colleagues nationally and internationally and from secondary source data. We use the third mission engagement models posited by Knudsen et al (2022) as an overarching organising mechanism to illustrate the variety of approaches entrepreneurial universities use for engagement with rural communities. Kundsens et al (2021) identified five universities third mission engagement models namely, *Stanford Model*, *the Laboratory Model*, *the Knowledge Spillover and Collaboration Model*, *the Spin-off Model* and *the Incubator Model*. We explain each of model type and map six core elements, university mission orientation, objectives, scope and activities, collaboration configuration, funding and outcome to each of our illustrative practice case studies.

Stanford Model:

The primary focus of this model is centred on the commercialisation of university-based knowledge through different technology transfer mechanisms such as technology licencing. In the USA several universities, some land-grant universities have built a strong reputation for technology transfer particularly through licencing in the agricultural domain such as UC Davis, Cornell University and the University of Illinois at Urbana-Champaign. In Europe, Wageningen University and Research (WUR) based in The Netherlands is an illustrative example of the Stanford model approach (see Table 5).

Table 5: Wageningen University and Research- The Netherlands

<i>University Mission Orientation</i>	Education, Research, Technology and Knowledge Transfer
<i>Objective</i>	"To explore the potential of nature to improve the quality of life"****
<i>Scope and Activities</i>	<ul style="list-style-type: none"> • Education, Research the Technology and Knowledge Transfer • Research Themes: Climate Change; Biodiversity, Feeding the World; Circular Economy and Healthy Food and Living**** • Teaching Activities: 20 BSc Programmes; 31 MSc Programmes; 49 MOOCs
<i>Collaboration Configuration</i>	<ul style="list-style-type: none"> • Collaboration between Wageningen University and Wageningen Research Foundation • Active research partnerships globally and in the Netherlands with a variety of other ecosystem actors
<i>Funding</i>	Broad funding mix from public, private and other activities.
<i>Outcomes</i>	<ul style="list-style-type: none"> • Spin-off firms through using institutionally created intellectual property • 2023 NanoMoi; Piense Technology • 2023 QS World University Ranking - Subject - Ranked the best agricultural university in the world.

Sources: [About Wageningen University & Research - WUR](#)*** [Themes Wageningen University & Research - WUR](#)****; Hoenen, S., Kolympiris, C., Wubben, E., & Omta, O. (2018). Technology transfer in agriculture: The case of Wageningen University. *From Agriscience to Agribusiness: Theories, Policies and Practices in Technology Transfer and Commercialization*, 257-276.

The Laboratory Model

The focus of this approach is about enabling industry to utilise the resources – infrastructure and people etc – of entrepreneurial universities to support the development of new technology along with knowledge transfer. There are different variations that have been adopted by entrepreneurial universities with respect to rural communities and economies. One variation of this model is where there are dedicated research units and centres that are focused on advancing research, policy and practice focused on

knowledge exchange with rural economies and communities. Examples of this approach include Countryside and Community Research Institute, University of Gloucester and the National Innovation Centre for the Rural Enterprise, a consortium of universities led by Newcastle University.

Another variation where institutionally wide facilities and expertise are explicitly directed at rural communities such as the Scotland's Rural College (see Table 6). Here there is a strong focus on knowledge transfer through infrastructure utilisation and support for entrepreneurship and innovation. In other countries there are similar model variations where the institutional focus is on supporting rural communities and economies and or sectors such as food and agriculture that are important to sustaining such contexts.

Table 6: Scotland's Rural College (SRUC)

<i>University Mission Orientation</i>	Education, Research and Third Mission – Consultancy
<i>Objective(s)</i>	SRUC Vision: “to become Scotland's Enterprise University at the heart of our sustainable natural economy”
<i>Scope and Activities</i>	<ul style="list-style-type: none"> • SAC Consultancy • Veterinary and Laboratory Services • Research facilities for beef, sheep, dairy, pig and poultry • Enterprise Academy for the Rural and Natural Economy • SEEDALE – Entrepreneurial Education • Ventures- Investment Fund • Innovation Hub • Partnership – focused on providing companies access to infrastructure and expertise
<i>Collaboration Configuration</i>	Range of research and innovation ecosystems collaborations across core activities
<i>Funding</i>	Scottish Government Grants; Scottish Funding Councils, Research Grants and Contracts, Advisory and Consultancy contracts**
<i>Outcomes</i>	12,000 clients nationally and internationally*

Sources: [About SRUC | SRUC](#); [sruc-strategy-2018-2022.pdf](#); [Business Services | SRUC](#); [sruc-report-financial-statements-document-2022-typesigned.pdf](#)**

Knowledge Spillover and Collaboration Model

This model emphasises how entrepreneurial universities can engage and pursue two-way knowledge exchange with other ecosystem actors. It goes beyond harder mechanisms of technology transfer to softer forms of knowledge transfer. This approach, while realising direct benefits to stakeholders, can accrue long term indirect benefits and spillover effects. Typically, such outcomes can be more easily realised for specific projects that require university participation along with other stakeholders. MaREI is a dedicated multidisciplinary research institute at University College Cork, Ireland that focuses on energy climate and marine issues. Their collaborative project with the Dingle Peninsula is an illustrative example of how dedicated university-based research expertise can be utilised effectively with rural based community groups (see Table 7). Other activities as part of this wider project included a pilot Farm Ambassador Programme with a focus on sustainability and digital transformation with Teagasc, Net Fease and Kerry Agribusiness, formation of a local energy co-operative, a comprehensive socio-economic profile and an array of community engagement events. McGookin et al., (2023:5) published a comprehensive review of this project that addressed its value and challenges. As part their recommendations they pointed to "...a need for new or revised university administration mechanisms and supports to enable community involvement with engaged research."

Table 7: MaREI, University College Cork and Dingle Peninsula, County Kerry Ireland

<i>Predominant University Mission Orientation</i>	University College Cork – Host Institution – Teaching, Research and Third Mission MaREI – Research and Third Mission
<i>Objective(s)</i>	“The key objectives are to work with the local community, schools, business and farming sectors to explore, support and enable the broader societal changes required for the low carbon transition.” (Dingle Peninsula, 2030:2)
<i>Scope and Activities</i>	Focus on Climate Change and Energy Transition for a Sustainable Future for the Dingle Peninsula.
<i>Collaboration Configuration</i>	MaREI Centre, Environmental Research Institute, University College Cork; North and West Kerry Development, ESB Networks and Dingle Creativity and Innovation Hub.
<i>Funding</i>	Science Foundation Ireland, US-Ireland Partnership Programme, ESB Networks
<i>Outcomes</i>	Some outputs include Energy Master Plan; Future Energy Scenario; Stakeholder Mapping and Facilitation; Engagement with Secondary School in the peninsula as part of Science Week.

Sources: Corca Dhuibhne 2030: a sustainable future for the Dingle Peninsula by 2030; <https://dinglepeninsula2030.com/wp-content/uploads/2022/03/Dingle-Peninsula-2030-Brochure.pdf>; Dingle Peninsula 2030 - MaREI

The Spin-Out Model

Knudsen et al (2022) argued that; “this model draws on the research mission, but may link to the education mission if student entrepreneurship is institutionalised through the TTO.” Many technology transfer offices offer different programmes to support the commercialisation of research to enable university-based founders (academics and students) to refine and validate their venture idea (see for example Cambridge Enterprise, Oxford University Innovation, University of Manchester Innovation Factory). However other universities structurally have incorporated the education mission to support this approach. The Agri Innovate offering at University of Galway is an example of how an entrepreneurial university (see Guererro et al., 2014) combines teaching and third mission to support rural based entrepreneurship and innovation through a distance education model (see Table 8). Other examples of this approach include the Wichita State University Growing Rural Businesses programme run by The Center for Entrepreneurship which is a two-month applied and practical certified programme, the six month EIT Food Seedbed programme

at Queens University Belfast that support food based start-ups, and LINCAM a collaboration between Lincoln Institute of Agri-Food Technology at University of Lincoln and the University Cambridge to support agri-tech research commercialisation.

Table 8: Agri Innovate, University of Galway, Ireland

<i>Predominant University Mission Orientation</i>	Teaching, Research and Third Mission
<i>Objective(s)</i>	One year distance education model that seeks to develop the entrepreneurial and intrapreneurial skills of individual actors in the agricultural sector
<i>Scope and Activities</i>	Support start-ups in the agricultural sector MSc Agricultural Innovation and Entrepreneurship – Three Pillars: Agri-Needs Finding; Design Thinking for the Agri-Sector; MITs Disciplined Entrepreneurs
<i>Collaboration Configuration</i>	University of Galway, Ireland
<i>Funding</i>	Springboard+ Department Further and Higher Education, Research, Innovation and Science (see gov.ie - Springboard courses)
<i>Outcomes</i>	On average generates 30 new ventures annually

Sources: AgInnovation: Agricultural Innovation & Entrepreneurship (MSc) - University of Galway; New University of Galway Masters Programme in Agricultural Innovation is Open for Applications; 30 new businesses formed from AgInnovation course annually, Agriland 13 June 2024.

The Incubator Model

In contrast to the spin-out model universities adopting the incubator model build infrastructure and facilities to support the engagement of the university community with companies and other actors that are designed to support new venture creation. According to Knudsen et al (2021) they also provide business support, mediation and select new businesses with the greatest potential to avail of this infrastructure and support. There is an array of examples of entrepreneurial universities providing such infrastructure and support and these models are particularly evident in medical, science and engineering sectors (see for example BioEscalator, University of Oxford; Start X; Launchpad Stanford University; Health Engine, UC Berkeley). The Rural Enterprise Acceleration offering at the Royal Agricultural University (see Table 9) provides different types of supports for entrepreneurs and for local businesses.

Table 9: Rural Enterprise Acceleration, Royal Agricultural University, UK

<i>University Mission Orientation</i>	Education, Research and Technology & Knowledge Transfer
<i>Objective(s)</i>	Agricultural Education and Research
<i>Scope and Activities</i>	<p>Farm 491: Incubator and innovation space providing four types of membership: virtual, virtual plus, hot desking and resident</p> <p>Service Providers Partnerships and Investor Network</p> <p>Student Enterprise Programme: RAU Ignite Enterprise Programme that is aimed at supporting new venture creation with the support of a range of ecosystem actors.</p> <p>The Growth Hub Cirencester Business Support: Provides co-working spaces, mentors, workshops and events.</p>
<i>Collaboration Configuration</i>	Ecosystems of actor collaborations to support new venture creation and business development
<i>Funding</i>	The Growth Hub funded by UK Government and Gloucestershire Country Council.
<i>Outcomes</i>	The Growth Hub: 501 individual supports to start a business; 1368 firms received high intense support; 2888 firms received medium intensity support; 3263, firms received light touch support (October 2014-2020); 481 net jobs 2019-20; Engaged with 25 per cent of local businesses since 2014 **

Sources Rural enterprise acceleration | Royal Agricultural University; Cirencester - Our services - The Growth Hub Gloucestershire; Growth Hub overview - February 2021 Gloucestershire Economic Growth Scrutiny Committee.pdf**

7 Key conclusions and implications

7.1 NICRE REUI Toolkit to Support Entrepreneurial University and Rural Communities Collaboration

To address some of the challenges and insights identified in our study we specifically designed and developed the *NICRE RUEI* (rural, entrepreneurial university interaction) *Toolkit for University Collaborations with Rural Enterprises and Communities*. Its purpose is to provide a practical offering for actors that want to pursue such collaborations and engagement. The Toolkit has been designed in a way that it can be applied to support the development of any form and type of university-based collaborations by any stakeholder actor.

We designed the toolkit so it can be used in a stepwise iterative way (see Table 10). The first three steps are designed actors to identify and refine their specific needs. This is a critical foundational activity for any effective collaboration between entrepreneurial universities and rural communities or vice versa. For effective and mutually beneficial collaboration there needs to be a clear identification and understanding of needs by all collaborators to ensure that there is unity of purpose and focus.

The remaining steps are focused on working through the specifics of a potential collaborative effort and to map out tangible actions. Careful consideration must be given by all collaborators as to the practical arrangements and steps that need to be undertaken to progress and build an effective collaborative effort. It also provides an opportunity to clearly identify some of the key barriers and constraints the full realisation of collaborative efforts. In designing the toolkit, we have deliberately taken a visual design approach, so it is accessible, practical and usable as possible by any stakeholder irrespective of experience and potential needs (see Figure 2). The toolkit provides a structured and systematic way to initiate and progress entrepreneurial university and rural based collaborations.

Table 10 NICRE RUEI Toolkit University Collaborations with Rural Enterprises and Communities

Step 1: Your needs
Step 2: Requirements
Step 3: Outcomes
Step 4: Enablers and Barriers
Step 5: Collaboration Mechanisms
Step 6: Resource Requirements
Step 7: Action Plan: tasks, timelines and key resource
Step 8: Critical Risks

Figure 2: NICRE RUEI Toolkit

RUEI Toolkit for Rural-Based University Collaboration

Your Need:			
Describe or visualise your need	Skills & Competence	You	University Collaborator(s)
	Expertise		
Why is it a need?	Resources		
Outcomes: Describe or visualise key outcomes			
Barriers		Enablers	
Collaboration Mechanism			
Collaborative Partnership Resource Requirements			
Key Tasks	Timeline		Key Milestones
Critical Risks			

7.2 Implications and Recommendations for Entrepreneurial Universities

Entrepreneurial universities are under growing pressure to contribute to economic and social development through all their missions. There is much informal, ad hoc and often institutionally invisible engagements between academic and rural communities at the micro level. The strategic issue for entrepreneurial universities is how best to fuse and orientate existing missions – teaching, research and the third mission - and structures to support the current and future needs of rural communities. There are mutual benefits to both entrepreneurial universities and rural communities to engaging and collaborating. In essence, there is no one size fits all approach that entrepreneurial universities can adopt to developing, building and sustaining collaborations and engagements with rural communities. Contextual dimensions are a key determinant as well as the willingness of entrepreneurial universities to sustain rural based collaborative engagements and collaborations.

Core Institutional Mission and Strategy

A strategic question for entrepreneurial university senior leaders is to decide if rural communities are a strategic institutional priority. If so, then at a strategic level the rural context needs to be explicitly recognised and integrated into the core stated institutional

mission as well as key strategic objectives and priorities across teaching, research and the third mission. Such an explicit articulation reflects how an entrepreneurial university as an anchor institution views and values rural communities. It also sets the boundaries of how an entrepreneurial university envisages contributing to supporting and sustaining rural communities. This explicit articulation of the relevance, value and importance of rural communities matters in setting the direction and sending a clear strategic signal within and outside the entrepreneurial university organisational boundaries.

Structures and Organisational Architecture

To realise key strategic objectives and priorities entrepreneurial universities need to consider what are the appropriate structures that are necessary to support sustainable and consistent engagement with rural communities. In the first instance they should review their current structures to explore how they can be enhanced to enable effective engagement and collaborations more explicitly with rural communities. Such a review of structures should cover the three core missions of entrepreneurial universities. Some of the enhancements may centre on crafting an explicit narrative about how different units or activities within an entrepreneurial university support rural communities, while other initiatives may focus on the accessibility and visibility of entrepreneurial universities in rural communities. It could also result in the creation of a dedicated senior institutional lead role akin to a Dean of Rural Affairs and Engagement whose sole responsibility is focused on rural engagement and collaborations. A fundamental question for entrepreneurial universities is to determine whether the current structures are sufficient and meet the current and future needs of rural communities.

Entrepreneurial universities need to explore what is the appropriate organisational architecture that provides tangible institutional wide support for rural community engagement and collaborations. It might be for example the case of fusing a rural community-based focus onto the existing entrepreneurial university organisational architecture or it could lead to the creation of new internal organisational units that are dedicated to supporting rural communities through its three main missions of teaching, research and technology and knowledge transfer. It could also mean that entrepreneurial universities need to invest in the professional development of university-based technology transfer professionals to be attuned and have the requisite knowledge to support effectively and efficiently support technology and knowledge transfer between entrepreneurial universities and rural communities. This could be extended to other internal actors including students, faculty and professional service staff. For example, many universities are creating centres focused on resilience that draw across all missions as well as intermeshing academic expertise, industry, NGOs etc to address specific common domain problems, challenges and opportunities. Wider opportunities to create dedicated university wide organisational architecture that support the entrepreneurial and innovation needs of rural communities should be considered and evaluated. In essence entrepreneurial universities need to ensure that there is strong alignment between

strategic intent as expressed through core mission, vision and priorities and the structures and organisational architecture that supports implementation. Also, they need to be mindful of the distinct entrepreneurship and innovation needs of rural communities.

Engagement and co-creation

Aligned to their strategy, structure and organisational architecture entrepreneurial universities need to consider what engagement models support the building of trust and social networks that are essential for any collaborations with rural communities. Entrepreneurial universities have a convening role that they can utilise to support the mobilisation of rural communities. Moreover, they can support the building of social capital and networks among rural actors that are beneficial in developing long term resilience and capabilities. As illustrated in our study there are different engagement models that entrepreneurial universities use across all their missions. This is contextually and institutionally driven. However, at the strategic level entrepreneurial universities need to have a clear engagement strategy and model that is mutually effective. A part of these considerations is to determine what engagement models are relational and what are transactional across all missions. Some engagements may be transactional based on specific needs of a rural business community or in response to unexpected events. The engagement model(s) adopted by entrepreneurial universities enables the building of long-term trust between entrepreneurial universities and rural communities. Therefore, the predominant engagement models should be relational rather than transactional. To support this entrepreneurial universities, need to explicitly tailor events for rural communities, ideally some of these events should be delivered in rural communities rather than on campus as part of long-term institutional approaches to building trust.

Initially engagement can have a predominant focus on one of the entrepreneurial university mission agendas, such as teaching, that over time draws in other academics and wider university competences and capabilities. Furthermore, entrepreneurial universities may embark on a set of strategic engagements with rural communities that are co-created in design and delivery. This may have a dual focus. First, is to determine what is the appropriate engagement models to use with rural communities. Second, is how best to co-create with rural communities to leverage the universities resources, capabilities and assets to meet current and future needs of rural communities.

7.3 Implications and Recommendations for Rural Communities

Empirical evidence of university-industry collaborations highlights the positive benefits, both direct and indirect on individual firms and individuals. Knowledge and know-how transfer over a consistent period through effective engagement, can be a powerful catalyst for rural communities and individual firms to address some of their current needs along with focusing on medium to long-term needs. It also can contribute to wider efforts

in building the resilience of rural communities. To this end we offer some practical recommendations:

Identification of Needs: Resilience, Economic and Social

To have effective university-industry collaborations actors need be clear about what their needs are. At a collective level rural communities through their own community's engagement processes may identify and map their resilience needs - economic, social, environmental and technological. This may result in such needs being used as a basis to engage with relevant entrepreneurial universities, policy makers and public research organisations. Such a collective approach can overcome scale and fragmentation challenges and provide a strong anchoring point and foundation to begin to progress and build engagements and collaborations with entrepreneurial universities that address specific rural community needs.

Similarly at the individual firm level in the first instance they should identify their current needs, with respect to innovation. Firms in different sectors such as agribusiness, tourism, hospitality etc will have distinct sectoral driven needs. Once current and future needs are identified the next step is to consider how entrepreneurial universities can contribute to supporting these needs. It could for example be initially through the teaching mission through live student projects, internships or through collaborative applied research projects.

Collaborate and Engage

Previous studies highlight the different cultures that exist between universities, industry, and other key stakeholders. This can frustrate the development of effective and sustainable collaborations that are mutually beneficial. Therefore, it is important for individual firms as well as for rural communities to consistently engage and collaborate with entrepreneurial universities. For example, in the initial phase focusing on workable and achievable collaborative efforts. Initial engagement could be focused on one of the needs identified by an individual firm or collectively by a rural community. Focusing on such identified needs also facilitates effective engagement and building of trust, know-how and expertise which is necessary for longer term sustainable and effective collaborations.

Collaborative and Absorptive Capacity

Collaboration from a practical perspective for university-industry collaboration requires having the necessary human capital skills, organisational processes, and mindset to fully commit and accrue collaboration benefits. Consequently, individual firms need to pragmatically think through how such collaborations with entrepreneurial universities feed through to the deployment of resources and in the daily routines of their firm. Moreover, what does mean in terms of the necessity to enhance the skills and competencies of current employees? What does it mean for the firm's current

organisation processes? What benefits is the firm seeking to realise through entrepreneurial university collaborations? It is also about developing a mindset and an organisational culture that is open, comfortable, and confident to participate or to lead collaborative efforts with entrepreneurial universities. In essence, rural firms and communities need to consider their collaborative capacity.

In tandem with this, rural based firms need to consider if they have the capacity to absorb knowledge and technology transfer from universities into their operations. For example, does an individual firm have the capacity, competence and resources to licence a technology from an entrepreneurial university? Can they assimilate new know-how from university partners directly into their operations? Therefore, rural businesses need to consider if they have the necessary skills, processes and organisation mindset to effectively collaborate with entrepreneurial universities across their three missions.

Overall, in Table 11 we outline the steps that individual firms and or rural based communities can use to consider and reflect on building effective relationships with entrepreneurial universities.

Table 11: Firm Level Steps to Build Effective Collaborative Relationships with Entrepreneurial Universities

Steps
1. Identification of Needs - Current and Future
2. Match Identification Needs with Relevant Entrepreneurial Universities
3. Engagement with Entrepreneurial Universities – NICRE REUI Toolkit
4. Build and Develop Collaboration(s) – Overtime multiple collaborations
5. Invest in Collaborative Capacity Building and Realisation

7.4 Implications for Policymakers

Our study highlights the need for dedicated policies to build, support, strengthen and grow collaborations and engagements between entrepreneurial universities and rural communities. Such dedicated policies not alone affirm and signal the importance of rural communities but also empowers action and the mobilisation of configurations of actors to address the current unmet and future needs of rural communities. In tandem with dedicated policies there is need for a dedicated and tailored public R&D investment for rural communities and incentives for rural based businesses to invest in innovation – product, process, service and management, some with the collaboration of entrepreneurial universities. Appreciating the value and merits of established frameworks and indicators for evaluating public R&D investments there is need to take a broader social value and evaluation perspective (OECD, 2022). Rural communities need sustainable and long-term collaborations with entrepreneurial universities. Therefore, we recommend:

Multi annual capacity building programmes to support

- Rural based firm level innovation;
- Entrepreneurial university rural technology and knowledge transfer;
- Entrepreneurial university supported and or guided rural entrepreneurship support, through for example incubators, innovation hubs, intrapreneurship and entrepreneurial skills

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*SLR paper





Annexes

Appendix 1 Systematic Literature Review Protocol

Setting the Research Objective

- Examine the current state of the research on entrepreneurial universities and engagement with rural communities to foster and support innovation and entrepreneurship.
- Map the current state of empirical research
- Identify the implications for future research

Defining the conceptual boundaries

- Focus on entrepreneurial universities and rural communities

Search Strategies

- Search focused on Scopus

Keywords used in search

Variations – entrepreneurial universities, entrepreneurial university.

- Entrepreneurial universities and rural economy
- Entrepreneurial universities and rural
- Entrepreneurial universities and rural businesses
- Entrepreneurial universities and rural communities
- Entrepreneurial Universities and rural and SMEs
- Entrepreneurial universities and rural and micro-businesses
- Entrepreneurial universities and rural and innovation
- Entrepreneurial universities and rural and entrepreneurship
- Entrepreneurial universities and rural and collaboration
- Entrepreneurial universities and rural and engagement
- Entrepreneurial universities and rural and motivations
- Entrepreneurial universities and rural and barriers
- Entrepreneurial universities and rural and entrepreneurs
- Entrepreneurial universities and rural and challenges
- Entrepreneurial universities and rural and opportunities
- Entrepreneurial universities and rural and eco-systems
- Entrepreneurial universities and rural and technology transfer
- Entrepreneurial universities and rural and knowledge management
- Entrepreneurial universities and rural and social innovation

Inclusion criteria

- Time frame January 1970 to December 2023
- English Language articles only
- Peer reviewed academic journal articles
- Search terms (see above)

Exclusion Criteria

Working papers, conference papers, non-peer reviewed book and retracted papers

Appendix 2 Entrepreneurial Universities, Entrepreneurs and Entrepreneurship

Year	Author	Research Question/Objective	Main Results	Journal	Context	Country	Unit of Analysis	Research Design
2018	Margaret Cowell, Sarah Lyon-Hill and Scott Tate	Explores the requirements of entrepreneurs within the dynamics of an entrepreneurial ecosystem	Demonstrates the needs of different entrepreneurs - urban and rural and the resources that they need	Journal of Enterprising	Roanoke-Blacksbury Region, Western Virginia	USA	Entrepreneurs /Firms	Mixed Method
2021	Trung Kien Dao, Anh Tuan Bui, Thi Thu Trang Doan, Ngoc Tien Dao, Hieu Hoc Le, Thi Thu Ha Le	Examines the entrepreneurial intentions of engineering and business students using theory of planned behaviour	Found no entrepreneurial intention among students from rural and urban areas	Heliyon	Hanoi University of Science and Technology	Vietnam	Students	Quantitative
2022	Ivan Paunovic ¹ , Cathleen Müller and Klaus Deimel (2022)	Examines the building of entrepreneurial initiatives within the triple helix	Case study highlight the importance of collaboration for entrepreneurship and intrapreneurship in a rural context	Sustainability	Bonn-Rhine-Sieg University of Applied Sciences And Neunkirchen-Seelscheid (NKS) (Municipality)	Germany	Project	Qualitative - Case Study
2018	Cuong Nguyen (2018)	Focuses on entrepreneurial intention of Vietnamese business students and the impact of family background, self-employment exposure and demographic factors	Higher entrepreneurial intention among male students. Some difference between rural and urban environments	Journal of Global Entrepreneurship	FPT University and Nguyen Tat Than University.	Vietnam	Students	Quantitative

2021	Anca-Otilia Dodescu, Elena-Aurelia Botezat, Alexandru Constăngioară and Ioana-Crina Pop-Cohut	Entrepreneurial intention of undergraduate students from non-economics and business disciplines	Identified a range of beneficial factors from entrepreneurial education on entrepreneurial intentions	Sustainability	University of Oradea	Romania	Students	Quantitative
2023	Maheshkumar P. Joshi, Deepak Pandit, Shalini Rahul Tiwari, Archana Choudhary	Examines the relationship between entrepreneurial intentions, entrepreneurial education and gender	Demonstrated positive relationship between entrepreneurial education and intentions. Highlighted urban and rural differences	Journal of Enterprising Communities	4 universities in Northern India with one university an all female university	India	Students	Quantitative
2018	Henry Nakelet Opolot, Prossy Isubikalu, Bonton Bernard Obaa & Peter Ebanyat	Investigates the influence of entrepreneurial training on small farmers 'competences, productivity and organisation capacity'	Found that entrepreneurial training had a positive impact and benefits such as business planning, marketing, leadership, networking etc.	Cogent Food and Agriculture	Hole and Lira Northern Uganda	Uganda	Farmers and Projects	Quantitative – Household Survey Qualitative – Focus groups
2016	Jari Kolehmainen & Joe Irvine & Linda Stewart & Zoltan Karacsonyi & Tünde Szabó & Juha Alarinta & Anders Norberg (2016)	The development of rural and remote regions and the quadruple helix in supporting and fostering innovation	Affirm the important role of quadruple helix actors play in rural context. Demonstrates different the evolutions. Role universities play in offering support and expertise	Journal of Knowledge Economy	South Ostrobothnia Finland; The Västerbotten Sweden; The North Great Plain Region Hungary; The Highlands and Islands Scotland	Finland, Sweden, Hungary and Scotland	N/A	Qualitative- Case Studies
2018	Farida Saleem, Ahmad Adeel, Rizwan Ali, Shabir Hyder (2018)	Entrepreneurial intentions to adopt ecopreneurship	Range of findings regarding self efficacy, entrepreneurial intentions and managing risk	Entrepreneurship and Sustainability Issues	Rural District in Pakistan One Public and on Private University	Pakistan	Students	Quantitative

2023	Elena Casprini, Tommaso Pucci, Niccolo Fiorini and Lorenzo Zanni (2023)	University based total quality management adoption at micro, meso and system levels	Grounded model of individual and organisation hard and soft dimension of TQM Pivotal role universities play in rural places	TQM Journal	University of Siena	Italy	University	Qualitative-Case Study
2011	Courtney E. Kimmel, R. Bruce Hull, Max O. Stephenson, David P. Robertson, Kimberly H. Cowgill	Universities and civic engagement to support community development	Benefits from this engagement of universities include goodwill, education and research opportunities	Higher Education	Virginia Tech and Catawba Landcare	USA	Catawba Landcare	Qualitative - Case Study
2022	Rabeh Morrar, Mohamed Amara, Hélène Syed Zwick	Self-employment among young Palestinian adults	Education and training increases the probabilities of self employment. Young males more likely to become self employed	Journal of Entrepreneurship in Emerging Economies	Palestinian territories	West Bank	Households	Quantitative
2023	Kalif Mohamud Farah and Yavuz Taşcıoğlu (2023)	Factors affecting agricultural entrepreneurship among Somali students in Turkey	Factors identified include agri-sector structural reforms, market and production costs, risk taking, need for support -national and international, entrepreneurial ideas, need for youth participation and social structures	Sustainability	University students studying agriculture	Turkey	Students-Somali	Quantitative - Survey
2022	Chang'an Liang, Guoming Du, Zhaoda Cui	Digital and inclusive finance to contribute to regional development	Digital finance can contribute in two ways 1) finance and 2) mobile payments	Sustainability	N/A	China	Firms	Quantitative

	and Bonoua Faye		No significant on the entrepreneurial effect of digital finance between entrepreneurship types and areas - rural and urban					
2022	Yapeng Li	Factors that attract rural start-ups by university students	Rural based university start-ups dependant on a range of factors such as financing, resources, economic conditions, entrepreneurial tradition	Sustainability	N/A	China	Students	Quantitative
2020	Zuzana Bednarikova, Miroslava Bavorova, Elena Ponkina (2020)	Factors that influence agricultural students to return home or out-migrate post graduation	Collaborative relationship between agri-sector and HEIs, finance, and living conditions influence agricultural student to stay in rural areas	Journal of Rural Studies	Altai Krai Atlai State Agrarian University	Russia	Student - Agriculture	Quantitative
2016	Heshmatollah Saadi, Ahmad Yaghoubi-Farani, Sara Jalilian and Reza Movahedi	Entrepreneurial orientation and social capital rural female entrepreneurs	Confirms that social impact has a positive effect on rural female entrepreneurial orientation	International Journal of Entrepreneurship and Small Business	Islamabad-Qarb County I	Iran	Rural Female Entrepreneurs	Quantitative
2012	Gerrit Rooks Adam Szirmaic and Arthur Sserwanga	Entrepreneurial innovativeness and the influence of social capital	Identified some tentative differences between rural and urban - networks and performance	Journal of African Economics	Kampala and Mpigi	Uganda	Entrepreneurs	Quantitative - Survey
2014	MJ Malebana (2014)	Entrepreneurial intention, and motivations. Focus on entrepreneurial role models, social	Entrepreneurial intention motivation influenced by the focused factors in this study	Journal of Economics and Behavioral Studies	Lompopo Province	South Africa	Students - Final Year B Comm Rural university students	Quantitative - Survey

		valuation of entrepreneurship and knowledge of entrepreneurship supports	Identified a need for independence a strong motivation focus					
2023	Omotosho Ademola, Mathew Kimweli Kimanzi and Alfred Modise	Entrepreneurial project learning and skills gap	Identified that skills gap not sufficiently addressed with this approach. Effective mentoring from industry and sustained support from universities are critical for supporting project based learning	Journal of Educational and Social Research	N/A	Nigeria and South Africa	Students = Third Year	Quantitative - Survey
2023	Muhammad Setiawan Kusmulyono, Wawan Dhewanto and Melia Famiola	Rural resilience	Entrepreneurial mindset, stewardship and assertiveness important for rural leaders to possess in enhance rural resilience	International Journal of Rural Management	N/A	Indonesia	Various individual ecosystem actors	Qualitative
2018	Susanne Gretzinger, Simon Fietze, Alexander Brem, and Tochukwu (Toby) Ugonna Ogbonna	How aspiring rural area entrepreneurs get embedded into business networks?	Aspiring entrepreneurs have different needs – those focused on new product development and service enhancements. Service enhancement aspiring entrepreneurs have strong network relation with university researchers and former fellow students.	Competitiveness Review	Sønderborg &	Denmark	Aspiring entrepreneurs	Qualitative – Case Study

2011	Sari Iivonen, Paula Kyrö, Sinikka Mynttinen, Marjo Särkkä- Tirkkonen & Helena Kahiluoto	Social capital and entrepreneurial behaviour and how entrepreneurs act, want and expect	Importance of building shared goal understanding that contributes to building trust and social capital Research leaning approach to avoid conflicts between entrepreneurs and researchers. Active approaches rather than theoretical approaches to learning for entrepreneurs. Researchers should learn and adjust their entrepreneurial behaviours to support entrepreneurial learning and the building of trust.	The Journal of Agricultural Education and Extension	South Savo Region	Finland	Entrepreneurs	Qualitative
2023	KaiChao Shao, Ruixue Ma, and Joseph Kamber	Inclusive digital finance (IDF) and entrepreneurial behaviours of rural mothers	IDF has significant affect on rural mothers in less developed regions. Important for rural development	Telecommunications Policy	N/A	China	N/A	Quantitative
2023	Chaolin Yang, Jingdong Yan, Xiaodan He, Shiqi Tian	Examines entrepreneurial survival of Chinese farmers	Identified different factors that influence survival rates include resources, environment, cognition and competences.	International Review of Economic and Finance		China	Farmers	Quantitative

2017	Mmakgabo Justice Malebana (2017)	Investigates Knowledge of government supports for entrepreneurship and entrepreneurial intentions	Affirms the importance of awareness of government support for entrepreneurship	Development Southern Africa	Eastern Cape and Limpopo	South Africa	Students	Quantitative
2010	Jarle Aarstad, Sven A. Haugland, and Arent Greve	Social capital and performance set in rural areas	Entrepreneurs with low social capital can overcome this through knowledge transfer ('cohesion' with other actors that have higher levels of social capital. Entrepreneurs can copy networking patterns of successful actors to secure resources	Entrepreneurship, Theory and Practice	Hydroelectric micro power start-up	Norway	N/A	Qualitative- Network Ttes modelling
2012	Khushdeep Dharni and Deepak Goel (2013)	Examines start-up activities of honey bee entrepreneurs	Highlights the important role of Punjab Agricultural University in support knowledge transfer	International Journal of Entrepreneurship and Small Business	Punjab	India	Beekeepers	Quantitative
2019	Maria Salomaa	Entrepreneurial architecture of university and the influence of the rural context	Rural contexts can shape university engagement and entrepreneurial architecture. Highlights the importance of top university leadership support such engagements	Regional Studies, Regional Science	University of Lincoln	UK	N/A	Qualitative - Case Study
2022	Maria Salomaa, David Charles and Gary Bosworth	University based innovation support through ERDF of rural regions	Identified challenges of engagement, seeking and matching academic expertise.	Industry and Higher Education	University of Lincoln	UK	N/A	Qualitative - Case Study

			For universities need for resources and incentives					
2008	Nuria Toledano and David Urbano	Student entrepreneurial mindset and leaning	Importance of promoting entrepreneurship in rural areas and the role of university in supporting the development of entrepreneurial mindsets through entrepreneurial education	European Journal of International Management	University of Huelva	Spain	N/A	Qualitative – Case Study
2022	Zhonghui Kang	Rural tourism and entrepreneurial attention	Insights into student intention post-graduation – 13.6% business start up	Frontiers in Psychology	University of Xi'an City	China	Students	Quantitative-Questionnaire
2020	Zsolt Bedő, Katalin Erdős, and Luke Pittaway	Entrepreneurial ecosystems and constrained contexts	Identified elements of a university that contributes to entrepreneurial ecosystem development	Journal of Small Business and Enterprise Development	N/A	N/A	N/A	Systematic Literature Review
2022	Valentina Diana Rusu, Angela Roman and Mihaela Brindusa Tudose	Youth and entrepreneurial intentions	Entrepreneurial intentions for rural based students positively related to business knowledge	Engineering Economics	Iasi County, Romania: Alexandru Ioan Cuza University of Iasi (UAIC), and Gheoghe Asachi Technical University of Iasi (UTGA)	Romania	Students	Quantitative
2017	Bushe Lekang, M.S. Nain, and Rashmi Singh	Experiential learning and entrepreneurial skill development	Exploratory study affirms the positive impact of experiential learning	Indian Journal of Agricultural Sciences	Universities Punjab, Uttar Pradesh, Haryana and Uttarakhand	India	Students	Quantitative



2020	Mohua Banerjee, Sayoni Biswas, Poulomi Roy, Sharmistha Banerjee, Suneel Kunamaneni and Alfred Chinta	Career planning, and entrepreneurial intention – agriculture	For career planning in the agricultural sector, family background and entrepreneurial capabilities significant predictor of entrepreneurial intent	Global Business Review	27 State Universities – West Bengal	India	Students -PG	Quantitative
2016	David Charles	Rural innovation and rural university engagement to support innovation activities	Challenges for rural universities regarding scale, scope and expertise. Potential limits to the supports that universities can provide for third mission activities	Science and Public Policy	University of Glasgow; University of the West of Scotland; Herriot Watt University, University of Cumbria; University of the Highlands and Island; University of Hull and University of Lincoln	UK		Qualitative – Case Studies

Appendix 2 Entrepreneurial Universities and Rural Challenges

Year	Author	Research Question/Objectives	Main Results	Journal	Context	Country	Unit of Analysis	Research Design
2018	Robert Reid, Evelyn Rising, Arthur Kaufman, Amanda Bassett, Martha Cole McGrew, Helene Silverblatt and Michael Haederle	Focus on rural health workforce and community health and university partnership.	Significant increases in recruitment of key health care professionals, a more cohesive medical community, a school-based clinic and support for other community challenges, including prevention of teen pregnancy.	Journal of Community Health	Rural setting South Eastern New Mexico	USA	Partnership agreements	Case Studies
2011	David A. McGranahan, Timothy R. Wojan and Dayton M. Lambertz	Creative class, rural and entrepreneurship and outdoor amenities and the sustaining of growth	Confirm the important of entrepreneurial context, workforce creative class employment and growth in no. of employment and establishments particular context with attractive outdoor amenities	Journal of Economic Geography	Periphery	USA	Start-Ups	Empirical Design (Secondary Data)
2015	Poppet Pillay and Jay Mitra	Focus on the role of researchers in supporting the development social enterprise project -IT	Demonstrates the value collaborations between government and profit focused social enterprises. Highlights the role of HEIs in supporting - curriculum development	Journal of Entrepreneurship and Innovation in Emerging Economies	KwaZulu-Natal	South Africa	Individual participants - Students with sample selection strategy	Action Research

2023	Omosho Ademola Olumuyiwa, Kimanzi Matthew Kimweli and Motalenyane Alfred Modise	Factors that influence rural universities studies acquire entrepreneurial skills and strategies used to teach entrepreneurship	Highlighted that family background and lack of support in universities limited entrepreneurial skill acquisition. Experience educational strategies more effective	Education Sciences	2 Rural Universities	South Africa Nigeria	Third Year - Studies Random Selection	Quantitative
2023	Silvana B Balconi, Luis F Dias Lopes, Claudimar P da Veiga, and Wesley V da Silva	Examines the relationship between small family farmer entrepreneurial behaviour and innovation	Three clusters 1) Marketing practices 2) Use of local resources 3) Collaborative interactions	International Journal of Entrepreneurship and Innovation	N/A	N/A	N/A	Systematic Literature Review
2023	Bótáné Horváth, Noémi., Katonáné Kovács, Judith., & Szőke, Szilvia	Examines how using learning among entrepreneurial teams of ecosystem actors – government, universities, society and industry can build rural human and social capital	Difference found in how information flows. Importance of having a common goal among ecosystem actors Takes times to build effective knowledge transfer.	Studies in Agricultural Economics	Mezőcsát and Noszvaj North Hungary	Hungary	Selected experts Delphi study Farmers	Delphi Study & Qualitative (Questionnaire)
2022	Chih-Hung Yuan, Dajiang Wang, Lihua Hong, Yehui Zou and Jiayu Wen	Youth entrepreneurship - return home entrepreneurship	Identified barriers relating to local environment, capital and experience. Affirmed the need for more support for youth entrepreneurship	Frontiers in Psychology	Universities based in Guangdong	China	Student	Quantitative

Appendix 3: Technology Transfer, Knowledge Management and Exchange

Year	Author	Research Question/Objs	Main Results	Journal	Context	Country	Unit of Analysis	Research Design
2022	Ivan Paunovic, Cathleen Müller and Klaus Deimel	Examines the building of entrepreneurial initiatives within the triple helix	Case study highlight the importance of collaboration for entrepreneurship and intrapreneurship in a rural context	Sustainability	Bonn-Rhine-Sieg University of Applied Sciences And Neunkirchen-Seelscheid (NKS) (Municipality)	Germany	Project	Qualitative – Case Study
2014	Peter Wiltshier and Michael Edwards	Explores tourism related knowledge transfer	Identifies the importance of reflexive learning, the benefits of student involvement and knowledge acquisition by communities. New opportunities for further collaboration comes from knowledge gaps	Kybernetes	Wirksworth, Derbyshire	UK	Project	Case Study Problem Based Learning
2022	You (Willow) Wu & Charles E. Eesley (2022)	University graduate migration from rural to urban and its effect on entrepreneurial performance	Confirms that rural to urban migrants can pursue riskier opportunities. Universities provide opportunities for reinvention for	Regional Studies	Tsinghua University	China	Entrepreneurs (Alumni)	Quantitative

			rural migrants in an urban setting University's role is important human capital distribution location post-graduation					
2018	Elisabete Sá, Beatriz Casais and Joaquim Silva	Examines the perceptions of nascent entrepreneurs regarding university industry collaboration programmes regarding support rural entrepreneurship	Identified personal and business value an their effects. Also identified how entrepreneurs contribute - economic, social and cultural	International Journal of Entrepreneurial Behaviour and Research	Municipality of Montalegre	Portugal	Entrepreneurs	Qualitative
2024	Muhammad Setiawan Kusmulyono, Wawan Dhewanto, and Melia Famiola	Explores rural resilience through entrepreneurial leadership	To build rural resilience rural leaders need an entrepreneurial mindset and assertiveness as well as stewardship	International Journal of Rural Management	Desa Cisantana: Cigugur District, Kuningan Regency, West Java Province. Desa Pulosari: Kalapanunggal District, Sukabumi Regency, West Java Province. Desa Panggunharjo :Sewon District, Bantul Regency, Special Region of Yogyakarta Province	Indonesia	N/A	Qualitative



2013	Sheena Carlisle, Martin Kunc, Eleri Jones and Scott Tiffin	Explores in a less developed countries how the triple helix approach is utilised to support innovation and entrepreneurship in the tourism industry	Based on two case studies affirms the triple helix collaborations to support knowledge transfer etc.	Tourism Management	ASSET and Sokoine University Programme	Gambia And Tanzania	N/A	Qualitative – Critical ethnography
2014	L Leavitt, C Hamilton-Pennell and B Fails	Explore how university and public libraries can support entrepreneurship in rural communities	Highlighted community economic gardening model Lessons identified include managing expectations, need for specialised skills, co-ordination challenging	Journal of Business and Financial Librarianship	City of Littleton, Michigan State University and Small Business Association of Michigan and Shepard Advisors	USA	Gardening project	Qualitative – Case Study
2012	Nicholas Theodorakopoulos, Deycy Janeth Sanchez Preciado and David Bennett	Use of intermediary organisation to support technology transfer between universities and rural economies	Details the benefits to fish farmers and coffee producers and the important role intermediaries play in supporting UIC.	Technovation	Cauca Region – Fish Farming and Coffee Production	Colombia	N/A	Action Research
2017	M. Dell'Olio, J. Hassink, L. Vaandrager	Explores social farming legitimacy	Different networks supported social farming Boundary spanners necessary to mediate between people and skills.	Journal of Rural Studies	Tuscany, Latium, Abruzzo and Molise	Italy	Stakeholders in four regions	Qualitative Case Studies

			Creating networks challenging and difficult. Need leaders with vision.					
2017	Piontek and Wyrwich	Investigates the university entrepreneurship in regions	Universities need prepare for demographic changes to support entrepreneurship. Population decline has a negative impact on universities entrepreneurial activities.	Review of Regional Research	Six Regions	German	N/A	Qualitative – Case Studies
2021	Teemu Makkonen	Universities and regional development	Some challenges identified concerning knowledge transfer. Universities need to engage with local economic actors.	International Journal of Knowledge-Based Development	Joensuu	Finland	N/A	Qualitative-Case Study
2018	Wei Yao, Heng Li and Mosi Weng	Universities and Regional innovation Systems	Identified different roles that universities play: technology promoter; practice provider, innovation leader and product/service designer	Triple Helix	Zhejiang University	China		Qualitative – Case Study
2015	Charles Harrington and Ramin Maysami	Universities, regional development and education	Discusses the benefits of university	Journal of Entrepreneurship Education	N/A	N/A	N/A	N/A



			engagement with regions and rural areas for entrepreneurs, businesses and communities					
2006	Olga I. Padilla-Zakour	Food entrepreneurship and university support	Highlights the different supports provided by universities. Notes how universities can value to businesses and food entrepreneurs	Journal of Food Science	The Northeast Center for Food Entrepreneurship	USA	Centre	Qualitative - Case Study

Appendix 4 Delphi Study Panel Questionnaire

Collaboration and Engagement Barriers

Based on your experience which of following **BARRIERS** do you consider to be critical for successful entrepreneurial university engagement and collaboration activities with rural enterprises and communities

Q2 Lack of trust, alignment and mutual understanding concerning expectations and or priorities

- Critical
 - Not Critical
-

Q3 Lack of support, expertise and skill to facilitate engagements and collaboration between entrepreneurial universities and rural enterprises and communities

- Critical
 - Not Critical
-

Q4 Differences between university knowledge and the real needs of rural enterprises and communities

- Critical
 - Not Critical
-

Q5 Differences in time line delivery demands between entrepreneurial universities and rural enterprises and communities

- Critical
- Not Critical
-

Q6 Low level of knowledge about the benefits that can arise from collaborations

- Critical
- Not Critical
-

Q7 Perceptions of academic status and capabilities

- Critical
- Not Critical
-

Q8 Research is not linked to the news or interest of rural enterprises and communities

- Critical
- Not Critical
-

Q9 Conflicts over intellectual property protection

- Critical
- Not Critical
-

Q10 Complicated and bureaucratic technology and knowledge transfer policies and processes

- Critical
 - Not Critical
-

Q11 Tensions between scientific production (such as academic peer reviewed papers) and exploiting technology and knowledge transfer opportunities

- Critical
 - Not Critical
-

Q13 Lack of technology transfer supports and expertise

- Critical
 - Not Critical
-

Q14 Lack of human capital to support collaboration and engagement between entrepreneurial universities and rural enterprises and communities

- Critical
 - Not Critical
-

Lack of critical mass, e.g.: project needs too small to justify engagement with university

- Critical
- Not critical

Start of Block: ENABLERS OF COLLABORATION AND ENGAGEMENT

A decorative graphic at the bottom of the page consisting of a green wave shape that starts thin on the left and thickens towards the right, with a darker green gradient at the bottom.

Enablers of Collaboration and Engagement

Q15 Based on your experience which of following **ENABLING FACTORS** do you consider to be critical for successful entrepreneurial university engagement and collaboration activities with rural enterprises and communities

Q16 Level of business investment in rural places and communities

- Critical
 - Not Critical
-

Q17 Organisation structure and research capacity

- Critical
 - Not Critical
-

Q18 Development and delivery of degree programmes that include student internships, visits and applied projects

- Critical
 - Not Critical
-

Q19 Targeted and tailored events for rural enterprises and communities

- Critical
- Not Critical

Q20 Creating meeting places and creative methods to support collaborations with rural enterprises and communities

- Critical
 - Not Critical
-

Q21 Scope of technology and knowledge transfer mechanisms for commercialisation and no commercialisation purposes

- Critical
 - Not Critical
-

Q22 Academic involvement in technology and knowledge transfer activities

- Critical
 - Not Critical
-

Q23 Trust and strong social connections

- Critical
 - Not Critical
-

Q24 Support from technology transfer office and technology transfer executives

- Critical
 - Not Critical
- 

Q25 Documented intellectual property, technology and knowledge transfer agreements

- Critical
- Not Critical

Q26 Geographical proximity between the entrepreneurial university and rural enterprises and communities

- Critical
- Not Critical

Q27 Government incentives and supports

- Critical
- Not Critical

Q28 Support from development agencies and public research councils - dedicated funding research and collaborative programmes and initiatives

- Critical
- Not Critical
-

Q29 Reputation and experience for collaboration and engagement with rural enterprises and communities

- Critical
 - Not Critical
-

Q30 Cost of technology and knowledge transfer for recipient rural enterprise/organisation

- Critical
 - Not Critical
-

Q31 Other

- Critical
- Not Critical

Start of Block: MOTIVATIONS FOR COLLABORATION AND ENGAGEMENT

Motivation for Collaboration and Engagement

Q32 Based on your experience which of the following **MOTIVATIONAL FACTORS** do you consider to be critical for successful entrepreneurial university engagement and collaboration activities with rural enterprises and communities.

Q33 Scientific opportunities

- Critical
 - Not Critical
-

Q34 Commercial opportunities

- Critical
 - Not critical
-

Q35 Social entrepreneurship and innovation opportunities

- Critical
 - Not Critical
-

Q36 Potential impact on rural enterprises and communities

- Critical
 - Not Critical
-

Q37 Potential impact on rural focused public policies

- Critical
 - Not Critical
-

Q38 Career promotion possibilities

- Critical
 - Not Critical
-

Q39 Problem solving opportunities

- Critical
 - Not Critical
-

Q40 Access to in-kind resources

- Critical
 - Not Critical
-

Q41 Access to funding

- Critical
 - Not Critical
-

Q42 Learning opportunity

- Critical
- Not Critical

Best Practice- Collaboration

Q45 Based on your experience please include any examples of best practice collaborations and engagement between entrepreneurial universities and rural enterprises and communities.

Appendix 5 Delphi Study; Some Background Empirical Papers on Barriers and Enablers of University Industry Collaborations

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