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Agrifood and tourism. The collaboration between universities and business networks for the economic development of inner areas through relational, educational and experiential tourism initiatives.

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List of abbreviations

AR - Augmented reality
CAP - Community-Academic Partnership
CoP - Community of Practice
ERDG - European Regional Development
ESF - European Social Fund
FPA - Framework Programme Agreement
HEI – Higher Education Institution
ICT - Information and Communication Technology
ISC - International Student Competition
KA - Knowledge Alliances
KIC - Knowledge and Innovation Communities
MSE – Multi-stakeholder engagement
MSC – Multi-stakeholder coalition
NIS – National Innovation System
NSIA - National Strategy for Inner Areas
OECD - Organisation for Economic Co-operation and Development
PEU - Perceived ease of use
PPP - Public-Private Partnerships
PU - Perceived usefulness
R&D – Research and development
RDP - Rural Development Programme
RIS3 - Research and Innovation Strategies for Smart Specialization
ROP - Regional Operational Programme
SDGs - Sustainable Development Goals
SME – Small-medium enterprises
SSH - Socio-economic Sciences and Humanities (SSH).
TAM - Technology Acceptance Model
TFEU - Treaty on European Union
TH - Triple helix
TM - Third Mission
TRA - Theory of reasoned action
UBC - University-business collaboration
UIC - University-industry collaboration/cooperation
UIG - University-industry-government
UIL - University-industry linkages
UIR - University-industry relationships
URE - University-Run enterprise
VR – Virtual Reality

INTRODUCTION

This study is the result of a three-years-experience at the Department of Education, Cultural Heritage and Tourism of University of Macerata (UniMc), working in collaboration with a research team coordinated by professor Alessio Cavicchi, committed in place branding and sustainable tourism development in inner and rural areas. This pathway has been developed in the context of an industrial PhD (*dottorato innovativo*), funded by Marche Region Regional Operational Programme (ROP), in which the candidate is required to spend 12 months in different companies for research and development purposes and 6 months abroad. In this specific case, companies involved in the PhD pathway were the Italian Centre of Sensory Analysis (CIAS), the Piceno Lab on Mediterranean Diet and the San Michele Arcangelo social cooperative, member of the association Cluster Agrifood Marche. As for the international mobility, because of the Covid-19 pandemic, it was possible to spend only 2 months (instead of 6) at Porto Business School in Porto (Portugal), a university strongly committed in university-business collaboration (UBC) projects. The PhD programme also included the involvement of 3 academics, working in different universities (University of Macerata, Polytechnic University of Marche and University of Urbino) and different but correlated disciplinary fields (agri-food marketing and tourism, computer engineering and agricultural economics).

Both the academic activity and the applied research within companies can be considered as part of a process of civic engagement (Goddard & Kempton, 2016; Goddard *et al*., 2016; Charles, 2016) of UniMc in the surrounding territory and with the local stakeholders. Indeed, as highlighted by its strategic plan (UniMc, 2018), in order to achieve its third and fourth mission, UniMc conceives itself as a common good and a public space interacting with the territory in which it is embedded (Tomasi *et al.,* 2021). To this aim, in line with the National Strategy for Inner Areas (NSIA) (Barca *et al.,* 2014), the Regional Operational Programme of the European Regional Development Fund (ERDF ROP) 2014-2020 (Marche Region, 2014) and the Regional Smart Specialisation Strategy (S3) (Marche Region, 2016), UniMc works with local, national and international key actors to build network and promote the territory, acting as facilitator for discussions and planning working tables involving various actors, to foster co-creation processes oriented to sustainable development (Tomasi *et al.,* 2021). In line with these goals, since 2009, UniMc, through the activity of a team from the Department of Education, Cultural heritage and Tourism, has been coordinating or been involving in many European, national and local projects (*table 1*), which have the common main objective of considering co-creation for innovation (Trencher *et al.*, 2013; 2014), and quadruple helix (QH) collaboration (Carayannis, & Campbell, 2006; 2009; 2010) as crucial elements to promote Marche Region inner and rural areas in a tourism perspective.

Indeed, the presence of universities in a region is crucial, especially in the case of rural areas and/or less central regions, where universities often represent "a unique repository of knowledge" because of the lack of other institutions providing similar services, acting as "vital partners necessary for the success of particular policies and projects" (Boucher *et al*., 2003: 890). As highlighted by Rinaldi and colleagues (2011), universities can play a key role in the development of network activities to foster rural tourism for at least three reasons. First, they provide scientific knowledge (*innovator*) aimed, for example, at identifying assets and peculiarities of the area; to this purpose they can train students, provide graduates to local economy, and deliver short courses or seminars to update and extend the knowledge of local operators (*trainer*). Thirdly, they can conduct discussions among stakeholders, by engaging actors since the beginning of the networking project (*facilitator*), adopting a *feed/ guide approach*, by leveraging other partners know-how and resources (*director/linker*) or a

bottom up/passive approach, by empowering key community stakeholders to self-diagnose problems and creating conditions that will lead to a self-realised transformation (*facilitator/empowerer*).

Table 1 - Overview of projects representing UniMc civic engagement (source: author's elaboration on Tomasi et al., 2021).

Project	*Duration*	*Type of funding*	*Main goal(s)*	*UniMc involvment*
Marche Excellence	2009-2012	Private-Public	▪ Creating a network among *Made in Marche* producers to promote the region.	▪ Expertise's provision ▪ Stakeholder engagement for networking.
Farm Inc	2013-2015	Leonardo Lifelong Learning Programme	▪ Providing marketing training to agri-food companies and facilitating skills' acquisition.	▪ Stakeholder engagement for the collection of learning needs ▪ Design, creation and provision of e-learning materials ▪ Management of the web portal.
Gastronomic Cities	2013-2105	URBACT	▪ Promoting gastronomy as a key for urban development, by increasing the reputation of Fermo as a cultural and gastronomic destination.	▪ Research activities ▪ Stakeholder engagement ▪ Contribution in the elaboration of the Local Action Plan ▪ Experiential learning activities with students.
International Student Competition	2015-ongoing	Local public and private sponsorships UniMc internal funds	▪ Enhancing the Mediterranean Diet as a leverage for the touristic development of Fermo Area though experiential, project-based and problem-based learning.	▪ Co-creation of the initiative ▪ Engagement of participants and professors. ▪ Design of the didactic program.
Innovamarche	2016-ongoing	EIP-AGRI	▪ Supporting the implementation of bottom-up innovative and sustainable projects.	▪ Supporting innovation brokering processes, acting as an intermediary for innovation. (e.g., facilitating the discussion, supporting the creation of operative groups, helping in formulating innovative ideas).
ARIEL	2018-2019	Interreg-Adrion (ERDF)	▪ Promoting technological and non-technological solutions for innovation and sustainability in small scale fishery and aquaculture in Adriatic-Ionian area.	▪ Innovation brokering for collecting learning needs. ▪ Design and creation of e-learning materials ▪ Participation to learning events for presenting the materials provided
The Wine Lab	2016-2019	Erasmus+	▪ Stimulating knowledge flow, ▪ sharing challenges and solutions, and jointly generating and accelerating ▪ innovation in the wine sector.	▪ Research activities ▪ Stakeholder engagement to boost cross-fertilisation. ▪ Organisation of participatory approaches to facilitate the dialogue among stakeholders and collect learning needs ▪ Organisation of experiential learning events ▪ Design and provision of e-learning materials.
FOODBIZ	2016-2019	Erasmus+	▪ Promoting university-community co-creation for innovation and knowledge exchange ▪ Promoting the acquisition of employability skills in students through their involvement in context-based learning with local agri-food businesses.	▪ Organisation of participatory experiential learning workshops involving stakeholders and students. ▪ Collection of learning needs and design of e-learning materials. ▪ Support in the elaboration of the Handbook and Guidelines.
Eureka PHD programme	2012-ongoing	ESF (ORP)	▪ Providing co-funded scholarships for PhD innovation projects ▪ Implementing UBC	▪ Application for obtaining several scholarships in collaboration with local companies. ▪ Tutoring of PhD Students.
Smart Marca	2018-2020	RDP	▪ Promoting Fermo area as a destination through a mobile app.	▪ Stakeholder engagement ▪ Contents creation
Ditemp	2019-2021	Erasmus+	▪ Providing a model of intervention to integrate digital transformation concept in curricular education	▪ Definition of learning outcomes for the development of competences related to digital transformation in business. ▪ Design of a learning pathway ▪ Training of trainers. ▪ Provision of guidelines.
REACT	2020-2021	Erasmus+	▪ Developing and testing a new online self-reflection tool built-on HEINNOVATE, exploring its added value in the framework of RIS3 and regional development.	▪ Research activities ▪ Stakeholder engagement with QH regional actor ▪ Design and testing of HEInnovate for RIS3

Background context

As shown in *table 1*, most projects carried out by UniMc in last 12 years are located (or involve) in Marche Region. As observed by Tomasi and colleagues (2021), Marche Region could be easily described through the words of Guido Piovene (1966), who considered this territory as a "distillate" of Italy, since its landscapes and works of art are the most typical Italian ones. Morphologically, the regional territory is divided into "vertical stripes" coming from the inner to the outer, corresponding to the Apennines, the hills (mid and high) and the Adriatic coast, which cover respectively, the 31%, the 33% and the 34% of the regional extension. Thirteen rivers run parallel from the mountains to the sea, creating the so-called "comb" structure. This conformation has historically influenced the economic development of the region, that has been concentrating most of the economic activities in the valleys and coastal areas, where several industrial districts, mainly based on family-run SMEs and specialised in fashion, shoes, furniture, and manufacturing industries, were born. The localisation of economic activities along the coast and in the mid-hills (Taffetani *et al.,* 2019), contributes to the definition of a polycentric territorial model (Mantino & Lucatelli, 2016), in which the larger centres act as attractors to smaller ones, which in many cases are only able to provide residents with limited access to essential services. This is the case of mountain and high hills areas in Marche Region, which since the Second World War because of an economic system based almost exclusively on agriculture, have been experiencing a progressive depopulation and a gradual loss of essential services (Pierantoni *et al.*, 2019).

Main peculiarities of these territories can be summarised in the expression "inner areas", representing the 60% of the Italian territory, the 53% of the municipalities and 23% of the population. Inner areas can be defined as fragile territories, distant from the centres of supply of essential services (education, health, and mobility), affected by depopulation and an ageing population, as well as by low levels of employment and poor industrialisation. (Barca *et al.*, 2014). Distinguished by a vulnerable landscape, but rich in environmental and cultural resources (Toscano, 2011; Mantino & Lucatelli, 2016; Marchetti *et al.,* 2017), these areas find their main strength in the dual nature of their diversity, both natural and cultural, varying from one place to another and including agricultural and construction practices, traditions, crafts. However, to be competitive in the global market, this variety needs to be organised through an effective integrated approach, pursued by the NSIA, through a set of actions aimed at curbing depopulation and relaunching the economy of inner areas, by supporting the establishment of local systems and networks (Barca *et al.,* 2014). Marche Region, in the framework of 2014-2020 Rural Development Programme (RDP) and together with the Regional Operational Programmes (ROPs) of the European Regional Development Fund (ERDF) and the European Social Fund (ESF) 2014-2020, adopted the strategy for inner areas as a territorial tool for the integration of development policies through 4 main steps: (1) the identification of project areas; (2) the elaboration of a strategy of area (3); the definition of the Framework Programme Agreement (FPA); (4) and the implementation of intervention sheets. As shown in *figure 1*, three regional inner areas have been identified in Marche Region: the inner area "Basso Pesarese e Anconetano", the inner area "Alto Maceratese", and the inner area "Ascoli Piceno". Overall, these areas involve 98 of the 225 municipalities of Marche Region and 197.198 inhabitants corresponding to the 13% of the regional population.[1]

These areas mainly correspond to the portion of regional territory affected in 2016 by the earthquake that hit central Italy regions (Abruzzo, Marche, Lazio, and Umbria) and included in the crater area. The 2016 "seismic crater" extends for a total of about 8,000 km^2, corresponding to the 17.4% of the total area of the 4 regions affected by the earthquakes. Half of the "seismic crater" is in Marche Region and corresponds to more

[1] Agenzia per la coesione territoriale. Regione Marche: https://www.agenziacoesione.gov.it/strategia-nazionale-aree-interne/regione-marche-aree-interne/ (24.10.2021).

than 40% of the regional territory. In the region, there are 87 of the 140 municipalities of the crater, mostly located in the southern provinces of Macerata, Fermo and Ascoli Piceno. Before the earthquake, 348.473 people lived in Marche Region seismic crater. This area was the less densely populated (88 inhabitants per km^2) considering the regional average (164 inhabitants per km^2), because of a general migration trend of working age population towards coastal and industrialized areas (Cerquetti *et al.,* 2019). Five years later, the 87 crater municipalities registered a decrease of 16.891 residents, passing from 348.473 inhabitants in 2016 to 331.582 in 2021 (CNA Marche, 2021). Concerning economic activities, after the earthquake, in the Marche crater, a total of 406 businesses closed their activities. The majority is linked to agriculture and tertiary, mainly traders and transport companies) with a decrease of about 1.500 jobs (CNA Marche, 2021). Seismic events had also a significant impact on the reduction of tourist flows, but before the earthquake, in the period 2009-2016, the number of businesses involved in tourism services and professional activities increased, both in the Marche and in the whole crater. In particular, the number of employees working in the catering and accommodation sectors, typically linked to the tourism sector, increased by 50% in the crater area. This trend is confirmed by arrivals, that in the period 2013-2016 increased (Cerquetti *et al.,* 2019).

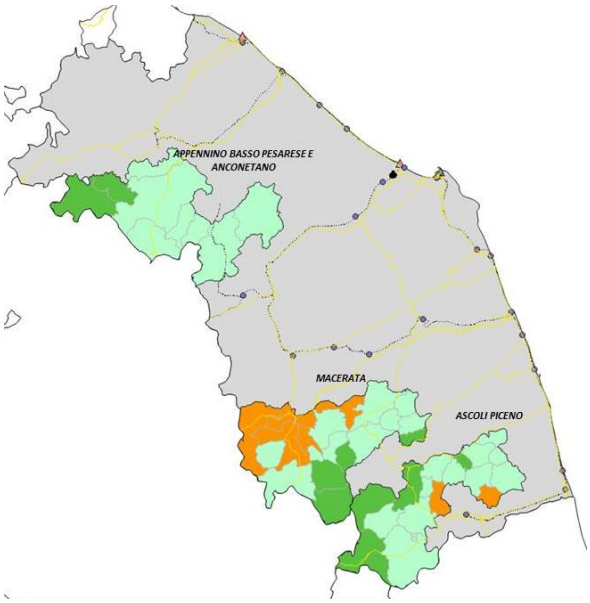

Figure 1 - Inner areas in Marche Region (source: Agenzia per la coesione territoriale).

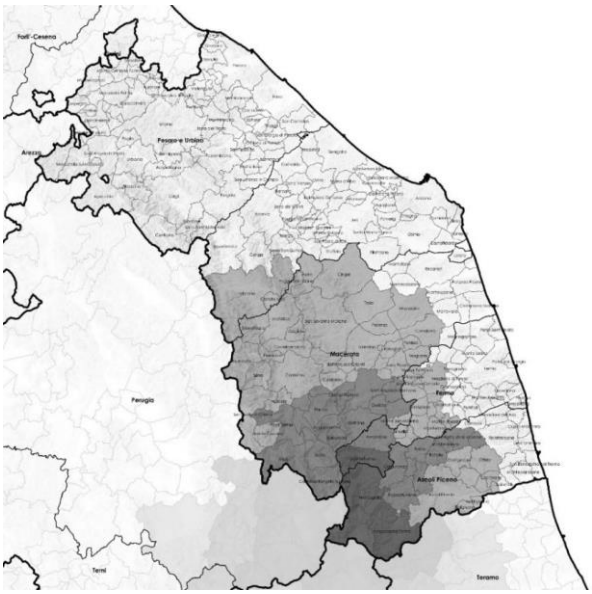

Figure 2 - Marche Region 2016 seisimic crater (source: Pierantoni et al., 2019).

In this perspective mountain and high-hills areas of Marche Region can be considered as disadvantaged areas. On one hand, they show a fragility mainly depending on four factors:

- depopulation and ageing population.
- marginality and physical distance from central areas.
- low distribution of industries with a corresponding rural production vocation.
- occurrence of disruptive events.

On the other, they represent a significant basin of unexploited cultural social, artistic, and ecological resources, that could constitute a potential for economic, social, and cultural development. In the globalised world, such richness represents a great opportunity, which can attract a new and growing, but not yet satisfied, demand for authenticity in tourism and consumption (Grayson & Martinec, 2004; Pine & Gilmore, 2007; Beverland & Farrelly, 2010).

In this specific context, a collaboration among businesses and knowledge organisations, can help this area to address the needs of globalisation, face economic and societal challenges related to marginality, and

enhance its cultural and social strengths. The civic engagement of UniMc, strongly embedded in a rural inner area, is part of this scenario and consists in a continual process of co-creation with local stakeholders, aimed at supporting networking to foster sustainable rural development, with a specific focus on rural tourism (Rinaldi *et al.,* 2011). As for methodological approach, in carrying out this engagement, UniMc mainly adopts action research methods. Action-research focuses on the relationships among academics, professionals and stakeholders and applies the experience of researchers to reality to study entrepreneurial and managerial behaviours (Gilmore & Carson, 1996; Reason & Bradbury, 2001; Grant *et al.,* 2008). To this aim, action research adopts a mix of techniques, mainly based on mutuality, which creates relationships and ensures reciprocal flows of communication, and commitment, which considers the personal involvement and closeness of the research design to the observed phenomenon. In this approach also experiential learning is included since it provides a holistic vision of a phenomenon. Indeed, experience, integrating perceptions, cognition, and behaviour (Kolb 1984), is a relevant element to collect information and learn something new or reinforce existing conclusions. In line with this action research approach, UniMc involved public and private actors within place-based joint projects, with the aim to identify specific needs and co-create innovative solutions to real problems, by combining global knowledge and local co-production and stimulating knowledge exchange (Tomasi *et al.,* 2021).

Research hypothesis and research questions

In this context of collaboration, the candidate developed her own research design, exploring potentials and challenges of collaborative linkages among universities, business networks and all QH actors for the economic development of inner areas, with a specific focus on tourism initiatives.

Collaborative linkages could assume various forms and involves several actors, as in the case of university-business collaboration (UBC) and university-industry (U-I) linkages - which include all types of interactions between HEIs and firms, aimed at achieving mutual benefits for all parties involved - as well as university-industry-government (UIG) interactions, including policy makers and Community-Academic Partnerships (CAPs), which, in a QH perspective, also involve community members. All these forms of cooperation can be considered in the framework of public-private partnerships (PPP), consisting in the sharing of knowledge, skills, capital, and other resources among different stakeholders able to trigger interactive processes and address policies, projects, and public service issues through joint development (Oppio & Torrieri, 2016). These collaborations could play a crucial role in fostering local development in disadvantaged areas (Kolehmainen *et al.,* 2016; Marques *et al.,* 2019; Ferreira *et al.,* 2021). In this field, opportunities for disadvantaged areas could also relate tourism (Lee, 2020; Nordberg et al.,2020; Rinaldi et al., 2020; Tomasi *et al.,* 2021).

In the last two decades, with the arise of the experience economy (Pine & Gilmore, 1998), tourism has been experiencing a growth in the demand for more sustainable experience-based authentic interactions with locals (Pine & Gilmore,1998; Beverland & Farrekky, 2010; Paulauskaite *et al.,* 2017). Indeed, recent tourism trends show that travellers are increasingly looking for unique and once-in-a-lifetime experiences and choosing to become more immersed in the daily local life (Booking.com, 2019; Mittiga *et al.,* 2019). In this perspective, experiential tourism can be defined as a form of tourism connecting tourists with the essence of a place and its communities (Dodds & Jolliffe, 2016). It engages visitors in immersive activities, involving all senses and creating connections on 4 different levels, namely emotional, physical, spiritual, and intellectual (Neuhofer *et al.*,2014). To provide an immersive experience, this form of tourism could include learning and relational components. These elements, if properly declined provide a distinctive advantage and make a destination suitable and appealing for entertainment, enrichment, and education purposes for both tourists and local

communities (MacDonald & Jolliffe, 2003). Educational tourism is a learning experience organised and managed by institutions providing educational programmes and aimed at achieving learning goals, by exploiting the opportunities offered by a destination (Tomasi *et al.,* 2020:6). This form of tourism is strongly linked to experiential learning, since it is conceived as a learning activity based on the direct experience through a "meaningful discovery" (Boydell, 1976; Kolb, 1984). In these terms, educational tourism covers various types of tourism, such as cultural tourism, ecotourism, volunteer tourism, agritourism, as well as study abroad programmes for HE students, school excursions and exchange programs, language travels, and adult study tours (Ritchie *et al.,* 2003; Richards, 2011a; Sie *et al.,* 2016; Nugroho & Soeprihanto, 2016). The concept of relational tourism puts the emphasis on relationships established between those who spend time in a destination as tourists and those who live there, as locals. In this approach, relationship is considered as an element of differentiation, focused on the authenticity and uniqueness of the destination (Richards & Wilson, 2006). Relational tourism includes within the tourism experience the daily lifestyle of the local community (Purpura *et al.,* 2007), thus encouraging community engagement (Okazaki, 2008), increasing residents' awareness about local culture, and stimulating positive relationships between tourists and locals (Bimonte & Punzo, 2016; Lee & Jan 2019).

These forms of tourism mainly address a tourist keen on being informed about the culture of the place, experiencing folklore, natural landscapes, and historical landmarks, enjoying activities in a rural setting such as walks, sports, festivals, crafts, and getting in direct contact with local community. New technologies can play an essential role in triggering these processes. Several studies, in fact, confirmed the significance in using Information and Communication Technologies (ICTs) to support tourism experience, both in terms of number of accesses and of quality of knowledge spreading (Gretzel & Jamal, 2009; Tussyadiah & Fesenmaier, 2009; Huang et al., 2010; Neuhofer et al. 2014; Buhalis, 2019). ICTs include various electronic tools that allow information to be accessed, transmitted, stored, and modified, such as telephony, the Internet, live broadcasting technologies, and recorded broadcasting technologies (Unesco, 2009:120). In last decades, these technologies, completely changed the way people view and interact with the world and how knowledge is produced and transmitted both in every-day life (Manyika *et al.* 2013) and in business environment, creating a new and more competitive global market (Porter 2001; Jorgenson & Vu, 2016). ICTs have been increasingly playing a major role in tourism since the 1980s (Poon 1993; Sheldon 1997; Buhalis 2003), globally transforming this sector and giving rise to the multifaceted phenomenon of E-tourism (Buhalis & O'Connor 2005; Buhalis & Law 2008; Pierdicca *et al.* 2019). Digital technologies can offer to tourism enterprises the opportunity to reach customers and tourists around the globe, providing them with many kinds of information (Bethapudi 2013). On consumer's side, ICT helps tourists and travellers to navigate through unfamiliar places and access any time and from anywhere to tourism products information, planning trips and obtaining information on roads linking to the sites and utilities availability (Shanker 2008; Hughes & Moscardo 2019).

Considering these premises, this study explores relationships among triple/quadruple helix approaches, disadvantaged areas, and sustainable tourism in Marche Region. Indeed, as confirmed by regional thematic clusters[2], Marche Region, and specifically mountain and high-hills areas, offer a wide range of opportunities in terms of culture heritage, gastronomy, events, handcrafts, nature, and landscapes. The region has also a strong vocation in terms of agri-tourism and cultural tourism, which, due to their relational and learning components, have many potentials in terms of experiential tourism. In these terms, community-based cultural and agri-food tourism, through the implementation of collaborations among different actors, can make Marche Region inner areas a destination suitable for immersive, relational, and learning experiences.

Starting from this hypothesis, this work tries to answer to the following research questions:

[2] https://www.turismo.marche.it/Vivi (21.10.2021).

- Which role can quadruple helix collaborations play in promoting experiential and relational tourism in Marche Region disadvantaged areas?
- Which role can ICTs play in promoting experiential and relational tourism in Marche Region disadvantaged areas?

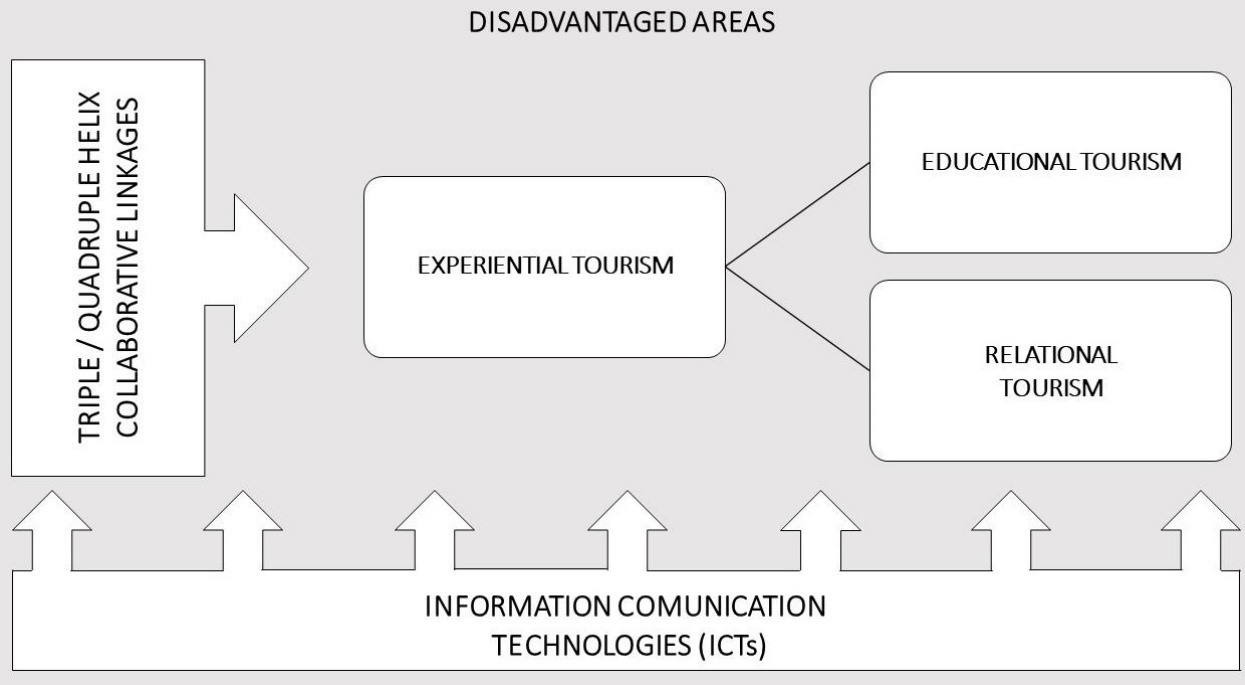

Figure 3 - Conceptual framework of the research (source: author's elaboration)

Outline of the research

The following chapters explore potentials of collaborative linkages to foster economic development in inner areas through experiential and relational tourism initiatives. To this aim, the study is divided into three sections.

The first part focuses on drivers, barriers, and main implications of UBC in disadvantaged areas. Thus, the first chapter provides a reasoned literature review on these topics. After a preliminary analysis of various conceptual and geographical declinations of disadvantaged areas and different forms of collaboration among triple and QH actors, 90 relevant articles are identified and analysed.

The second part analyses potentials of QH collaborations and ICTs to foster experiential tourism in a rural area. To this aim the case of Smart Marca project is presented. Smart Marca is an example of public-private partnership which involved different actors through participatory processes in the creation of a smartphone mobile application aimed at promoting Fermo Area as a cultural and agri-food destination. The second chapter analyses the opportunities related to public-private cooperation for the implementation of ICTs to promote cultural heritage tourism. After a literature review on the role of cooperation between private and public sectors and the most relevant ICTs for the promotion of cultural heritage, the analysis moves to travel apps, by illustrating features, main trends and some applications of this technology to cultural heritage and tourism. In the second part of the chapter the connection between tourism, cultural heritage and digital technologies is analysed through the description of Smart Marca app. The third chapter investigates the connections among tourism, cultural heritage, and ICTs, by providing an assessment of how these applications can influence customers' intentions to visit a destination. To this aim, the Technology Acceptance Model (TAM)

has been adopted as a framework to explore customer intentions to adopt tourism apps, use Smart Marca app and visit Fermo area.

The third part considers potentials of QH collaboration to foster relational tourism. In this section the case of *Agritur-Aso* Association is presented. *Agritur-Aso* is a local association located in a rural area and composed by 22 rural accommodation facilities and farms offering hospitality through the combination of experiential, relational and community-based tourism activities. The fourth chapter presents a longitudinal case study and explores the role of the university in the creation of knowledge networks in a remote rural region. Specifically, the case of the collaboration between UniMc and *Agritur-Aso* association, is analysed as a form of knowledge network aimed at promoting tourism in relational perspective. The last chapter analyses relational tourism and *Agritur-Aso* case in light of the Covid-19 pandemic, focusing on the *Staffetta della Cucina Ciocheciò*, an online gastronomic "relay race", organised by the *Agritur-Aso* association, in collaboration with other actors, during the 2020 lockdown. This chapter analyses how and to what extent the model of relational tourism described in the previous chapter and heavily related to the direct contact among guests, hosts and local communities, can be pursued in the post-COVID-19 scenario and which role could be played by new technologies.

Figure 4 shows the outline of the research.

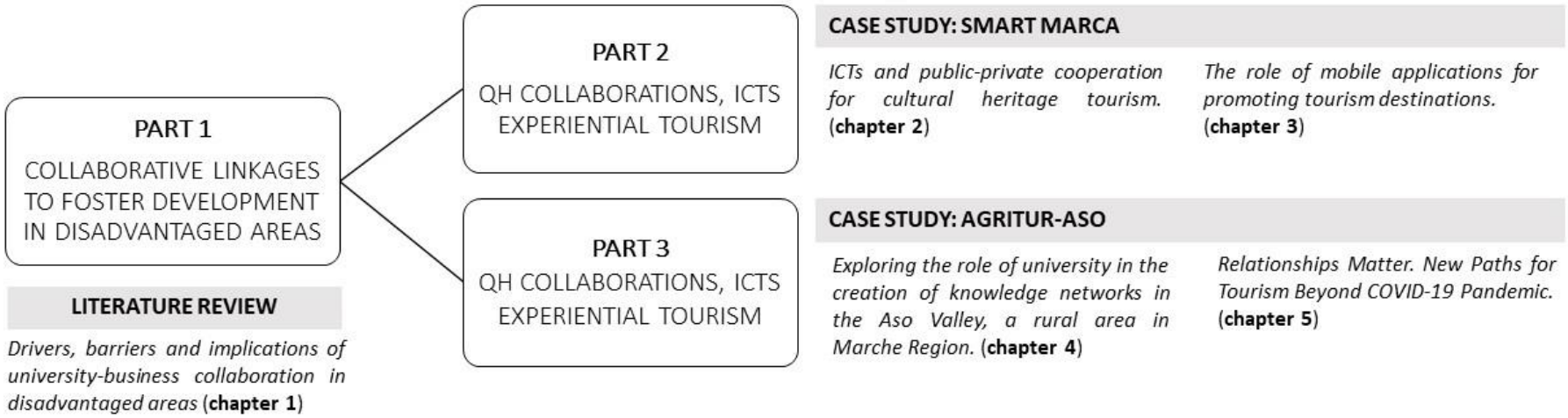

Figure 4 - The outline of the research (source: author's elaboration)

For what concerns methodology, both quantitative and qualitative approaches have been chosen. A survey based on TAM framework has been elaborated and conducted on a sample of 128 university students to explore customers intentions to adopt tourism apps and visit a destination. In this case a grid of 8 influencing factors has been built, to investigate young users' attitudes towards continuing using Smart Marca app, adopting other similar mobile apps and visiting one or more of the attractions presented within the app (***chapter 3***). As regards the *Agritur-Aso* case a questionnaire was conducted with *Staffetta*'s participants, with the aim to examine the role played by technology, locality, and gastronomic traditions in maintaining existing relations and creating new ones within a relational tourism system of offer (***chapter 5***). Semi-structured interviews were conducted with the *Agritur-Aso* Association president (***chapter 4***) and *Staffetta*'s organizers (***chapter 5***). Moreover, a focus group with international students participating to *Agritur-Aso* iniatives was organized (***chapter 4***). In chapter 4, to gain an in depth understanding of potentials of collaboration between the university, a business networks and members of community Participatory Action Research (PAR) methods were also applied. PAR can be defined as a "participatory democratic process" (Reason & Bradbury, 2001: 1), aimed at understanding reality, by changing it (Capriello, 2012; Fals-Borda, 2001; McTaggart, 1997; Reason & Bradbury, 2006). It is participatory, since it treats participants as competent and reflexive agents capable of participating in all aspects of the research process (Brydon-Miller *et al.,* 2003; Kindon *et al.,* 2007). Researchers work in partnership with communities in a manner that generates knowledge and actions immediately feasible to examine and solve a problematic situation and lead to actions to produce social transformation (Brydon-Miller *et al.*, 2003; Greenwood, 2002). To this aim, research activities included interviews, observations, formal and informal meetings between the researchers and the association members. Also, desk research was conducted, by monitoring tourism promotion websites, blogs, social media pages/profiles, and YouTube channels.

Notes for the reader

This PhD thesis is a collection of papers that were produced as part of the three-year research project described. These contributions have been presented at international conferences and, in some cases, published in conference proceedings, journals or books.

A revised version of chapter 2 has been published by *Il Capitale Culturale. Studies on the Value of Cultural Heritage*, in the special issue "Food and Wine: representations, cultural identities and co-creation for sustainable development". The publication is the following: Ferrara, C., Pierdicca, R., Paolanti, M., Aleffi, C., Tomasi, S., Paviotti, G., Passarini, P., Mignani, C., Ferrara A., Cavicchi, A., & Frontoni, E. (2020). The role of ICT and public-private cooperation for cultural heritage tourism. The case of Smart Marca, *Il capitale culturale. Studies on the Value of Cultural Heritage. Supplementi*, 10, 189-205 (doi: 10.13138/2039-2362/2424).

A revised version of chapter 3 has been presented to the 6th International Scientific Conference ToSEE - Tourism in Southern and Eastern Europe (University of Rijeka, 30 june -2 july 2021) and has been accepted to be published in conference proceedings. The publication is the following: Ferrara, C., Pierdicca, R., Balestra, M., Mignani, C., Frontoni, E., & Cavicchi A. (2021). ICTs and mobile applications for promoting tourism destinations: the case of Smart Marca app. *Conference Proceedings of the 6th ToSEE Conference* (*in press*).

A revised version of chapter 4 has been accepted to be published as a chapter in the book *Universities and Regional Engagement*. *Universities and Regional Engagement*. *From the Exceptional to the Everyday.* The publication is the following: Tomasi, S., Ferrara C., Paviotti, G., Aleffi, C., Cavicchi A., & Bertella, G. (2022). Exploring the role of the university in the creation of knowledge networks in the Aso Valley, a rural area in Marche Region (Italy). In Iakovleva, T., Thomas, E., Nordstrand Berg, L., Pinheiro, R., & Benneworth, P. (eds). *Universities and Regional Engagement*. *Universities and Regional Engagement*. *From the Exceptional to the Everyday*. Routledge (*forthcoming*. ISBN 9780367713072).

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PART 1
Collaborative linkages to foster development in disadvantaged areas

Tullio Pericoli, *Paesaggio Instabile,* oil on canvas (1998)

CHAPTER 1 - Drivers, barriers, and implications of university-business collaboration in disadvantaged areas

Over the last decades, the rise of the knowledge economy, along with globalisation and financial and environmental crises, have made knowledge increasingly more recognized as a determinant source for economic growth and competitiveness. In this context, Higher Education Institutions (HEIs)[3], as a source of new knowledge, have been experiencing a structural and functional transformation (Deiaco *et al*. 2012; Benneworth *et al*. 2016). Throughout this process, universities have been redesigning their mission and activities (Trencher *et al.*, 2014; Rubens *et al.,* 2017; Dalmarco *et al.,*2018), moving away from their traditional "ivory tower" position, and shifting their focus from teaching (first mission) and research (second mission) towards a more entrepreneurial and proactive role (Etzkowitz & Leydesdorff 2000; Mowery & Sampat 2005; Saad *et al.*, 2015; Saad & Zawdie 2011). This "new" role is commonly labelled as "third mission". The term Third Mission (hereinafter TM) refers to a wide set of activities performed by HEIs, consisting of a general contribution to society (Compagnucci & Spigarelli, 2020). This contribution depends on universities typologies, such as entrepreneurial university (Etzkowitz & Leydesdorff 2000), functions (Miller *et al.*, 2018) and collaboration models as Triple Helix (TH) partnerships (Etzkowitz & Leydesdorff 2000; Leydesdorff, 2012). According to Secundo and colleagues (2017), TM includes the generation, use, application, and exploitation of knowledge with external stakeholders and society, with the aim of promoting entrepreneurial skills, innovation, social welfare, and the creation of human capital. Other scholars (Etzkowitz, 2003; Rothaermel *et al.*, 2007) also focus on the role of TM in supporting the development of science and society through various forms of communication and social engagement. Mora and colleagues (2015) classified TM activities into three main categories: research (technology transfer and innovation), teaching (lifelong learning/continuing education) and university engagement in social and cultural life. According to this view, TM is the result of a dialogue between university and the social, cultural, economic, and political environment in which it is embedded. This dialogue includes a wide set of links to industry, government, and civil society (Vorley & Nelles, 2009; Predazzi, 2012; Giuri *et al.*, 2019), which can significantly support both firms' competitiveness and local growth (D'Este *et al.*, 2013).

Among those links, the creation of connections with businesses and industry represents one of the most relevant means that can be used by academia to fulfil TM goals. (Nsanzumuhire & Groot, 2020). The development of the TH model, describing the interactions among the three helices (government, university and industry) in the generation of new knowledge and innovation (Etzkowitz, 1994; Etzkowitz & Leydesdorff, 1995), and its evolution towards the fourth helix, which includes the civil society (Trencher *et al.,* 2013; Cavicchi *et al.,* 2013; Carayannis *et al.,* 2018), reframed the role of universities, by increasing their engagement in society and into the economic environment (Orazbayeva *et al.,* 2019). These models proposed a "new position" for HEIs, according to which the interaction with businesses is not enough to fulfil the potential of collaborative linkages. Government and civil society also play a key role in creating and leading knowledge society (Abramo *et al.,* 2012). Within this process, according to the S3 promoted by the European Commission (Rinaldi *et al.,* 2018), universities can act as a means for cross-fertilisation and co-creation in different thematic

[3] *HEIs* are understood to mean all types of institutions, which provide higher education. These institutions must be formally recognised by the relevant national/regional authority and includes Universities, Universities of applied sciences, Polytechnics /technical universities, Colleges and tertiary schools. In this contribution the terms HEI and university will be considered and used as synonymous.

areas and for different actors, can support innovation as well as the achievement of sustainable development, by contributing to the rise of a trans-disciplinary, practice-based knowledge generation (Tomasi *et al.,* 2021).

The 3 or 4-actor collaboration is particularly relevant in the creation and dissemination of knowledge and innovation in developing countries (Guimón, 2013), as well as in the development of disadvantaged areas. On one hand disadvantaged areas show a fragility depending on many causes and related to some specific conditions, which can be regarded as "wicked problems" (Rittel & Webber 1973).

On the other hand, they are important areas of unexploited cultural social, artistic, and ecological resources, with a potential for economic, social, and cultural development. In this context, the collaboration among businesses and knowledge organisations can help regions to address the needs of globalisation and knowledge economy, understand and build on the cultural and social strengths of a place and facilitate dialogue between local businesses.

Despite the growing interest in collaborative linkages and many studies being conducted describing the state-of-the-art of the phenomenon and providing a quantitative overview of the literature, few authors focused on the concept of "disadvantaged area"; furthermore, those who addressed the issue considered it separated from the various/other? forms of collaboration. This paper aims at filling this gap, by undertaking a detailed literature review in order to investigate drivers and barriers of collaborative linkages in disadvantaged areas and explore their main implications for local and regional development.

Therefore, in the first part a literature review focusing on different forms of collaboration among TH and QH actors, meanings and dimensions of disadvantaged areas and drivers and barriers of multi-actors' collaboration is provided. In the second part, the methods used for the literature survey are outlined: based on Web of Science and Scopus databases, 90 relevant articles were identified and analysed and results are presented and discussed. Conclusions point out that collaborative linkages for disadvantaged areas need to be considered in a wider perspective and highlight two main implications emerged from the review: the involvement of communities in local development processes focused on tourism and the opportunities from Research and Innovation Strategies for Smart Specialization (RIS3).

Literature review

Forms of collaborative linkages

Universities and businesses have been transferring knowledge and joining forces for their own and broader societal benefits for centuries (Galan-Muros & Plewa, 2016). Nevertheless, the interest in UBC has significantly increased since the 1990s , simultaneously with a growing reliance of industrial policy on knowledge transfer as a tool for the development of knowledge-intensive economies and increased competitiveness (Bozeman 2000; Muscio, 2012). As a result, the topic became the object of academic, policy and managerial discussions (Wilson, 2012; Davey *et al.,* 2018; Galan-Muros & Davey, 2019).

Galan-Muros & Plewa (2016:370) defined this kind of interaction as a strategic alliance, based on cooperative and voluntary agreements aimed at exchanging, sharing or co-developing capital, technology, or specific assets. Conceptually, industry can be included within the business category. However, even if the terms "business" and "industry" are frequently assumed to be synonymous, literature uses them separately, considering business as the activity of making money by producing or buying and selling goods, or providing

services[4], and industry as those business activities that produce a particular type of thing or provide a particular service[5] to satisfy consumers' demand using material resources readily available. This is the main reason why, even though the definitions refer to similar or identical concepts, the literature on university-business linkages refers distinctly to university–business cooperation (UBC) and university-industry (U-I) interactions.

UBC includes any type of interaction between HEIs and business aimed at achieving mutual benefit (Davey *et al*., 2011; 2018; Healy *et al*., 2014; Plesniarska 2018; Galan Muros & Davey 2019; Orazbayeva *et al.,* 2019). The first review on UBC was undertaken by Lambert (2003), who analysed the state of art of this form of collaboration in the UK, by focusing on the impact it has on research and development (R&D), the businesses already collaborating with university and policy recommendations. UBC has later strongly changed both in quantitative and qualitative terms, thanks to two main factors that acted as a stimulus for cooperation: a major awareness of the central role of universities in providing high-level skills, world-class research base, oriented to innovation, and the increase in government funding initiatives (Wilson, 2012). A second and third review on these topics were provided in 2011 and 2018 (Davey *et al.,* 2011;2018), in the project "The State of University-Business Cooperation in Europe", promoted by the European Commission in 2010-11 and 2016-17. The projects aimed at providing a comprehensive and up-to-date understanding of the state of UBC in Europe, from the perspective of both HEIs and businesses. They explored the state of UBC in different countries, by analysing drivers and barriers from the perspective of different stakeholders, regulatory frameworks and the type and extent of existing measures supporting UBC at a national level.

Similar to UBC, U-I interactions refer to any form of interaction connecting universities and businesses to each other (Puffal *et al.,* 2014). U-I interactions include:

- university-industry collaboration or cooperation (UIC): interaction between any member of the higher educational system and industry in order to encourage knowledge and technology exchange (Ankrah & Al-Tabbaa, 2015).
- university-industry linkages (UIL): bi-directional linkages between university and industry entities, aimed at enabling the diffusion of creativity, ideas, skills and people possessing and creating mutual value (D'Este & Patel, 2007; Plewa & Quester, 2007; Plewa *et al.,* 2013; Albuquerque *et al.,* 2015)
- university-industry relationships (UIR): relationships and collaboration processes between universities and companies (Geisler & Rubenstein,1989; Bonaccorsi & Piccaluga, 1994).

The literature on U-I interactions originally focused on conceptual aspects, such as the form, scope and formation of cooperation, motivation and outcomes for collaboration (Geisler and Rubenstein, 1989; Bonaccorsi & Piccaluga,1994; Caloghirou *et al.*, 2001), as well as on factors affecting the success of the collaboration (Valentin, 2000; Perkmann & Walsh, 2007). More recently, authors moved their focus more on empirical studies detailing the aspects and interaction experiences in specific countries (De Fuentes & Dutrénit, 2016; Zhou *et al.,* 2016; Zavale & Langa, 2018).

Among these definitions, a common element is the mutual benefit these forms of cooperation are aimed at. Collaborative linkages provide complementary skills to be shared by both firms and universities, as they contribute to save costs and improve research outcomes (Hemmert *et al.*, 2014). Moreover, thanks to productive and well-established research relations with industry, universities may maximize the "capitalization of knowledge", receiving firms' practical information and solutions to be applied to problems (Etzkowitz *et al.,*

[4] Longman Dictionary of Contemporary English. Business: https://www.ldoceonline.com/dictionary/business (30.10.2021).
[5] Longman Dictionary of Contemporary English. Industry: https://www.ldoceonline.com/dictionary/industry (30.10.2021).

2000; Eun *et al.*, 2006). Thank to those relations, HEIs may build a dynamic research approach -typical of enterprises and integrate public research funding (Etzkowitz *et al.*, 2008). On the other hand, firms may apply university knowledge and technical development in order to design and develop products and improve processes (Etzkowitz *et al.*, 2000; Mowery & Sampat, 2005), but also to integrate internal R&D activities (Veugelers & Cassiman,2005) and conduct ground-breaking research for innovation (Butcher & Jeffrey 2005; Bruneel *et al.*, 2010). Additionally, knowledge transfer between universities and organizations is also essential for the development of broader (local, regional or national) innovation systems (Jaffe 1989; Varga 1998; Anselin et al., 2000; Cooke 2004; Gunasekara 2006; Huggins *et al.*, 2008; Laranja *et al.*, 2008).Many studies show that an effective collaboration between university and business may have an impact on economic growth (Bodas Freitas *et al.*, 2012) and generate local knowledge spillovers (Breschi & Lissoni 2001; Feldman & Desrochers 2003), in terms of production of patents (Nelson 2001), development of spin-offs (Shane 2005) and science parks (Siegel *et al.*, 2003).

Galan-Muros (2016) identified 3 main factors that can stimulate the integration between universities and businesses. First, collaboration can address organisational problems. As for universities, it represents a way to face issues related to the decrease of public funding (Carayol ,2003; Brem & Radziwon, 2017), with the opportunity to obtain additional funds for R&D. Furthermore, it can trigger the mutual exchange of knowledge between partners and guarantee a protection of research results against competition (Pleśniarska, 2018). From the business perspective, UBC or U-I interactions not only provide skilled human capital and contribute to improve innovation, but also support firms to gain and maintain their competitive advantage in international markets (Tucker, 2002). Other important benefits for firms when collaborating with universities include the reduction of both costs and business operation risk, using university as a source for ideas, as well as the development of new products and services (Pleśniarska 2018). Among the advantages of cooperation, there are also the speed-up of the innovation process, the reduction of the time to market (e.g.: reducing the time between a product idea and the launch of the product on the market), and project-related cost and risk sharing (Dan, 2013). In addition to what mentioned above, collaboration can address social and economic issues currently faced by European countries, such as unemployment, lack of competitiveness, current economic and social problems, increased competition, etc. (Davey *et al.,* 2018). Last but not least, both UBC and U-I interactions can act as essential drivers of knowledge-based economies and societies, by contributing to the economic development at both regional and national level (OECD 2002) and meeting the demands of the labour market, in terms of relevant knowledge and skills (Gibb & Hannon, 2006; Storm 2008; Razvan & Dainora, 2009). In this perspective, Viktorova and colleagues (2019) focused on the role of cooperation between universities and business to achieve Sustainable Development Goals (SDGs). To this purpose, they considered two tendencies developed and supported by European funds as models of possible interaction: the formation of Knowledge Alliances (KA) uniting universities, companies, and other organizations with the aim of developing entrepreneurship and innovative activity in any field, and the creation of Knowledge and Innovation Communities (KIC), aimed at introducing and developing innovations in eight main areas.

In many cases, the cooperation between universities and businesses is included in the wider field of public-private partnership (PPP), whose aim is sharing knowledge, skills, capital, and other resources among the different stakeholders in order to trigger interactive processes and address complex policies, projects and public service issues through joint development (Kims *et al.*, 2005; Ismail,2013; Oppio *et al.*, 2016). In those cases, in addition to universities and firms, two other actors can be involved within collaborative linkages: government and civil society.

UIG interaction is considered as the key to innovation and growth in a knowledge-based economy (Etzkowitz & Zhou, 2017). Within this interaction, each actor "takes the role of the other", while maintaining its primary role and identity:

- universities, as key knowledge producers and disseminators (Kruss, 2008:667), take on the role of industry, by stimulating the development of new firms from research, introducing "the capitalization of knowledge" as an academic goal.
- Firms, as key agents of economic growth (Kruss, 2008:667), develop training to even higher levels and share knowledge through joint ventures, acting like universities.
- Governments act as public venture capitalists while carrying out their regulatory activities to enable integration and participation.

When collaboration is developed between universities and community members, the Community-Academic Partnership (CAP) model can be applied. This form of collaboration includes community members (representatives or agencies), who have knowledge of a specific situation, and academic researchers (Drahota *et al.,* 2016). In the context of CAPs, community-based participatory research and participatory action research are usually applied with the aim to reduce the academic-community stakeholders' gap and provide benefits and interventions relevant to the community (Drahota *et al.,* 2016).

Models

The forms of collaborative linkages among the institutional, industrial, governmental, and social spheres analysed in the previous paragraph can be considered taking into account the two main models: the triple helix and the quadruple helix (*fig. 5*).

Triple Helix

The Triple Helix (TH) theory emerged from the integration between the interest in the study of UIR (Etzkowitz, 1994) and the need to build an evolutionary model able to identify an overlay of communications (Leydesdorff, 1995). Starting from these assumptions, the metaphor of the triple helix was identified as the most suitable to represent a framework based on university-industry-government (UIG) interactions, aimed at analysing knowledge-based economies and shaping new systems for innovation and growth (Etzkowitz & Leydesdorff, 1995). The TH model stresses the interaction between academia, government, and business, focusing on UIG relations (Etzkowitz & Leydesdorff, 2000: 109-111).It considers national and/or local development policies through research systems (HEIs), social contexts or economic and/or social returns on projects funded by government decision makers (government) or companies (industry) (Galvao *et al.*, 2019). In this perspective, Ranga and Etzkowitz (2013:238) defined TH systems as a set of three main elements:

- components: the institutional spheres of university, industry, and government, each with a wide array of actors;
- relationships between components: technology transfer, collaboration and conflict moderation, collaborative leadership, substitution, and networking;
- functions: competencies of the system components, mainly consisting in the generation, diffusion and use of knowledge and innovation and determining the system's performance.

Over the last three decades, the literature on TH considered two complementary perspectives.

The *neo-institutional* perspective examines the growing prominence of university among innovation actors. This group of studies mainly includes national or regional case studies and transnational comparative analyses

focused on various aspects, such as forms of collaboration, types of stakeholders, drivers, barriers, benefits and impact, contribution to regional development, etc. (Etzkowitz, 2002; Inzelt, 2004; Geuna & Nesta, 2006; Geuna & Rossi, 2011; Etzkowitz & Ranga, 2012; Svensson *et al.,* 2010). This perspective also considers the way TH actors are aligned among themselves and how they cooperate. Etzkowitz and Leydesdorff (2000) identified three main configurations of collaboration.

- S*tatist*: government plays the lead role and drives academia and industry, that have a limited capacity to initiate and develop innovative transformations;
- L*aissez-faire*: industry acts as a driving force on the other two actors, considered as ancillary support structures. The government has a limited intervention in economy and mainly acts as a regulator of social and economic mechanisms; universities act mainly as providers of skilled human capital.
- *Balanced*: university and other knowledge-producing institutions play an increasing role, acting in partnership with industry and government, and even taking the leadership in joint initiatives. This configuration is specific to the transition to a knowledge society, since it offers the most important insights for innovation. As argued by Ranga and Etzkowitz (2013:238), "the potential for innovation and economic development in a knowledge society lies in a more prominent role for the university and in the hybridization of elements from university, industry and government to generate new institutional and social formats for the production, transfer and application of knowledge".

The neo-evolutionary perspective considers TH actors as co-evolving sub-sets of social systems (Leydesdorff, 1997, 2000, 2006, 2012; Leydesdorff & Meyer, 2006). These sub-systems interact according to two processes of communication and differentiation: a functional one, between science and markets, and an institutional one, between private and public control, which allow various degrees of selective mutual adjustment (Leydesdorff & Etzkowitz, 1996, 1998).

The TH model can be adapted to different contexts. Among others, it can have an impact on academic entrepreneurship (AE). AE can be defined as the entrepreneurial activity of HEIs, whose aim is to commercialize research findings (Kaloudis et al. 2019: 62). As a field of research, AE is connected to many topics, such as UIC (Agrawal, 2001; Bozeman et al., 2013), technology and knowledge transfer (Bozeman, 2000; Perkmann et al., 2013), technology commercialization (Kirchberger & Pohl, 2016; Markman et al., 2008) and entrepreneurial university (Etzkowitz, 1983;2003;2004). The concept of entrepreneurial university (EU) addresses the need for a closer link between university research and the R&D market activities of firms. EUs can act both as a knowledge-producer and a disseminating institution (Etzkowitz 2004; Kirby 2005; O'Shea *et al.,* 2005, 2008; Rothaermel *et al.*, 2007; Guerriero & Urbano, 2012) and are involved in partnerships, networks and other relationships with public and private organizations that are an umbrella for interaction (Inzelt, 2004). This knowledge-capitalisation approach integrates economic development into university as an academic function alongside teaching and research (Kaloudis et al. 2019). AE can take various forms of governance able to mediate knowledge flows between university and industry, such as technology sales, patent licensing, joint research projects (or joint research centres), spin-off firms, university science parks, and education. Among them, University-Run enterprises (UREs) can play a crucial role in triggering knowledge industrialization. URE is a pattern of technology transfer particularly popular in Chinese universities. Like spin-offs, founders and technologies of URE, come from university, but, unlike spin-offs, they are still affiliated to university, thus ensuring benefits and patents continue to belong to university (Eun *et al.,* 2006).

Quadruple Helix

Even if TH model is useful to describe the dynamics driving innovation in the context of knowledge economy and society, the recent spread of growth models incorporating new drivers (e.g., human capital, knowledge, innovation, entrepreneurial spirit, etc.), required a further evolution. Many studies actually focused on the topic of open and user-driven innovation (Chesbrough 2003a; b), highlighting the need to extend this approach, as it can include local community. The concept of targeted open innovation therefore emerged as a model in which the openness of innovation is combined with a strategic view on the role of communities in the whole business model (Hossain & Islam 2015).

Starting from this user-oriented innovation approach and considering Leydesdorff (2012) perspective, who argued the opportunity of a "N-tuple of helices", Carayannis and Campbell (2009) added a fourth helix to the original TH model, thus creating the QH model. This theory refers to an action model aimed at generating innovations (Arnkil *et al.,* 2010) and involving 4 groups of stakeholders. The fourth helix has been defined by Carayannis and Campbell (2009:2016) as "media-based and culture-based public" and "civil society", corresponding to the wider community. QH enables a larger variety of innovations than the TH model. First, it includes democratic values within the innovation process, which is not naturally inherent in the TH model. As argued by Kolehmainen and colleagues (2016:29), the inclusion of the fourth helix contributes to the definition of a knowledge-based and innovation-based driven democracy, towards a "creativity society" (Dubina *et al.,* 2012). Secondly, unlike TH innovation activities, which are mainly focused on producing high-tech innovation from the latest technology and research knowledge for science-based high-tech companies (MacGregor *et al.,* 2009), QH innovation activities focus on the production of other kinds of innovations and the application of existing technology and research knowledge as well as user knowledge (Arnkil *et al.,* 2010: 16). When considering the SMEs perspective, quadruple and user-oriented type of innovation activities could provide new possibilities to participate in innovation activity, as also other types of SMEs could participate compared to strongly science-based ones only or firms having science-based firms as clients (Arnkil *et al.,* 2010).

Universities, as actors of QH, play a civic role increasingly more, by involving themselves locally and triggering value co-creation processes and by collaborating with industry, government, and civil society to face real-world problems, foster societal transformation, and advance sustainable development (Goddard *et al*., 2016; Carayannis &Campbell 2006, 2009).

According to the co-creation framework, HEIs act in a transformative way as "a multi-stakeholder platform engaged with society in a continual and mutual process of creation and transformation" (Trencher *et al*., 2014:8) and move away from their third mission to a "fourth mission", that is co-creation for sustainability (Trencher *et al.*, 2014). As argued by Rinaldi and colleagues (2020), co-creation for sustainability is a wide concept that includes various research and social engagement dimensions at varying degrees and combinations, such as: participatory and action research; technology transfer; transdisciplinarity; cooperative extension system; service learning and regional development. In this context university can act as a civic university, defined as a type of university that combines teaching, research and engagement with the outside world (Goddard & Kempton, 2016). Goddard and Kempton (2016) identified seven dimensions of CU: sense of purpose, active engagement; holistic approach; sense of place; willingness to invest; transparency and accountability; use of innovative methodologies.

HEIs also play a key role in place-based policies (Beer et al. 2020), including Research and Innovation Strategies for Smart Specialisation (RIS3), which can be defined as a new approach towards regional

development (Edwards *et al.,* 2017; McCann &Ortega-Argilés, 2015; Fonseca & Salomaa, 2020), promoting a broader understanding of innovation and cooperation between QH actors (Foray, 2013).

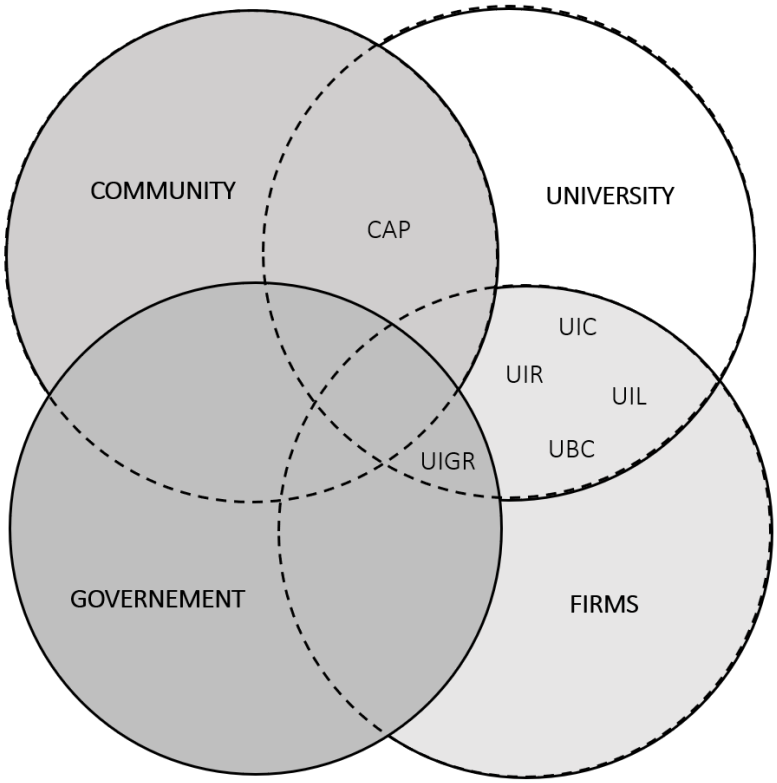


Figure 5 - The panorama of PPPs according to triple and quadruple helix models (source: author's elaboration)

Areas and types of interaction

Collaborative linkages among universities and other triple and quadruple helix actors can take several forms. Focusing on the level of interaction among actors, Santoro (2000) identified four types of U-I activities:

- Research support: the least interactive type of U-I relationships. It consists of financial and equipment contributions, such as gifts or endowment trust funds, made by industries to universities.
- Cooperative research: more interactive than research support, because firms work with university through a formal network based on a coordinated research agenda. It includes contract research with individual investigators, consulting by faculty, and specific group arrangements to address immediate industry problems.
- Knowledge transfer: highly interactive activities, which include on-going formal and informal personal interactions, such as research consortia, trade associations, co-authoring of research papers, cooperative education, curriculum development, and personnel exchanges.
- Technology transfer: highly interactive activities, directly focused on addressing immediate and specific industry needs and issues. It takes place through technological consulting arrangements, the firm's use of university's extension services, jointly owned or operated ventures.

Considering the main missions of universities, Davey and colleagues (2018:40) identified four areas of UBC, which are in turn divided in 14 groups of activities, detailed in *Table 2.*

- Education is the original mission of HEIs. In this field, cooperation between universities and business offers many opportunities, mainly in terms of alignment of curricula and graduates' skills with the labour market, improvement of employment pathways and recruitment. Among the contributions universities can provide to their national and regional economies, the supply of skilled human capital plays a crucial role (Marques P., 2017). More specifically, U-I activities and linkages, such as international internships, joint projects as well as the involvement of industries in curricula development can both enhance student skills and employability (Ashraf et al., 2018) and have a significant impact on the absorptive capacity of firms (Marques P., 2017).
- Research is one of the earliest documented topics of cooperation between HEIs and firms. Originally focused on practical problem solving (Rosenberg & Nelson, 1994), collaborative research has become more "industry-oriented, with academics visiting manufacturing firms to contribute to the modernisation and optimisation of processes, (Etzkowitz, 2001).
- Valorisation is connected to the TM of universities. Within this area of cooperation, HEIs become part of a national/regional innovation system and act as a source of next generation innovations, high-tech new companies and entrepreneurial talent for the value chains of industry. In this field, HEIs can trigger economic growth and entrepreneurship development, by improving efficiency and competitiveness, incubating innovations, and diffusing entrepreneurial capabilities (Yuwawutto *et al.,* 2010 Surie, 2011). Moreover, in the current context of increasing competition, in which many nations compete to improve their innovation capability, universities, thanks to the collaboration with industry, can have a huge impact on national economies (Fiedler & Welpe, 2010; Robin & Schubert, 2013) and support the implementation of National Innovation Systems (NIS). U-I collaborations can therefore accelerate the process of technological catch-up as well as sustain productivity growth and competitiveness (Iqbal *et al.*, 2015).
- Management corresponds to a more strategic approach of cooperation between HEIs and firms, based on the "co-creation for sustainability" framework.

Table 2 - Area and activities of cooperation (source: Davey et al.*, 2018).*

Area of cooperation	***Type of activity***	***Tangible outcomes***
Education	Curriculum co-design	Definition and organisation of new study programmes; professional courses on a fee-basis to respond to the skill and training needs of industry; training relationships with firms; curriculum-integrated work placement programmes.
	Curriculum co-delivery	Projects and experiences in business for students; training of firm employees; training of postgraduates and internships at firms e.g., joint supervision of PhDs; guest lectures by business representatives.
	Mobility of students	Temporary or permanent movement of students from HEIs to business; internships as part of formal education and co-operative student work placements in the productive sector; doctoral studies hosted inside industrial labs; hiring of students through the academics contact; work placement in doctoral research.
	Dual education programmes	Periods of time in both an academic and a working setting and double certification.
	Lifelong learning for people from business	Adult education; HEI academics delivery company courses; non-academic 'in-residence' professionals from local communities; continuing education; collaborative doctoral education; professors of practice.
Research	Joint R&D	R&D activities; research joint ventures; cooperative research projects; joint publications with firm scientists/researchers; joint supervision of theses with firm scientists/researchers; research grants and donations; informal information exchange; co-financing a PhD student and industrial PhD.
	Consulting to business	contract research; R&D consulting; business services such as testing and certification.

	Mobility of staff	Sabbatical periods for professors; professional secondments; adjunct professorships for professional from industry within the HEI; employees' managers and researchers from business to HEIs.
Valorisation	Commercialisation of R&D results	Disclosures of inventions; patenting; sales; licenses.
	Academic entrepreneurship	Creation of new ventures (spin offs) by researchers; co-creation of firms by academia and industry.
	Student entrepreneurship	Creation of new ventures by students (start-ups)
Management	Governance	Participation of academics on business boards; business leaders involved in HEI decision-making or sitting on the boards of HEIs; hierarchic structures and models of hierarchic governance; policy communities; advisory roles and regional leadership-
	Shared resources	Association contracts; university-industry research consortia; university-industry cooperative research institutes/centres; specialist research centres; shared human resources; financial and advisory aid to research-based firms; innovation/incubation centres; research, science, and technology parks; creation of electronic networks and equipment and resource sharing.
	Industry support	Sponsorship; adjunct professorships/sponsored university chair in an area of interest; informal exchange forums and workshops; scholarships and postgraduate linkages and industry sponsored meetings and conferences.

Channels, mechanisms, and tools of interaction

Knowledge and technology can be transferred between universities and other triple and quadruple helix actors through a variety of mechanisms, channels, and tools, each one related to specific forms of interactions.

Nsanzumuhire and Groot (2020), grouped collaboration mechanisms into three main categories: trust building, boundary spanning and implementation processes (*tab. 3*).

- Trust represents a key element within U-I interaction, thanks to its potential to bridge cultural differences between university and industry, and reducing barriers to collaboration (Hemmert *et al.,* 2014; Harris & Lyon, 2013).
- Boundary spanning is crucial to overcome disciplinary, institutional, and cultural differences among partners. The main boundary spanning mechanisms is the creation and development of Technology Transfer Offices (TTOs), University Incubators (UIs) and Collaborative Research Centers (CRCs) (Lee, 2014; Villani *et al.,* 2017).
- Implementation processes include educational collaboration, university entrepreneurship, and research-related collaboration. As for educational collaboration, Kunttu (2017) identified 4 main mechanisms that contribute to foster joint knowledge and learning, that is students' projects, thesis projects, tailored degree courses, and jointly organized courses; the literature on academic entrepreneurship mainly focuses on mechanisms fostering entrepreneurship within academia and the creation of spin-offs (Dalmarco *et al.,* 2018; Boh *et al.,* 2015), as well as organizational requirements for entrepreneurial university (Styhre & Lind, 2010) and mechanisms to create and manage spin-off and start-up (Wright *et al.,* 2007). Collaborative research includes many topics and approaches, such as project organizational frameworks (Fernandes *et al.,* 2020), project lifecycle (Canhoto *et al.,* 2016) as well as principles for the management of R&D projects (Morandi, 2011) and mechanisms to support UBC (Galan-Muros *et al.,* 2015).

As for channels through which interactions can take place, Cohen and colleagues (2002) mainly considered publications and reports, informal interaction, public meetings and conferences, contract research, consultancy, joint and cooperative ventures, patents, personnel exchanges, licenses, and the hiring of graduates. Focusing on the dominant mode of governance, Alexander and Martin (2013) distinguished

between relational and transactional channels. Considering the modes of interaction, Dutrenit and colleagues (2010) and later da Cunha Lemos and Cario (2017) identified 4 groups of channels (*tab. 3*).

- Traditional channels going from university to industry and having a short-term intensity of interaction. This category includes conferences, publications, and the hiring of recent graduates;
- Service channels providing a knowledge flow from university to industry with a short-term intensity of interaction. They include information exchange, personal training, consultancy activities and temporary exchange of staff;
- Commercial channels based on a bidirectional knowledge flow between university and industry, having a medium-term intensity of interaction. This category includes patents, technology licenses, incubators and spin-off from public research;
- Bi-directional channels including bidirectional knowledge flows between university and external actors with a long-term intensity of interaction. They include collaborative or joint R&D projects, contract research, knowledge networks, scientific technological parks

With regard to the tools through which collaboration can be shaped, Davey and colleagues (2018) referred to 4 categories of structural mechanisms: bridging structures, employability and career services, infrastructures, and external integration structures (*tab. 3*).

Table 3 -Mechanisms, channels, and tools for collaborative linkages

	Type	*Forms of interaction*
Mechanisms *(Nsanzumuhire & Groot, 2020)*	*Trust building*	Existing relationships
		Use of intermediaries
		Building trust from
	Boundary spanning	Technology Transfer Offices (TTOs)
		University Incubators (UIs)
		Collaborative Research Centers (CRCs)
	Implementation processes	Educational collaboration
		Academic entrepreneurship
		Collaborative research
Channels *(Dutrenit et al., 2010)*	Traditional	Informal contacts
		Conferences
		Publications
		Hiring of recent graduates
	Service	Personal training
		Information exchange
		Consultancy
		Temporary exchange of staff
	Commercial	Prototypes
		Patents
		Licensing
		Incubators
		Spin-offs
		Joint ventures
	Bi-Directional	Collaborative or joint R&D
		Contract research
		Knowledge network
		Scientific
		technological parks
Tools *(Davey et al.,2018)*	Bridging structures	Agencies dedicated to UBC (e.g., TTOs, innovation offices)
		Board member or vice rector positions for UBC
		Industry liaison offices (ILOs)
	Employability and career services	Alumni networks
		Career offices
	Infrastructure	Co-working spaces accessible by business

		Joint research institutes
		Incubators
		Science / Technology Park
External structures	integration	Adjunct positions available within the university for business people
		Lifelong learning programmes involving business people

Drivers and barriers of collaborative linkages

Since knowledge transfer between universities and businesses is essential both for the organizations involved and the broader innovation system, understanding the factors that inhibit (barriers) or stimulate (drivers) this process, is a priority. The literature on these topics provided several insights, mainly considering specific regional or national cases with a stronger focus on barriers rather than on drivers (Galan-Muros & Plewa, 2016).

Traditionally, authors analysed UBC influencing factors in the framework of the resource-based view (Das & Teng, 2001), by focusing on the material factors related to collaboration, such as firms' capabilities (Hagedoorn, 1993), resources (Barney, 1991) and potential funding that can be gained through collaboration (Brouthers *et al.,* 1995). Other scholars integrated this competence-based approach with a social component, considering the social effects of collaboration (Zukin & Di Maggio, 1990). Other factors have thus been included, such as the level of awareness of actors, the nature of contacts, the organizational culture, and existing relationships (Zaheer & Venkatraman, 1995; Dyer & Singh, 1998 Gulati, 2007).

Drivers

Drivers can be defined as factors that provide the reason to do something or overcome an obstacle. Scholars analysed drivers of collaboration taking into consideration different perspective. As shown in *table 4*, they can be categorised according to three main perspectives: the spatial dimension, the nature of factors and the interaction with barriers.

With reference to the first perspective, Johnston and Huggins (2016) distinguished between spatial or geographical proximity and non-spatial proximity and demonstrated that the formation of U-I links is the result of both spatial factors (spatial proximity) and prior experience of collaboration (non-spatial proximity). Non-spatial proximity – refers to the facilitated interaction among actors who follow similar behaviours similar behaviours and includes cognitive proximity, organizational proximity, social proximity, and institutional proximity. According to this perspective, non-spatial proximity is similar to belonging to an epistemic community where interaction is facilitated through shared language, culture, norms, values and behaviours.

Starting from the different types of factors triggering or hindering collaboration, Galan-Muros and Plewa (2016) provided a review on a set of both drivers and barriers across 7 UBC activities (curriculum design and delivery, lifelong learning, student mobility, professional mobility, R&D, entrepreneurship, commercialization) and identified two main categories of drivers, corresponding to material (resource availability) and social factors (relationships) respectively.

Focusing on the relationships between drivers and barriers, Davey and colleagues (2018), distinguished between facilitators and motivators. Considering the double perspective of universities and firms, authors highlighted how removing barriers does not necessarily mean that the collaboration will take place, but. it rather makes it possible. Thus, they identified facilitators as factors providing the capability to do something, and motivators as factors able to drive the starting of an activity.

Table 4 – Drivers' categories

	Spatial dimension *(Johnston & Huggins 2016)*	
Spatial proximity	Location	Characteristics of the place where actors al located
	Geographical distance	Proximity between actors of collaboration
Non-spatial proximity	Cognitive proximity	Shared knowledge bases or skills
	Organizational proximity	Shared methods and procedures
	Social proximity	Shared relationships
	Institutional proximity	Shared culture
	Nature of factors *(Galan-Muros & Plewa, 2016)*	
Material Factors	Resource availability	Access to complementary and unique resources
		Increasement of expertise in a new field
		Improvement of recruitment efforts
Social Factors	Relationships	Trust
		Commitment
		Shared goals
		Common motivations
		Ongoing relations
	Interaction with barriers *(Davey et al., 2018)*	
Facilitators	Relational	Short geographical distance between organizations
		Existence of mutual trust
		Existence of mutual commitment
		Existence of shared goal
		Prior relation with the partners
		Partner flexibility
	Orientation	Commercial orientation of the university Scientific orientation of the business
		University interest in accessing business knowledge Interest of business in accessing scientific knowledge
		Existence of funding to undertake the cooperation
		Attractive IP conditions for businesses
Motivators	Promotion/Reputation	Obtain funding/financial resources
		Increase chance of promotion
		Improve reputation of business/university
	Research	Obtain customised solution for business
		Improve business innovation capacity
		Access to new technologies and knowledge
		Access new discoveries ad an early stage
		Access university facilities
		Use research in practise
		Gain new insights for research
	Education	Improve teaching
		Improve graduate employability
		Provide access to better qualified graduated
		Improve skills of employees through training
	Society	Positive impact on society
		Contribute to the mission of the university
		Address societal challenges and issues
	Funding	Obtain funding/financial resources

Barriers

A barrier is something that "provides a hindrance or obstacle to do something" (Davey *et al.,* 2018: 77). Barriers of collaboration have been studied according to different approaches. A group of authors (Vega-Jurado *et al.,* 2007; Gümüsay & Bohn, 2018) focused on the localization of factors hindering collaboration and divided them into internal and external barriers; other scholars considered the dimension of perception and

distinguished between perceived barriers and really faced barriers (Muscio & Vallanti, 2014; Muscio & Pozzali, 2012); Belkhodja and Landry (2007) also divided barriers into institutional and contextual barriers.

Table 5 considers barriers according to three main perspectives. Muscio and Vallanti (2014), who focused on cause-effect relationships, identified 16 barriers and grouped them into four categories. Davey and colleagues (2018) considered the double perspective of universities and organizations and provided five categories of barriers. Nsanzumuhire and Groot (2020) carried out a literature review on UIC, considering a double context perspective (developed and developing country). With reference to barriers to collaboration, authors thus identified five categories: misalignment barriers; motivation related barriers; capability related barriers; governance-related barriers and contextual barriers.

Table 5 - Barriers' categories

	Cause-effect relationships perspective *(Muscio & Vallanti, 2014)*
Conflicts with companies	Potential conflicts with industry regarding patents
	Short-term oriented industry research
	Delay in the dissemination of research outcomes on industrialists' side
	Difficulties in finding innovative companies
	Mutual lack of understanding on expectations/priorities
	High personnel turnover/poor industrial strategy
Academic networking problems	Lack of established procedures for collaboration
	Lack of TTOs/low profile od TTOs
	Difficulties in getting in contact with individuals from industry
	Lack of government funding schemes
Conflicts with academic goals	Conflict between collaboration and career progression
	Collaborations conflict with teaching/research duties
	Rules set by university or government-funding schemes
Nature of research	Lack of link between university research and industry interests/needs
	Few/no companies in professional research networks
	Low importance of IP in university research fields
	Double-actors (university-business) perspective *(Davey et al., 2018)*
Awareness	Lack of awareness of university research activities/offerings
	Lack of awareness of opportunities arising from collaborating with business
	Difficulty in finding the appropriate collaboration partner
	No appropriate initial contact person within the university
Funding and resources	Lack of business funding for UBC
	Lack of government funding for UBC
Internal barriers	Bureaucracy related to UBC in business
	Bureaucracy related to UBC in universities
	Frequent staff turnovers within university/business
Results barriers	Focus on producing scientific outcomes (e.g. papers) by universities
	Limited absorptive capacity within business
Cultural barriers	Lack of people with business knowledge within universities
	Lack of people with business knowledge within business

	Differing motivation between universities and business
	Differing modes of communication and language between university and business
	Differing time horizons between universities and business
	Double - context perspective *(Nsanzumuhire & Groot 2020)*
Misalignment	University education and research not focused on industrial relevance.
	Differing requirements and expectations
	Divergence about patents
	Confidentiality issues and lack of secure facilities
	University research is extremely orientated towards pure science
Motivation	Lack of trust in the local education system
	Lack of incentives for students and teachers for the establishment of relationships with firms
	Low lecturers' working and salary conditions
	Lack of interest of firms
	No necessity (the firm's R&D is enough to innovate)
	Lack of incentive schemes
	No extra funding for cooperation
	Uninteresting outcomes
	No influence on academic reputation
	Freedom of research rules it out
Capability	Lack of understanding of the industry
	Low quality of research
	Insufficient institutional support /missing support for finding partners
	Lack of adequate linkage structure
	Time pressure
	Lack of training for managing partnerships
	Difficulties in concluding contractual agreements
	Low public and private funding
	Difficulties in relation to infrastructure such as ICT
Governance	Amount and complexity of procedures in research activities
	Bureaucratic restrictions
	Difficulties in dialogue
Context	Rules set by the university or government-funding schemes
	University atmosphere not favorable for collaboration
	Students are there for a short time while projects are for long term
	Geographic distance
	Companies profile do not allow to see universities as supportive
	Absence of country-level policy and lack of support institution from the government
	Absence of specific legislation enforcing companies to fund HEIs
	Absence of suitable firms to cooperate with
	Small number of researchers and scientists involved in the work at enterprises

Types of disadvantaged areas

The term "disadvantaged" is broad, and, according to the adopted perspective, can be associated to different concepts and gain several meanings. A disadvantaged area is a defined geographical space (e.g., region, country, etc.) that, due to its peripheral location, its specific resources, or the emergence of unpredictable natural events, has a lower competitive advantage when compared to other areas (Aleffi *et al.,* 2020:2). As argued by Pérez-Soba and colleagues (2013), territories presenting these peculiarities are currently approached as a subset of disadvantaged and least favoured regions. Their specificities are described as "handicaps" and identified in the context of efforts to reduce disparities among European regions. According to article 174 of the Treaty on European Union (TFEU), EU is committed in "reducing disparities between the levels of development of the various regions and the backwardness of the least favoured regions*".* From this point of view, the collaboration among universities, businesses, governments, and local communities through triple and/or quadruple helix approaches could play a key role in both triggering economic growth and social development and turning peripheral or otherwise less developed regions onto the path of sustainable knowledge-based development (Kolehmainen *et al.,* 2016).The collaboration among these actors may actually address the needs of globalisation and knowledge economy, as well as help to understand and building on the cultural and social strengths of a place and facilitate dialogue among local businesses.

A clear understanding of the concept of disadvantaged area and its possible declinations is thus needed. On one hand disadvantaged areas are frail, because of a wide variety of territorial specificities; on the other, they have a territorial capital with an exceptional value and diversity and represent significant basins of unexploited cultural social, artistic, and ecological resources that could potentially trigger economic, social, and cultural development.

Territorial specificities of disadvantaged areas are mostly described as geographic ones, as in the case of sparsely populated, insular, border, and mountainous regions (Pérez-Soba *et al.,* 2013). The attribute "disadvantaged" is often used as a synonym for peripheral, remote and marginal in order to stress the physical/geographic distance from more central areas (Pezzi & Urso, 2016), by highlighting other peculiarities, such as depopulation, low productivity, and environmental risks (Kang *et al.,* 2013). In some cases, the attribute "disadvantaged" specifically refers to an "inner area", defined as a portion of territory located far away from large and medium-sized urban centres, and from their associated infrastructures, but characterized by the presence of both natural and cultural resources (Barca *et al.,* 2014; Lucatelli *et al.,* 2013; Baldi, 2019). Pérez-Soba and colleagues (2013) also developed a similar concept and identified key characteristics of inner peripheries, defined as areas with specific geographic challenges and needs, including structurally weak parts of islands, coastal zones, and mountainous areas. (European commission, 2011).

Other territorial specificities include areas affected by industrial transition, where socio-economic characteristics prevail over geographic ones. From this point of view, the attribute "disadvantaged" is associated to less favoured, lagging or resource-constrained environments and regions with low-industrial-density to highlight the nature of poor and/or low-income areas (Dax, 2005; Farole *et al.,* 2018). In other cases, the term is also used to refer to rural areas or regions[6] in order to stress the rural productive and economic vocation of a territory (Dijkstra & Poelman, 2014).

[6] For the aim of this research, the definition of rural area adopted by the European Commission to describe the new degree of urbanisation classification has been considered (Dijkstra & Poelman, 2014). This classification distinguishes three types of areas: densely, intermediate, and thinly populated (or rural) areas. This approach was developed to harmonise similar but not identical spatial concepts, by using the population grid as a new source of information. Nevertheless, the term rural area can have multiple meanings

"Disadvantaged" is also applied to distressed regions to describe an area so damaged by a natural catastrophe that its inhabitants need food, clothing, shelter, and economic aid from national charities or the federal government (Jennings, 1934; MacLeod *et al.,* 1997). Moreover, disadvantaged areas can also refer to a country and be used to indicate an emerging, developing or less-developed country.

Table 6 provides an overview of all these meanings, associating each term with its specific definition. As shown by the same table, when classifying disadvantaged areas, five main features can be extracted from the scientific literature on the matter: (1) *depopulation and ageing population*; (2) *physical distance from central areas*; (3) *occurrence of disruptive events or disasters*; (4) *poor land/scarce economic/low distribution of industries*; (5) *rural vocation*. Each category focuses on one of the main factors that identify these areas as "disadvantaged". According to the adopted definition, some terms refer to concepts belonging to two or more categories. These overlaps are highlighted in *figure 6*. Even though the Figure cannot be considered complete and exhaustive, as it is based on a qualitative coding of the adopted definitions (tab. 6), it shows that most of the terms are so strongly connected and integrated that they can be grouped within the macro-category "disadvantaged area". Starting from the definition provided in table 6, figure 6 locates each type of disadvantaged area within circles that reflect single peculiarities. Since almost all the types of disadvantaged area reflect more than one characteristic, several overlaps among the five categories result[7]. This is the case, for example, of depopulated areas, where demographic issues are associated with geographical isolation and a scarce economic activity. Overlaps also apply to distressed regions, where disruptive events or disasters have an impact on depopulation, as well as marginal areas, also characterised by low productivity, reduced economic return and severe limitations for agricultural use. Weak economies and depopulation also characterize peripheral areas; moreover, less-favoured regions also experience a low or dwindling population and rural and thinly populated area are strictly related to demographic issues. The physical distance from central areas and economic issues are the conditions that mainly affect and unify these territories, and this is the reason why the circles corresponding to these two categories are larger than the others. In the intersection between these two categories, depopulation and rural vocation also play a role, showing that there is an interdependent or cause-effect relationship between the different characteristics. The occurrence of

depending on the perspective considered. As argued by Muilu and Rusanen (2014), it is scarcely possible to achieve any universally applicable, exact, and unambiguous definition of these areas. The starting point for many of the early definitions of rural area was the intensity of land use. Considering this criterion, Clout (1977) defined rural areas as "those parts of a country which show unmistakable signs of being dominated by extensive uses of land, either at the present time or in the immediate past''. In 1985, Gilg, borrowing the interpretation proposed by Bealer and colleagues (1965), highlighted the importance to consider rural areas in a wider perspective and observed that definitions should always rely on ecological, occupational, as well as cultural and social criteria or on the combinations of two or more criteria (1985: 83-84). Advancements in statistical methods and data processing have helped to develop a growing interest in more analytical definitions of rural areas and different comparable divisions into degrees or types of rurality have been developed. The *Project on Rural Indicators,* carried out by the Organisation for Economic Co-operation and Development (OECD) in 1994 (OECD, 1994), provided a taxonomy analysing the degree of rurality of territories. The classification was based on the population densities of administrative and statistical areal units, assuming that rural areas generally have a lower population density than urban areas and considering that the number of people in a region is not enough to make comparisons on an international scale. The project thus identified three types of rural areas: predominantly rural, significantly rural, and predominantly urbanised (OECD, 1994: 24-25). On the other hand, rural areas have also been considered as cultural or social constructs, not exclusively based on physical or statistical categories, but as portions of territory considered from different points of view, such as speeches, acts, and figments of the imagination (van der Ploeg, 1997). In the Report "The Future of Rural Society" (European Commission, 1988), the European Commission adopted a qualitative approach and drew up a classification of rural areas based on three classes, which have not been defined on statistical criteria. The division is instead based on the recognition of three kind of issues: the pressure of modern life, rural decline, and very marginal areas. Areas are assigned to classes according to their level of integration into national economy and their distance (not exclusively physical distance) from the main centre of their region: remote areas, intermediate areas, and economically integrated areas.

[7] Only in the case of the inland/internal/hinterland area overlaps do not occur since the definition associated with this term refers exclusively to its spatial location in a marginal area or an area distant from the city.

disruptive events seems to be a more marginal factor in the identification of a disadvantaged area (only distressed regions are included in this category), which is however closely related to economic and depopulation issues.

Table 6 - Types of disadvantaged areas (source: author's elaboration)

Category	*Type*	*Definition*	*Transversal condition(s)*
Depopulation and ageing population	*Depopulated area*	Sparsely populated area facing at least four common problems: (1) demographic problems (young people emigrate, and the remaining population is ageing); (2) geographical isolation (located far away from economic centres, with high transport costs and problems of access mainly due to deficiencies in transport infrastructure); (3) scarce economic activity (employment tends to be concentrated in the primary sector or in the public sector, industrial activity is largely in traditional rural areas, and services are lacking); (4) low living standard (Crauser, 2001).	Lack of services Low living standards Out-migration Unemployment
	Shrinking region	Region affected by a process of a considerable and constant loss of population. The term is also used to indicate employment decline or economic downturn (Reckien & Martinez-Fernandez, 2011; Ubarevičienė *et al.,* 2016.)	Out-migration Unemployment
Occurrence of disruptive events or disasters	*Distressed region*	Region so severely damaged by a flood, hurricane, or other natural catastrophe that its inhabitants need food, clothing, shelter, and economic aid from national charities or the federal government. It is characterized by high unemployment, out-migration, and decline in local cultural, educational, health, and political institutions (MacLeod *et al.,* 1997).	Environmental risk Lack of services Low living standards Out-migration Unemployment
Physical distance from central areas	*Hinterland/ internal/inland area*	Portion of land located behind the coast or the banks of a river, or an area of a country that is far away from cities (Cambridge English dictionary).	Lack of services
	Inner area	Area located far away from large and medium-sized urban centres, and from their associated infrastructures, characterized by the presence of both natural and cultural resources (Barca et al. 2014; Baldi, 2019; Lucatelli *et al.*, 2013).	Lack of services
	Marginal area	Area characterised by a low-intensity farming system where a cost-effective production is not possible, because of site conditions, cultivation techniques, agricultural policies and macro-economic and legal conditions. They are generally fragile and may be affected by high environmental risk (Wiegmann *et al.,* 2008; Kang *et al.*, 2013).	Environmental risk Lack of services
	Mountainous area	Area with high levels of both ecological and cultural diversity, but in most cases inaccessible, fragile, marginal to political and economic decision-making and home to some of the poorest people in the world (Messerli & Ives 1997; Stepp, 2000).	Environmental risk Lack of services Low living standards Unemployment
	Periphereal area	Area marked by a set of common characteristics, such as geographic remoteness, weak economies, out-migration, high state intervention, lack of control over decision-making processes, high aesthetic values, etc., that are both the cause and the result of its remote character (Pezzi &Urso, 2016).	Out-migration Lack of services
	Remote area	Place physically, economically, and politically distant from centres of wealth and power; it is culturally or ethnically diverse and sparsely settled and exhibit extreme limits on its autonomy, self-sufficiency, and welfare. Frequently, remote areas are a more extreme extension of rural areas (Brezzi *et al.,* 2011).	Lack of services Low living standards
Poor land/scarce economic/low distribution of industries	*Deprived area*	Area affected by the absence of essential or desirable attributes, possessions and opportunities which are considered no more than the minimum by that society (Coombes *et al.*, 1994; Noble *et al.,* 2006).	Lack of services
	Developing/emerging country	Nation (also called emerging or transitional economy) that has not quite achieved a significant degree of industrialization relative to their populations and tend to rely on agriculture as prime industry. Its main peculiarities are an underdeveloped industrial base and a low gross domestic product (GDP) per person, a low or moderate Human	Low living standards

		Development Index (HDI), a poor quality of governance and a relatively low standard of living (United Nation)	
	Lagging region	Poor and low-income area located in central and eastern Europe experiencing stagnant productivity and job destruction (Farole *et al.,* 2018).	Lack of services Low living standards Unemployment
	Less developed region	Region where the GDP per capita is below 75% of the EU average (Antonescu, 2020)	Low living standards
	Less favoured region	Area characterized by the presence of poor land or poor productivity, lower than average production, a low or dwindling population predominantly dependent on agricultural activity, the accelerated decline of which could cause rural depopulation (Landabaso *et al.,* 1999; Dax, 2005).	Lack of services Low living standards Out-migration Unemployment
	Low growth region	Region covering less developed and transition regions that did not converge to the EU average between the years 2000 and 2013 in Member States with a GDP per head below the EU average. It covers all the less developed and transition regions in Greece, Spain, Italy, and Portugal (European Commission, 2017).	Low living standards
	Low-income area	Regions with a GDP per head below 50% of the EU average. It covers several less developed regions in Bulgaria, Hungary, Poland, and Romania (European Commission, 2017).	Low living standards
Rural vocation	*Rural area*	Area located outside towns and cities, sometimes classified as the countryside, where more than 50% of population lives in rural grid cells, as used in the degree of urbanisation (Dijkstra & Poelman, 2014).	Lack of services Low living standards Out-migration
	Thinly populated area	Area located outside towns and cities, sometimes classified as the countryside, where more than 50% of population lives in rural grid cells, as used in the degree of urbanisation (Dijkstra & Poelman, 2014).	Lack of services Low living standards Out-migration

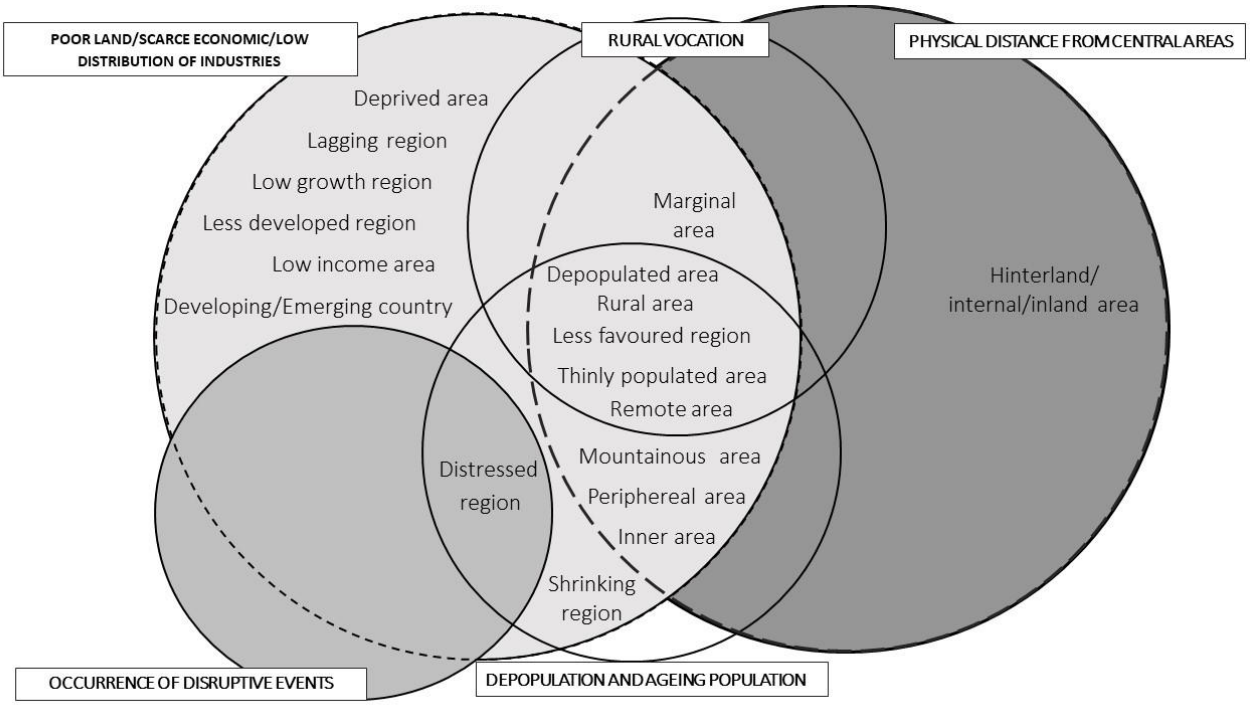


Figure 6 – Categories and types of disadvantaged areas (source: author's elaboration).

Table 7 – Transversal conditions of disadvantaged areas (source: author's elaboration).

Type	*Environmental risk*	*Lack of services*	*Low living standards*	*Out-migration*	*Unemployment*
Depopulated area		X	X	X	X
Deprived area		X			
Developing/emerging country			X		
Distressed region	X	X	X	X	X
Hinterland/ internal/inland area		X			
Inner area		X			
Lagging region		X	X		X
Less developed region			X		
Less favoured region		X	X	X	X
Low growth region			X		
Low-income area			X		
Marginal area	X	X			
Mountainous area	X	X	X		X
Periphereal area		X			
Remote area		X	X		
Rural area		X	X	X	
Shrinking region				X	X
Thinly populated area		X	X	X	

The coding of definitions provided in table 6 also allowed some transversal conditions affecting disadvantaged areas to be identified+, consisting in a general state of fragility. As shown in table 7, most types of disadvantaged areas are affected by the lack of services, low living standards and unemployment. As a result of their interdependence, these conditions also trigger out migration processes. Nevertheless, table 7 also highlights how each area is interested by the overlaps of different conditions.

The complexity and the varied level of interconnection of these features contribute to identify development processes in disadvantaged areas as a "wicked problem". The term "wicked problem" was used for the first time in 1973 by Rittel and Webber, who focused on the existence of a group of social and organisational planning problems that cannot be successfully treated with traditional linear, analytical approaches. They called them wicked problems, in contrast to tame problems (Rittel & Webber 1973). Since then, the term has been applied in many disciplines, such as public administration, policy science, health education, ecology, forestry, business administration, and applied economics, to refer to dynamically complex, ill-structured, public problems (Batie, 2008; Ritchey, 2013). Wicked problems refer to issues which are highly complex, have innumerable and undefined causes, and are difficult to understand and frame (Dentoni et al., 2012), because they are influenced by many dynamic social and political factors (Rittel & Webber 1973) and are connected to, or are symptoms of, other problems (Carroll *et al.,* 2007). Because of this nature and their complex interdependences, wicked problems cannot be solved (Conklin 2006), through finding "right answers" or "solutions", but rather, they must be managed (Dentoni et al. 2012), thus becoming better or worse (Rittel & Webber 1973). According to Batie (2008:1177), wicked problems can be described through eight characteristics.

- No agreement exists about what the problem is and each attempt to create a solution changes the problem.

- The solution is not true or false: the end is assessed as “better” or “worse” or “good enough”.
- The problem changes over time.
- Many stakeholders are likely to have differing ideas about the “real” problem and its causes.
- The end is accompanied by stakeholders, political forces, and resource availability and there is no definitive solution.
- Solution(s) to problem is (are) based on “judgments” of multiple stakeholders.
- The problem is associated with high uncertainty as to system components and outcomes.
- There are not shared values with respect to societal goals.

Development processes in disadvantaged areas can be considered as a wicked problem, since, as highlighted in table 6, a unique idea and definition of disadvantaged area does not exist. Moreover, even though most types of disadvantaged areas share similar conditions, as shown in figure 6, there are specific issues, peculiarities and needs that affect some areas/regions only. This implies that there is no a priori solution or intervention model to be followed. Thirdly, the management of disadvantaged areas implies the involvement of many and different stakeholders, who often do not agree about the nature of the problems and their causes. As a result, possible solutions are also difficult to be found and shared among all the stakeholders. In this context, the definition of a dialogue among all the stakeholders involved, that is local public institutions, entrepreneurs, consultants and researchers, is crucial in order to measure collective coordination capacity (Cavicchi et al., 2013) and identify the conditions for the definition of multi-stakeholder coalitions (MSCs), aimed at defining and reaching sustainability objectives (Peterson, 2013:12). In this process, as argued by Cavicchi and colleagues (2013), HEIs can act as a facilitator since they possess the resources and capital needed to research the productive system, lead discussions among stakeholders, and report the progress in all stages of the process.

Materials and methods

The original research questions for this literature review were “which are the drivers and barriers of university-business collaboration in disadvantaged areas?” and “which are the main implications of these linkages for local/regional development?”. As summarised in *table 10*, the literature review process proceeded according to three main steps structured into different stages respectively.

1. *Identifying relevant literature and search methods and tools*
   This first step of the desk research was a prior review on the meanings and dimensions of disadvantaged areas and an in-depth study about UBC and UIC, aimed at identifying keywords and defining search strings. After having established a primary set of 29 keywords, belonging to 4 conceptual categories (tab.8), able to encompass both research topics (disadvantaged areas and collaborative linkages), 131 research strings have been defined (***annex 1***). Scopus and Web of Science databases have been then adopted as search tools and a set of inclusion/exclusion criteria have been established (tab.9), taking into account English language scientific papers, book chapters and conference proceedings published between 1990 and 2021.
2. *Data extraction, selection and processing*
   This step included an initial search of documents, with a preliminary and secondary selection. To facilitate these processes and record several features of each article, a Microsoft Excel grid has been developed. The grid included basic information to be collected for each document, *that is author(s)*, *title of the article*, *year of publication*, *original language*, *source type*, *document type*, *abstract*, and

keywords. The initial search provided 396 pieces of evidence. **The first step, the preliminary selection, was aimed at optimizing the corpus and eliminating the duplicates of articles** obtained through the multiple steps of the search process. From this first round of selection, 216 documents were chosen. The sample was further refined according to the set of established exclusion criteria and by eliminating documents that had no direct relevance. At the end of the secondary screening and selection stage, 115 article were selected.

3. *Data analysis*

After having produced a primary grid of data through a careful and systematic analysis, the third step was an in-depth analysis of each article. Abstracts of each publication were perused and those most suited to the purpose of the study were chosen for in-depth reading. First, a coding frame was developed to identify a range of attributes and understand how the field of study is divided into research clusters. Nine attributes were taken into consideration: (1) *type of disadvantaged areas (2) main research question*(s); (3) *type of actors and forms of collaboration;* (4) *models*; (5) *areas and types of interaction*; (6) *channels of interaction*; (7) *mechanisms/tools of interaction*; (8) *drivers*; (9) *barriers*; According to the attributes grid, two rounds of clustering were conducted: both rounds further selected documents; round 2 grouped them into clusters. Through this last step, 90 papers (***annex 2***) were chosen and categorized into clusters according to five main topics: *students' skills development and employability*, *knowledge and technology transfer*, *economic growth and entrepreneurship development*, *implementation of National Innovation Systems (NIS)* and *regionally based growth.*

Table 8 - Keywords

Conceptual category	*Keywords*
Synonyms of "disadvantaged"	*depopulated; developing; deprived; distressed; disadvantaged; emerging; hinterland; inland; inner; internal; lagging; less developed; less favoured; low growth; low income; marginal; peripheral; remote; rural; shrinking; thinly populated.*
Spatial boundary	*area, country; region*
Interaction	*university-business; university-industry*
Implication	*local development; regional development; smart specialisation*

Table 9 - Inclusion and exclusion criteria

Criteiron	*Inclusion*	*Exlusion*
Database(s)	Scopus	Any other databases and resources not included in Scopus or Web of Sciences
	Web of science	
Language	English	Any other language
Time period	1990-2021	Any study pubblished before 1990
Source type	Journal articles	Any other source type
	Conference paper	
Document type	Literature review	Any other document type
	Conceptual paper	
	Case study	
	Quantitative study	
	Qualitative study	

Table 10 - Procedure followed during the literature review process

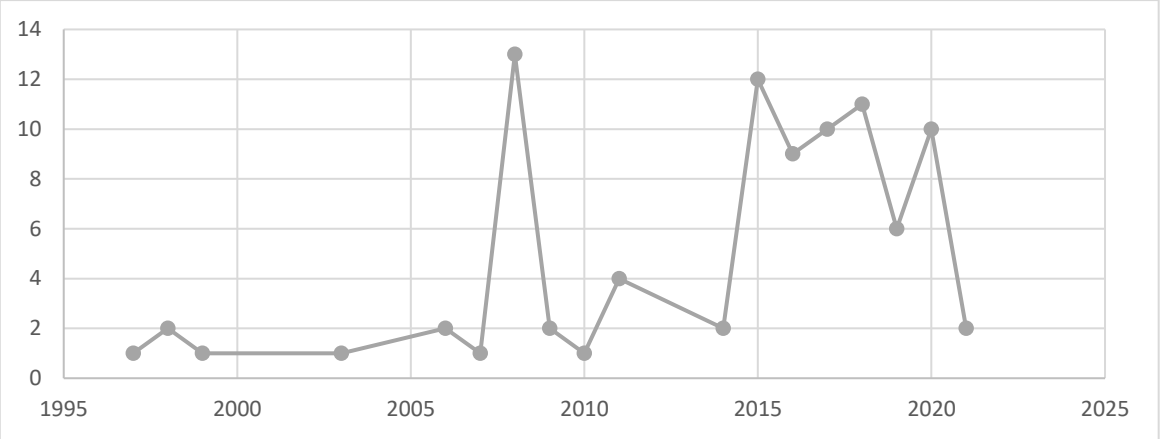
Step	*Objective(s)*	*Activities*	*Tool(s)/ Method*	*Results*
Identifying relevant literature	Defining the field of investigation	Review on meanings and dimensions of disadvantaged areas	bibliographic research	list of references
		In depth study on UBC and UIC	bibliographic research	list of references
	Developing search strings	Selection of search terms able to encompass research topics	Boolean terms "or" and "and"	29 keywords 131 research strings
	Identifying search methods	Electronic databases	Scopus; Web of Sciences	-
	Defining inclusion and exclusion criteria	Establishing a set of exclusion criteria	bibliographic research	list of references
Data extraction, selection, and processing	Initial search	Search on databases according to Scopus and Web of Sciences search criterion "titles, abstracts or keywords". Multiple steps.	Scopus; Web of Sciences	396 documents
	Documents screening and selection	Excel grid definition	Scopus/ Web of sciences research fields	-
		Systematic analysis of each article	Scan and skimming	-
		Preliminary screening and selection (elimination of duplicates)	Manual	216 documents
		Secondary screening and selection (application of exclusion criteria, elimination of articles with no clear relevance)	Manual	115 documents
Data analysis	Clustering	Definition of a coding frame	Manual	9 attributes
		Clustering (round 1): classification of each paper according to the attributes grid and further selection	Manual	101 documents
		Clustering (round 2): coding of each paper according to drivers and barriers grid and cluster/subcluster grid	Manual	90 documents 5 clusters

Findings and discussion

Evolution of publication and sources

Graph 1 shows consistency regarding the trends of literature on collaborative linkages among TH and QH actors in disadvantaged areas. A total amount of 90 scientific papers were published over the period 1990-2021. Since 2008, the number of publications has consistently increased, and in the decade 2008-2018, 64 articles were published. The trend was the same in 2019 and 2020. The 90 documents were published by a total of 54 journals, 1 book publisher (Edward Elgar Publishing) and in 4 conference proceedings. As for conference papers, two of them were published in the 4th IEEE International Conference on Management of Innovation and Technology. With regard to articles, 12 journals published more than 1 paper (***annex 3***). *Regional studies* and *Science* and *Public Policy* are the journals that published the highest number of papers, both with six articles, followed by *Technology Analysis & Strategic Management* (5) and *Industry and Higher Education*, *International Journal of Technology Management & Sustainable Development* and *Journal of the Knowledge Economy* (4).

The academic fields of these journals can be classified into six main clusters: (1) innovation, R&D and technology transfer-focused journals (e.g. *Scientometrics; Research Policy; Journal of the Knowledge Economy*); (2) development studies journals (e.g. *Science and Public Policy, European planning Studies, Review on Policy Research*); (3) Management and business-oriented journals (e.g. *Entrepreneurial Business and Economics Review; Studies in Agriculture and Economics*); (4) Education and higher education journals (e.g. *Industry and Higher Education, Education & Training*); (5) Social sciences journals (e.g. *Journal of Sustainable Tourism; Human Systems Management*); (6) Cross-disciplinary journals (e.g. *Sustainability, Regional Studies, Journal of Rural Studies*). The eclecticism of these sources is a testament to the multidisciplinary (and, in some cases, transdisciplinary) nature of research on collaborative linkages in disadvantaged areas.



Graph 1 - Evolution of number of publications 1990-2021 (source: author's computations on Web of Science and Scopus)

Research questions addressed, methods and countries researched

As discussed by O'Brien and Bortagaray (2015: 248-249), the main research questions addressed by literature on U-I linkages can be grouped into three main categories: determinants, modes of interaction and outcomes.

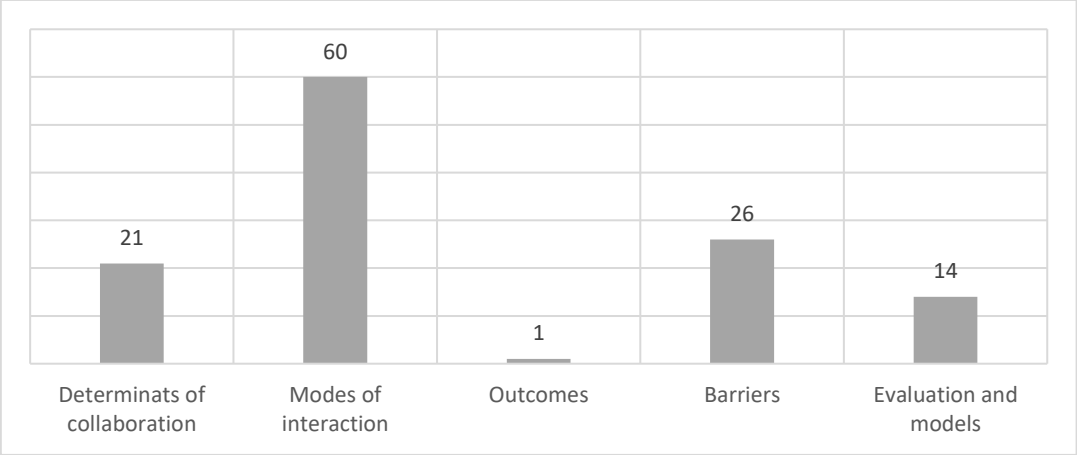
- Determinants mainly include motivations and incentives driving UILs and structural conditions of cooperation (e.g., firm size, location, capabilities of universities).
- Modes of interaction take into consideration channels and the extent of collaboration, the diversity of linkages depending on location, firm characteristics, and academic discipline and the importance of universities compared to other information channels available to industry.
- Outcomes focus on the benefits and risks of collaboration and explore to what extent HEIs and firms share similar perspectives about benefits.

Considering the approach of this review, which explored drivers, barriers and the main implications of all the forms of collaborative linkages in disadvantaged areas, drivers have also been included within determinants and two categories have been added, that is barriers and models and evaluation.

- Barriers analyse factors hindering cooperation and evaluation
- Models and evaluation provide frameworks to explore the topic of collaboration in disadvantaged areas and/or focus on tools and methods to measure value generated by collaborative experiences.

Graph 2 shows the distribution of the 90 publications per research question addressed. 27 publications were included in more than one category, as they address more than one research question. The graph also

shows the dominance of modes of interaction: 60 research questions addressed forms of cooperation, channels, mechanisms, and tools adopted. 21 and 26 research questions focus on factors driving (determinants) or hindering (barriers) the collaboration among different actors respectively.



Graph 2 - Number of articles per research question addressed

As for methods, most publications (84) applied case study, but the sample also includes three literature reviews and four conceptual papers. With reference to case studies, 13 publications adopted the multiple case study approach, to compare the dynamics of different countries or regions (Kolehmainen *et al.,* 2016; Garcia *et al.,* 2018; Lilles *et al.,* 2020). Among case studies, 56 publications used single research methods, that is surveys (Attia, 2015; Dahms & Kingkaew,2016; Natario *et al.,* 2016), interviews (Charles, 2016; Marques, 2017; Aleffi *et al.,* 2021) and the review of official statistics, documents, or database (Serbanica *et al.,* 2015; Pugh, 2017; Güemes-Castorena &Ponce-Jaramillo, 2019). Six publications adopted mixed methods, combining interviews with surveys (Gozali *et al.,* 2016; Fai *et al*., 2018), or the review of statistics, documents and/or database with survey (Chryssou, 2020), with interviews (Ranga *et al.,* 2008; Zavale & Macamo, 2016) or both survey and interview (Jauhiainen & Suorsa, 2008).

As shown in ***annex 4***, the top countries researched in the field of collaborative linkages in disadvantaged areas are located in Europe, with 43 publications, followed by Asia (30), America (20), Africa (12) and Australia (1). In Europe, most studies are located in Spain (specifically in the region of Andalusia), with six publications, Finland (5), Portugal and United Kingdom (4). As for Asia and America, most publications focus on less developed (or developing) countries, such as Thailand (7), Malaysia and India (6), China and Brazil (5). Some publications are focused on the comparison among different European countries, or among EU and extra EU countries, which usually reflects the comparison between developed and developing (or emerging) countries.

Types and nature of collaboration in disadvantaged areas

As highlighted in the literature review, the analysis of three main elements has to be carried out when defining the characteristics of collaborative linkages in disadvantaged areas:

- *the type of actors involved* in the collaboration, which determines the type of relationship and the model the relationship draws inspiration from;
- *the areas and types of interaction*, to which channels and structural mechanisms are linked;
- the *declination of disadvantaged area*.

With regard to the type of actors, most of the publications (89) consider universities and firms as the main actors of collaborative linkages in disadvantaged areas. Specifically, even though the terms "business" and "industry" are often assumed to be synonymous, 81 publications refer to industry and eight to business. Referring to other actors of collaboration, 23 publications consider government, nine include the civil society and one publication focuses on school. When taking into account the way these actors collaborate among them, most of the publications (66) consider relationships between universities and industry/business. 15 publications focus on UIG linkages and eight also include civil society. The nature of the actors involved in collaborations is also strictly related to the type of approach on which the collaboration is based. 79 publications refer to the TH approach, with a specific focus on U-I linkages (Datta & Souleh, 2018; de Moraes Silva *et al.,* 2018; Lopes & Lussuamo, 2020), UBC (Marques, 2017; Marques *et al.,* 2019; Aleffi *et al.,* 2020; Chryssou, 2020), entrepreneurial university (Etzkowitz & Dzisah, 2008; Boutifour *et al.,* 2015) and university-run enterprise (Eun *et al.,* 2006). 11 publications are based on the QH approach, since they also consider the role of local communities, by paying specific attention to the value co-creation model (Lee, 2020; Rinaldi *et al.,* 2020), the framework of civic universities (Tomasi *et al.,* 2021) and the potential role of universities in designing and implementing RIS3 (Marques *et al.,* 2019; Ferreira *et al.,* 2021).

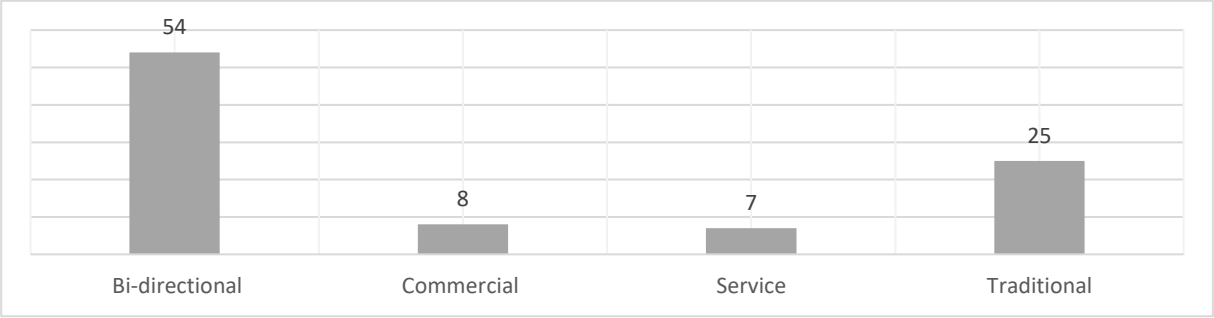
With reference to areas of interaction, with reference to the taxonomy provided by Davey and colleagues (2010:40), *table 11* highlights that most publications focus on research activities (55), followed by cooperation (14), education (11) and valorisation (6). In most cases, publications include more than one area of interaction, as collaborative linkages are considered transversal relationships involving the different missions of universities. In the field of education, most of the publications addresses the topics of lifelong-learning for people already working within firms (Brundin *et al.,* 2008; Marques, 2017; Mgonja, 2017;) and students' mobility to foster employability (Fernández-Esquinas *et al.,* 2016; Vaaland & Ishengoma, 2016; Zavale, & Macamo,2016; Ashraf et al.,2018); curriculum co-design and co-delivery also plays a crucial role (Etzkowitz & Dzisah,2008; Homma *et al.,* 2008; Vaaland & Ishengoma, 2016). With reference to research activities, many publications deal with joint R&D activities (Johnston & Huggins, 2016; de Moraes Silva *et al.,* 2018; Fai *et al.,* 2018). In this area the topic of university consultancy services to companies is also addressed (Pinto *et al.,* 2015; Zavale & Macamo, 2016). As for valorisation activities, publications mainly consider the commercialisation of R&D results (Datta & Saad, 2008; Pohulak-Zoledowska, 2011), for example through patenting (Fernández-Esquinas *et al.,* 2016; Fischer *et al.,* 2018). In the area of cooperation, most of the publications address the topics of shared resources, like infrastructures (Cabral & Dahab, 1998; Charles, 2016; van Oostrom *et al.,* 2019), personnel and equipment (Botanè *et al.,* 2015) and governance (Lilles *et al.,* 2020; Marques *et al.,* 2019).

Table 11 - Number of publications per area and activity of interaction (source: author's elaboration on Davey et al., 2018)

Area of interaction	*Number of publications*	*Activity*	*Number of publications*
Education	13	Curriculum co-design	4
		Curriculum co-delivery	4
		Mobility of students	6
		Dual education programmes	0
		Lifelong learning for people from business	7
Research	55	Joint R&D	52
		Consulting to business	7

		Mobility of staff	1
Valorisation	6	Commercialisation of R&D results	5
		Academic entrepreneurship	4
		Student entrepreneurship	0
Cooperation	14	Governance	6
		Shared resources	12
		Industry support	2

As for the channels and mechanisms through which interactions take place, *graph 3* identifies the channels of collaboration mentioned within the publications. As in many cases collaboration linkages refer to various activities, in some publications more than one channel of interaction is considered. Bi-directional channels are the most considered (54), followed by traditional channels (25), commercial channels (8) and service channels (7). With reference to the tools through which collaborative linkages are shaped (tab.12), the publications mainly consider infrastructures, with a specific focus on science and technology parks (Cabral and Dahab, 1998; Malairaja and Zawdie, 2008; Nordberg, 2015; van Oostrom *et al.,* 2019; Nordberg *et al.,* 2020), incubators (Cáceres Carrasco & Aceytuno, 2015; Dahms & Kingkaew, 2016; Gozali *et al.,* 2016), joint research institutes (Homma *et al.,* 2008) and co-working spaces (Charles, 2016); also bridging structures are considered, such as technology transfer offices (Fai *et al.,* 2018; Padilla Meléndez & Fuster Martín, 2014) and industrial liaison offices (Jones-Evans, 1999).

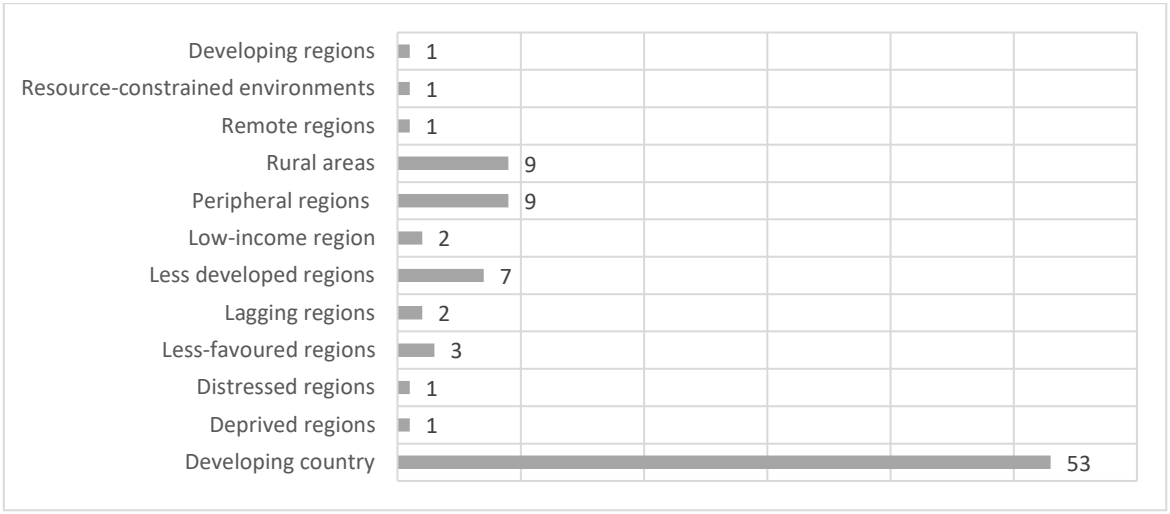


Graph 3 - Number of publications per channel of interaction (source: author's elaboration on Dutrenit et al., 2010)

Table 12 - Number of publications per tool (source: author's elaboration on Davey et al., 2018)

Type	*Number of publications*	*Tool*	*Number of publications*
Bridging structures	3	Agencies dedicated to UBC	1
		Board member or vice rector positions for UBC	1
		Industry liaison office	1
Employability and career services	0	Alumni networks	-
		Career offices	-
Infrastructure	10	Co-working spaces accessible by business	1
		Joint research institutes	1
		Incubators	3
		Science / Technology Parks	5
External integration structures	0	Adjunct positions within the university for business people	0
		Lifelong learning programmes involving business people	0

As for the type of disadvantaged area considered by literature, *graph 4* shows that most of the publications refer mainly to the common usage of the term "developing country" . In this case, nine publications specifically address the topic of the comparison among developed and developing (or emerging) countries (Urman, 2017; Mêgnigbêto, 2018; Czerwińska-Lubszczyk *et al.,* 2020; Lilles *et al.,* 2020). Moving from a national to a local dimension, another group of publications focuses on the notions of area and region, by analysing collaborative linkages in less developed regions (Etzkowitz & Dzisah, 2008; Hong, 2008; Serbanica *et al.,* 2015; Marques, 2017: Marques, A. *et al.,* 2019 Marques, P. *et al.,* 2019; Ferreira et al., 2021), less favoured regions (Kolehmainen *et al.,* 2016; Natário *et al.,* 2017; Yigitcanlar *et al.,* 2017) and peripheral regions (Jones-Evans *et al.,* 1999; Jauhiainen & Suorsa, 2008; Tiffin & Kunc, 2011; Nordberg, 2015; Pinto *et al.,* 2015; Fernández-Esquinas *et al.,* 2016; Iqbal *et al.,* 2018; Sá *et al.,* 2019; van Oostrom *et al.,* 2019). A group of authors also focused on rural areas (Surie, 2011; Bótáné *et al.,* 2015; Charles, 2016; Johnston & Huggins, 2016; Aleffi *et al.,* 2020; Lee, 2020; Nordberg *et al.,* 2020; Rinaldi *et al.,* 2020; Tomasi *et al.,* 2021). A smaller group of publications also considered lagging regions (Ranga *et al.,* 2008; Pugh, 2017), low-income regions (Zavale & Macamo, 2016), remote regions (Aguiar-Diaz, 2015) and resource-constrained environments (Datta & Souleh, 2018).



Graph 4 - Number of publications per type of disadvantaged area

Drivers and barriers of collaboration in disadvantaged areas

Assuming as models the frameworks described in the literature review (Johnston and Huggins 2016; Galan-Muros & Plewa, 2016; Davey *et al.*, 2018), the clustering and coding on the publications reviewed highlighted 7 main factors that can potentially drive collaborative linkages among universities and other TH and QH actors in disadvantaged areas.

1) *Cognitive proximity* consists in shared knowledge bases or skills and includes many conditions, such as advanced research capabilities and scientific productivity (Sarpong *et al.*, 2017), knowledge assimilation and dissemination capabilities (Datta & Souleh, 2018), absorptive capacity (Fernández-Esquinas *et al.*, 2016), technology proximity (Torres *et al.*, 2011) as well as the existence of transdisciplinary groups (Aguiar-Diaz *et al.*, 2015).

2) *Social proximity* refers to the existence of shared relationships among actors and includes shared goals, mutual trust and commitment (Attia, 2015), the existence of prior experiences of collaboration (Attia, 2015; Johnston & Huggins, 2016), the proactive role of actors within society (Padilla Meléndez & Fuster Martín 2014; Iqbal *et al.*, 2018), as well as the attitude to understand common interests: it considers cooperation as an effective means to address societal challenges (Attia, 2015); Aleffi and colleagues (2020) also identified the presence of associations, local producers and operators as a driver for collaboration.
3) *Structural factors* refer to geographical proximity between actors, but also include internal factors, such as location (van Oostrom *et al.*, 2019), size and dimensions of firms and other organizations involved (Torres *et al.*, 2011) and the availability of structures (Zavale & Macamo, 2016; Robertson *et al.*, 2019).
4) *Resource availability* mainly refers to government incentives and fundings (Kruss, 2008; Zavale & Macamo 2016; Yigitcanlar *et al.*, 2017), but also includes the existence of a funding relationship between government and industry (Wang *et al.*, 2020) and the employment of university staff and students by firms (Attia, 2015).
5) *Organizational proximity* consists in shared methods and procedures and includes product and process innovativeness (de Moraes *et al.*, 2018), shared understanding (Johnston & Huggins, 2016), university orientation to market and business flexibility (Attia, 2015).
6) *External factors* consist in a wide group of elements depending on the political, economic, social and cultural context in which the collaboration takes place, which can positively affect the building of collaborative linkages. They include environmental factors (Güemes-Castorena & Ponce-Jaramillo, 2019), the existence of intermediary agencies with a proactive role (Kruss 2008; Yuwawutto *et al.*, 2010) and the high costs of R&D (Kruss, 2008).
7) *Institutional proximity* refers to the existence of a shared culture among the actors involved, related to institutional missions (Kruss, 2008) and policy formulation and implementation (Yigitcanlar *et al.*, 2017).

As for barriers, the review of the literature provided a list of factors that can hinder collaboration in disadvantaged areas and can be grouped into six categories.

1) *Capability related barriers* refer to a general lack of skills (Attia, 2015) and knowledge infrastructure (Zavale & Macamo, 2016). More specifically, this category includes the lack of organizational structures and mechanisms to support collaboration (Brundin *et al.*, 2008; Boutifour *et al.*, 2015; Chryssou 2020), as well as insufficient equipment, such as laboratories and development services (Schiller & Brimble 2009; Wickramasinghe & Malik, 2018; Czerwińska-Lubszczyk & Jagoda-Sobalak 2020) and inadequate experience (Schiller & Brimble 2009; Zavale & Macamo 2016; Wickramasinghe & Malik, 2018; Lopes & Lussuamo 2020). Many scholars also focus on limited resources in terms of time allocated for conducting research (Czerwińska-Lubszczyk & Jagoda-Sobalak 2020). The lack of fundings is considered as the most relevant barrier to collaboration in disadvantaged areas (Jones-Evans *et al.*, 1999; Saad *et al.*, 2008; Schiller & Brimble 2009; Padilla Meléndez &Fuster Martín, 2014; Boutifour *et al.,* 2015; Kolehmainen *et al.*, 2016; Zavale & Macamo 2016; Datta & Souleh 2018; de Moraes Silva *et al.*,.,2018; Chryssou, 2020), together with the lack of institutional support (Saad *et al.*, 2008; Elnasr Sobaih & Jones, 2015; Filippetti & Savona, 2017).
2) *Cultural barriers* mainly depend on the misalignment and divergence of motivations (Brundin *et al.*, 2008; Saad *et al.*, 2008; Boutifour *et al.*, 2015; Chryssou, 2020), time horizons (Czerwińska-Lubszczyk

& Jagoda-Sobalak 2020) and modes of communication and language (Ranga *et al.,* 2008) among actors. As for the misalignment, authors take into consideration the strong focus universities give to teaching activities (Schiller & Brimble, 2009; Czerwińska-Lubszczyk & Jagoda-Sobalak, 2020), which often reflects a limited entrepreneurial spirit (Attia, 2015; Chryssou, 2020). This category also includes the lack of mutual understanding of expectations, priorities and needs among actors (Boutifour *et al.*, 2015), a low level of confidence, trust and transparency (Schiller & Liefner 2007; Padilla Meléndez & Fuster Martín, 2014; Boutifour *et al.*, 2015; Elnasr Sobaih & Jones 2015; Lopes & Lussuamo, 2020), as well as secrecy issues (Attia, 2015).

3) *Governance-related barriers* refer to bureaucratic restrictions (Schiller & Liefner 2007; Ranga *et al.,* 2008; Padilla Meléndez & Fuster Martín, 2014; Aleffi *et al.*, 2020; Czerwińska-Lubszczyk & Jagoda-Sobalak 2020), mainly depending on internal barriers (de Moraes Silva *et al.*, 2018) and the overlapping of responsibilities (Ranga *et al.,* 2008), to the detriment of efficiency. Governance barriers also include weak interactions and insufficient communication among actors (Schiller & Liefner 2007; Ranga *et al.,* 2008; Natário *et al.*, 2017).
4) *Context-related barriers* include the distance and/or geographical discontinuity of the university's head office (Lopes & Lussuamo 2020), the absence of suitable firms to cooperate with (Zavale & Macamo 2016; Lopes & Lussuamo 2020) and the lack of institutional support, mainly depending on the absence of consistent policies focused on U-I linkages (Zavale & Macamo 2016; Schiller & Brimble 2009) and the centralization of national policies (Schiller, 2006).
5) *Awareness barriers* consist in the difficulty by one or more actors to recognise the added value related to collaboration (Ranga *et al.,* 2008; Dahms & Kingkaew 2016; Kolehmainen *et al.*, 2016; Aleffi *et al.*, 2020; Chryssou, 2020), mainly depending on the absence of a defining culture of entrepreneurship at various levels of society (Jones-Evans *et al.*, 1999) and the lack of recognition, at a university level, of the practical work carried out in enterprises as part of scientific and didactic activities (Czerwińska-Lubszczyk & Jagoda-Sobalak, 2020).
6) *Results barriers* refer to the limited absorptive capacity of firms (Schiller & Brimble 2009; Chandran *et al.*, 2014; Chryssou, 2020) and the strong relevance given by university to the production of scientific outcomes (e.g., papers), which often do not match industry needs and goals and activities related to collaborative linkages (Jones-Evans *et al.*, 1999).

Table 13 shows the numbers of publications for each group of drivers and barriers to collaboration identified by the review.

Table 13 - Drivers and barriers of collaborative linkages in disadvantaged areas. Number of publications per category (source: author's elaboration)

Drivers	*Number of publications*	*Barriers*	*Number of publications*
Cognitive proximity	23	*Capability related barriers*	36
Institutional proximity	2	*Cultural barriers*	35
External factors	4	*Context related barriers*	10
Organizational proximity	6	*Governance related barriers*	12
Resource availability	7	*Awareness barriers*	8
Social proximity	17	*Results barriers*	4
Structural factors	13		

Implications of collaboration in disadvantaged areas

The in-depth analysis of the 90 publications allowed them to be clustered according to five main topics, deemed most pertinent to explore the main implications of collaborative linkages in disadvantaged areas (tab.14)

1) *Students' skills development and employability*: the role of interactions between universities and firms to supply skilled human capital (Marques, 2017) and support students' employability, through international internships and industry involvement in curriculum development (Ashraf *et al.,* 2018). As for this topic, collaboration involves universities and businesses in developing countries and less developed regions.
2) *Knowledge and technology transfer*: the role of universities and collaborative linkages in the creation and dissemination of new knowledge, through innovation-oriented and collaborative R&D activities. This cluster also considers academic entrepreneurship (Eun *et al.,* 2006; Etzkowitz & Dzisah, 2008; Liefner & Schiller, 2008; Schiller & Brimble, 2009; Fai *et al.,* 2018), the production of patents (Fisher *et al.,* 2018) and the development of science and technology parks (Cabral & Dahab, 1998; Malairaja & Zawdie, 2008; van Oostrom *et al.,* 2019), spin-offs and university business incubators (Cáceres Carrasco & Aceytuno,2015; Dahms, & Kingkaew, 2016; Gozali *et al.,* 2016). As for the nature of actors and collaborations, this cluster mainly considers university and industry/business relationships, which often involve governments, according to a TH approach. With regard to the type of area, knowledge and technology transfer activities mainly interest developing countries; however, remote regions, low-income regions, less developed regions, peripheral regions and rural areas are also considered.
3) *Economic growth and entrepreneurship development*: the potential of collaborative linkages to foster economic growth and firms' innovation and competitiveness. Attention is paid to the role of university in entrepreneurship development (Brundin *et al.,* 2008), with a specific focus on rural entrepreneurship (Surie, 2011; Sà *et al.,* 2019). TH actors are mainly considered and cases from developing countries, peripheral regions and rural areas are explored.
4) *Implementation of NIS*: the potential of collaborative linkages to support the growth of National Innovation Systems. This group of publications mainly regards developing countries and resource-constrained environments (Attia, 2015; Usman, 2017; Datta & Souleh, 2018; Wickramasinghe & Malik, 2018; Chryssou, 2020) and focuses on the role of research collaboration between university and industry for NIS implementation (Iqbal *et al.,* 2015) and the interaction effect of QH collaborations on the development of social entrepreneurship (Iqbal *et al.,* 2018).
5) *Regionally-based growth*: the potential of university-industry knowledge and technology transfer in the context of regional development. The knowledge-based development approach is here applied to regional scenarios and considered as a strategy for social and economic regeneration in developing countries, deprived and distressed regions, rural areas, peripheral and less-favoured regions (MacLeod, *et al.,* 1997; Abbey *et al.,* 2008; Kruss, 2008; Padilla Meléndez & Fuster Martín, 2014; Pinto *et al.,* 2015; Yigitcanlar *et al.,* 2017). The Knowledge-based regional development approach is considered from both TH and QH points of view, since it includes the engagement in local innovation activities, as in the case of rural universities campuses (Charles, 2016). Within the QH framework, a group of publications considers collaborative linkages as a precondition for Research and innovation Strategy for Smart Specialization (RIS3), mainly focusing on developing countries, less developed and peripheral regions (Nordberg, 2015; Marques *et al.,* 2019; Lilles *et al.,* 2020; Ferreira *et al.,* 2021). The role of the community in knowledge-based regional development is also analysed, taking into consideration the opportunity of CAPs and value

co-creation models to foster rural development and entrepreneurship (Kolehmainen *et al.,* 2016; Norderberg *et al.,* 2020), with a specific focus on tourism (Lee, 2020; Nordberg *et al.,*2020; Rinaldi *et al.,* 2020; Tomasi *et al.,* 2021).

Lastly, a group of publications focuses on determinants and models to define collaborative linkages in disadvantaged areas and to assess their effect and impact. These studies mainly focus on types and dimensions of collaboration (Pinho & Fernandes,2015; Fernández-Esquinas *et al.,* 2016: Filippetti & Savona, 2017; Zavale & Langa, 2018, Marques, P. *et al.,* 2019; Nsanzumuhire & Groot, 2020), categories (Pugh, 2017; Schaeffer *et al.,* 2017), factors (Wang *et al.,* 2020), stages (Saad, *et al.,* 2017), models (Widiawan, 2008), and barriers (Ranga *et al.,* 2008; Lopes & Lussuamo, 2020). As for evaluation, the effects of collaborative linkages and index and indicators to assess collaborations are also explored (Elnasr Sobaih & Jones, 2015; Serbanica *et al.,* 2015; Tiffin & Kunc,2011; Mgonja, 2017; Mêgnigbêto,2018).

Table 14 - Number of publications, actors, models, and types of disadvantaged areas per cluster of collaboration (source: author's elaboration)

Cluster	*Number of publications*	*Sub-cluster*	*Number of publications*	*Actors*	*Model*	*Type of disadvantaged areas*
Students' skills development and employability	2	-	-	University Business	TH	Developing countries Less developed regions
Knowledge and technology transfer	34	Production of patents, development of spin-offs and science parks	7	University Business	TH	Developing countries Low-income region Peripheral regions
		Academic entrepreneurship	5	University Business Government	TH	Developing countries Less developed regions
Economic growth and entrepreneurship development	8	-	-	University Business Government	TH	Developing countries Rural areas Peripheral regions
Implementation of NIS	7	-	-	University Business Government Local community	TH; QH	Developing countries Resource-constrained environments
Regionally based growth	20	Knowledge-based (regional) development	8	University Business Government Local community	TH; QH	Developing countries Deprived regions Distressed regions Less favoured regions Rural areas Peripheral regions
		RIS3	4	University Business Government Local community	TH; QH	Developing countries Less developed region Peripheral regions
		The role of community	6	University Business Government Local community	QH	Less favoured regions Rural areas

The Quadruple Helix paradigm shift: from UBC to QH collaborative linkages

Figure 7 shows the main implications related to collaborative linkages in disadvantaged areas, by considering the type of actors involved within the collaboration. As also highlighted in *table 14*, when collaborative linkages are considered from the perspective of knowledge-based development, there is a gradual paradigm shift from a TH to a QH approach, which assigns a crucial role to local community, as a fourth actor of the innovation helix (Carayannis & Campbell, 2009).

This paradigm evolution, as proved by the review of the literature, also reflects the temporal order of publications. Publications related to QH collaborations have been published since 2015, as a confirmation of the crucial role recognised to university engagement in recent years in triggering value co-creation processes and addressing local development challenges (Trencher *et al.*, 2014; Goddard *et al*., 2016; Carayannis & Campbell 2006; 2009). From this point of view, the review has provided evidence about the need to consider collaborative linkages in a wider perspective, involving not only universities and firms, but also government and local communities as crucial actors of the triple and quadruple helix of innovation. More specifically, when adapting the approach developed by Dentoni and Peterson (2011), referred to agribusiness, multi-stakeholder coalitions (MSCs), to disadvantaged areas, it can play a crucial role in managing the wicked problems of these territories. MSCs can be defined as "long-term partnerships involving multiple participants from two or more categories of stakeholders (government, business, societal organizations, and knowledge institutions) with the objective of jointly defining and reaching sustainability objectives" (Peterson, 2013:12).

Figure 7 also shows that QH collaborations play an key role in collaborative linkages in disadvantaged areas in terms of both implementation of NIS and regional growth. Regionally-based growth is the cluster that involves the widest group of disadvantaged areas (*fig.8*). With regard to this topic, the review of the literature highlights the potential of collaborative linkages in supporting knowledge-based regional development, through two main levers: RIS3 and the involvement of communities in local development processes focused on tourism.

As argued by Foray (2013), RIS3 can be defined as a new approach towards regional development, based on the cooperation among all QH actors. The review highlighted that even disadvantaged areas can generate regionally-based growth through an evolution of the TH into the QH, which may help each actor towards the development of innovation (Norberg, 2015). According to such a perspective, policy makers responsible of RIS3 should adjust RIS3 priority domains, to better address the needs of all QH actors operating in disadvantaged areas (Marques A. *et al*., 2019). On the other hand, HEIs can act as "connectors", by promoting local and regional learning, innovating partnerships and developing continuous leadership capacity in the region (Tomasi *et al*., 2021).

The review also recognised a crucial role to local community in fostering knowledge-based regional development. Starting from the assumption that the main barriers to collaboration in disadvantaged area are related to capability and cultural issues, placing collaborative linkages in a wider perspective, including local communities within regional and local development processes, represents an added value. By integrating local communities, the QH approach includes democratic values within the innovation process and contributes to the definition of a knowledge and innovation-based driven democracy, towards a creative society (Dubina *et al*., 2012; Kolehmainen *et al*., 2016). More specifically, the local community has been acknowledged to play a crucial role in CAPs and value co-creation processes linked to the promotion of tourism in rural regions, and, more generally, in disadvantaged areas (Rinaldi *et al.,* 2021; Tomasi *et al.,* 2021). As discussed by Nordberg and colleagues (2020), the involvement of local communities in the promotion of local identities, through

cultural events and several activities, can foster a tourism-oriented entrepreneurship. QH collaborations can also provide efficient tools in stimulating knowledge and relational resources among local stakeholders, while advancing landscape conservation and rural community development (Lee, 2020). Local communities can also play a crucial role in terms of participatory destination-building processes. University engagements with local communities can thus enable co-creation process within the context of destination branding (Rinaldi, 2020).

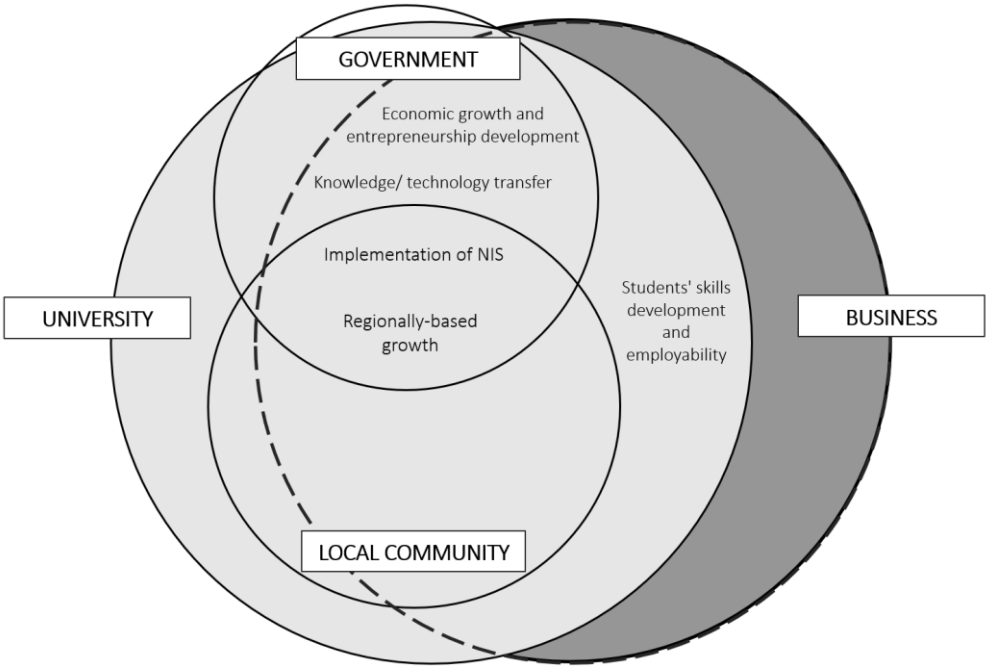


Figure 7 - Main implications of collaborative linkages in disadvantaged areas. QH actor perspective (source: author's elaboration)

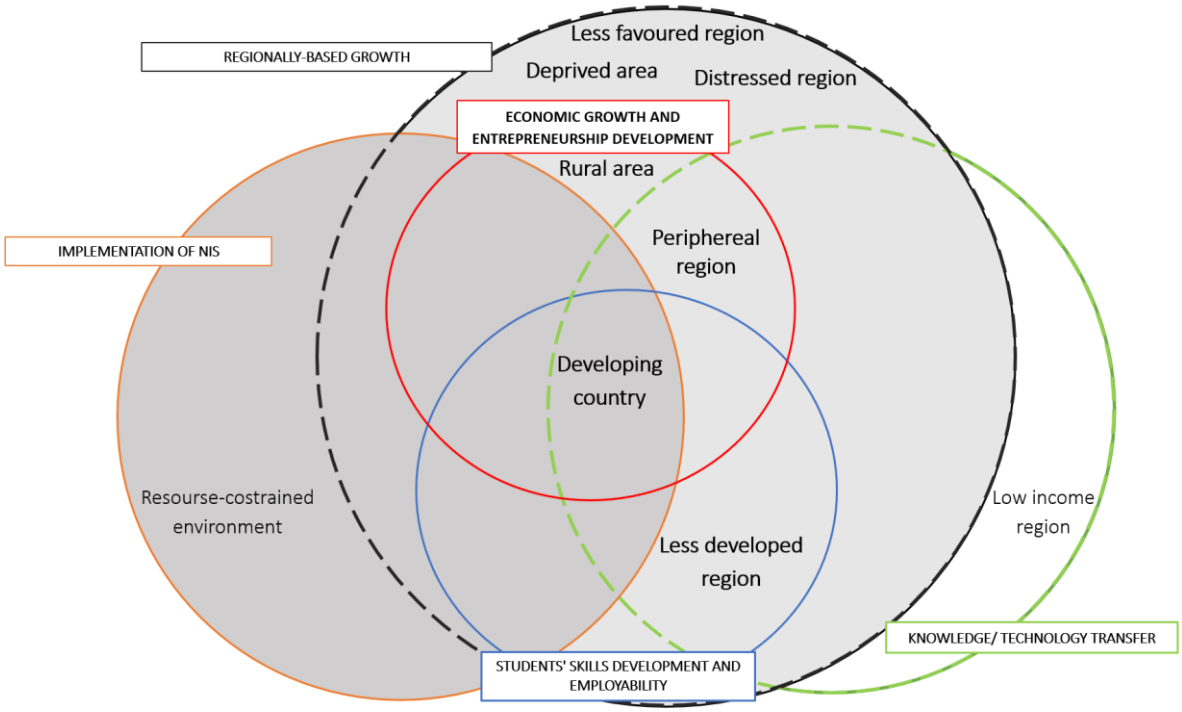


Figure 8 - Main implications of collaborative linkages. Disadvantaged areas perspective (source: author's elaboration).

Conclusions

The aim of this work was to explore the drivers and barriers of UBC in disadvantaged areas and identify the main implications of these linkages for local development. In order to do so, a reasoned literature review was carried out to investigate the different forms of collaboration, by considering actors involved, the main approaches and models, areas and types of interaction, channels and mechanisms of interaction, drivers and barriers. The literature review process followed three main steps: *identification of relevant literature and search methods and tools, data extraction, selection and processing* and *data analysis*. Based on Web of Science and Scopus, 90 relevant articles were identified and analysed.

Research provided evidence about the need to consider UBC in a wider perspective, involving not only universities and firms, but also government and local communities as crucial actors of triple and quadruple helix of innovation and assigned to MSCs a crucial role in managing wicked problems affecting disadvantaged areas (Dentoni & Peterson, 2011; Peterson, 2013).

Paper's findings demonstrate that the main drivers for cooperation in disadvantaged areas consist in the existence of an epistemic community, based on a *cognitive proximity*, mainly including shared language, norms, values, behaviours, and skills; moreover, the existence of socially-embedded relationships among actors (*social proximity*) and structural factors (size and dimension of the firm, age, ownership type and localization) play a crucial role. Barriers are related to misalignment (such as university education and research not focused on industrial relevance, confidentiality issues and lack of security facilities), capabilities (mainly lack of adequate linkage structure, low public and private funding), culture (different motivation between universities and business) and governance (mainly bureaucratic restrictions). As for the main implications, five clusters were identified: *students' skills development and employability*, *knowledge and technology transfer*, *economic growth and entrepreneurship development*, *implementation of National Innovation Systems (NIS)* and *regionally based growth*. The paper argues, therefore, for the need to consider collaborative linkages for disadvantaged areas in a wider perspective, including national/regional/local governments and local communities. Thus, it analyses the potential role of collaborative linkages in the framework of knowledge-based regional development, considering two main implications emerged from the review: opportunities related to RIS3 and its implementation towards TH collaborations to promote regional development and the involvement of communities in the local development process focused on tourism and based on participatory and co-created processes.

As for the main limitations, the study made clear a significant focus on the notion of disadvantaged area following the meaning of "developing country". A matter of fact that consequently reflects an inclination of the reviewed literature towards extra EU publications and case studies. Most of the terms associated to "disadvantaged area" identified in the preliminary analysis were not reflected in the review. The reason for this is related to a second limitation, that is the choice (supported by the scientific literature on methodology of literature review) to carry out keyword and string research in the English language and the identification, as exclusion criterion, of publications written in languages different from English. These choices consequently determined the exclusion from the sample of all the meanings of disadvantaged areas mainly linked to specific national contexts and therefore often investigated within publications written in the language of the country of origin. This is the case, for example, of the notion of "inner area", strongly linked to Italian development policies and usually analysed in Italian-language literature as "area interna" (Barca *et al.,* 2014).

From this perspective, further research could narrow the field to the European context and, through a deeper analysis of the meanings of "disadvantaged area" on a national scale, provide a review of the literature that takes into consideration also publications in languages other than English.

Annexes

Annex 1 – Research strings

	Step 1		*Step 2*
1	Depopulated area* (and) "university business"	1	"University-business" (and)"regional development"
2	Depopulated area* (and) "university industry"	2	"University-industry"(and) "regional development"
3	Depopulated country* (and) "university business"	3	"University-business"(and) "local development"
4	Depopulated country* (and) "university industry"	4	"University-industry" (and) "local development"
5	Depopulated region* (and) "university business"	5	"University-business"(and) "smart specialisation"
6	Depopulated region* (and) "university industry"	6	"University-industry" (and) "smart specialisation"
7	Developing area*(and) "university business"		
8	Developing area*(and) "university industry"		
9	Developing country*(and) "university business"		
10	Developing region*(and) "university business"		
11	Developing region*(and) "university industry"		
12	Deprived area* (and) "university business"		
13	Deprived area* (and) "university industry"		
14	Deprived country* (and) "university business"		
15	Deprived country* (and) "university industry"		
16	Deprived region* (and) "university business"		
17	Deprived region* (and) "university industry"		
18	Distressed area* (and) "university business"		
19	Distressed area*(and) "university industry"		
20	Distressed country* (and) "university business"		
21	Distressed country*(and) "university industry"		
22	Distressed region* (and) "university business"		
23	Distressed region*(and) "university industry"		
24	Disadvantaged area* (and) "university business"		
25	Disadvantaged area* (and) "university industry"		
26	Disadvantaged country* (and) "university business"		
27	Disadvantaged country* (and) "university industry"		
28	Disadvantaged region* (and) "university business"		
29	Disadvantaged region*(and) "university industry"		
30	Emerging area*(and) "university business"		
31	Emerging area*(and) "university industry"		
32	Emerging country*(and) "university business"		
33	Emerging country*(and) "university industry"		
34	Emerging region*(and) "university business"		
35	Emerging region*(and) "university industry"		
36	Hinterland area*(and) "university business"		
37	Hinterland area*(and) "university industry"		
38	Hinterland country*(and) "university business"		
39	Hinterland country*(and) "university industry"		

40	Hinterland region*(and) "university business"
41	Hinterland region*(and) "university industry"
42	Inland area*(and) "university business"
43	Inland area*(and) "university industry"
44	Inland country*(and) "university business"
45	Inland country*(and) "university industry"
46	Inland region*(and) "university business"
47	Inland region*(and) "university industry"
48	Inner area*(and) "university business"
49	Inner area*(and) "university industry"
50	Inner country*(and) "university business"
51	Inner country*(and) "university industry"
52	Inner region*(and) "university business"
53	Inner region*(and) "university industry"
54	Internal area*(and) "university business"
55	Internal area* (and) "university industry"
56	Internal country*(and) "university business"
57	Internal country*(and) "university industry"
58	Internal region*(and) "university business"
59	Internal region*(and) "university industry"
60	Lagging area*(and) "university business"
61	Lagging area*(and) "university industry"
62	Lagging country*(and) "university business"
63	Lagging country*(and) "university industry"
64	Lagging region*(and) "university business"
65	Lagging region*(and) "university industry"
66	Less developed area*(and) "university business"
67	Less developed area*(and) "university industry"
68	Less developed country*(and) "university business"
69	Less developed*(and) "university industry"
70	Less developed region*(and) "university business"
71	Less developed region*(and) "university industry"
72	Less favoured area*(and) "university business"
73	Less favoured area*(and) "university industry"
74	Less favoured country*(and) "university business"
75	Less favoured*(and) "university industry"
76	Less favoured region*(and) "university business"
77	Less favoured region*(and) "university industry"
78	Low growth area*(and) "university business"
79	Low growth area*(and) "university industry"
80	Low growth country*(and) "university business"
81	Low growth country*(and) "university industry"
82	Low growth region*(and) "university business"

83	Low growth region*(and) "university industry"
84	Low-income area*(and) "university business"
85	Low-income area*(and) "university industry"
86	Low-income country*(and) "university business"
87	Low-income country*(and) "university industry"
88	Low-income region*(and) "university business"
89	Low-income region(and) "university industry"
90	Marginal area*(and) "university business"
91	Marginal area(and) (and) "university industry"
92	Marginal country*(and) "university business"
93	Marginal country*(and) "university industry"
94	Marginal region*(and) "university business"
95	Marginal region(and) "university industry"
96	Periphereal area*(and) "university business"
97	Periphereal area*(and) "university industry"
98	Periphereal country*(and) "university business"
99	Periphereal country*(and) "university industry"
100	Periphereal region*(and) "university business"
101	Periphereal region*(and) "university industry"
102	Remote area*(and) "university business"
103	Remote area*(and) "university industry"
104	Remote country*(and) "university business"
105	Remote country*(and) "university industry"
106	Remote region*(and) "university business"
107	Remote region*(and) "university industry"
108	Rural area*(and) "university business"
109	Rural area*(and) "university industry"
110	Rural country*(and) "university business"
111	Rural country*(and) "university industry"
112	Rural region*(and) "university business"
113	Rural region*(and) "university industry"
114	Shrinking area*(and) "university business"
115	Shrinking area*(and) "university industry"
116	Shrinking country*(and) "university business"
117	Shrinking country*(and) "university industry"
118	Shrinking region*(and) "university business"
119	Shrinking region*(and) "university industry"
120	Thinly populated area*(and) "university business"
121	Thinly populated area*(and) "university industry"
122	Thinly populated country*(and) "university business"
123	Thinly populated country*(and) "university industry"
124	Thinly populated region*(and) "university business"
125	Thinly populated region*(and) "university industry"

Annex 2 - List of 90 publications on which the literature review is based

	Source	*Title*	*Journal/conference proceedings*
1	Abbey *et al.,* 2008	*Vorsprung durch Technium: Towards a system of Innovation in South-west Wales.*	Regional Studies
2	Aguiar-Diaz *et al.,* 2016	*University–industry relations and research group production: is there a bidirectional relationship?*	Industrial and Corporate Change
3	Aleffi *et al.,* 2020	*Universities and Wineries: Supporting Sustainable Development in Disadvantaged Rural Areas.*	Agriculture
4	Ashraf *et al.,* 2018	*Student employability via university-industry linkages.*	Human Systems Management
5	Attia, 2015	*National innovation systems in developing countries: barriers to university–industry collaboration in Egypt.*	International Journal of Technology Management & Sustainable Development
6	Bótáné *et al.,* 2015	*Building an entrepreneurial environment in rural regions: a possible way to develop human and social capital.*	Studies in Agricultural Economics
7	Boutifour *et al.,* 2015	*An investigation into the key determinants of university–industry links in Algeria.*	International Journal of Technology Management & Sustainable Development
8	Brundin *et al.,* 2008	*Triple helix networks in a multicultural context: Triggers and barriers for fostering growth and sustainability.*	Journal of Developmental Entrepreneurship
9	Cabral & Dahab, 1998	*Science parks in developing countries: the case of BIORIO in Brazil.*	International Journal of Technology Management
10	Cáceres Carrasco & Aceytuno, 2015	*Academic spin-offs incubation strategies: the case of the Andalusian region.*	Cuadernos de Gestión
11	Carvalho de Mello *et al.,* 2016	*Introduction to the special issue: Universities as interactive partners.*	Science and Public Policy
12	Chandra *et al.,* 2014	*Innovation systems in Malaysia: a perspective of university—industry R&D collaboration.*	AI & society
13	Charles, 2016	*The rural university campus and support for rural innovation.*	Science and Public Policy
14	Chen & Ye, 2008	*The modes of university-industry collaborative innovation in service: A case study from China.*	4th IEEE International Conference on Management of Innovation and Technology
15	Choi *et al.,* 2015	*Quantifying the Triple Helix relationship in scientific research: statistical analyses on the dividing pattern between developed and developing countries.*	Quality & Quantity
16	Chryssou, 2020	*University–industry interactions in the Sultanate of Oman: Challenges and opportunities.*	Industry and Higher Education
17	Czerwińska-Lubszczyk *et al.,* 2020	*Cooperation of universities with business in Poland and the USA–perspective of scientific environment.*	Management Systems in Production Engineering
18	Dahms & Kingkaew, 2016	*University Business Incubators: An Institutional Demand Side Perspective on Value Adding Features.*	Entrepreneurial Business and Economics Review
19	Datta & Saad, 2008	*Social capital and university–industry–government networks in offshore outsourcing–the case of India.*	Technology Analysis & Strategic Management
20	Datta & Souleh, 2018	*Conceptualizing university-industry linkages in resource-constrained environments.*	International Journal of Technology Management & Sustainable Development
21	de Moraes Silva *et al.,* 2018	*University-industry R&D cooperation in Brazil: a sectoral approach.*	The Journal of Technology Transfer
22	Elnasr Sobaih & Jones, 2015	*Bridging the hospitality and tourism university–industry research gap in developing countries: The case of Egypt.*	Tourism and Hospitality Research
23	Etzkowitz & Dzisah, 2008	*Rethinking development: circulation in the triple helix.*	Technology Analysis & Strategic Management
24	Eun *et al.,* 2006	*Explaining the "University-run enterprises" in China: A theoretical framework for university–industry relationship in developing countries and its application to China.*	Research Policy
25	Fai *et al.,* 2018	*Towards a novel technology transfer office typology and recommendations for developing countries.*	Industry and Higher Education

26	Fernández-Esquinas *et al.,* 2016	*Tracing the flows of knowledge transfer: Latent dimensions and determinants of university–industry interactions in peripheral innovation systems.*	Technological Forecasting and Social Change
27	Ferreira *et al.,* 2021	*Smart Specialisation and learning regions as a competitive strategy for less developed regions.*	Regional Studies
28	Filippetti & Savona, 2017	*University–industry linkages and academic engagements: individual behaviours and firms' barriers. Introduction to the special section.*	The Journal of Technology Transfer
29	Fischer *et al.,* 2018	*Quality comes first: university-industry collaboration as a source of academic entrepreneurship in a developing country.*	The Journal of Technology Transfer
30	Garcia *et al.,* 2018	*Is cognitive proximity a driver of geographical distance of university–industry collaboration?*	Area Development and Policy
31	Goktepe, 2003	*The Triple Helix as a model to analyze Israeli Magnet Program and lessons for late-developing countries like Turkey.*	Scientometrics
32	Gozali *et al.,* 2016	*A framework of successful business incubators for indonesian public universities.*	International Journal of Technology
33	Güemes-Castorena & Ponce-Jaramillo, 2019	*University–Industry Linkage Framework to Identify Opportunity Areas.*	Review of Policy Research
34	Homma *et al.,* 2008	*Strengthening university-industry linkage in developing countries through international cooperation: Case of Sri Lanka through cooperation of Toyohashi university of technology, Japan.*	Innovative techniques in instruction technology, E-learning, E-assessment, and Education
35	Hong, 2008	*Decline of the center: The decentralizing process of knowledge transfer of Chinese universities from 1985 to 2004.*	Research policy
36	Intarakumnerd & Schiller, 2009	*University-industry linkages in Thailand: Successes, failures, and lessons learned for other developing countries.*	Seoul Journal of Economics
37	Iqbal *et al.,* 2015	*Evaluating national innovation system of Malaysia based on university-industry research collaboration: A system thinking approach.*	Asian Social Science
38	Iqbal *et al.,* 2018	*Antecedents of Sustainable Social Entrepreneurship Initiatives in Pakistan and Outcomes: Collaboration between Quadruple Helix Sectors.*	Sustainability
39	Jauhiainen & Suorsa, 2008	*Triple Helix in the periphery: the case of Multipolis in Northern Finland.*	Cambridge Journal of Regions, Economy and Society
40	Johnston & Huggins, 2016	*Drivers of university–industry links: The case of knowledge-intensive business service firms in rural locations.*	Regional Studies
41	Jones-Evans *et al.,* 1999	*. Creating a bridge between university and industry in small European countries: the role of the Industrial Liaison Office.*	R&D Management
42	Kolehmainen *et al.,* 2016	*Quadruple helix, innovation, and the knowledge-based development: Lessons from remote, rural and less-favoured regions.*	Journal of the Knowledge Economy
43	Kruss, 2008	*Balancing old and new organisational forms: changing dynamics of government, industry, and university interaction in South Africa.*	Technology Analysis & Strategic Management
44	Lee, 2020	*Enhancing Community-School-University Partnership for Rural Landscape Conservation: a Case Study in Taiwan.*	Geoheritage
45	Liefner & Schiller	*Academic capabilities in developing countries—A conceptual framework with empirical illustrations from Thailand.*	Research policy
46	Lilles *et al.,* 2020	*Comparative view of the EU regions by their potential of university-industry cooperation.*	Journal of the Knowledge Economy
47	Lopes & Lussuamo, 2020.	*Barriers to University-Industry Cooperation in a Developing Region.*	Journal of the Knowledge Economy
48	MacLeod *et al.,* 1997	*Knowledge economy and the social economy: university support for community enterprise development as a strategy for economic regeneration in distressed regions in Canada and Mexico.*	International Journal of Social Economics
49	Malairaja & Zawdie, 2008	*Science parks and university–industry collaboration in Malaysia.*	Technology Analysis & Strategic Management
50	Marques P., 2017	*Human capital and university–business interactions: an example from the wine industry.*	Regional Studies

51	Marques A. *et al.,* 2019	*Industry technology transfer within the context of RIS3 North of Portugal.*	Knowledge Management Research & Practice.
52	Marques P. *et al.,* 2019	*Spaces of novelty: Can universities play a catalytic role in less developed regions?*	Science and Public Policy
53	Mêgnigbêto, 2018.	*Measuring synergy within a Triple Helix innovation system using game theory: cases of some developed and emerging countries.*	Triple Helix
54	Mgonja, 2017	*Enhancing the university-industry collaboration in developing countries through best practices.*	International Journal of Engineering Trends and Technology
55	Natario *et al.,* 2017	*Using a triple helix approach to examine interactions and dynamics of innovation in less-favoured regions.*	Industry and Higher Education
56	Nordberg, 2015	*Enabling regional growth in peripheral non-university regions—The impact of a quadruple helix intermediate organisation.*	Journal of the Knowledge Economy
57	Nordberg *et al.,* 2020	*Community-driven social innovation and quadruple helix coordination in rural development. Case study on LEADER group Aktion Österbotten.*	Journal of Rural Studies
58	Nsanzumuhire & Groot, 2020	*Context perspective on University-Industry Collaboration processes: A systematic review of literature.*	Journal of cleaner production
59	Padilla Meléndez & Fuster Martín, 2014.	*University-Business Collaboration and Regional development. The case of Oruro (Bolivia).*	Revista Venezolana de Gerencia
60	Pinho and Fernandes, 2015.	*Relevance of university–industry links for firms from developing countries: exploring different surveys.*	Developing National Systems of Innovation
61	Pinto *et al.,* 2015	*Universities and knowledge-intensive business services (KIBS) as sources of knowledge for innovative firms in peripheral regions.*	Regional Studies
62	Pohulak-Zoledowska, 2011	*"Innovative Activity of Universities – Knowledge Creation in Developed and Fast Developing Countries"*	Transformations in Business & Economics
63	Pugh, 2017	*Universities and economic development in lagging regions: Triple helix policy in Wales.*	Regional Studies
64	Ranga *et al.,* 2008	*Enhancing the innovative capacity of small firms through triple helix interactions: challenges and opportunities.*	Technology Analysis & Strategic Management
65	Rinaldi *et al.,* 2020	*University contributions to co-creating sustainable tourism destinations.*	Journal of Sustainable Tourism
66	Robertson *et al.,* 2019	*Leveraging social capital in university-industry knowledge transfer strategies: a comparative positioning framework.*	Knowledge Management Research & Practice
67	Sá *et al.,* 2019.	*Local development through rural entrepreneurship, from the Triple Helix perspective: The case of a peripheral region in northern Portugal.*	International Journal of Entrepreneurial Behavior & Research.
68	Saad *et al.,* 2017	*University–industry relationships in developing countries: Opportunities and challenges in Algeria, Indonesia, Malaysia and India.*	International Journal of Technology Management & Sustainable Development
69	Saad *et al.,* 2008	*The triple helix strategy for universities in developing countries: the experiences in Malaysia and Algeria.*	Science and Public policy
70	Sarpong *et al.,* 2017	*Organizing practices of university, industry and government that facilitate (or impede) the transition to a hybrid triple helix model of innovation.*	Technological Forecasting and Social Change
71	Schaeffer *et al.,* 2017	*Searching to bridge the gaps: a new typology of university-industry interaction.*	Academia Revista Latino-americana de Administración.
72	Schiller, 2006.	*Nascent innovation systems in developing countries: University responses to regional needs in Thailand.*	Industry and innovation
73	Schiller & Brimble, 2009	*Capacity building for university–industry linkages in developing countries: The case of the Thai Higher Education Development Project.*	Science, Technology and Society
74	Schiller & Liefner, 2007	*Higher education funding reform and university–industry links in developing countries: The case of Thailand.*	Higher Education
75	Serbanica *et al.,* 2015	*University–Industry Knowledge Transfer and Network Patterns in Romania: Does Knowledge Supply Fit SMEs' Regional Profiles?*	European Planning Studies
76	Surie, 2011	*The emergence of new markets, distributed entrepreneurship, and the university: fostering development in India.*	International Journal of technoentrepreneurship

77	Tiffin &Kunc, 2011	*Measuring the roles universities play in regional innovation systems: a comparative study between Chilean and Canadian natural resource-based regions.*	Science and Public Policy
78	Tomasi *et al.*, 2021	*Civic universities and bottom-up approaches to boost local development of rural areas: the case of the UniMc.*	Agricultural and Food Economics
79	Torres *et al.,* 2011	*What are the factors driving university-industry linkages in latecomer firms? Evidence from Mexico.*	Science and Public Policy
80	Usman, 2017	*Does University-Industry Collaboration Matter for Innovation?*	International Journal of Educational Research and Innovation
81	Vaaland & Ishengoma, 2016	*University-industry linkages in developing countries: perceived effect on innovation.*	Education andTraining.
82	van Oostrom *et al.,* 2019.	*Does the Location in a Science and Technology Park Influence University-Industry Relationships? Evidence From a Peripheral Region.*	International Journal of Knowledge Management
83	Wang *et al.,* 2020	*Funding research in universities: do government resources act as a complement or substitute to industry funding?*	Economic Research
84	Wickramasinghe & Malik, 2018	*University–Industry collaboration in Sri Lanka—A developing country perspective. .*	International Journal of Innovation and Technology Management
85	Widiawan, 2008	*Identifying the most suitable university-industry partnership model in developing countries.*	4th IEEE International Conference on Management of Innovation and Technology
86	Yigitcanlar *et al.,* 2017	*Knowledge-based development dynamics in less favoured regions: insights from Australian and Icelandic university towns.*	European Planning Studies
87	Yuwawutto *et al.,* 2010	*A Triple Helix strategy for promoting SME development: the case of a dried banana community enterprise in Thailand.*	Industry and Higher Education
88	Zaky *et al.,* 1998	*The university-industry gap and its effect on research and development in developing countries.*	28th Annual Frontiers in Education Conference.
89	Zavale & Langa, 2018	*University-industry linkages' literature on Sub-Saharan Africa: systematic literature review and bibliometric account.*	Scientometrics
90	Zavale & Macamo, 2016	*How and what knowledge do universities and academics transfer to industry in African low-income countries? Evidence from the stage of university-industry linkages in Mozambique.*	International Journal of Educational Development

Annex 3 - Descriptive statistics on journal publishing articles on collaborative linkages in disadvantaged areas

Journal	*Number of publications*
Academia Revista Latino-americana de Administración.	1
Agricultural and Food Economics	1
Agriculture	1
AI & society	1
Area Development and Policy	1
Asian Social Science	1
Cambridge Journal of Regions, Economy and Society	1
Cuadernos de Gestión	1
Developing National Systems of Innovation	1
Economic Research	1
Education and Training	1
Entrepreneurial Business and Economics Review	1
European Planning Studies	2

Geoheritage	1
Higher Education	1
Human Systems Management	1
Industrial and Corporate Change	1
Industry and Higher Education	4
Industry and innovation	1
Innovative techniques in instruction technology, E-learning, E-assessment, and Education	1
International Journal of Educational Development	1
International Journal of Educational Research and Innovation	1
International Journal of Engineering Trends and Technology	1
International Journal of Entrepreneurial Behavior & Research.	1
International Journal of Innovation and Technology Management	1
International Journal of Knowledge Management	1
International Journal of Social Economics	1
International Journal of technoentrepreneurship	1
International Journal of Technology	1
International Journal of Technology Management	1
International Journal of Technology Management & Sustainable Development	4
Journal of cleaner production	1
Journal of Developmental Entrepreneurship	1
Journal of Rural Studies	1
Journal of Sustainable Tourism	1
Journal of the Knowledge Economy	4
Knowledge Management Research & Practice	2
Management Systems in Production Engineering	1
Quality & Quantity	1
R&D Management	1
Regional Studies	6
Research Policy	3
Review of Policy Research	1
Revista Venezolana de Gerencia	1
Science and Public Policy	6
Science, Technology and Society	1
Scientometrics	2
Seoul Journal of Economics	1
Studies in Agricultural Economics	1
Sustainability	1
Technological Forecasting and Social Change	2
Technology Analysis & Strategic Management	5
The Journal of Technology Transfer	3
Tourism and Hospitality Research	1
Transformations in Business & Economics	1
Triple Helix	1

Annex 4 - Number of publications per country

Continent	*Number of publications*	*Country*	*Number of publications*
Europe	43	Austria	1
		Finalnd	5
		France	1
		Germany	2
		Greece	1
		Hungary	3
		Iceland	1
		Ireland	1
		Italy	3
		Malta	1
		Netherland	1
		Poland	1
		Portugal	4
		Romania	1
		Russia	1
		Scotland	1
		Spain	6
		Sweden	2
		United Kingdom	4
		Wales	3
Asia	30	India	6
		Indonesia	2
		Israeli	1
		Japan	1
		Malayisia	6
		Pakistan	2
		Singapore	1
		Sri Lanka	1
		Taiwan	1
		Thailand	7
		Turkey	1
		United Arab Emirates	1
Africa	12	Algeria	3
		Angola	1
		Egypt	2
		South Africa	3
		Sub-Saharan Africa	2
		Tanzania	1
America	20	Bolivia	1
		Brazil	5
		Canada	3
		Chile	1
		China	5
		Mexico	3
		North America	1
		USA	1
Australia	1	-	1

PART 2
Quadruple helix collaborations, ICTs, and experiential tourism.

The case of Smart Marca mobile app.

Tullio Pericoli, *Vita fra le rocce,* oil on canvas (2000)

CHAPTER 2 – ICTs and public-private cooperation for cultural heritage tourism.[8]

In the last decades, an extensive literature has been devoted to the role of tangible and intangible cultural heritage in boosting economic growth and local development through tourism (Greffe, 1989; Throsby, 2001; Klamer, 2004). Culture can make a destination appealing to a prospective tourist (Kumar, 2017) and act aa tool for economic development: growth is achieved by attracting visitors motivated by interest in the historical, artistic, scientific or lifestyle/heritage offerings of a community, region, group or institution (Silberberg, 1995; Csapo, 2012; Smith & Richards, 2013); it reinvigorates the interest in history and culture in both tourists and local communities and satisfies a need for authenticity and return to the cultural roots of a territory (McKercher & Du Cros 2002; UNWTO, 2006; Richards, 2018).

In order to fully carry out the nature of cultural heritage as an asset to foster local development and tourism, an important contribution can be provided by the network of private and public institutions in the tourism sector, through the exploitation of ICTs. Public-private partnerships (PPP) consist in the sharing of knowledge, skills, capital, and other resources from different stakeholders. They can engage stakeholders within an interactive process to address complex policies, projects and public service issues through joint development (Kim *et al*. 2005). Since the 1960s, this type of collaboration has become important for the conservation and management of cultural heritage (Jelinčić *et al*. 2017). In this perspective, digital technologies, represent an important opportunity to satisfy the changing demand for cultural tourism, which increasingly asks for immersive and interactive experiences based on local and authentic tangible and intangible culture (Richards, 2014). Several studies, in fact, demonstrate that the use of ICTs in the cultural experience enhances it in terms of number of accesses and of quality of knowledge spreading (Wang 2009; Arcese *et al*. 2011; Haydar *et al*. 2011; Bekele *et al.* 2018).

This chapter investigates the connections between tourism, cultural heritage, and digital technology, highlighting the potentials of PPPs for the exploitation of some ICT tools for the promotion of cultural and heritage tourism. In the first part, the theoretical background is outlined, by focusing on the role of public-private cooperation and current technologies for the promotion of cultural heritage tourism; then potentials, trends and taxonomies of travel apps are analysed. In the second part, the main features of Smart Marca mobile app, designed to promote cultural tourism in Fermo area (Marche Region, Italy), are presented and the profile of the app according to taxonomies analysed in the first part of the chapter, is built. Conclusions discuss the role that technologies and mobile applications like Smart Marca can play for the creation and promotion of a destination.

Theoretical framework

Public-private partnerships and cooperation in cultural heritage tourism

Organizational partnerships between public and private sphere generally bring together actors from different governmental, commercial, and non-profit sectors with the aim of providing value, beyond the location of companies and customers, to broader groups of stakeholders (Quélin *et al.,* 2017). There are many

[8] A revised version of this chapter has been published in the special issue "Food and Wine: representations, cultural identities and co-creation for sustainable development" by *Il Capitale Culturale. Studies on the Value of Cultural Heritage* (see: *Notes for the reader*).

forms of PPPs that seek to contribute to the achievement of social or public objectives. The benefits come from both partners, in proportion to their involvement in the tasks performed. This provides a more productive implementation of services that would not have been equally efficient if they had been managed independently (Wojewnik-Filipkowska, 2012). Such collaborations could therefore lead to a win-win situation.

Originally, PPPs started to be applied for urban regeneration strategies until the preservation of cultural heritage, such as archaeological sites, buildings, landscapes, urban areas, collections, and natural areas of significative heritage (MacDonald &Cheong, 2014). In this kind of projects, it was considered important from the beginning to involve all those who live in a territory, as projects potentially impacting on people's daily life (Jelinčić *et al.*, 2017). In fact, local tourism strategies should consider the needs and expectations of all stakeholders, such as the population, entrepreneurs and investors and all public and private actors (Franco & Estevão, 2010). Both sectors bring different components. The key role of the public sector is to provide a strategic planning framework for environmental protection and heritage management. Private companies, on the other hand, provide the infrastructure, the basic services and thus play an essential role in the development of the strategies identified (Kim *et al.*, 2005). Also, according to the World Tourism Organization (World Tourism Organization, 2018), cooperation between the various actors involved in the public and private sectors in tourism is crucial for increasing competitiveness.

Current Technologies in cultural heritage tourism

ICTs have been encouraging the definition of self-service consumption attitudes, offering the opportunity to identify, customize and purchase tourism products and reduce industry costs for their world-wide distribution (Bethapudi, 2013). Some scholars focused on ICT ability to create a competitive advantage for tourism destinations and organizations, by improving the interactivity with consumers (Buhalis & Jun, 2011), accessibility, visibility, and satisfaction (Bethapudi, 2013).

Mobile communication devices have huge implications for the travel experience before, during, and after visiting a destination. First, they make the travel planning easier through ubiquitous access to online search engines, information, booking services, apps, social media platforms (Wang & Fesenmaier, 2013). The availability of interactive experiences about destinations can also influence decision-making (Wang *et al.,* 2016). Moreover, through the collection and analysis of digital footprints, tourism enterprises and organizations can obtain feedbacks about the performances of their offers and understand tourist behaviours in relation with a destination (Zhang *et al.,* 2010). Public spaces can be better experienced through contextual tailored information and services responsive to current conditions and situations (Pierdicca *et al*. 2019): internet connection and tools like built-in cameras, GPS sensors and beacons, enable a form of communication based on people geographical location (Hugues & Moscardo, 2019). Thanks to context-awareness services (Satoh 2008), places and destinations become "senseable spaces" and tourists can naturally access to interactive experiences even in unfamiliar places (Osaba *et al.,* 2018). Users-generated contents can play a pivotal role also in terms of trusted information and about post-purchase behaviour (Rezaei *et al.* 2016).

These devices and services can represent an important opportunity for the development of cultural heritage tourism, especially if integrated with immersive reality technology (Hugues & Moscardo, 2019). This term generally refers to technologies and applications supporting various kind of immersive experiences, bounded by real and virtual environments, with augmented reality (AR) and augmented virtuality (AV) in between (Bekele *et al.*, 2018; Bec *et al.*, 2019; Bekele &Champion 2019). Indeed, AR and VR can make a place or a product immediately accessible in digital format, by displaying additional contents and involving users in an immersive cognitive process focused on edutainment and learning by consuming (Fritz *et al.*, 2005;

Pierdicca *et al*., 2015a; b; Bogicevic *et al.*, 2019). Among these experiences, augmented reality (AR) combines physical real world with virtual computer-generated information (Azuma *et al*., 2001) and allows real time interaction between users and virtual objects (Liarokapis, 2007). It augments the sense of reality, by superimposing virtual objects and cues upon the real world in real time, instead of virtual reality (VR), that creates three-dimensional virtual environments. When fully exploited, AR completely immerses users in a computer-generated representation of the real environment (Carmigniani *et al.,* 2011). The adoption of AR in the tourism sector may help reducing the need to translate abstract information, or switch gaze between information and physical space; it gives opportunity to cultural institutions, tourist professionals and destinations to differentiate themselves by superimposing images and organizing and transmitting information in layers, making them more appealing: AR can provide tailored contents and services since information can be targeted according to tourists' knowledge level, interests and specific needs (Kounavis *et al.,* 2012*).* AR applications in mobile devices easily increase tourists' awareness about surroundings and unknown destinations: they are useful tools for interactively accessing location-based information about a point of interest and creating memorable and unique experiences (Kounavis *et al.,* 2012*).* VR creates completely virtual environments (Jung *et al.*, 2015). Unlike AR, that augments the sense of reality by superimposing virtual objects and cues upon the real world in real time, VR, when fully exploited, completely immerses users in a synthetic world without any possibility of seeing the real environment, except through computer-generated representations (Carmigniani *et al.*, 2011). VR is a great support for researchers and tourism professionals, for cultural heritage management, marketing, entertainment, education, accessibility, and conservation (Guttentag, 2010). VR application to heritage tourism allows to provide immersive and involving experiences, using artifacts and actions related to the past (Bec *et al.,* 2019), although real experiences cannot be completely substitute (Mura *et al.,* 2017). Lastly, mixed reality (MR) includes all immersive experiences that, blending real and virtual environments in different ways, are halfway between AR and AV (Bekele *et al*., 2018).

Many studies demonstrated the viability of AR and VR adoption for different application within the tourism sector. First, as shown by Yovcheva and colleagues (2014)*,* AR reduces the need to translate abstract information, or switch gaze between information and physical space. The opportunity to superimpose images and organize and transmit information in layers or upon request enable cultural institutions, tourist professionals, cites and destinations to present attractions in a more enjoyable way, to differentiate themselves from each other (Jung *et al.* 2015). Considering users' perspective, Kounavis and colleagues (2012) focuses on AR opportunities to provide contents and services tailored to tourists' specific needs, since information can be targeted according to one's knowledge level and interests, age, profession and so forth. Also, AR applications easily increase tourists' awareness about surroundings and unknown destinations (Martínez-Graña *et al.,* 2013). The impact of VR on tourism has been widely discussed by Guttentag (2010), who demonstrates how VR offers many opportunities to both tourism researchers and professionals, in terms of planning and management, marketing, entertainment, education, accessibility and cultural heritage preservation. Huang and colleagues (2016), focuses on VR implications in tourism marketing, showing how virtual worlds can provide opportunities for destination marketing organizations to communicate with targeted markets and potential visitors, creating destination awareness. Moreover, Bec and colleagues (2019) highlight opportunities for heritage tourism; through virtual reality technology, heritage tourism can offer experiences that involve visiting or engaging with places, artefacts and activities which authentically represent the past. A key issue with the creation of virtual world is represented by authenticity. Some scholars focused on the role of virtual experiences on tourists' perceptions of authenticity (Hobson &Williams 1995; Dewailly,1999; Guttentag, 2010). Even if non-corporeal forms of mobility are progressively becoming more common in people's leisure and tourist experiences, Mura and colleagues (2017), focusing on virtual tourism

and its relationship with authenticity, demonstrates how many aspects of tourist experience, like corporeal and sensorial involvements, may never be fully replicable and are crucial components to experience authenticity in the tourism experience.

Mobile travel apps: trends and potentials

Since the use of mobile communication devices, mainly smartphones, continues to grow, the mobile app market may become one of the fastest growing media outlets in the history of consumer technology (Kennedy-Eden & Gretzel, 2012). According to Blair (2019), the 57% of all digital media usage comes from mobile apps. Globally, travel category represents the 5% of all online apps, with 61.600 applications available on Apple Store and 64.100 on Play Store (Sommer, 2015). This phenomenon is closely related to the user's age profile and affects more the generation Z (1995-2010) and millennials (1980-1994), with an average of 112,6 monthly hours per user for 18-24 age rank and 102,4 monthly hours per user for 25-34 (Blair, 2019). In this context, tourism and travel app category represents the 5% of all online apps (Sommer, 2015). According to TripAdvisor (2016), the 45% of connected travellers use mobile phones to plan and/or book travel activities: the 56% looks for restaurants, the 47% reads other users reviews and the 36% looks for accommodation.

As for potentials, this "mobile apps revolution" can significantly transform the travel experience. Mobile applications for travel activities can influence consumers' behaviour, choices and travel planning, reconfiguring the relationships among tourists, places, and other people (O'Brien and Burmeister, 2003): they can make the trip more spontaneous (Wang & Fesenmaier, 2013), through the adoption of context-aware mobile services and mobile tour guides recommendations about the surroundings that can influence, and direct tourists are provided (Höpken *et al.,* 2010). It can also enable a better sense of the place and a new idea of sociality (Jasson, 2007): mobile apps can facilitate tourists' interactions with other people (local community, other tourists, hosts, friends, etc.) and influence tourists' activities and emotions during the trip (Wang, 2013). Moreover, location-based services can provide geo-referenced information, thus inviting tourists to visit the closest attractions and then creating an after-the-trip relationship to stimulate repeated visits (Palumbo *et al*., 2013). Thanks to mobile applications, cultural attractions have the chance to find new ways to get the attention of tourists. Location based services can provide geo-referenced information, that can invite tourists to visit the closest attraction and maintain the relation after the trip, thus getting more chances of repeated visits (Palumbo *et al*., 2013). Moreover, virtual, and augmented reality tools can enhance the way users interact with the physical world, adding more information about people, buildings and places (Matrimon *et al*., 2010; Bonacini, 2014). In this way, these tools have two main potentials: creating engaging experiences for on-site tourists and inviting them to really visit the places they experienced virtually.

Mobile travel app taxonomies

As shown in *table 15*, mobile travel apps can be categorised considering three main criteria. From a value chain perspective and considering the nature of information provided, Wang and colleagues (2011) grouped tourism and travel apps into 12 categories: *flights information manager* category includes apps for searching and tracking flights; *destination guides* group is referred to apps providing various information about a place; *online travel agency* apps include applications for searching, reserving and booking various services (tickets, flights, hotels, etc); apps under *facilitator* category include apps providing quick facts (Wi-Fi spot, gas stations, local time, etc.); *attractions guides* and *entertainment* category include apps for the purpose of giving travel tips and fun; *food finder* apps give information about restaurants; *augmented reality* category includes all apps

for viewing live situations in other places through webcams; finally *language assistant*, *local transportation*, *currency converter* and *tips calculator* category include all apps providing practical information related to every-day life. Using the same criterion, Kennedy-Eden and Gretzel (2012) proposed a taxonomy based on seven categories divided into sub-categories. Apps under the *navigation* category help visitors find their way during a travel (GPS, augmented reality, way finder); the social category includes apps with a sharing, collaboration, communication or social component; *mobile marketing* apps are used to receive marketing messages; *security and emergency* category include emergency locator services, health monitoring, weather alerts, etc.; *transactional* apps are referred to every kind of transaction (financial/banking, tickets/reservations, shopping); *entertainment* apps provide fun and include games, videos/television, music, e-reader, photographs/editing, and fantasy sports; the i*nformation* category includes app providing many kind of information related to tourism. Even if the first model (Wang *et al.*, 2011) considers every stage of the tourist experience, including for example planning activities too, in Kennedy and Eden and Gretzel (2012), some categories do not directly involve tourism or travel apps, but apps that could be useful during a vacation (medical reporting, emergency services, emergency information, etc.). Considering technical functions embedded within the apps, Dickinson and colleagues (2014) divided mobile travel apps in five categories and analysed how each category alters human interactions with other people, places, objects, and information. *Information* category includes app providing only information or information plus search functions; *two-way sharing capabilities* category includes apps that give the provider the ability to receive information from users (e.g. about their location, preferences, etc.), through the app itself, blogs and social media; under *context awareness* category apps based on contextual sensors, like temporal and spatial location, are included; *internet of things* category includes app able to communicate with other people and everyday objects (vehicles, parcels etc.); *tagging* apps are able to leave messages on places and objects for future visitors. From the customization perspective, Kennedy-Eden and Gretzel (2012) found seven main areas and twelve sub-categories, by identifying for each area the level of users' interactivity. *Preferences* category is referred to a huge area of personal preferences that a travel app can satisfy; apps included in *location sensitive* group provide interaction through location information systems; the third category is referred to security and includes apps allowing the control of personal information; under the *control through the web* category there are apps providing frequent flier programs, e-books, itinerary compilation; *content added category* includes applications that change whit contents' addition by users; *aesthetics* category is referred to apps that change their appearance to fit users 'preferences; finally the *same for all* category includes all apps that do not offer any interaction.

The integration of these three taxonomies can represent a useful tool for providers, tourist operators and destination manager to define the profile of a travel app, identify its features and functionalities, measure the level of effectiveness and efficiency and plan any improvements and/or implementations.

Table 15 - Travel app categories (source: author's elaboration on Wang et al., 2011; Dickinson et al., 2014; Kennedy-Eden & Gretzel 2012).

	Contents and nature of information provided
Flights information manager	Searching and tracking flights apps
Destination guides	Apps providing specific information about a place/destination
Online travel agency	Apps for searching and reserving various travel services
Facilitator	App providing quick facts (Wi-Fi spot, gas stations, local time, etc.)
Attractions guides	App providing travel tips
Entertainment	App providing suggestions for fun
Language assistant	Apps providing practical information related to every-day life at a destination
Local transportation	

Currency converter	
Tips calculator	
Augmented reality	App for viewing live situations in other places through webcams
	Technical functions
Information	App providing information or information plus search functions
Two-way sharing capabilities	App providing information from users (e.g. about their location, preferences, etc.) to service providers, through the app itself, blogs and social media
Context awareness	Apps based on contextual sensors (e.g.: temporal and spatial location sensors)
Internet of things	Apps able to communicate with other people and everyday objects (e.g.: vehicles, parcels etc.);
Tagging	Apple able to leave messages on places and objects for future visitors
	Level of customization
Personal preferences	Apps satisfying various personal preferences
Location sensitive	Apps providing interaction through location information systems
Security	Apps allowing the control of personal information
Control through the web	Apps providing frequent flier programs, e-books, itinerary compilation
Content addition	Apps that can change with contents added by users
Aesthetic changes	App that can change their appearance to fit users 'preferences
The same for everyone	Apps that do not provide any interaction

Background context: mobile travel apps and AR and VR applications to cultural heritage

As shown in *table 16*, ICTs and specifically AR and VR technologies have been widely applied to cultural heritage with different purposes. One of the most used AR apps, is the *Aurasma* app, which provides multimedia contents, like video, link, website, 3D animation, by pointing an object (newspapers; picture; image, etc.) with the smartphone/ tablet camera. In 2006, Wagner and colleagues (2006) developed an application based on the educational game called *Virtuoso*, which aims to order a collection of artworks based on their creation date along a timeline. Another app frequently used in the field of education for cultural heritage is the *Cave Automatic Virtual Environments* (CAVE) app, which provides immersive virtual tours: users wearing 3D glasses can move freely in a room, where walls and floors are projection screens (Ott & Pozzi, 2008; Christou, 2010). As for the application in the field of cultural and heritage tourism, in 2009 Ardito and others (2009) developed *Explore!*, an educational game aimed at supporting students during the visit and exploration of some Italian archaeological sites. *Google Expeditions* app[9] allows to take part in hundreds of virtual visits to many cultural attractions, by using a mobile phone and a Google Cardboard viewer. The *Vatican app*[10] provides tours and information about Vatican in Rome: tourists can enter each room with high-definition images.

Table 16 - Main apps and technologies applying AR and VR for cultural heritage (source: author's elaboration).

App	AR	VR	Description
Aurasma	X		App providing additional multimedia contents (video, link, website, 3D animation) when pointing an object (newspapers; picture; image, etc.) with a smartphone or a tablet
Virtuoso	X		Educational game which allows to put in a chronological order a collection of artworks (Wagner *et al.,* 2006)
Explore!	X		Mobile augmented reality game supporting middle school students in visiting Italian archaeological sites (Wagner *et al.,* 2006)
Google Expeditions[11]		X	App providing 360° virtual visits to popular cultural attractions (e.g. Great Wall of China) through a smartphone and a Google Cardboard viewer

[9]< https://edu.google.com/products/vr-ar/expeditions/?modal_active=none >
[10] <http://www.vatican.va/content/vatican/it/apps.html>
[11]Google Expeditions < https://edu.google.com/products/vr-ar/expeditions/?modal_active=none > (24.10.2021)

Vatican app[12]	X	App providing 360° virtual tours to Vatican rooms in Rome and information about the site.
CAVE	X	Acronyms for *Cave Automatic Virtual Environments,* app transforming surfaces (walls and floors) in projection screens enabling immersive experiences usually applied to cultural heritage education. Users need to wear 3D glasses (Christou, 2010).

Smart Marca app

Smart Marca is the name of a project designed to create a smartphone mobile application with the purpose to promote Marche Region, focusing on cultural heritage and natural sites. The name comes to the *Marca Fermana*, the ancient administrative sub-division of central Italy, corresponding to the territory which was under the jurisdiction of the town of Fermo. Today *Marca Fermana* is also the name of a non-profit association, promoting the territory's culture and tourism [13].

The project is an example of PPP, since it involved two universities with different expertise (Universities of Macerata and Marche Polytechnic University), a Destination Manager Organization (*Marca Fermana* Association) consisting in a network of public (municipalities, Fermo Province, the Chamber of Commerce and educational institutions) and private entities (trade associations, tourist associations, banks), two start-ups operating in the field of multimedia and virtual and augmented reality and a research center specialized in sensory analysis (CIAS Innovation).

Benefits related to the digitization of *Marca Fermana* cultural heritage are many. On the one hand, cultural institutions can better promote themselves and increase the visibility of the known and unknown, tangible, and intangible local cultural heritage, thus increasing the number of visitors, both in digital and real platforms, by differentiating the cultural offer according to the type of user. On the other hand, the creative industries can use specialized figures to exploit the digital cultural heritage and create innovative services for tourism. Moreover, territories and territorial aggregators can more specifically respond to tourists' needs, by improving the quality of information on digital cultural heritage; create stronger relationships with the chain of actors involved; make digital cultural heritage the basis of market strategies in tourism. From a tourism operators' perspective, small and medium companies can present themselves in the market in a more suggestive and effective way, by providing more suitable cultural contents. Finally, tourist can discover less-known places, by taking advantage of virtual instruments; use technology, especially on mobile devices to plan cultural experiences and travel.

As shown in *figure 9* with the ICT architecture of the project, Smart Marca app applies both AR and VR. Furthermore, beacons and geolocation systems are used to support users during their travel experience. In particular, the AR systems were developed to facilitate customers in the analysis of two paintings (the *Adoration of the shepherd* by Peter Paul Rubens, located in Fermo Civic Art Gallery and *Landscape,* by Osvaldo Licini, located in the artist's house-museum, in the village of Monte Vidon Corrado). The app allows to identify AR contents, by framing the painting with the smartphone (or tablet) camera. The augmentation consists in the provision of several tags that highlight its contents and provide specific details and characteristics for a complete view of the artwork. The VR systems, on the other hand, aim at giving visibility to the most significant places and municipalities of *Marca Fermana*: particular attention has been given to Falerone, a Roman city formerly called *Falerio Picenus*, where we can still find a Roman amphitheater. Through VR, Smart Marca app enhances the historical value of the area, thanks to the 3D reconstruction of the amphitheater; details and building blocks of the amphitheater and its

[12] Vatican App <http://www.vatican.va/content/vatican/it/apps.html> (24.10.2021)
[13] *Marca Fermana* Association <https://www.marcafermana.it/> (27.10.2021).

surroundings can also be observed. Moreover, a section about typical products is presented: it provides the sensory profile of some of them that achieved DOC, DOCG and IGP certifications. Users can interact with the app by expressing their own perceptions about the products, by creating a personal profile and then checking the correspondence with the official sensory profile and by expressing their level of appreciation about the product (fig10).

Considering the taxonomies summarised in *table 14*, Smart Marca app provides various information and travel tips about *Marca Fermana*, such as accessibility and mobility, art and culture, gastronomy, shopping, sport and relax (*destination guide*; *attraction guide; travel transportation*), but also fun opportunities (*entertainment*, through immersive experiences related to local cultural heritage: sensory profiles, 360° panoramic guided tours, 3d reconstruction and AR. From a technology perspective, Smart Marca includes many levels of description and interpretation of Fermo area (through texts, pictures, maps, virtual tours, etc) and its cultural attractions (*information*); moreover, it allows data mining by app provider to research visitor catchment, travel routes, frequently viewed elements of attractions (*two-way sharing capabilities*); thanks to beacons technology, the app can also send alerts relative to visitor proximity to users and can provide live travel information about events, attractions currently open, changes to attraction timetable (*context awareness*). Considering the level of customization, Smart Marca app is a *locations sensitive* app since it provides augmented reality experiences and local texts alerts (*fig. 11*).

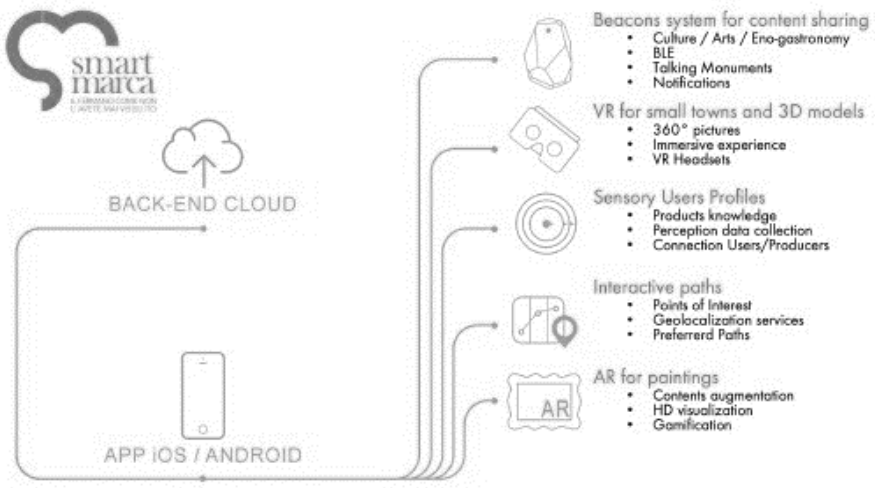


Figure 9 - ICT architecture of Smart Marca app (source: Smart Marca project)

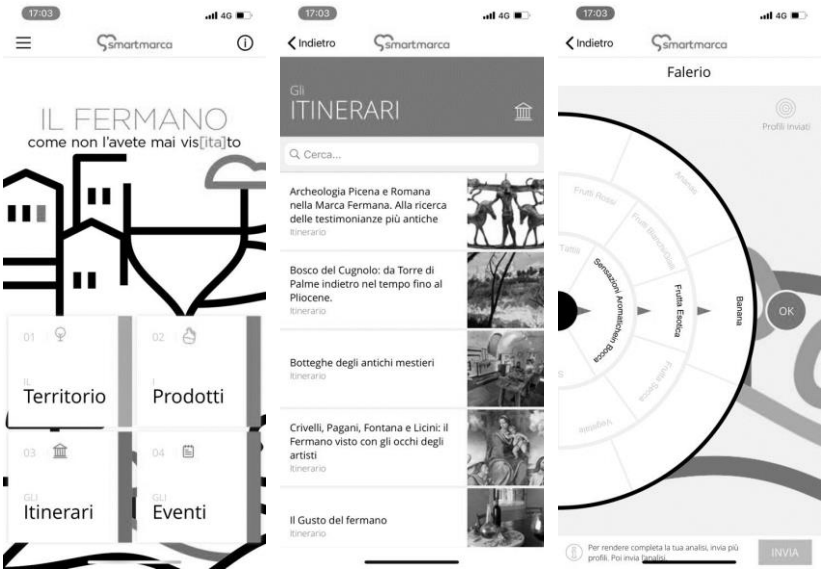


Figure 10 - Smart Marca mobile app (source: Smart Marca project)

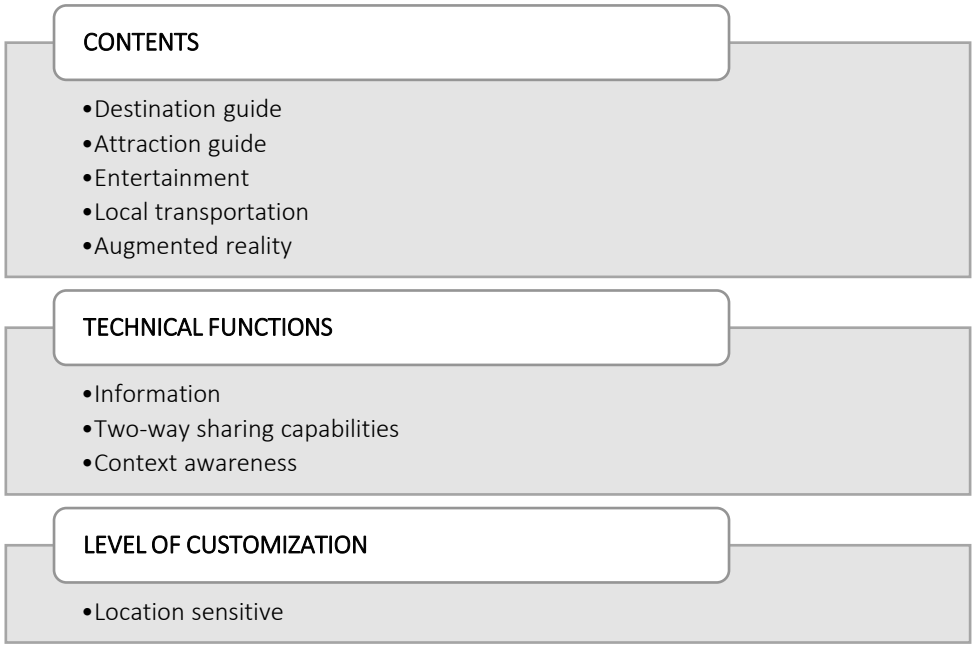


Figure 11 - Smart Marca app profile (source: author's elaboration)

Conclusions

This chapter shows how traditional forms of tourism are progressively integrating new technologies, to provide tourists with additional services and allow a more complete and satisfying experience. This is especially so given the increasing pivotal role played by local public and private actors in the creation of new technologies, the importance of the latter in every step of tourism experience, the level of immediacy of user generated content and trends related to the use of tourist and travel apps.

Smartphones through many kinds of new technologies, such as beacons, AR and VR can customize information and make tourist experiences more immersive. In this constantly evolving context, it is important to understand that the relationship between all stakeholders in a territory, which involves sharing power, work, support and/or information, can achieve common goals and mutual benefits. According to this, tourism

providers and all public and private actors operating on a destination, need to re-invent their approach and become agile to deliver contents and services in a mobile context.

Starting from these premises, this paper highlighted the opportunities offered by ICTs for cultural heritage tourism and for the promotion of a cultural destination, according to the experiential tourism perspective. The case of Smart Marca app has been presented as an example of how new technologies can promote and make virtually accessible even distant places and activate tourist flows that otherwise could not be possible. This achievement has been possible thanks to the definition of a cooperation model based on an interdisciplinary approach, that integrated different research areas, such as history of art, cultural heritage communication, software engineering and sensory analysis and thanks to the collaboration between public and private stakeholders.

Future research could refer to the analysis of users' satisfaction with the app, about the intention to visit Fermo area after using Smart Marca app and about the collection and analysis of Smart Marca users' digital footprints, in order to obtain feedbacks about the app performance and analyse the tourist's behaviour in relation with *Marca Fermana* destination.

CHAPTER 3 – The role of mobile application for promoting tourist destinations.[14]

In 2013, the McKinsey Global Institute identified a set of 12 disruptive technologies predicted to have significant potential to drive economic impact by 2025 (Manyika *et al.,* 2013). Among these, ICT was expected to impact some areas of tourism too. The application of ICTs to tourism, namely e-tourism, has been in existence for over 30 years, starting with the spread of the internet and the introduction of central reservation and booking systems and progressively transforming tourism (Shanker, 2008; Buhalis & O'Connor 2015; Buhalis & Jun, 2011). E-tourism represents an opportunity to satisfy the demand for cultural tourism, which increasingly requires a re-evaluation of the original role of cultural attractions towards immersive and interactive experiences, giving the opportunity to taste local and authentic culture (Richards, 2011b; 2014). Indeed, many studies, demonstrate that new technologies enhance how culture is experienced, both in terms of number of people who can have access to knowledge and quality of the diffusion of the knowledge itself (Arcese *et al*., 2011; Haydar *et al*., 2011; Bekele *et al.,* 2018).

Studies on e-tourism, mainly focused on the use of the internet (Fodor & Werthner, 2005; Cardoso & Lange, 2007), and mobile applications in tourism services (Sebastia *et al*., 2009; García-Crespo *et al*., 2009; Smirnov *et al*., 2015). Within this field of studies, a gap concerns the analysis of the influence of mobile travel or tourism app on tourist behaviors. Indeed, few studies have evaluated the relationship between the adoption of mobile applications and the decision to visit a destination. Highlighting the dynamics and implications of this relationship may be useful to increase the ability of a mobile app to attract tourists in a certain destination. To full fill this gap, the purpose of this chapter is exploring, through the case of Smart Marca app, the connections among tourism, cultural heritage, and digital technology, by answering to the following questions:

- RQ1: *What factors affect users' attitude towards using mobile apps and intention to visit tourism destinations?*
- RQ2: *To what extent mobile tourism apps can influence customers' intentions to experience a destination?*

In the first part, the theoretical framework is outlined, by focusing on the nature of cultural heritage as a destination enhancer and on the adoption of e-tourism by consumers, by focusing on the Technology Acceptance Model (TAM). In the second part the TAM is applied to the case of Smart Marca app (***chapter 2***): methodology is outlined, and results are discussed. Conclusions point out that mobile tourism apps can play a crucial role in the selection and promotion of a destination. Understanding attitudes regarding user adoption of mobile tourism apps will contribute to suggest new possibilities to attract customers, new approaches to develop tourism marketing strategies and new ideas to enhance the customer experience.

[14] A revised version of this chapter has been presented to the 6th International Scientific conference *ToSEE - Tourism in Southern and Eastern Europe* (University of Rijeka, 30 june -2 july 2021) and has been accepted to be published in conference proceedings (see: *Notes for the reader*).

Theoretical framework

The role of cultural heritage as a destination enhancer

Culture can play a dual role in tourism (Zeppel & Hall, 1991). On the one hand, it can influence the desirability of a destination (Kumar, 2017), by reinvigorating the interest in history and culture (Richards 2018), introducing tourists and local communities to the cultural roots of a territory (Kajos & Banyai 2012) and satisfying both the need of authenticity and the return to origins (Beverland & Farrekky, 2010). On the other hand, cultural and heritage tourism is a tool of economic development that achieves economic growth, attracting visitors (Silberberg 1995; Csapo, 2012).

In recent decades, cultural and heritage tourism is experiencing an ongoing process of change, in response to the fragmentation of supply and demand, the growing competition between destinations and companies (McKercher &Du Cros, 2002; Richards &Wilson, 2007), and the definition of a new idea of culture. Indeed, cultural heritage is no longer associated to the sum of works of art, but includes landscape, intangible assets, and all «resources inherited from the past which people identify, independently of ownership, as a reflection and expression of their constantly evolving values, beliefs, knowledge and traditions» (Council of Europe, 2015). Along with this shift of paradigm, tourists are increasingly looking for new, meaningful, and immersive experiences. To answer to these new needs, ICT could be applied to cultural and heritage tourism to prove lively experiences or re-create places and historical scenes, able to make a cultural destination more appealing to a prospective tourist.

Consumers' acceptance of e-tourism

In 2010, European Commission highlighted that innovation and new information technologies have become determining factors to stimulate competitiveness in the European tourism industry (European Commission, 2010: 8). The relevance of this phenomenon is confirmed by data. In 2015, the 50% of Europeans who used the internet to shop online, bought or ordered online holiday accommodation, such as hotel reservation (26%) and/or other travel arrangement (24%) (Eurostat, 2016).

The application of ICT to tourism, namely e-tourism, can make a tourism offer more attractive and inclusive, since it provides tools for developing, managing, and distributing tourism products worldwide (Bethapudi, 2013; Pierdicca *et al*., 2019). Thanks to ICT, the planning process is easier and more flexible (Meehan *et al.,* 2016) and the travel experience is more engaging both during and after the trip (Rezaei *et al*., 2016). In this context, mobile devices play a crucial role, since they provide a real-time information support, by allowing tourists to access information, (Trakulmaykee *et al*., 2013); making decisions more effectively (Lamsfus *et al*., 2013) and living interactive experiences (Ukpabi & Karjaluoto, 2017). In these processes, context-awareness services enable a form of communication based on people geographical location (Hugues & Moscardo 2019) and transform places in "senseable spaces", by providing immersive experiences (Osaba *et al.,* 2018) and facilitating interactions among tourists, local community and hosts. Moreover, the collection and analysis of digital footprints, allows to receive feedbacks about performances and understand tourists' behaviours (Zhang *et al*., 2010; Önder *et al.,* 2016).

The existing literature on e-tourism focuses on consumers engagement in the use of ICT for tourism services, by considering consumers' behaviours regarding ICT (Steinbauer & Werthner, 2007; Nunkoo &Ramkisson, 2013; Sahli & Legoherel, 2015) and consumers adoption of new technologies (Parra-López *et al*., 2011; Ukpabi & Karjaluoto, 2016; Book & Tanford, 2019). As for the influence of mobile information system in

tourism, researchers focused on factors, affecting users' attitude towards adopting and using tourism apps to choose a destination, by covering various topics (No & Kim,2014; Lai, 2015; Kim *et al.,* 2015; Chang *et al*., 2016; Kuo *et al.*, 2019).

As for models mostly applied to analyse users' behaviours and measure the level of technology acceptance within the tourism sector, existing studies mainly focused on the social cognitive theory (SCT) (Lu *et al*., 2015) the innovation diffusion theory (IDT) (Chang & Jang 2014;), the technology acceptance model (TAM) (Huh *et al.*, 2009; Kim *et al.,* 2008; Kuo *et al.*, 2019), the unified theory of acceptance and use of technology (UTAUT) (San Martín & Herrero, 2012) and the extended unified theory of acceptance and use of technology (UTAUT 2) (Gupta *et al*., 2018). While SCT pays more attention to personal and environmental variables (Bandura, 2001), IDT, UTAUT (and UTAUT 2) and TAM focus on the characteristics of technology that may affect behavioural intention, adoption decision and use behaviour.

The technology acceptance model (TAM) is an information systems theory elaborated by Davis (1985) and rooted in the theory of reasoned action (TRA), according to which a behaviour depends on the intention to perform that behaviour, which in turns is determined by the person's attitude and subjective norm concerning the behaviour in question (Fishbein *et al*., 1980). Starting from this theory, TAM assumes that perceived ease of use (PEU) (the degree to which a person believes that using a particular system will be free of effort) and perceived usefulness (PU) (the degree to which a person believes that using a particular system will enhance his or her performance), can predict the usage of technology, since they are primary determinants of user technology adaptation. According to the TAM, PEU and PU are influenced by external variables (Xia *et al*., 2018), and all determine users' intention (Davis, 1985). TAM includes two other constructs: the attitude towards use, corresponding to user's evaluation of the desirability of employing a particular information systems application and the behavioural intention to use, that is a measure of the likelihood a person will employ the application (Fishbein *et al*., 1980).

In the last decades, the TAM has been widely employed in various contexts. Herrero and San Martín (2012) adopted this model to investigate the intention to use the websites of rural tourism accommodations to look for information and make online reservations. TAM has also been adopted also to identify factors for using augmented reality (AR) in heritage destinations and investigate their influence on users' attitudes and intention to use this technology and visit a destination (Chung *et al*., 2015; Kuo *et al*., 2019) associated TAM factors to E-Servicescape Environment and E-Word–of Mouth Communication, to determine, through a set of 11 hypothesis, user intention and willingness to use and adopt tourism apps and visit a destination. Authors demonstrated that the e-servicescape environment and e-word-of-mouth communication play major roles in determining intentions to adopt tourism apps and to visit tourism destinations and that these factors are influenced by PEU and PU.

Methodology

Since the use of mobile communication devices mainly affects 18-24 aged users (Blair, 2019), the research focused on a sample of 128 university students attending cultural heritage and tourism courses at UniMc. A survey based on a questionnaire was conducted from May 2020 to March 2021 with the aim to investigate young users' attitudes towards using mobile apps for travel and tourism purposes.

The questionnaire consisted in 23 questions, aimed at collecting respondents' general information (section 1), investigating their familiarity with digital technologies (section 2) and their level of acceptance of technologies for travel and tourism purposes (section 3) and assessing users' perception about the usefulness and ease of use of the app (section 4). Sections 1-3 consisted in closed-ended questions, while section 4

included open-ended questions to assess PEU and PU also in a qualitative perspective. All respondents were asked to complete the questionnaire after they had downloaded and experienced the app.

Starting from the framework elaborated by Kuo and colleagues (2019) and considering Smart Marca app characteristics, a grid of 8 influencing factors has been built (*fig.13*). TAM has been used to analyse the relationship between these 8 factors and two moderator variables, (PEU and PU), to assess their impact on users' attitudes and intentions to adopt other tourism apps, continue using Smart Marca app and visit Fermo area. To this aim, 6 research hypotheses have been formulated:

- Smart Marca characteristics have effect on PU (*H.1*)
- Smart Marca characteristics have effect on PEU (*H.2*)
- Smart Marca characteristics have (positively) effect on attitudes towards continuing using the app (*H.3*)
- Smart Marca characteristics have (positively) effect on the intention to adopt other tourism apps (*H.4*).
- Smart Marca characteristics have (positively) effect on the intention to visit Fermo area and attractions included within the app (*H.5*)
- Attitudes towards continuing using Smart Marca positively affect the intention to visit Fermo area and attractions included within the app (*H.6*)

Considering these hypotheses and using a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), the questionnaire assessed respondents' levels of agreement or disagreement with 8 constructs and analysed, for each item, their influence on 3 intentions/attitudes (*fig. 12*).

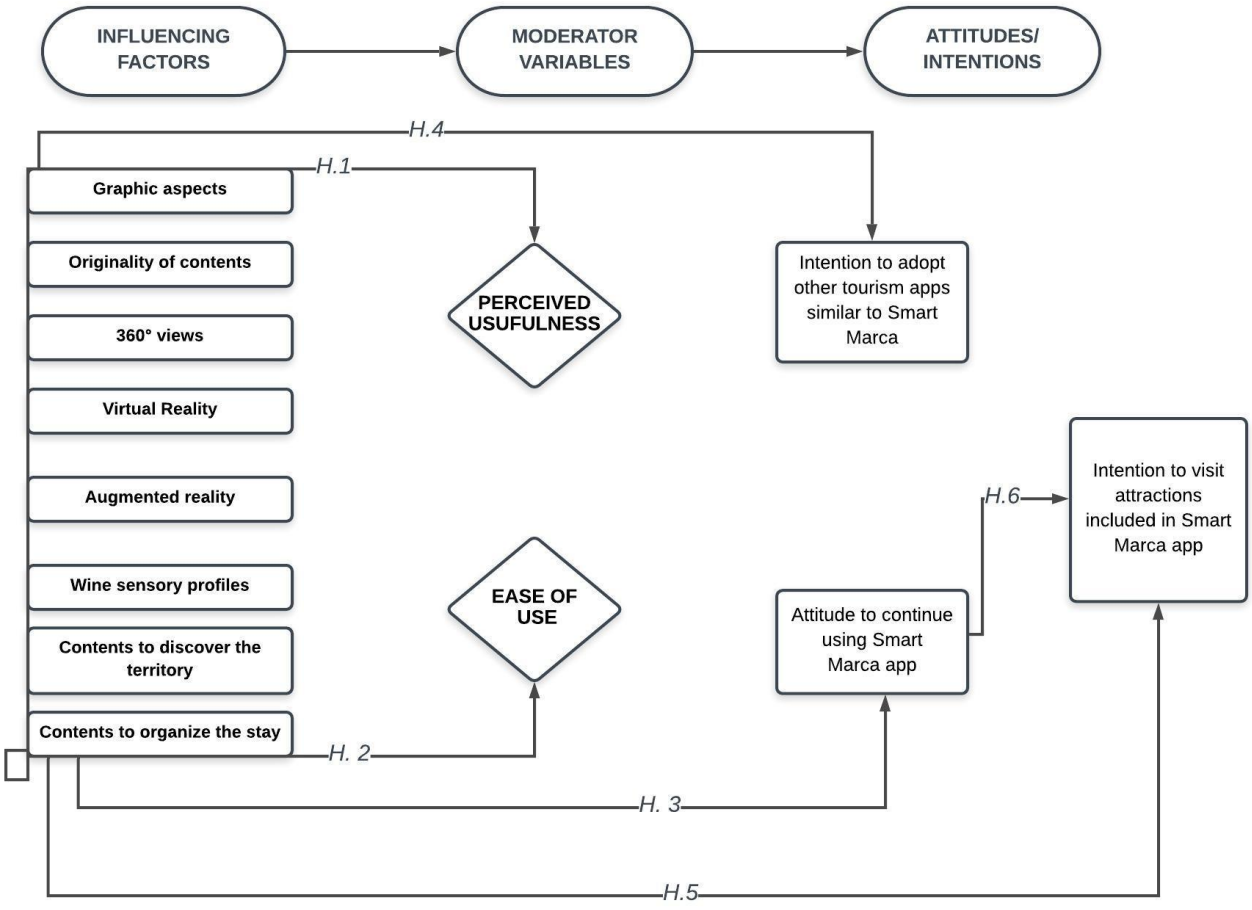


Figure 12 - Methodological framework (source: author's elaboration)

Findings and discussion

Concerning the respondents' profile, the 25% was male and the 75% female, with and average age of 22,9. Eighty percent attend a bachelor's degree course in Cultural Heritage and Tourism and the 20% attend an international master's degree course in International Tourism and Destination Management. Most respondents are from Marche Region (69%), followed by respondents from other Italian regions (25%) and other countries (6%).

As for their level of familiarity with technologies, the 65% of respondents declared to be familiar with digital technologies, mainly used for education and training, shopping and telecommunication. Regarding the use of technology for travel purposes, most respondents generally use mobile app for tourism purposes in general and to enhance the knowledge of a place.

As for consumers acceptance of mobile app for tourism purposes, results show that the intention to continue to use Smart Marca, adopt other tourism apps and visit places and attractions included within the app are mainly influenced by the usefulness (contents to discover the territory; contents to organize the stay) and the originality of information provided (tab 17). Graphic aspects play a major role in influencing the adoption of other tourism apps, rather than in creating a loyalty relationship in the use of Smart Marca or in triggering the decision to visit Fermo area (tab 17). The importance given to the originality of contents is also confirmed by the role attributed to VR and AR tools and to the sensory wheel: even if respondents recognized a good level of influence of these factors in all the 3 proposed scenarios, 360° views and VR play a major role in influencing the decision to visit Fermo area, while AR and wine sensory profiles seem to incentive the continuing use of the app (tab 17).

As regard for the single influence of Smart Marca characteristics on users' attitudes and intentions, the results of correlation analysis (Rosenthal & Rosnow, 2008; Lazar *et al.,* 2017) shown in *table 18* suggests that the intention to continue using the app is correlated with the intention to visit Fermo area (*corr. 2*) as for the originality of contents provided (*Pearson's r value*=0,63). Virtual and augmented reality contents, as well as wine sensory profile positively affect the correlation between the attitude in using tourism apps and the intention to visit Fermo area (*corr.3*). Indeed, *table 17* shows a positive linear relationship between the two variables, for all influencing factors, with a significative correlation in case of augmented reality (r=0,81), 360° views (r=0,763), wine sensory profiles (r=0,79), and virtual reality (r=0762).

Table 17 - Users' acceptance of mobile apps for tourism purposes (source: authors' elaboration).

Influencing factors	*Your intention to continue to use Smart Marca app would be positively affected by:*		*Your intention to download and adopt other tourism apps would be positively affected by:*		*Your intention to visit attractions presented in the app would be positively affected by:*	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Graphic aspects	2,875	0,83	3	0,77	2,82	0,74
Contents to discover the territory	3,54	0,55	3,57	0,55	3,47	0,57
Contents to organize the stay	3,33	0,74	3,54	0,6	3,42	0,66
Originality of contents	3,19	0,8	3,28	0,79	3,17	0,82
360° views	2,72	0,89	2,69	0,85	2,75	0,92
Virtual reality	2,67	0,91	2,65	0,91	2,68	0,91
Augmented reality	2,73	0,88	2,66	0,82	2,64	0,9
Wine sensory profile	2,88	0,91	2,79	0,87	2,86	0,91

Table 18- Users 'acceptance of mobile apps for tourism purposes. Correlation analysis (source: authors 'elaboration).

Influencing factors	*Intention to continue to use Smart Marca app /attitude towards tourism apps use* (*corr.1*)	*Intention to continue to use Smart Marca app /intention to visit Fermo area* (*corr.2*)	*Attitude towards tourism apps use/ intention to visit Fermo area* (*corr.3*)
	r value	r value	r value
Graphic aspects	0,161	0,015	0.484
Contents to discover the territory	0,112	0,014	0,547
Contents to organize the stay	0,026	0,029	0,546
Originality of contents	0,009	0,632	0,632
360° views	0,012	-0,043	0,763
Virtual reality	-0,071	-0,121	0,762
Augmented reality	0,004	-0,067	0,810
Wine sensory profile	-0,077	-0,091	0,794

These aspects are also confirmed by the results of the last part of the questionnaire aimed at exploring the nature of usefulness and ease of use as moderator variable in the decision to adopt a mobile app for tourism purposes. Most respondents (102) declared they had not faced usability issues and appreciated app's design and functionalities («overall the application is well designed»; «it works well»). They also specified that the app was clear, intuitive, and easy to use («it is easy to find information for short period of time»; «there are useful information which are easy to reach»; «well organized and complete information»; «usability is great, really easy to use it and to find all the information needed»). As for usefulness, most respondents declared to have downloaded the app to get a better knowledge of the territory and to discover new places («my aim was to get to know the Fermo area in greater depth»; «I wanted to discover new things to visit») and local products («I set out to analyse the wine section»). Among them, some respondents focused on the opportunity to virtually experience a place that cannot be physically visited («I would have liked to take a virtual tour of the countries that I cannot physically visit now»; «my aim was to get to know the inland villages of *Marca Fermana* while sitting comfortably on my sofa»). This has been considered relevant also to have a stimulus to visit the area («the aim was to find the motivation to convince me to visit the area»; « I wanted to be encouraged to visit the area»). Other respondents downloaded the app to receive information about facilities, restaurants, museums and their opening hours to organize a stay («my first goal would be helping me into finding the perfect places where to eat, or to stay»; «I wanted to check if it was possible to find out the opening hours of historical and archaeological sites in the Fermo area») but also to be aware about events and experiences («by using the app I wanted to find out what it could offer in terms of services and experiences»; «I downloaded it to be informed about events in the area»).

Moving from expectations to users' satisfaction, most respondents declared that the app helped them in achieving their goal, in terms of knowledge of the territory («the app introduced me to products and events that I was previously unaware of»; «I was able to easily find a large number of itineraries») and practical information («the app provided information about the opening hours of the sites I was interested in»; «in some cases this application is very useful for having practical information about towns that are in the province of Fermo»). As for the answers to the question "Which features of the app are most/least important to you?", the knowledge of the territory has been considered as the most important feature (52 responses): among the app sections, the ones focused on events, itineraries and local products have been mostly appreciated. Respondents also appreciated VR and AR tools (7), the wine sensory wheel (5) and geo-localised information (5). Speed and ease of use has been considered as important by 10 respondents, while graphics aspects and

specifically the opportunity to see places, attractions and products has been considered as important by 7 respondents.

The survey found that Smart Marca characteristics firstly have effect on the level of PU (*H.1)* and PEU (*H.2*). Moreover, attitudes towards continuing using the app affected by the combination among influencing factors and moderator variables, play a specific role in influencing the intention to visit Fermo area and its attractions (*H.6*). Indeed, Smart Marca app has been considered as a useful tool to experience Fermo area at distance and as a stimulus/motivation to physically visit it. The stronger importance given to usefulness of contents, rather than graphic aspects and opportunities to live an immersive experience, shows that new technologies have a vital role to play in meeting the concrete needs of users in planning a trip and not just for their own sake, such as gaming or augmented reality. This is confirmed by two aspects:

- the originality of contents represents a crucial junction, in terms of scores received (tab 2), between the importance given to contents and their presentation (contents to discover the territory, contents to organize the stay, graphic aspects) and to the opportunities provided by new technologies (360° views, virtual reality, augmented reality, wine sensory profile).
- the wine sensory wheel and AR and VR tools have been considered as important features of the app.

In this sense, Smart Marca characteristics meet 3 levels of needs and provides specific implications in terms of acceptance of mobile apps for tourism purposes:

- they simplify the use of the app, influencing the attitude to continue using it.
- they provide original and useful contents, influencing the attitude to adopt other mobile apps.
- they provide and immersive experience of the territory influencing the intention to visit the destination.

Conclusions

This chapter explores the connections among tourism, cultural heritage, and ICT, by investigating how customers use tourism mobile apps and how tourism apps can influence the intentions to visit a cultural destination. To this aim, potentials of e-tourism and tourism apps to promote a destination are highlighted and Smart Marca app is presented as a case study.

A survey conducted on a sample of 128 university students who used Smart Marca app and based on TAM showed that the combination of ICT and tourism is able to make a travel experience more attractive and engaging not only during and after the trip, but also remotely (Bethapudi, 2013; Rezaei *et al*., 2016; Pierdicca *et al*., 2019).

Therefore, the research highlights that many factors can determine the acceptance of mobile apps for tourism purposes. First of all, users accept tourism apps because they are more inclined to accept them if they are perceived as useful and easy to use (Chung *et al*., 2015; Kuo *et al*., 2019). In this study, PU and PEU had a major role in determining attitudes towards continuing to use the app and adopting other similar apps, even they demonstrate a relevant role also in influencing the intention to visit a destination.

Consumer acceptance also depends on specific characteristics of the mobile app, mainly contents to discover the territory and organize the stay in the area (Trakulmaykee *et al*., 2013; Lamsfus *et al*., 2013), but also graphic aspects, that determine the attitude towards continuing using the app and adopting other tourism app, but also influence the intention to visit the destination experienced in a virtual way. In this sense the way how contents are provided (originality of contents), represents a relevant link between the importance given to contents (contents to discover the territory, contents to organize the stay, graphic aspects) and opportunities provided by new technologies (360° views, virtual reality, augmented reality, wine sensory profile) to live interactive and immersive experiences (Ukpabi & Karjaluoto, 2017; Osaba *et al.,* 2018).

Moreover, the study shows that mobile travel apps can play a crucial role for the creation and promotion of a cultural destination, since they impact on the way how culture is experienced (Arcese *et al*., 2011; Haydar *et al*., 2011; Bekele *et al.,* 2018). In this sense, if culture can be considered as a "destination enhancer", since it can positively affect the desirability of a place (Zeppel & Hall, 1991; Kumar, 2017) and stimulating the economic growth of a territory by attracting tourists (Silberberg 1995; Csapo, 2012), technology, when applied to the promotion of a cultural destination, can act as a "destination attractor".

As for further contributions, the research also highlights that, since new technologies, and specifically tourism apps, help in analysing and understanding users' behaviours, attitudes, and intentions (Zhang *et al*., 2010; Önder *et al.,* 2016), they can support mobile app providers, but also local authorities and destination management organizations (DMOs) in attracting tourists in a destination. Indeed, in a managerial perspective, the analysis of the influence of mobile tourism app on the decision to visit a destination could allow to improve contents, information, and specific other tools and furthermore segment users, supporting the definition of new ways to develop tourism marketing strategies, attract customers and improve their experience (Kounavis *et al.,* 2012).

The main limitation of this study is that the developed scale should be checked against a more differentiated sample, by considering other clusters of users and assessing their level of acceptance of a tourism mobile app like Smart Marca. Therefore, future research should apply the scale in wider and more diverse contexts to identify the impacts of perception and behaviours regarding tourism apps' consumption value on customers who use the apps.

PART 3
Quadruple helix collaborations, ICTs, and relational tourism

The case of *Agritur-Aso* Association

Tullio Pericoli, *Paesaggio Instabile,* oil on canvas (1998)

CHAPTER 4 – Exploring the role of the university in the creation of knowledge networks in the Aso Valley, a rural area in Marche Region.[15]

Rural areas are often disadvantaged by their peripheral position, depopulation, and the scarcity of primary services (Barca *et al*., 2014). This study argues that universities, through the creation of knowledge networks, could help these areas develop the economic and social resilience needed to counter these difficulties and to thrive. Rural areas can be attractive tourism destinations because of their peaceful, natural beauty, made even more inviting when combined with opportunities to learn about their cultural and historical heritage, enjoy local traditional festivals and savour their special foods and wines. This cultural capital should be exploited to develop sustainable tourism (Richards, 2002; Rinaldi, 2017) through collaboration between various actors with complementary skills and areas of expertise (Sharpley, 2002), especially local cooperatives and associations (Aref & Gill, 2009; Johnson, 2010; Nair *et al*., 2013), which may organise activities and events featuring typical products and expressing the values and knowledge of their local historical heritage.

In this context, universities can have a crucial role in creating knowledge networks and enhancing the "rural buzz" that is the flow of information and knowledge among the individuals, organisations, and businesses in a rural area through face-to-face interactions (Bathelt *et al*., 2004). Of particular value for both the site and the students are the university-organised opportunities for experiential learning (Kolb, 1984); students work with local actors contributes to the creation of knowledge networks for sharing and using different types of knowledge (Phelps *et al*., 2012) and to the enhancement of "rural buzz" (Thomas, 2016). These factors can foster innovation and rural development (Lane & Oreszczyn, 2013).

In this chapter, an Italian case study from Marche Region, the collaboration between the UniMc and a local association, *Agritur-Aso*, is presented as example of a network for the co-valorisation of regional cultural capital. The study research question is: *how and to what extent can universities stimulate knowledge networks to valorise regional cultural capital in remote rural regions?*

Theoretical framework

Knowledge networks in rural areas

In a knowledge network, the participants are the nodes, and their shared knowledge constitutes the links. While several types of knowledge networks are discussed in the literature (Jamal &Getz, 1995; Cooper, 2006; Ngo *et al*., 2018), this chapter focuses on informal ones based on openness and reciprocity that draw together different types of knowledge in a rural region and lead to the creation and utilisation of regional resources and competencies that support concrete collective and collaborative actions (Lane & Oreszczyn, 2013; Kolehmainen *et al*., 2016). When existing social relations form the basis for such a network, the participants often share common values, attitudes, and interpretative schemes, and this encourages the flow of information, allowing all the members to learn and benefit as each member shares his or her knowledge

[15] A revised version of this study has been accepted to be published in the book *Universities and Regional Engagement. From the Exceptional to the Everyday*, edited by T. Iakovleva, E. Thomas, L., Nordstrand Berg, , R. Pinheiro and P. Benneworth (see *Notes for the reader*)

(Fesenmaier & Contractor, 2001). Temporary knowledge clusters also are formed through events that facilitate interactions among different actors (Bathelt & Schuldt, 2008).

Regional development and innovation in remote areas can be fostered when local communities form knowledge networks. This flow of information created face-to-face, in co-presence and co-location among actors and firms from the same industry, place or region, can be defined "local buzz" (Bathelt *et al*., 2004). "Global pipelines" are links beyond the local level, which can have a role in knowledge creation and innovation, as they integrate information from other environments with potential to increase local interpretation and usage of knowledge (Bathelt *et al*., 2004).

Thomas (2016) provided an example of a rural knowledge network and "local buzz", analysing a Welsh case study and identifying five dimensions: (1) interaction between farmers; (2) interaction between different agricultural suppliers/service providers; (3) interaction between the government and farmers; (4) interaction between knowledge transfer specialists and farmers; (5) spread of knowledge throughout the community and beyond.

In the tourism sector, a similar model was applied by Bertella (2011a) to the concept of Community of Practice (CoP) as developed by Wenger (1998), indicating groups of people who participate together in a collective process of learning about tourism to produce a shared practice. In a CoP, members reflect on and engage o to learn how to achieve an objective perceived as meaningful (Bertella, 2011a). The actors involved feel a sense of belonging to the place where they act and to the group with whom they work: a sense of reciprocal trust, of responsibility towards the community, and strong identity usually characterise a CoP (Bertella, 2011a) and distinguish it from a generic learning/knowledge network. CoPs and can be significant for promoting tourism in their area, as knowledge and identity give value to the natural and cultural resources on offer.

The role of universities

In the last decade, universities have been progressively involved in their local contexts. According to Goddard and colleagues (2016), civic universities are actively engaged with the local community through a holistic approach to impacting society beyond the academy. Characterised by a sense of purpose and a sense of place, they want to impact society by addressing societal challenges, or specific global or local problems, and view their local areas as a "living laboratory" (Goddard *et al*., 2016).

For civic universities, "teaching has a strong community involvement with the long-term objective of widening participation in higher education and producing well-rounded citizens as graduates" (Goddard and Kempton, 2016:13). Specifically, through experiential learning (Kolb, 1984), their students connect the academic environment to local communities and, consequently, play an essential role in creating knowledge networks (Phelps *et al.*, 2012).

Community-Academic Partnerships (CAPs) are collaborations between community members of rural areas and nearby universities to foster knowledge exchange (Drahota *et al*. 2016). They "are characterised by equitable control, a cause(s) that is primarily relevant to the community of interest, and specific aims to achieve a goal(s) and involve community members (representatives or agencies) that have knowledge of the cause, as well as academic researchers" (Drahota *et al*. 2016:192). The community context in which the collaboration process is formed and the relationships among the participants involved are significant for taking actions (Brookman-Frazee *et al*., 2012). The following interpersonal factors facilitate the collaboration:

- trust and respect.
- the presence of shared visions and goals.

- good communication (common language) and capacity to solve conflicts.
- clear division of roles and functions.

Benefits of knowledge networks in rural areas

Previous research in rural areas pointed out different types of knowledge that can be developed (Fonte, 2008; Csurgó *et al*., 2008; Bertella, 2011b). In terms of food, networks can foster scientific, political, managerial and local knowledge. Scientific knowledge is a standardised form of knowledge from research, for example, in the case of food and gastronomy; political and managerial knowledge relate the organisation of production of food that is considered a competitive tourism product; lasty, local knowledge consists in a technical form of knowledge about how to produce and prepare local food.

CAPs can yield a variety of outcomes. They can be proximal: (1) partnership synergy; (2) knowledge exchange; (3) tangible products; and distal (which depend on the proximal); (4) development of/enhanced capacity to implement programs or interventions; (5) improved community care; (6) creation of sustainable CAP infrastructure for collaboration; (7) changed community context (Brookman-Frazee *et al*., 2012; Drahota *et al*., 2016). Students benefit from this collaboration process and active engagement in activities promoted in the local community, as they learn new knowledge, identify employability opportunities and are encouraged to be active citizens (Goddard &Kempton, 2016: 13).

Background context

The University of Macerata

UniMc is located in Marche Region. Its origins date back to the Middle Ages: in 1290 a School of Law run by a private master was founded under the protection of Macerata Municipality, thus having the features of a public university. In 1540, Pope Paul III re-organised this school as the *Studium Generale Maceratense* with the classic four faculties (Law, Theology, Philosophy, Medicine) (Pomante, 2013). UniMc has today 5 departments and it is the unique Italian university exclusively focused on Socio-economic Sciences and Humanities (SSH). Accordingly, its motto is “Innovation through Humanities”: through a humanistic approach, it finds innovative interdisciplinary solutions for social and economic challenges (Compagnucci *et al*., 2018). In the academic year 2017/2018, 10.083 students enrolled at UniMc, 438 of them were international (USTAT, 2018). As articulated in its 2019-2020 strategic plan, UniMc seeks to expand its function as a public space where interactions with the city and the territory occur (UniMc, 2018). In line with the National Strategy for Inner Areas (NSIA) (Barca *et al.,* 2014), the Operational Programme for Regional Development based on the ERDF (Marche Region, 2014) and the RIS3 (Marche Region, 2016), the University works with local actors to market the region, serving as a facilitator for discussions and planning working tables involving a network of various organisations, to reinforce relationships among participants and foster co-creation of sustainable development.

UniMc has coordinated or been involved in a wide range of European projects at the international level, also related to agriculture, food and wine, and tourism (Tomasi *et al.,* 2021). More specifically, since 2009 a team from the Department of Education, Cultural Heritage and Tourism has been working on agri-food marketing and territorial branding in rural areas, using an action research approach (Gilmore &Carson, 1996;

Grant *et al.*, 2001) and an emphasis on mutuality and commitment. In this context, a collaboration between UniMc and the *Agritur-Aso* Association began.

The *Agritur-Aso* Association

In the southern part of the Marche Region, between the Sibillini Mountains and the Adriatic Coast, lies the *Aso*Valley (or Valdaso, named after the *Aso* River), straddling the provinces of Ascoli Piceno and Fermo. This land, populated by 29.392 inhabitants (ISTAT, 2019) living in 21 municipalities, is characterised by small hillside rural villages, surrounded by orchards, vineyards and vegetable gardens, and marked by a strong local cultural heritage, longstanding culinary traditions and many typical local food products (Ferrara, 2015). In this territory, in 2007, *Agritur-Aso* association was founded by six rural accommodation facilities and farms. The association has now 22 members and collaborates with local tourism promoters and organises cultural events based on local resources to foster community engagement and revitalise abandoned sites and small villages. *Agritur-Aso* members offer hospitality enriched with experiential activities (Pine and Gilmore, 1998) based on traditional, seasonal local gastronomy, natural and cultural resources, and the valorisation of local traditions (Bertella &Cavicchi, 2017), thus combining experiential tourism (Sundbo & Sørensen, 2013), relational tourism (Grolleau, 1987) and community-based tourism (Okazaki, 2008). *Agritur-Aso* has a twofold aim and carries out initiatives mainly addressed to tourists and/or guests of its facilities, local community/stakeholders and students.

- Creating projects fostering a better quality of life for local communities. These projects are based on solidarity and sustainability among all the actors involved in the promotion of the territory and apply the philosophy of "Lu 'rajutu", a dialect expression meaning "reciprocal help" and deep-rooted in the rural culture. To this aim, the Association designed the following events:
  - the *Salata* (2007-2013): a rural neighbourhood dinner evoking the ritual of the pork slaughter and promoting the values of conviviality.
  - *Lavandaso* festival (ongoing since 2012): lavender festival, including a market of local fresh products and handicrafts and cultural activities to bring abandoned villages/cultural sites back to life, by raising awareness in the local community and tourists on the importance of caring about the future of these places through an *agora* to discuss the future of the place (Bertella *et al*., 2020).
  - *Li Tajulì pilusi* festival (ongoing since 2014): traditional home-made pasta festival that includes entertainment and cultural activities and an *agora* between the community and tourists to discuss the sustainability and quality of local life for the repopulation of rural villages.
- Promoting a form of hospitality based on authentic and spontaneous relationships between hosts and guests through activities and events that valorise the local culture, history and traditions, and in doing so, to reinforce the sense of belonging of locals. To this aim, the following events are carried on.
  - the *Vintage* festival: (2009-2012) historical re-enactment of traditional winemaking and the preparation of *vincotto*, a traditional mulled wine.
  - *Marche in your suitcase* (ongoing since 2009): form of cultural and gastronomic exchange during which *Agritur-Aso* members travel abroad during low tourist season to the towns of their former guests. They promote Marche Region through cultural events and dinners, featuring products from small local rural firms, to attract more visitors to the Region (Bertella &Cavicchi, 2017).
  -

Methodology

A longitudinal case study (Yin, 2003) was chosen to investigate changes in small communities, especially when there is a collaborative relationship with those being studied (Holland *et al*., 2006). This long-term research activity was based on the PAR approach, mainly used in the field of rural development (Cahill, 2007). PAR is an umbrella term for a series of methods aimed at analysing and deepening a specific situation and co-creating solutions through active participation of researchers in collaborations with non-researchers (Elden &Chisholm,1993; Kindon *et al*., 2007; Bertella, 2019).

Research activities were carried out from 2014 to 2019 and included interviews, observations, formal and informal meetings between the researchers and the association members. The data on which this specific study relies derive mainly from various documents and a series of fieldworks. Desk research was carried on, by monitoring tourism promotion websites (7), blogs (7), social media pages/profiles (2) and YouTube channels (1). A review with 15 videos and 27 articles published in online magazines was also compiled.

As for field research, a semi-structured interview with the *Agritur-Aso* Association president and a focus group with international students participating in the *Lavandaso* festival in 2019 were conducted and recorded and then transcribed and codified into three main steps: identification of emerging aspects, categorisation and summary of the main points emerged. Participant observation, consisting in informal conversations with organisers and participants, has been practised during classes with students, at UniMc events and during *Lavandaso* (2017; 2018) and *Li Tajulì pilusi* festival (2017). To analyse the data, a framework built on an adaptation from the *rural buzz* model described by Thomas (2016) was developed with a focus on the role of the university in fostering knowledge networks. Such framework (*tab. 19*) supports the analysis of the multiple levels of knowledge exchange between UniMc and rural actors in terms of the five dimensions of rural buzz and adds a sixth one, the "global pipeline" (Bathelt *et al*., 2004). The model considers rural residents as active subjects in a network of knowledge development.

Table 19 - The rural buzz dimensions adapted to the Agritur-Aso case study (authors' elaboration from Thomas, 2016; Bathelt et al., 2004).

	Rural buzz adapted dimensions	*Description*
D1	Interaction between tourism and hospitality operators	General interaction between tourism and hospitality operators from the Aso Valley on an informal/conversational level. **Horizontal but informal knowledge exchange**
D2	Interaction between tourism and hospitality operators and other service providers from the area.	Temporary co-presence: opportunity to observe and communicate with each actor contributing to rural buzz. **Horizontal knowledge exchange** **Temporary clustering**
D3	Interactions between tourism and hospitality operators and the government	Government presence at events encourages trust and fosters communication between different rural actors. This allows operators to express their views to the government and to influence policy. **Vertical knowledge exchange** **Temporary clustering**
D4	Interaction between knowledge transfer facilitators and tourism and hospitality operators	Tourism and hospitality operators can benefit from knowledge transfer facilitators (specialists providing information on innovative practice in tourism, training courses and support). **Vertical knowledge exchange** **Temporary clustering**
D5	Knowledge spreading	The knowledge created can spread throughout the region over time (through media, word of mouth, events, relationships based on trust) and enable complex information flows and rural transformation. **Trust** **Buzz**

D6	Global pipelines (Bathelt *et al*., 2004)	The links created beyond the local level can have a role in knowledge creation and innovation, as they integrate information from other environments with the potential to increase local interpretation and usage of knowledge. **Vertical knowledge exchange** **Horizontal (potentially informal) knowledge exchange**

Findings

Results show three level of collaboration involving, among other actors, UniMc and *Agritur-Aso* association: *collaboration in the field*, *collaboration at the university* and *collaboration in Italy and abroad*.

Collaboration in the field

As for collaboration in the field, two initiatives organised by UniMc involved *Agritur-Aso*, the International Student Competition (ISC) on place branding and Mediterranean Diet and the Wine Hackathon.

The ISC is a short study abroad programme organised since 2015 in collaboration with the Piceno Lab of Mediterranean Diet, offering to international students and their professors an opportunity to spend a week in Fermo province to experience the area, learn about its culture and food traditions. Also, participants take part to a competition requiring the definition of ideas aimed at promoting the Mediterranean Diet territorial brand through social media and fostering sustainable development in the area (Tomasi *et al*., 2019). The *Agritur-Aso* president, who is also one of the Piceno Lab founders, hosted some students in his B&B. This direct engagement enabled him to build relationships with international participants, some of which invited the *Agritur-Aso* to organise events in their own countries. Thanks to those relationships, by 2019, *Marche in your suitcase* had already organised three events in Belgium and two in the USA. The Wine Hackathon is a 24-hour event organised by UniMc in 2018 as part of the European project *The Wine Lab. Generating innovation between practise and research*[16]. During the hackathon, groups of students, researchers and professionals competed to propose innovative ideas to promote Marche Region as a Food and Wine destination. The *Agritur-Aso* president has been hosted to the event as key speaker.

On the other hand, two initiatives organised by *Agritur-Aso* in the Aso Valley have in turn involved UniMc. This is the case of *Li Tajulì pilusi* and *Lavandaso* festival. In *2017,* UniMc organised a participative process event (*agora*) during *Li Tajulì pilusi* festival, to share ideas about the contribution from the population to revitalise small, abandoned villages in the rural areas of Marche. Since 2017, national and international volunteering students from the master's degree in international *Tourism and Destination Management*, supported by some PhD students, managed some part of *Lavandaso* festival (Bertella *et al*., 2020). In 2019, 2 students from Ghana, 2 from India, and 1 from Azerbaijan organised the ethnic cooking class and prepared traditional dishes from their country. Participants have been involved in a focus group to evaluate the cooperation between the Association and UniMc. They expressed satisfaction for the opportunity to interact with and learn about the local community and the surrounding area. They also valued the opportunity to practice on soft skills. They suggested the opportunity to be involved also in the event design and organisation, to increase the visibility and enhance the reputation of the event.

[16] The Wine Lab project <https://www.thewinelab.eu/en/> (28.10.2021).

Collaboration at the University

As for collaboration at the University, two initiatives in academia have benefitted both *Agritur-Aso* and UniMc students. This is the case of Agri-food marketing classes, based on a problem-based learning approach (Barrows, 2002) and a participatory event organized in January 2017 by UniMc focused on the recovery after the 2016-earthquakes in Central Italy.

Concerning the first initiative, since 2015, *Agritur-Aso* president has presented the Association's promotional activities, primarily focusing on *Marche in your suitcase*. Students adopting the case developed proposals coherent with the theory studied in the class. The president answered students' questions and later put into practice the most innovative and feasible ideas presented. In 2020 the students worked on the Business Model Canvas (Osterwalder, 2004) and proposed some ideas to help *Agritur-Aso* members during the post-COVID-19 recovery.

During the event focused on the 2016-earthquakes in Central Italy, local stakeholders from education, agriculture, tourism, and culture, discussed in groups coordinated by the UniMc on proposals and projects about the social and economic reconstruction of the territory. *Agritur-Aso* presented its initiative to raise funds to rebuild a church in a village through the donations of international contacts from *Marche in your suitcase*. During the event, *Agritur-Aso* enriched its network meeting a former high school German teacher. She put the Association in contact with an association of Italians in Germany. As emerged from the interview, they then organised together *Marche in your suitcase* events in Obertshausen and Dudenhofen in 2017 and 2018. In turn, *AgriturAso* organised some concerts in the small historical theatres of Marche for a mandolin orchestra of Dudenhofen. These were planned for 2020 but postponed due to COVID-19.

UniMc has also established an official agreement with *Agritur-Aso* for curricular students' internships.

Collaboration in Italy and abroad

UniMc's national and international network has helped *Agritur-Aso* expand its activity. As reported during the interview, the Association established relations with the Wine Route of Tuscany, participated in Tuscan events, and shared its experiences at the post-graduate course in Wine in the Calabria Region. Moreover, in September 2019, the Association presented its activities at the Summer School on Sustainable Development promoted by the University of Siena (Tuscany).

Supported by UniMc, *Agritur-Aso* presented the experience of *Marche in your suitcase* in an application for the 2019 ECTN Award for sustainable cultural tourism (ECTN, 2019). At the 12th International Conference for Cultural Tourism in Europe held in 2019 in Granada (Spain), the Association was awarded first prize as a Destination of Sustainable Cultural Tourism in the "Culinary Heritage, Wine, Food & Gastronomy Tourism" category (Europa Nostra, 2019).

Agritur-Aso also met Arizona State University students interested in sustainable agriculture, through *Agritur-Aso* experiential learning activities organised for *Edulingua,* an Italian Language and Culture School in San Severino Marche (MC). Students visited *La Scentella*, attended to a presentation about *Agritur-Aso*' s goals and activities, especially *Marche in your suitcase*, and featured the quintessence of sustainable tourism, a *Ciocheciò*[17] dinner prepared with seasonal products, home-grown or bought from local farmers.

[17] *Ciocheciò* is and invented and stands for "what is actually available" (see chapter 5).

Discussion

The long-term relationship between the *Agritur-Aso* association and UniMc, even though mainly informal, suggests that reciprocal exchange of knowledge can emerge from an existing social tie based on trust, respect, good communication, shared goals, and a sense of belonging and identity (Wenger, 1998; Bertella, 2011a; Brookman-Frazee *et al*., 2012; Drahota *et al.*, 2016). Over time, this interaction enabled the Association to broaden its network locally, nationally, and internationally (Fonte, 2008; Csurgó *et al*., 2008; Fesenmaier & Contractor, 2001; Lane & Oreszczyn, 2013). This resulted in the exchange of various types of knowledge, particularly tourism knowledge about the valorisation and exploitation of rural resources as experiences, and local managerial and political knowledge about the socio-cultural aspects of the specific area (Bertella, 2011b). In the following paragraphs, the relationship between UniMc and *Agritur-Aso* according to the rural buzz adapted dimensions (tab.18) will be discussed.

Rural buzz in the classroom

The courses in *Agri-food Marketing* and *Place Branding and rural development* engage students in experiential learning and problem-based learning activities (Kolb, 1984; Barrows, 2002), to support their employability by experiencing real challenges in the working environments (Goddard & Kempton, 2016). Specifically, in the *Agri-food marketing* course, students who did their project work on the *Agritur-Aso* case took part in a temporary knowledge cluster (Bathelt & Schuldt, 2008). Indeed, as they learned about it during the class presentation, spoke with its members and other stakeholders and, in some cases, worked with them during curricular internships, they started sharing its goals and sought to support it. There is a two-way exchange of information: the students learn about the specific characteristics of the area and the Associations' activities and at the same time serve as knowledge transfer facilitators (D4), providing the Association with new knowledge to support its promotion of the area.

Through the participatory approach event promoted to discuss with local stakeholders about the post-earthquake recovery, the university also facilitated knowledge exchange with other stakeholders from the same or different fields (D1, D2). The event was also participated by public bodies, with whom the university regularly deals. In this sense, the university supports reciprocal awareness among stakeholders that may influence policymaking (D3). Through these events, government and institutional participants understand the activities going on in the rural areas and the needs for resources.

Rural buzz in the area

UniMC participation in *Agritur-Aso* events (e.g., *Li tajulì pilusi* festival) and, in exchange, the participation of *Agritur-Aso* operators in university events and learning experiences in the area (e.g. ISC) can be related to several dimensions of the rural buzz framework (Thomas, 2016). As a civic engaged university, UniMc considers the local area as a living laboratory (Goddard *et al.*, 2016). These events foster interactions among tourism and hospitality operators (D1), other service providers (D2) and the local community, and help identify the needs of the local community, providing the university with a deeper understanding of the local context, which is the subject of research of its studies, through a participatory action research approach (Cahill, 2007). This link is also applicable to the role of students working as volunteers in the frame of events such as the *Lavandaso* festival: by supporting organisation and implementation of the events, students can apply the theoretical

knowledge gained during their university courses (D4). The dimension of CAPs to enhance care for the community (Brookman-Frazee *et al*., 2012; Drahota *et al*., 2016) is retrievable in the case of the *agora* managed by UniMc during the festival *Li Tajulì pilusi.* Indeed, in that occasion*,* participants discussed the future of the abandoned villages of rural areas. The *agora* served to share ideas on the topic and build relationships with other participants and professionals: new relationships support the development of new opportunities for collaboration (D1, D2, D4). The CoP concept also comes into play here: university students, teachers and residents can be viewed as practitioners that possess different types of knowledge and share the same interest and concern for the local area (Wenger, 1998). As such, UniMc contributes to horizontal rather than vertical knowledge exchange, as the transfer of knowledge is reciprocal, and the local cultural values are part of the knowledge flow (Thomas, 2016). In this collaborative inquiry, all the participants, including the university itself, invest their professional identities as part of a dynamic, forward-looking community (Wenger, 1998).

Rural buzz beyond the Fermo area: a "global pipeline"

Through the UniMc network, *Agritur-Aso* could share knowledge (Thomas, 2016) throughout the region (D5) and beyond (D6), by participating in several initiatives to present and provide experiences related to its activities. Thanks to the UniMc collaboration with *Edulingua* in San Severino Marche, it happened locally with the involvement of the Arizona State University students in a field trip. It also occurred outside the region, at the Wine Route in Tuscany, at the Wine Master in Calabria and the Summer School in Siena.

In a "global pipeline," links with actors abroad expand the potential for knowledge creation and innovation (Bathelt *et al*., 2004), as information can be transferred to other contexts but can also come from different environments, thus increasing local interpretation and usage of knowledge (Bathelt *et al*., 2004). In this context, UniMc has facilitated new partnership synergies and helped actors to implement programs or interventions beyond the local area (Brookman-Frazee *et al*., 2012; Drahota *et al*., 2016). For example, UniMc helped Marche in your suitcase by sharing its network to meet new partners who decided to support the initiative. It is also valid for the involvement of international students in the *Agritur-Aso* activities, as they can promote interculturalism and place-making (e.g., ethnic cooking classes), gain local knowledge, and also provide to locals an international perspective and become "ambassadors" for the region in their countries (Wenger, 1998; Bertella, 2011a; Brookman-Frazee *et al*., 2012; Drahota *et al*., 2016) (D6).

Conclusions

This chapter investigated the role that universities can play in stimulating knowledge networks to valorise regional cultural capital in remote rural regions through a PAR approach. It explored the long-term relationship between UniMc and *Agritur-Aso*, a local association of tourism and hospitality operators from a Marche region's rural area.

The findings suggested that the reciprocity between UniMc and *Agritur-Aso* contributed to creating the basis for temporary proximity, tacit knowledge and situational learning; furthermore, results highlight that *Agritur-Aso* benefitted the expansion of its network significantly through UniMc contacts. Thus, universities can play a significant role in stimulating knowledge networks to valorise regional cultural capital in remote rural regions. The horizontal knowledge exchange and expansion of learning relationships beyond the local area and the significant amount of time developing reciprocal trust and mutual commitment based on a shared vision of rurality and the related challenges and potential strongly emerge. These factors were addressed in

terms of the concepts of “rural buzz”, CoP and CAP. This case presents some critical aspects: UniMc -*Agritur-Aso* collaboration, based on trust and mutual commitment and related to researchers and students personal and informal engagement, has never been officially structured. The lack of structure prevents it from a long-term vision. For example, the relationships built in the classroom sometimes were not nurtured after the end of the course and had not a follow-up in practical terms.

Moreover, the Association’s activities are mainly based on volunteering: they depend on the free availability of human and financial resources. In this way, continuity cannot be guaranteed: this is one of the main reasons why some of the events stopped (e.g., the *Salata*; the *Vintage* festival). A more structured collaboration with the University could provide the Association with more opportunities to access public funding and direct contact with local and regional public authorities. More generally, creating a sustainable CAP infrastructure for collaboration could also share the University’s wider network with local stakeholders and turn these relationships into concrete collaborations from a long-term perspective.

This study presents some limitations. Firstly, it lacks precise measurements of these relationships' impact in terms of improved community care and changed the community’s context. Concerning this, future studies should be dedicated to understanding the actual nature of the knowledge exchange between the actors involved and how it is translated into concrete actions. A second limitation concerns the existence of perspectives on the local development of tourism that differ from the view advocated and promoted by the investigated university and association. Such an issue can be related to possible conflicts and power relations that might have been overseen, partly due to the researchers’ active role in the investigated collaboration. As a research team, we discussed this aspect and strived to gain a broad view of possible relevant topics and actors excluded from the cooperation. Nonetheless, future studies about the rural buzz and the collaboration between universities and local associations might include a seventh dimension representing the lack of interactions among potentially relevant actors.

CHAPTER 5 – Relationships matter. New paths for tourism beyond COVID-19 pandemic.[18]

In the last decade, the tourism demand for more sustainable experience-based authentic interactions with locals (Pine and Gilmore, 1998; Beverland & Farrekky, 2010; Paulauskaite *et al.,* 2017) has increased. Recent tourism trends show that tourists and travellers, when visiting a destination, are increasingly looking for unique and once-in-a-lifetime experiences and choosing to become more immersed in the daily local life (Booking.com, 2019; Mittiga et al., 2019). In this perspective, relational tourism, which puts the emphasis on personal relationships, exchanges, individualised and unique experiences has become popular as a research topic (Purpura *et al.,* 2007; Bertella *et al.,* 2018; Kastenholz *et al.,* 2020; Lin & Fu, 2020; Marques and Gondim Matos, 2020). The outbreak of COVID-19 pandemic brought the tourism industry to a standstill (ILO, 2020; UNWTO 2020b; WTTC, 2020), changing tourists' behaviours and habits (Del Chiappa, 2020) and compromising the social and relational nature of tourism (Higgins-Desbiolles, 2020; Qui *et al.,* 2020). This situation stimulated scholars and researchers to investigate how this industry will recover after COVID-19 and how can be sustainable in a dramatically changed world (Chang *et al.,* 2020; Jamal & Budke, 2020; Lapointe, 2020; Zenker & Kock, 2020). In this context, technology and the relations created by web resources (Gretzel *et al.,* 2020; Marques & Gondim Matos, 2020), played a central role in building or maintaining relationships in tourism.

This chapter aims to understand if relational tourism can be pursued in the post-COVID-19 tourism recovery and how and to what extent new technologies can contribute to promoting authentic tourism experiences during and after a crisis. To this aim, an exploratory case study from Italy presents the experience of the *Staffetta della Cucina Ciocheciò*, ideated during the COVID-19 lockdown and consisting in an online "relay race" in which participants were asked to post, in a private Facebook group, easy-to-make recipes. This research analyses the role played by technology within the *Staffetta* in maintaining existing relations, creating new ones, and promoting a relational tourism destination, through local food and traditions. These aspects have been analysed through qualitative and quantitative methods: a semi-structured interview has been conducted with the 5 organisers, and 71 online questionnaires addressed to participants were collected.

The chapter is structured as follows: after a literature review on relational tourism, the role of gastronomy and local food for place branding and tourism is stressed, considering the opportunities related to web and technologies in supporting relationality in the post-COVID-19 scenario; then the methodology is presented, and results are discussed, by paying attention to the potential integration between the relational tourism model and the network relationality framework. Conclusions highlight that relationality in tourism can play a relevant role also in the context of a crisis thanks to the technology that, far from being a substitute for reality, can facilitate face-to-face interactions and stimulate the visit to places known only virtually.

Theoretical framework

Relational tourism

The tourism sector has changed over the years, by producing new forms of tourism and hospitality (Purpura *et al.,* 2007): tourists are increasingly looking for immersive experiences in the culture and traditions of places

[18] A revised version of this chapter has been published in the book *COVID-19: Paving the Way for More Sustainable World,* edited by W. Leal Filho (see: *Notes for the reader*).

(Richards, 2013b). Travel is perceived as a source of knowledge; tourists want to live like locals (Richards, 2013a; Paulauskaite *et al.,* 2017) and discover the territory, by also preferring less known destinations and inland areas with rich folklore and local culture. In this perspective, the generation of relationships with the place becomes relevant: exchanges and personal relationships characterise the uniqueness and individuality of the tourist's experience (Kastenholz *et al.,* 2020; Lin & Fu, 2020; Marques & Gondim Matos, 2020). Repeated visits are strongly influenced by the tourist's satisfaction with relationality during the tourism experience (Valls *et al.,* 2004).

The concept of relational tourism refers to a relationship established between those who spend time in a destination as tourists and those who live there, as locals. This relationship is perceived as a value and an element of differentiation which takes place spontaneously (Purpura *et al.,* 2007; Bertella *et al.,* 2018; Kastenholz *et al.,* 2020). As argued by Ruggieri (2007: 54), relational tourism requires the subsistence of at least four conditions.

- A territory with relational characteristics, such as attractions related to the territory characterised by reduced size, if compared to mass tourism destinations (e.g., small villages, farms, local handicraft companies, etc.).
- A supply system with elements and conditions facilitating these forms of tourism and hospitality (e.g., agritourism's, historical residences, historical houses, etc.).
- A type of traveller inclined to interactions and exchanges with the main players in the relational tourism supply chain (e.g., services providers', local community, etc.).
- Interaction, represented by that set of relationships and exchanges that take place between the main players in the relational tourism supply chain (e.g., entrepreneurs, local community, tourist information offices staff, other tourists, etc.).

The author provided a multidimensional model (*fig. 13*) to define relational tourism. He describes it as a combination of relationships in which hosts approach tourists in a friendly way, in order to let them discover the beauty and the peculiarity of their own historical, artistic, folkloristic, culinary and human heritage. The tourist becomes a protagonist, a generator of value, completing the tourism offer itself (Ruisi, 2004). The productive tissue is also integrated into this system (Purpura *et al.,* 2007).

Advantages related to this relational approach are many. First, this type of tourism can represent a mechanism able to avoid a serial reproduction and to focus instead on the authenticity and uniqueness of the place (Richards & Wilson, 2006). Secondly, relational tourism represents a stimulus for the local economy, especially for small and medium enterprises starting from the agri-food, productive-craft and historical-cultural sectors (Naselli, 2005). Thirdly, this kind of approach, encouraging community engagement (Okazaki, 2008) and involving the daily lifestyle of the local community (Purpura *et al.,* 2007), can increase residents' awareness about local culture and promote positive relationships between tourists and locals (Sherlock, 2001; Teye & Sirakaya, 2002; Bimonte & Punzo, 2016; Lee & Jan, 2019).

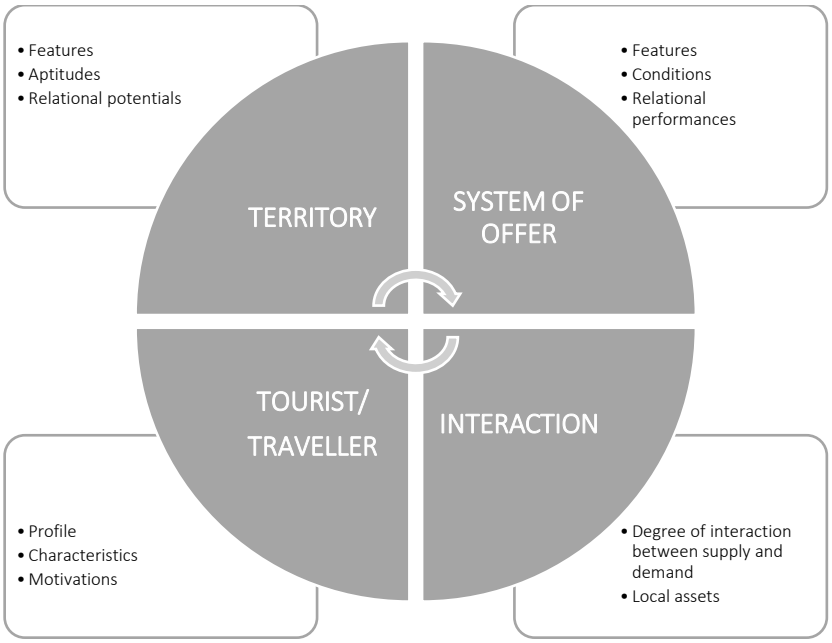


Figure 13 -A multidimensional model for relational tourism (source: author's elaboration on Ruggieri, 2007).

The role of gastronomy and local food for place branding and tourism

Gastronomy and local food play an important role in the development of relationships within the tourism sector. Being an expression of local culture and reflecting regional identities and values (Hjalager & Richards, 2003; Gyimóthy *et al.,* 2009; Rinaldi, 2017), they can differentiate a place from another, thus increasing its attractiveness and competitiveness. This differentiation builds on the idea of an identity-based sense of place, also represented by the bundle of products and services that make up a tourist experience (Harrington et al., 2010: 17). In this sense, the UNWTO *Global Report on Food Tourism* (2012), emphasises the need for food tourism for its potential to convert food and gastronomy, as heritage, into elements of tourism attraction.

According to Richards (2012: 19), food can provide the development of tourism experiences in many ways.

- *Linking culture and tourism*: local food could act as a bridge to bring tourists and locals together in a shared cultural experience.
- *Developing the meal experience*: meals based on local food represent a central part of the tourism experience, which can be memorable and meaningful.
- *Producing distinctive foods*: local foods can act as distinctive elements for place branding and in the marketplace.
- *Developing the critical infrastructure for food production and consumption*: local food can stimulate networking among many actors (e.g., producers, chefs, critics, other culinary trendsetters, journalists, bloggers, etc.).
- *Supporting local culture*: food experiences can provide the cultural capital necessary to sustain the development of local culture.

In this context, consumers progressively ask to be involved in the production and preparation of food during their tourism experiences. This approach embraces the concept of creative tourism, which includes participation in food experiences and knowledge of food and gastronomy (Richards, 2011b). Tourism networks

can stimulate the establishment of relationships between food producers and tourists, thus giving value to regional products (Rinaldi, 2017). It can happen by transmitting the local know-how to tourists and sharing it with them (Bessière, 1998): strategic tools can make link quality, diversity and uniqueness of local food products and dishes emerge and link it to the place to support both the image and the brand of a destination (Rinaldi, 2017: 14).

The role of the web (network) to support relationality in tourism: network relationality

Recently, the reduced spatial distance, the increased physical mobility, and virtual contacts due to the extensive use of the internet have strongly influenced the provision of tourism services (Marques and Gondim Matos, 2020) and especially the way relationships take place. Here, the concept of hospitality is relevant and characterised by a feeling of empathy between hosts and guests (Bialski, 2012). In this relationship, technology is a bridge to interactions (Bawens, 2010) and a facilitator of new forms of sociality (Marques and Gondim Matos, 2020).

To explain social changes related to technological advancements Wittel (2001) used the term network sociality, considering five key elements: (1) the level of integration/disintegration with the community; (2) the intensity of social relations (3) the contents of relations; (4) the boundaries between work and leisure; (5) the integration of technology. Molz (2014) adapted this framework to the hospitality sector, employing the concept of network hospitality, that is based on five aspects: (1) the sharing of private places with strangers; (2) the transformation of strangers into guests; (3) the random nature of guest's choices; (4) the availability of different types of temporary spaces; (5) the fact that guests behave as if they are at home.

Since the relational tourism experience, of which hospitality is an essential part, emphasises relational elements, according to Vázquez and Ruggieri (2011), in order to evoke relationality, the sense of physical encounter and personalised contact with the host community is fundamental. According to Porter (2004), in fact, the distinction between online and offline interactions does not exist, as they are only different means of interaction; moreover, considering the increasing importance of tourist's embeddedness in the local culture (Gordon, 2008; Richards, 2013a; 2014), both sociality and relationality are strongly connected to locality (Wittel, 2001; Molz, 2013; 2014). For these reasons, building on network sociality and network hospitality frameworks, Marques and Gondim Matos (2020) elaborated the network relationality model, which focuses on the relationship between host and guest and, particularly, on how the host influences the tourism experience in a local setting. This model is based on four key principles (*fig. 14*).

- *Temporary belongingness*: temporary attachment to a place, providing the conditions to recreate a community and stimulating a sense of places, usually missing in virtual communities.
- *A priori empathy*: virtual empathy between hosts and guests that starts before the direct encounter. From the hosts' perspective, it is the basis for first positive contact, and it marks the beginning of an effective two-sided relationship (both online and offline).
- *Relational spaces*: both geographical and virtual spaces, corresponding to different moments of the host-guest relationship and representing a central node to the tourist experience.
- *Technology as a bridge to face-to-face interactions*: a set of tools from which relationships begin and take shape, but not central to the relational experience, as the emphasis is on face-to-face interactions.

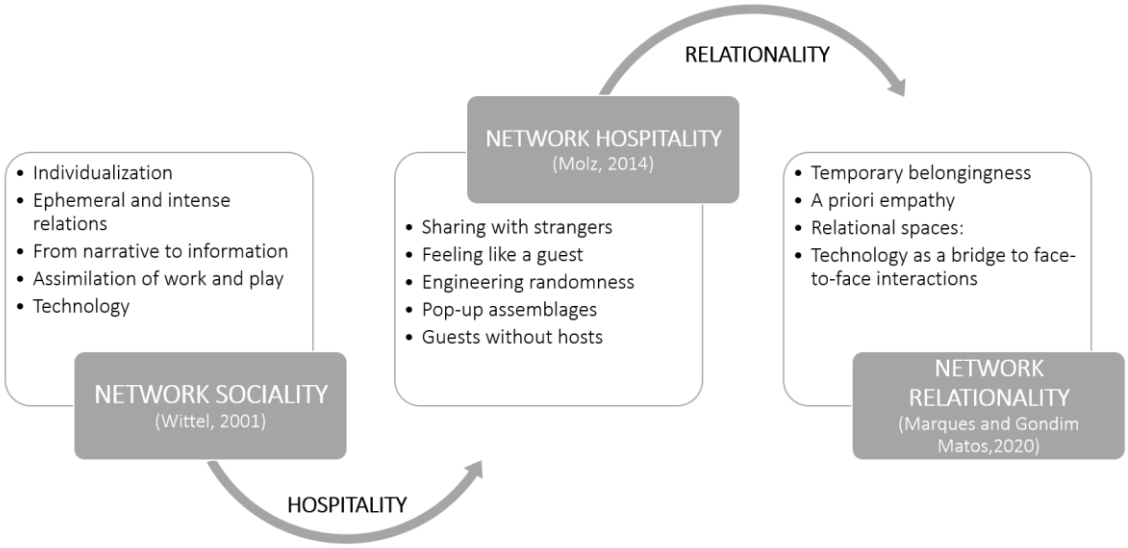


Figure 14 - Hospitality and relationality implications in network sociality (source: our elaboration on Wittel, 2001; Molz 2014; Marques & Gondim Matos,2020).

The outbreak of COVID-19 pandemic: the role of technology in the tourism sector

The COVID-19 pandemic has caused economic, social, and political damages, still not precisely identifiable. Tourism, hospitality, and events sectors have been paralysed by governments efforts to control the pandemic, thus causing a collapse of the whole sector (Higgins-Desbiolles, 2020).

The crisis has raised new questions, especially about the strategies for the tourism industry recovery and its evolution. There are no answers to these questions yet, but technology certainly plays a central role in all this. During this pandemic, ICT "*has been widely used, adapted and developed to address some of the pressing problems in people daily life, including work, travel, leisure, business as well as governance*" (Gretzel *et al.,* 2020, p.2). Technology has become a major factor in addressing specific problems (e.g. traveller screening, case and contact monitoring, online education and entertainment during isolation, to name but a few) and in fostering resilience in tourism (Gretzel *et al.,* 2020; Hall *et al.,* 2020).

In this perspective, the COVID-19 pandemic crisis may offer "*a rare and invaluable opportunity to rethink and reset tourism toward a better pathway for the future*" (Higgins-Desbiolles, 2020: 11).

COVID-19 challenges: tourism trends, global and local changes

One of the most immediate economic effects of the crisis associated with COVID-19 has been the blocking of tourist flows. In response to the generalised measures of social distancing, all tourism activities, at the beginning of March, were reduced to zero (Gössling *et al.,* 2020). At the end of March 2020, UNWTO (2020b), estimated the pandemic would have caused international tourist arrivals to decline 20-30% (compared to 2019). Data from the hospitality sector confirm this estimation: for the week of the 21st of March,

in comparison to the same week in 2019, in all countries, guest numbers have declined significantly, by 50% or more (STR, 2020).

In Italy, travel restrictions have reset to zero an activity that in the quarter of March-May is used to live a seasonal relaunch (ISTAT, 2020). Indeed, in the same period in 2019, the expenditure of foreign travellers amounted to 9.4 billion euros (Bank of Italy, 2020). COVID-19 also impacted on travel behaviours and perception. A recent survey carried out by the University of Sassari, administered to 5.556 persons, investigated the changes in the way Italians would have travelled during and after the pandemic (Del Chiappa, 2020). A good level of cleanliness and sanitisation of public spaces (e.g.: streets, beaches, etc,) (85%); outdoor activities (85,9%) and attractions (e.g.: archaeological sites) (74,3%) are the most important aspects considered by respondents to feel safe during their vacations. The survey also highlighted a relevant propensity to give up some relational aspects of the holiday, such as conviviality during the meals: to avoid overcrowding, 56.5% of respondents would prefer having room-serviced lunch and dinner or meals served in prearranged shifts (73,4%) The research also revealed a higher predisposition to proximity tourism: 67.8% of respondents would travel within the residence region and only the 22.5% would probably travel abroad in the next 12 months.

Methodology

In this chapter an exploratory case study from Italy, focused on the experience of the *Staffetta della Cucina Ciocheciò* is presented. The selected case study is relevant as researchers have long investigated the face-to-face relational approach applied to the experiential and relational tourism offer by rural local networks promoted by some of the organizers of the *Staffetta* (Bertella & Cavicchi, 2015; 2017; Bertella et al. 2018*)*. From the authors' perspective, it was interesting to understand whether this approach has changed, due to the COVID-19 and to which extent technology has helped in maintaining it during the pandemic. An already existing relationship of trust and openness facilitated the data collection and helped in shedding light on the investigated phenomenon.

The research examined the multidimensional model for relational tourism (Ruggieri*,* 2007) and the role that food can play for the development of tourism experiences (Richards, 2012), by also considering the elements of the network relationality framework (Marques and Gondim Matos, 2020). The latter was applied with the scope to explore the role played by technology, locality, and gastronomic traditions in maintaining existing relations and creating new ones within a relational tourism system of offer.

Both qualitative and quantitative approaches have been chosen for the investigation of the *Staffetta* case (Eisenhardt, 1989; Yin, 2003): semi-structured interviews were conducted to all *Staffetta*'s organizers (5) and a survey was administered to participants (July 2020). Interviews were performed online due to COVID-19 travel restrictions and lasted approximately 1 hour each. As regards the questionnaire, a multilanguage online form (Italian, English and French) was prepared and posted on the Facebook group of the *Staffetta*. Among the 229 members of this Facebook page, 71 answered, of which 52 actively participated to the initiative; 19 only acted as audience. Both the questionnaire and the interview were organized into four main clusters of questions aimed at investigating issues showed in *table 20*.

The data analysis was performed by three members of the research team: two of them, separately, operated the interviews' coding according to a common approach. A third member operated the calculations on the questionnaires' data. These were then checked by the other members.

An interviewer and a rapporteur conducted semi-structured interviews which have been recorded, transcribed, and analysed by highlighting similarities and differences in the five organizers' answers. The

emerging aspects were first identified, then categorized on the basis of similarities and synthesized in sentences summarizing the main points. Then, a comparison between the analysis performed by the two was made and the data organized in themes mostly according to the research question. These have been reported in the findings. A phase of interpretation and integration, then followed (Mayan, 2009).

Data resulting from the survey have been analysed by another author to outline the main descriptive statistics. Elaborated data has been reported in the findings.

Both the information emerging from the interviews and from the survey have been reported in the findings, following the initial structure in clusters. In this way, it has been possible to make a comparison between the organizers and participants' perceptions, by reconducting them to the same themes considered through the lens of the models chosen for the analysis. The main themes emerged are the following: relevance of the relational component; the role played by locality and gastronomy within the *Staffetta*; the importance given to the network relationality dimensions; virtual versus real social contacts in a long-term perspective.

Table 20 – Structure of the interview and questionnaire

	Interview (organizers)	Questionnaire (participants)
CLUSTER 1 (Richards 2012; Ruggieri., 2007)	RELATIONAL TOURISM	THE IDEA OF THE *STAFFETTA*
	Knowledge and perception of the relational tourism model	Perception about the initiative; motivations for participation.
	Role of gastronomy and locality to support relational tourism	
	The impact of COVID-19 on relational tourism	
CLUSTER 2 (Ruggieri, 2007)	PREMISES TO THE ORGANIZATION	PREMISES TO THE PARTICIPATION
	Nature of relationships between organizers	Previous experiences
	Nature of relationships between organizers and participants before the *Staffetta*	
CLUSTER 3 (Marques and Gondim Matos, 2020; Richards 2012; Ruggieri, 2007)	THE *STAFFETTA* EXPERIENCE	
	Level of engagement, nature of relationships, interactions and information exchanged during the initiative	
	Network relationality: temporary belongingness, a priori empathy, technology, relational spaces.	
CLUSTER 4 (exploratory)	TOURISM IMPLICATIONS	
	The role of the *Staffetta* for post-COVID-19 recovery	
	The role of the *Staffetta* in promoting destinations	

Findings

A "relational" answer to COVID-19 crisis: the *Staffetta della Cucina Ciocheciò*

The *Staffetta della Cucina Ciocheciò* (literally "The relay race of the *Ciocheciò* cooking style") is an initiative promoted during the COVID-19 lockdown (1st May – 30th June 2020), using a private Facebook group. Its scope was to face the difficulties provoked by the social distancing during the lockdown, by bringing together people from several countries, in order to improve and maintain existing relationships virtually and to create new ones. The *Staffetta* was ideated and organised by three rural hospitality facilities' owners, a journalist, and an extra-virgin olive oil taster. Two of them come from Marche Region (Roberto Ferretti and Anna Maria Monaldi), one from Liguria (Claudio Porchia), one from Veneto (Marisa Saggiotto) and one from Japan (Yoko Moriyama). Each organiser invited participants to enter the Facebook group and eventually present a recipe and had a specific role within the organization. All the organisers are related to each other by

a long-lasting friendship and by exchanges (sometimes only virtual) based on three main network experiences, that represented important conditions for the development and organization of the *Staffetta*: the *Ciocheciò* philosophy, the use of spontaneous herbs in the kitchen and relational tourism.

The *Ciocheciò* philosophy (the word is invented and stands for "what is actually available") promotes a form of hospitality in which spending time, sharing, and preparing meals together is very important for creating spontaneous, positive relationships between hosts and guests visiting a territory. According to *Ciocheciò* philosophy, cooking means cooking simple and easy-to-make recipes with seasonal, 0km, healthy, typical products that also sometimes spontaneously grow in a territory. Local knowledge in the use of these ingredients is also relevant. The *Ciocheciò* concept was invented in 2015 by some of the organisers of the *Staffetta* during a conference organised by the World *Wigwam* Circuit. In that occasion, the name *Ciocheciò* was first used to talk about a dinner prepared by using the available ingredients. The idea of writing a blog to tell about other similar experiences was born, and the *Circuit of the Cucina Ciocheciò* was then created. The use of spontaneous herbs in the kitchen has been inspired by the figure of Libereso Guglielmi – botanist, and expert in recognising and using spontaneous herbs, who worked as a gardener for the family of the Italian writer Italo Calvino[19] - and by the values of the World *Wigwam* Circuit, joined by one of the organizers through her local association. The *Wigwam* Circuit is a social Promotional Association, which has its headquarter in northern Italy and manages a network of more than 300 clubs in 15 countries. Wigwam clubs aim at re-discovering, protecting and promoting local resources through tourism, leisure and didactic-educational activities (Bertella & Cavicchi, 2017).

The *Staffetta* also has to do with the concept of relational tourism. Three of the five organisers are active in promoting relational tourism through their own hospitality facilities. Two of them are also engaged in a relational tourism network composed by 22 members, among which rural hospitality facilities: the *Agritur-Aso association* (*chapter 4*), established in 2007 in Marche Region, is aimed at promoting experiential, relational and community-based tourism (Bertella *et al*., 2018; 2019) for revitalising rural areas and guaranteeing a better quality of life for local communities. Since 2009, the association has also been organising *Le Marche in Valigia* (literally: *Le Marche* in your suitcase), aimed at promoting Marche Region abroad through cultural events and dinners, by re-creating a friendly atmosphere (Bertella & Cavicchi, 2017). Due to the COVID-19 restrictions and to national hospitality policies, after the end of the lockdown not all the members of the association re-opened: the ones whose primary income depends on tourism opened their facilities to the public; two of them ideated and organised the *Staffetta*; some others took part to the initiative.

The *Staffetta* involved 229 people (the number of users registered to the Facebook group), coming from several countries. Every participant had to post the recipe according to a weekly schedule. The recipe had to follow the *Ciocheciò* principles. After presenting its recipe in the post, with a combination of text and pictures, the participant had to "pass the baton" to another participant. 77 members actively took part in the initiative by presenting a recipe (47 recipes come from 14 regions of Italy; 30 recipes from 17 different countries in the world). At the end of the *Staffetta*, all the recipes were supposed to be collected and published in the *Ciocheciò* blog.

[19] Italo Calvino (1923-1985) was an Italian journalist and novelist considered one of the most important Italian fiction writers. His best known works include the *Our Ancestors* trilogy (1952–1959), and the novels *Invisible Cities* (1972) and *If on a winter's night a traveler* (1979). (Mondello,1990).

The experience of *Staffetta* according to the organisers

Relational tourism

For all the organisers, the added value of relational tourism consists in an opportunity to live an *immersive experience* in a place through direct *involvement* and active participation in an informal and friendly atmosphere (*doing together*). The emotional component plays a decisive role: sensations and feelings contribute to strengthen the experience, generate reciprocal personal enrichment and wellbeing and, thus, create an ongoing relationship (*loyalty*). The host is a crucial figure (*active and proactive role*), whose task is to put guests at ease (*hospitality*) and to act as the first point of contact with the destination, by sharing personal contacts, information, and knowledge about local culture (*pivot and territorial information point*). On the other hand, the relational tourist has an *aptitude for relationships* and direct experiences in the territory.

The time shared by host and guests is essential in the construction of the relationships («It is the use of the time that strengthens the relationship» - R.F.; «Relational tourism means dedicating time; a time that cannot be monetised»- A.M.). Hosts dedicate time to guide guests in the discovery of the territory and of the people, acting as *facilitators* («The community is a testimony of the local culture, so the relational experience can be conceived within a territorial relationship» - A.M.; «If a guest, visiting a village, meets friendly and hospitable people, he feels at home and perceives that he is living a story in a welcoming and not hostile territory» - R.F.). Food and wine traditions support the tale about the identity of a territory (*linking culture and tourism*; *supporting local culture*), stimulate conviviality and experiential aspect of doing together (*developing the meal experience*) and also create a sensory link with the territory, and the experiences lived («In relational tourism the 5 senses are important: taste and smell are important to memorise the place where one has travelled» - Y.M.).All these relationships can be maintained over time, also with the distance and beyond the tourism experience itself.

About the impact of COVID-19 pandemic, respondents agreed that it had some negative consequences as it led to the impossibility to travel and to the need to maintain distances thus compromising the direct human contact, which is a pivotal aspect of relational tourism. On the other hand, it seems to have created new stimuli for domestic tourism and enhanced the search for authentic, hands-on and outdoor experiences.

Premises to the organization

Before the *Staffetta*, the organisers were linked by a long-lasting friendship, based on shared interests: the *Staffetta* was conceived as a way to keep alive these relationships, share contacts and spread the values of *Ciocheciò*. Organizers invited people with whom they share common values. Indeed, especially the ones who run rural hospitality facilities (3 out of 5 organisers) declared that they met most of the participants they involved, thanks to their relational tourism activity.

The Staffetta experience

All the interviewees affirmed that, concerning the involved participants, this experience enriched (not changed) the nature of the existing relationships: the shared information increased personal knowledge (*sharing common values and visions*) and supported the creation of new contacts, with opportunities, in some cases, for future exchanges and real encounters (*relationships repeated in time*, both *offline and online relationships*).

In terms of contents, as defined in the *Staffetta*'s rules, most of the exchanges concerned information related to the recipes presented (*knowledge, traditions and habits*). Still, there were also moments of sharing private aspects (*intimate and personal stories and moments*), when describing a recipe, participants also

decided to share anecdotal details related to their stories. In some cases, some of the participants re-proposed their version of a recipe posted by others, sometimes by re-adapting it with ingredients found locally.

The virtual *temporary belongingness* to the places was stimulated by elements of locality, communicated through the use of products and food and wine traditions in the presented recipes (*locality as identity*). The *Staffetta* also contributed to the definition of a good level of a *priori empathy*. In particular, the choice of a closed group helped to create a pleasant atmosphere of enthusiasm and reciprocal encouragement («This empathy emerged from the typology of comments: they were mainly messages of appreciation for the recipes presented and expressions of curiosity for the places visited» – C.P.). However, the interviewees pointed out that it was a virtual form of empathy: real empathy can also be created by actual human contact. Technology (in particular social media) played a fundamental role both in maintaining existing relationships (*bridge to promote human interactions at a distance*) and in building new relationships (*facilitator of new forms of sociality*). However, all the interviewees reiterated that, although the technology was an essential tool, without previous interpersonal relationships the initiative would not have taken place («The Staffetta would not have been possible if there had not been a deep knowledge between us organisers» – C.P.). All the interviewees agreed that, in the context of the *Staffetta*, physical space and co-presence were not necessary elements, because the conditions imposed by COVID-19 did not allow otherwise. Nevertheless, online space is perceived by all respondents as an additional element, but not as a substitute for physical space («Online and physical space are two complementary spaces. When this is not possible, only one space may be sufficient. But for a complete experience both spaces are needed» - R.F.).

Tourism implications

Most of the interviewees consider this initiative as a long-term solution for post-COVID-19 recovery. They are planning a second winter edition and working on a book for collecting the recipes presented in the first edition. Some interviewees, however, expressed their hope for transforming the online relationships into real ones through a live edition (*going from virtual to real*).

Concerning the role of the *Staffetta* for tourism promotion, even if the objective of the initiative was not clearly related to tourism, the organisers recognised that sharing elements of one's own culture arises interest and curiosity (Staffetta *as knowledge and sharing of mutual identities starting from the gastronomic vehicle*), encourages the creation of new contacts and friendships (Staffetta *as a creator of plots*) and stimulates the desire to deepen this knowledge through real meetings on the respective territories of the participants (Staffetta *as a bridge to face-to-face interactions*; Staffetta *as an attractor).* This already happened to one of the organisers, which was invited by one of the participants, a new acquaintance, and travelled after the lockdown to visit her region and make direct experience of the local gastronomy. Some of the other participants were also invited to visit other regions and countries.

The experience of *Staffetta* according to participants

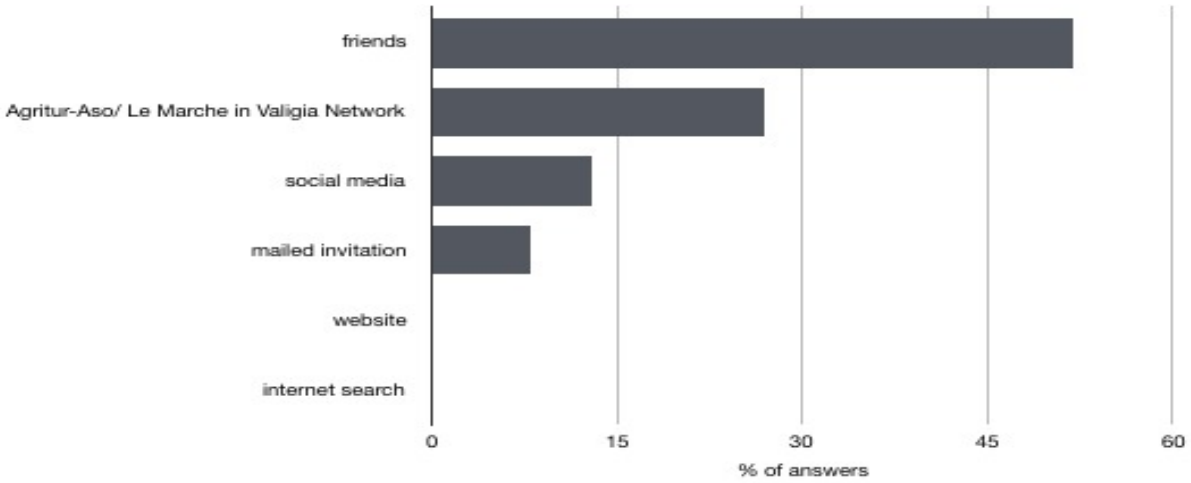
The idea of the Staffetta

A total of 71 questionnaires was collected, of which 52 actively participated in the initiative by presenting a recipe and 19 just acted as an audience.

All participants showed enthusiasm for the *Staffetta* («I like the topic; original and very useful»). Among the motivations for participation, the initiative was perceived as a way to practice a personal interest for cooking («I am a fan of cooking»; «I love both regional cuisine and cuisines from all over the world»). It was also felt like an occasion for *sharing* and *conviviality* («I participated to enhance the value of relationships and

for the pleasure of sharing how amazing it is to make food together»*;* «It seemed an amazing example of conviviality»), and as a way (*facilitator*) to tell the territory (*locality*) and the local traditions («I wanted to introduce to the others my place of origin»). Some respondents also referred to the *Staffetta* as an opportunity to experience different places and cultures («Since it is a good way to get to know different traditions»; «…far different from yours»). Thus, *hospitality* turned into *hosting* since the participants themselves became the hosts of their territory. Moreover, for some of the respondents, it was also a way to promote a sustainable lifestyle («it teaches people to live with simplicity and the importance of connecting with nature…»; «it promotes a healthy and sustainable way of cooking»*;* «it encourages de-consumption»).

The impact of COVID-19 became a recurrent element within the answers, being perceived as a restriction to human relationships. As a result, the *Staffetta* was experienced as an occasion to bring back social contacts («As a reaction to the unpleasant moments of the lockdown»; «it was a wonderful way to connect with others, especially during the COVID-19 lockdown when none of us could meet in person»). The element acquaintance or *friendship* was of primary importance for participants to know about the *Staffetta*: 52% claimed they got to know the event through their acquaintances, while 27% through *Agritur-Aso /Le Marche in Valigia* network (*graph 5*).



Graph 5 - Q1: *How did you learn about the Staffetta experience?*

Premises to participation

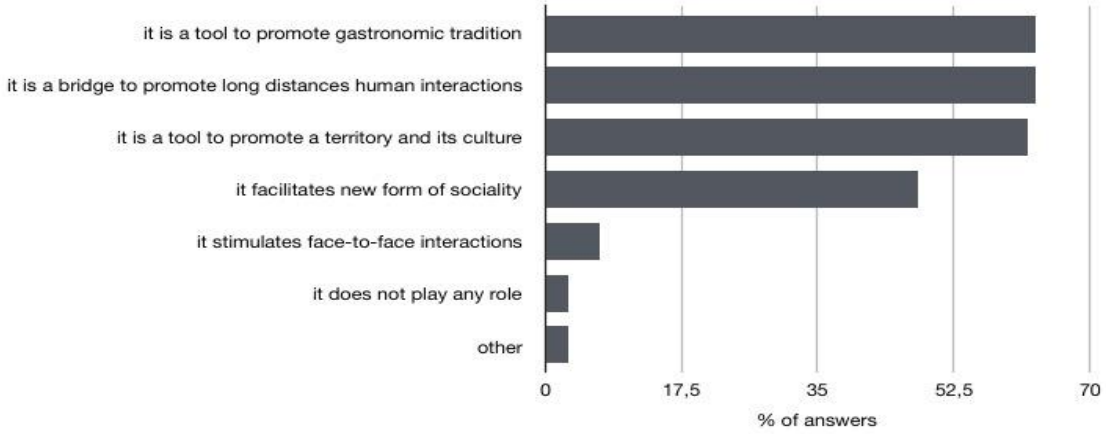
61% of respondents had already visited the areas and the facilities involved in the initiative before the *Staffetta* and established a *friendly* (41%), and *long-lasting* (17%) *relationship*, where the main reciprocally shared information was about knowledge, traditions, and habits. Mutual trust and reciprocity have been shared as well («I know the organisers and the quality of their work»; «I know who promoted the initiative and his philosophy of relational tourism»), but also a feeling of solidarity emerged to support the cause («I believe in the project»*;* «I share this way of life»; «I agreed with the idea of *Ciocheciò* cuisine from the very beginning»).

The Staffetta *experience*

Thanks to the *Staffetta*, 73% of respondents who actively participated by sharing a recipe, declared to have had the chance to build up new relationships (72%), mostly friendships (58%). Once again, the most shared information concerns knowledge, traditions and habits besides tips about local lifestyle, reciprocity and mutual trust. 83% of respondents developed a *sense of belonging* to the group especially by *developing a*

family feeling with participants and by *feeling part of a virtual community* where sharing tales about their territory and some daily habits.

The online format helped in consolidating *a-priori empathy* with other participants (83%) who already knew each other and further enhancing the relationships mainly through the virtual community. Technology (*graph 6*) was primarily conceived as *a bridge to promote long-distance human interactions*, tool *to promote a territory and its culture* and also as *a tool to encourage gastronomic tradition*.



Graph 6 -Q.9: Which role did technology play in nurturing relationships in the context of Staffetta?

Tourism implications

Considering the *Staffetta*'s implications, the online relational dimension of the initiative has been seen by participants as a long-term solution for the post-COVID-19 recovery (79%), since it let participants know about new places and traditions (90%). However, it might not completely replace the physical space for interactions. Indeed, as a complementary tool, it can be a way to promote it (24%) and to invite people to visit physical places in the first place (56%). As a matter of fact, after the event, 82% (58 respondents) would like to visit (or come back) to the areas virtually acquainted through the experience of food traditions.

Discussion

This research has shown that the relational component can play a decisive role in the knowledge of a place and its territorial and cultural peculiarities (Rifkin, 2000), even in the contest of a crisis such as the COVID-19 pandemic.

Even if the *Staffetta* is not strictly a tourist experience, the first element that contributed to its success lies in the previous relationships among the organisers and between organisers and participants. This aspect is confirmed by the fact that more than half of the participants became aware of the initiative through their acquaintances, or through *Agritur-Aso*/*Le Marche in Valigia* network (*graph 5*). The data about the 61% of the respondents declaring to have already visited a place or facility related to the *Agritur-Aso* network reveals the centrality of the network as an instrument, associated to the relational approach, for bringing together people sharing common values (interest in cooking; sharing with others upon values related to the *Ciocheciò* principles and the concept of relational tourism; promotion of a sustainable and healthy lifestyle). In this regard, it is relevant that the nature of the relations established before the *Staffetta* between organisers and participants is perceived by the organisers and by the 41% of respondents as a friendship relationship, which for 17% of the respondents is considered to be long-lasting. The other two elements that played an essential role within

the *Staffetta* were the territorial roots of the initiative (*locality*) and the role of food and gastronomic traditions (gastronomy). The *Staffetta* was perceived, both by the organisers and the participants, as a vehicle through which narrating a territory and its traditions (Wittel, 2001; Molz, 2013;2014). Within the *Staffetta,* gastronomy acted as a bridge able to link local communities to non-local people (*linking culture and tourism*) and also a tool to live memorable and meaningful experiences (*developing the meal experience*) of cultural exchange (e.g., participants reproduce their own version of other participants' recipes) (Richards, 2012: 19).

The connecting element among these three factors was the online format of the *Staffetta*. According to the network relationality dimensions (Marques & Gondim Matos, 2020), both in the organisers and participants' perspective, the *Staffetta* favoured a good level of *temporary belongingness*, stimulating a sense of places especially by developing a family feeling with participants and by feeling part of a virtual community; the online format also helped in creating or consolidating *a-priori empathy* with organisers and other participants, marking the beginning of a two-sided relationship. Despite the positive role recognised to the online format of the *Staffetta* for the creation of new relationships or strengthen existing ones, technology played an instrumental role (Bawens, 2010; Porter, 2004): in the absence of the other three elements (relationality, locality and gastronomy) the online format would have been an end in itself. This is confirmed by the fact that technology was mainly conceived by respondents as a tool to promote long-distance human interactions, a territory and its culture and gastronomic traditions (*graph 6*). Moreover, the online relational space of the *Staffetta* has been perceived as a way to invite people to visit the physical space (56%).

In terms of implications, the *Staffetta* was an opportunity to create new relationships and/or to strengthen existing ones and to stimulate the desire to deepening knowledge to real meetings on the respective territories of the participants. In this sense, the *Staffetta* can be conceived as a bridge to stimulate face-to-face interactions and a potential tourism attractor. This latter aspect emerged from the organisers' wish to go from virtual to real and to meet each other in a second on-site edition; in the case of the participants, to travel the places known virtually (online) and indirectly (through the recipes) during the *Staffetta*. This aspect is confirmed by the fact that places of origin of the organisers are the ones that participants would most likely visit in the future (Marche: 34%; Japan: 28%; Veneto: 12%; Liguria: 7%). This element could somehow be linked to the role played by previous relationships established between organisers and participants but also to the natural friendly attitude of the organisers in establishing new relationships.

Conclusions

Starting from the impact of COVID-19 pandemic in tourism sector in terms of travel restrictions, decrease in the demand and changes in the tourists' behaviour, this chapter has analysed the opportunities given by relational tourism in the post-pandemic scenario with a focus on how and to what extent technologies can contribute to promoting authentic tourism experiences during and after a crisis.

The case of the *Staffetta della Cucina Ciocheciò* has been presented. This initiative, proposed during the lockdown, aimed at maintaining existing relationships and create new ones, by involving organisers and participants in an immersive virtual cooking experience based on *Ciocheciò* shared values and the benefits of relationality in terms of engagement and wellbeing.

Results showed that, even if virtually, elements of relational tourism are included in this experience. Thus, relational tourism can be pursued in the post-COVID-19 tourism recovery, when connected with locality and gastronomy, as in this case. The role played by technology is relevant: far from being a substitute of reality, it can act as a bridge to facilitate face-to-face interactions and stimulate real visits to places known only

virtually. In the investigated case, it is the interplay of real and virtual social interactions that has emerged as the key factor for a kind of tourism that can face challenges and crisis such as the COVID-19.

As far as lessons learnt from the *Staffetta*'s experience and this exploratory research, some suggestions and recommendations emerged. These, taking into account the charter for tourism, travel, and hospitality after COVID-19 proposed by Chang and colleagues (2020), could benefit practitioners at local, regional and global level, in managing relationships with tourists. On the one hand, this study suggests that social direct interactions are essential elements for the creation of authentic tourism experiences. On the other hand, online interactions can play a decisive role in maintaining stable and long-lasting relationships and in creating new ones that from virtual can turn to real. This is possible during and also after a crisis.

Considering future perspectives, practitioners willing to maintain existing relationships and/or to create new ones could:

- consider the territory and the local communities as *key elements* of the bond they would like to create through their online and offline interactions with guests.
- consider food and immersive experiences, virtual or real, as *supporting elements* to enhance the level of engagement of tourists and improve the relationship itself.

This study presents some limitations. Further research could focus on a quantitative and qualitative analysis of the evolution of the demand for relational tourism after the lockdown and the *Staffetta* experience, based on data on the tourism flows to the destinations and facilities involved in the initiative, to understand if it somehow had an impact in terms of tourism promotion.

CONCLUSIONS

This study had a twofold objective. On the one hand, it was an attempt to analyse drivers and barriers of QH collaborations for local development and explore its potentials in stimulating and implementing experiential and relational tourism initiatives in disadvantaged areas, with a specific focus on Marche Region. On the second hand, it aimed at understanding the potential role of ICTs in triggering and supporting these processes. To this aim, a reasoned literature review on drivers, barriers, and implications of UBC in disadvantaged areas has been provided and two cases from Marche Region, analysing different applications of QH collaborations to experiential and relational tourism initiatives, have been presented.

The literature review (***chapter 1***) provided evidence about the need to consider UBC in a wider perspective, involving not only universities and firms, but also government and local communities as crucial actors of triple and quadruple helix of innovation. In this sense the development process of disadvantaged areas has been considers as a wicked problems and analysed in lights of opportunities related to MSCs. The review of the literature demonstrated that the main driver for cooperation in disadvantaged areas consists in the existence of an *epistemic community* (Sarpong *et al.*, 2017; Datta & Souleh, 2018*),* but also *social proximity* (Attia, 2015; Johnston & Huggins, 2016) and structural factors (Torres *et al.*, 2011; van Oostrom *et al.*, 2019) play a crucial role. Barriers are related to misalignment among actors (Brundin *et al.*, 2008; Chryssou, 2020), capabilities (Attia, 2015; Zavale & Macamo, 2016), and governance (Padilla Meléndez & Fuster Martín, 2014; Czerwińska-Lubszczyk & Jagoda-Sobalak 2020). As for main implications, 5 cluster have been identified: *students' skills development and employability*, *knowledge and technology transfer*, *economic growth and entrepreneurship development*, *implementation of National Innovation Systems (NIS)* and *regionally based growth*. Conclusions highlighted potentials of QH collaborations in disadvantaged areas in supporting knowledge-based regional development (Pinto *et al.*, 2015; Yigitcanlar *et al.,* 2017) through two main levers: RIS3 (Ferreira *et al.,* 2021) and the involvement of communities in local development processes focused on tourism (Lee, 2020; Rinaldi *et al.,* 2020; Tomasi *et al.,* 2021).

To answer to the first research question, the results of the literature review have been applied to two cases of collaborative linkages aimed at promoting experiential and relational tourism initiatives in remote rural areas of Marche Region. As highlighted in ***chapter 2***, Smart Marca project is an example of PPP (Kim *et al.*, 2005; Ismail, 2013; Oppio *et al.,* 2016), since it involved two universities (Universities of Macerata and Marche Polytechnic University), a Destination Management Organization consisting in a network of public (municipalities, Fermo Province, the Chamber of Commerce and educational institutions) and private entities (trade associations, tourist associations, banks), two start-ups operating in the field of multimedia and virtual and augmented reality and a research center specialized in sensory analysis (CIAS Innovation). This cooperation model, thanks to an interdisciplinary approach and through participatory processes aimed at involving the main local actors, allowed to design and implement an experiential tool for the promotion of Fermo area as a cultural and gastronomic destination (Smart Marca mobile app). In doing so, the PPP integrated different expertise related to ICTs, the history and peculiarities of the territory, tourism marketing and sensory analysis, thus achieving a result that would not have been possible without this multi-actor cooperation. The case of *Agritur-Aso* association (***chapter 4***) described a form collaboration among a network of tourism and hospitality operators, members of local community and UniMc and oriented do the definition of a knowledge network to promote a remote rural region as a relational destination. This long-term collaboration, which can be assimilated to a CAP (Drahota *et al.,* 2016), stimulated tacit knowledge and situational learning, and contributed to the expansion of *Agritur-Aso* network, also in terms of visibility and

tourism flows. Both cases demonstrate that the cooperation among all actors of QH can play a relevant role in fostering economic development of disadvantaged areas, since it makes it possible to network resources that would not be available to individual actors, stimulates relationships, increases knowledge capital and enables the creation of an integrated supply system, able to promote disadvantaged areas as appealing destinations, which provide immersive experiences in close contact with the local community.

As for the second research question, both cases showed that ICTs could play a crucial role in promoting experiential and relational tourism in disadvantaged areas. The Smart Marca case (***chapter 3***) highlighted that mobile travel apps can create and provide immersive experiences, even if at distance. Indeed, many respondents considered Smart Marca app as a useful tool to get a better knowledge to discover a territory and its products. Graphic aspects and contents provided have been also considered as a stimulus to visit the area and organize a stay. The case of the *Staffetta* (***chapter 5***) recognized an essential role to technologies, since without the online format and the use of social media, the initiative had not taken place. Moreover, the online relational space created by the *Staffetta* has been considered as an opportunity to invite participants to visit the physical spaces. Both cases demonstrated that if culture can be considered as a "destination enhancer", since it can positively affect the desirability of a place (Zeppel & Hall, 1991; Kumar, 2017) and attract tourist, thus stimulating the economic growth of a territory (Silberberg 1995; Csapo 2012), technology, if applied to the promotion of a destination, can act as a "destination attractor". Nevertheless, both cases assigned to ICTs an instrumental role in the context of the tourism experience. The results of the survey on Smart Marca (***chapter 3***), in fact, showed a major influence of factors related to contents and services, rather than "immersive" factors such as VR and AR, on the decision to visit Fermo area. In the same way, in the case of the *Staffetta* (***chapter 5***), in the absence of the three main elements that inspired the initiative, namely relationality, locality and gastronomy, the online format would have been an end in itself. To conclude, far from being a substitute of reality, technology can act as a bridge to facilitate face-to-face interactions and stimulate real visits to places known only virtually.

In this context, HEIs can give a contribution to the systematization of the offer thematic tourism services and products, by collaborating in the design of a strategic plan involving all QH actors, facilitating the emergence of need and the sharing of ideas, as well as supporting joint projects. In an operative perspective, this could be done through the creation of a regional hub which promotes experiential tourism in disadvantaged areas and improves the sustainability of the local economy.

This work clearly presents some limitations. First, it does not provide a systematic overview about the regional tourism supply in disadvantaged areas. In these terms, more data could be collected by focusing on specific peculiarities of disadvantaged areas in Marche Region. On the one hand, an analysis of current tourism flows, and the demand of experiential and relational tourism in this portion of the region should be carried out; moreover, a focus on the economic impact of the current tourism offer in disadvantaged areas should be provided. On the other hand, it could be useful gaining a better and more accurate understanding of the nature and impact of the QH collaborations in the economic and tourist development of the disadvantaged areas of Marche region, through both a desk and field research, by collecting data and involving QH actors in PAR processes.

As for future research, the study highlighted the importance of skilled human capital to trigger collaborative linkages to foster local development, but also showed how these potentials are currently scarcely considered by researchers in the context of disadvantaged areas and how students are rarely considered as crucial actors in triple and quadruple helix collaborations. In this perspective, a focus on the role of universities in involving students in participatory learning experiences aimed at

providing specific skills to support local development and improve employability in disadvantaged areas could contribute to extend the literature on collaborative linkages in disadvantaged areas.

In the same way, collaborative linkages for tourism purposes and destination building processes revealed to be crucial aspects for the social, economic and cultural growth of disadvantaged areas. In this perspective, future research should focus on the definition of strategic and operational models to face the topic of the development process in disadvantaged areas in the framework of wicked problems.

All research activities should be also designed and conducted by paying attention to the new scenarios outlined by the Covid 19 pandemic.

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