SIM Conference 2024
*Serena Galvani**
Roberta Bocconcelli

University of Urbino Carlo Bo – Department of Economics, Society and Politics

**corresponding author*
serena.galvani@uniurb.it

GRAND CHALLENGES AND THE RENEWED ROLE OF UNIVERSITY FOR RESEARCH & DEVELOPMENT

Abstract
The objective of this article is to analyze the evolving role of universities in a rapidly changing environment driven by grand challenges like open innovation and sustainability. They are reshaping the goals of both universities and business organizations, requiring network integration. Using a qualitative methodology, this study is based on an in-depth analysis of a single case study, the MARLIC project. While the findings are preliminary, they outline future research directions, demonstrating how universities and businesses can collaborate within shared networks in the contemporary attempt to navigate grand challenges.

Introduction and literature background

The role of universities as active participants in market research and innovation activities is already well established, particularly in their capacity to support businesses and organizations in achieving their innovation goals. In recent years, however, this role is evolving as a response to new ways of innovating that aim toward increasingly broadened and shared goals. The global push toward sustainability in all its dimensions – economic, social, and environmental – and toward more collaborative models of technological development, such as open innovation or crowdsourcing, is reshaping the objectives of all organizations (Castro *et al*., 2021). Universities are being called upon to meet the pressing demand for sustainability and to conduct research that promotes innovation and progress while ensuring ethical practices, clean processes, circularity, environmental respect, consumer protection, and much more (Soini *et al*., 2018).

The new goals posed by 'grand challenges' (Ulnicane, 2016) such as climate change or sociopolitical imbalances that have led to wars, inequalities, and injustices, are, for the first time, shared objectives that all types of organizations must address (Gupta, 2019). To survive and operate in today's business environments, it is necessary to demonstrate genuine commitment to such macro-objectives, which inevitably fuel a mechanism of resource sharing within more or less formal business networks.

Existing studies examining the role of universities in R&D processes primarily focus on the universities' ability to commercialize research outputs through spin-offs, patents, and licenses. They explore the internal changes within the university itself to support innovation, including the formalization of functions like the Technology Transfer Office (Brantnell & Baraldi, 2022; Zhou & Tang, 2020; Weckowska, 2015).

Universities no longer act solely as 'facilitators' of innovative processes; their role is not limited to the development of specific businesses, or to meeting the strategic goals of targeted partner companies. Instead, they become entities 'on par' with other market organizations, with whom they share the same goals and complex, global issues (Rossoni *et al*., 2024). In essence, grand challenges are becoming increasingly 'diffused', and the need to achieve higher, more valuable and worthy objectives such as multi-faceted sustainability, is permeating the more micro-level goals of individual organizations (Fernhaber & Zou, 2022). University research is not exempt from this process and is becoming more complex due to the need to be sustainable as well as innovative, leading to contextual changes in contemporary research practices.

The exceptional nature of grand challenges and their shared importance across organizations worldwide is prompting universities to adopt a new form of research. Universities seek to actively respond to these challenges and deliver a broader 'common good' that extends beyond the individual benefits of the university itself. Today, the focus of university research is no longer on the commercialization of research outputs – although this remains a key aspect to ensure the economic feasibility of initiatives. Rather, the focus is on the ability of research to combine innovation, sustainability, ethics, cooperation, and respect. Various cases across business sectors ranging from aerospace to automotive, from agribusiness to industrial, are moving toward formalized networks and research partnerships (Schweizer & Lesser, 2023). New business networks arise, where the combined presence of companies, universities, and non-profit organizations enables meeting sustainability and open innovation goals that would be challenging to achieve independently (Rossoni *et al*., 2024).

Therefore, a question arises in relation to what the challenges are that universities face in driving innovation today, given the changing global research environment. Adopting the analytical lens of the ARA model (Håkansson & Snehota, 1995) may be particularly useful for conducting an in-depth analysis of this research development process, where the foundational objectives are no longer those of a single organization but are macro-objectives shared by all organizations within a business network. For these reasons, the study addresses the following research question:

How are universities changing role within business networks in response to the transition toward a macro context characterized by grand challenges?

Methodology

Given the exploratory nature of the research question, a qualitative methodology is deemed appropriate (Mansourian, 2008). Specifically, this research is based on the analysis of a single case study (Eisenhardt, 1989), exploring the changing dynamics in the role of universities involved in shared research projects. The selected case is MARLIC, a European project aimed at establishing a sustainable composite material laboratory for customization of projects, processes and prototyping. The project involves collaboration between the Marche region, 21 companies operating in various sectors that use composite materials and are located within the region, 5 public research entities (including two universities: the University of Camerino and the University of Urbino Carlo Bo), and the Cluster Marche Foundation.

MARLIC was chosen since it exhibits some key characteristics: i) it involves the formal participation of two universities (one of which – the University of Camerino – is the lead institution for the entire project) in a formalized research activity in collaboration with various partners (both business and non-business actors); ii) the research is aimed at achieving macro-objectives shared by all partners, addressing contemporary grand challenges such as sustainability and circularity; iii) the shared macro-objectives are combined with the micro-objectives of each project participant. For universities, the individual goals include stimulating regional innovation, affirming leadership in highly specialized knowledge and know-how, bringing new high-performance products to market that are co-patented with local companies, and supporting such companies in accessing new market spaces.

Given the embryonic state of this research, data collection is ongoing, and the material currently available should be considered preliminary. So far, two interviews have been conducted – each lasting approximately 40 minutes – along with participation in one event presenting MARLIC and its challenges, which lasted nearly 150 minutes. The researchers' goal is to further develop the present research in the coming months by integrating additional data from interviews and focus groups. The data analysis process is also ongoing and is based on the manual decoding and classification of the collected data according to the three categories of the ARA framework: Actors, Resources, and Activities (Håkansson & Snehota, 1995).

Case presentation and results

MARLIC is a European project co-financed by the Marche region with a budget of approximately €11 million (resources) and implemented under the leadership of the University of Camerino (actor). The project, beginning in early 2023, consists of two key outputs. The first is the inauguration of a laboratory for the analysis of new composite materials (resource), which opened in July 2023 and became fully operational in November, located near the lead university. As MARLIC's Project Manager explains, "*Why formalize a lab? At that time, many universities were investing in 'diffused' labs, where partners shared their equipment with each other. However, we found this model unsustainable for MARLIC, where many companies collaborate – often competitors – and not all have the expertise to use the equipment at other institutions. Therefore, we decided to create a physical laboratory in one centralized space, which doesn't disseminate instruments but rather knowledge and technological transfer*." The second output is the launch of a collaborative digital platform (resource) in the Marche region, specializing in composite materials and connecting all project partners.

MARLIC represents a disruption in the traditional research approach of the two universities involved. As the Vice-Rector for Research at the University of Urbino underlined, "*In the past, there was a lack of a true organizational system for research. Over time, however, specific competencies have been integrated, along with access to new funding sources such as the region's support for MARLIC, which has contributed to a more structured organization of research*."

MARLIC was established with three main goals: the first one is innovation. It aims to create new composite materials, develop new methods for reusing or recycling existing materials, and design new composite products and production processes. The second objective concerns sustainability. The project, while generating product and process innovation, must achieve optimization results in terms of environmental, social, and economic sustainability. As the lab director emphasizes, sustainability (activity) has become central, even for chemists who have not traditionally focused on it: "*Today, even we chemists need to create innovative materials that are not only economically viable for companies but also sustainable, technically sound, and new*." The third objective is to ensure rapid research timelines. Research typically requires long development periods, which industry cannot afford. For this reason, MARLIC adopts an applied research approach to develop innovative solutions quickly.

In essence, MARLIC combines R&D activities, analysis and testing, training and orientation, and project proposals. The approach is centered around synergy: for the University of Camerino, it is crucial that all the involved actors work together, for (and with) other partners. As the Project Manager points out, "*MARLIC transcends the concept of occasional university-firm collaboration to develop a model based on synergy…a project of university-business contamination in a physical space*." This synergy-oriented approach facilitates innovative processes (activity) with a focus on sustainability and creates a win-win situation for all involved partners (actors): "*One of the lab's strengths is that it combines various technologies in one place, allowing companies to share challenges, experiences, and technologies, facilitating continuous interaction between partners*" (MARLIC Director). However, the initial push for synergy encountered some cultural resistance: "*A list of necessary equipment was drawn up, ranging from technological tools to air conditioning systems. The investment was made physically by the partners. At first, companies were skeptical about spending money on equipment that would be housed in a location other than their own company*" (MARLIC Project Manager). These resistances were overcome when companies realized that synergy means not only strategic alignment between actors but also coordination and optimization of available resources: "*They changed their minds when they realized the equipment purchased was not only cutting-edge and highly performing but also chosen because it wasn't already available within universities or companies. Yet, it was compatible with technologies already present in partner labs, making it useful to all partners and truly spreading the concept of innovation.*"

The lab personnel (resource) were hired ad hoc – mainly research fellows and management engineers – before the equipment was available, giving them the necessary time for proper training (activity) and ensuring an operational team once the equipment was in place. Training, along with safety, are two key issues the university has had to manage within the project: "*Today, innovation, patenting, and production require an organizational structure that hosts a range of key competencies, ensuring not only the technical development of research and related performance but also maintenance, safety, accessibility, optimized data management, and privacy protection. MARLIC benefits from maintenance contracts for its equipment, and lab access is restricted. Only technical staff, professors, and PhD students can enter. Access is also granted to private individuals based on demonstrated levels of training and expertise; project partners can also access the lab. Some of them have even more experience than the university in using certain tools, which further facilitates the ongoing process of knowledge exchange between partners*" (MARLIC Director).

Preliminary discussions and future research agenda

Although preliminary, the research findings provide insights into the topic investigated and outline trajectories for future exploration. A key observation is that, in addressing grand challenges, universities are increasingly adopting research systems based on networks and resource sharing among multiple actors to optimize activities and ensure a continuous process of knowledge exchange. In this context, innovation is no longer designed by universities solely based on the needs of individual organizations. Traditional development of sporadic collaborations with single partners

is being replaced by the stable creation of structured networks, where universities converge actors, resources, and activities. Actors are numerous, diverse, and come from different backgrounds. The shared resources are of two types: on the one hand, each actor makes available intangible resources such as specialized knowledge and technological know-how; on the other hand, each actor invests financial resources to procure new assets (equipment, physical spaces, technology), which become a common good accessible to all partners. Ultimately, the activities carried out within the research network provide a tangible demonstration of the synergistic effort taking place. Every activity is the result of the combined expertise, resources, commitment, and collaboration of each actor involved, culminating in the development of innovative and sustainable ideas that would have been impossible to achieve in isolation.

By observing the research topic through the ARA framework, it appears how a particular role in contemporary research is played by actors, who are critical in supporting sustainable innovation processes. They wield considerable influence over the success of network dynamics. To ensure the success of collaborative research projects, certain key conditions must be met by actors, including: i) a clear and well-defined internal design of research activities within the university – with designated roles – and development and monitoring strategies for achieving set objectives; ii) the attainment of strategic alignment among actors who share similar values and goals, fostering ongoing collaboration and synergy; iii) the establishment of shared operational practices to ensure the protection of privacy, security, and research quality.

However, there are significant challenges that need to be addressed to achieve such goals, which incorporate: i) cultural resistance from certain actors – particularly business entities – in understanding the value of joint research and in managing common equipment in shared spaces (thus, equipment that they have purchased but do not have direct control over); ii) increased complexity for the leading university, whose role is twofold. On the one hand, the university acts as an orchestrator and facilitator of relational processes within new business networks; on the other hand, it works as an equal partner to business organizations, sharing the same objectives and challenges; iii) the need to comply with specific and particularly challenging financial constraints imposed by the project's funding bodies. This aspect is especially relevant when the business network is formally and preemptively structured.

Given the preliminary stage of the research, several questions have emerged that remain unanswered, providing potential avenues for further study: Can business networks be established both formally and spontaneously? What are the differences? What drives one configuration of a network over another? How is the internal structure of universities reconfigured in light of their new role within business networks? How does this affect the nature of relationships with other actors? What institutional policies support the involvement of more actors in research networks? How can institutions help organizations overcome the emerging challenges in managing such networks?

References

Brantnell, A., & Baraldi, E. (2022). Understanding the roles and involvement of technology transfer offices in the commercialization of university research. *Technovation, 115*, 102525.

Castro, G.D.R., Fernandez, M.C.G., & Colsa, A.U. (2021). Unleashing the convergence amid digitalization and sustainability towards pursuing the Sustainable Development Goals (SDGs): A holistic review. *Journal of Cleaner Production, 280*, 122204.

Eisenhardt, K.M. (1989). Building theories from case study research. *Academy of management review, 14*(4), 532-550.

Fernhaber, S.A., & Zou, H. (2022). Advancing societal grand challenge research at the interface of entrepreneurship and international business: A review and research agenda. *Journal of Business Venturing, 37*(5), 106233.

Gupta, A. (2019). The decade to deliver. A call to business action. *Accenture Strategy*. Available at: https://www.accenture.com/content/dam/accenture/final/capabilities/strategy-and-consulting/supply-chain---operations/document/Accenture-The-Decade-to-Deliver-a-Call-to-Business-Action.pdf (last accessed: 06/09/2024).

Håkansson, H., & Snehota, I. (1995). *Developing relationships in Business networks*. Routledge.

Mansourian, Y. (2008). Exploratory nature of, and uncertainty tolerance in, qualitative research. *New Library World, 109*(5/6), 273-286.

Rossoni, A.L., de Vasconcellos, E.P.G., & de Castilho Rossoni, R.L. (2024). Barriers and facilitators of university-industry collaboration for research, development and innovation: a systematic review. *Management Review Quarterly, 74*(3), 1841-1877.

Schweizer, C. & Lesser, R. (2023). COP28: Strong progress from Dubai and the road ahead. *Boston Consulting Group*. Available at: https://media-publications.bcg.com/BCG-Executive-Perspectives-COP28-Dubai-Progress-and-the-Road-Ahead.pdf (last accessed: 06/09/2024).

Soini, K., Jurgilevich, A., Pietikäinen, J., & Korhonen-Kurki, K. (2018). Universities responding to the call for sustainability: A typology of sustainability centres. *Journal of Cleaner Production, 170*, 1423-1432.

Ulnicane, I. (2016). 'Grand Challenges' concept: a return of the'big ideas' in science, technology and innovation policy? *International Journal of Foresight and Innovation Policy, 11*(1-3), 5-21.

Weckowska, D.M. (2015). Learning in university technology transfer offices: Transactions-focused and relations-focused approaches to commercialization of academic research. *Technovation, 41*, 62-74.

Zhou, R., & Tang, P. (2020). The role of university Knowledge Transfer Offices: Not just commercialize research outputs! *Technovation, 90*, 102100.