

The Inevitable but Altered Roles of Universities Within an Innovation Ecosystem

Linde Baaijens, Maria Freidel, Denice Groenen, Antonios Matzakos Chorianopoulos, Jordan Vasseur, Matthijs Zwemmer, Emőke Takács and Toon Abcouwer

University of Amsterdam, Netherlands

a.w.abcouwer@uva.nl

Abstract: It is evident that for an organisation, the most successful way for operating is being part of business ecosystems and creating more value than on its own. Universities play a specific role in this field. We undertook this research to verify the universities' role in an innovation ecosystem where they work together with businesses to create and share new cutting-edge knowledge. Our theory-based research offers scientifically underpinned suggestions for innovators and entrepreneurs in developing innovation ecosystems with a specific focus on the altered role of universities. The article focuses on the roles of universities to discover how it can become more resilient to adapt to the ever-changing demands of an innovation ecosystem. How can it provide professional knowledge sharing on an equal base within the ecosystem whilst remaining its leading role in innovation and knowledge development? This approach breaks with the traditional view of universities as the primary source of knowledge in society. Universities take several roles in a business ecosystem, which we conclude in this paper. To let universities stay strong in innovation, they must adapt their traditional role to suit to the ever-changing demands presented by the ecosystem. They need to focus on knowledge sharing instead of knowledge delivery to achieve a sustainable growth. The changing approach fits better the innovation and entrepreneurship by working within a knowledge ecosystem. Additionally, organisations must stay proactive by evaluating partners better, building meaningful relationships, and adopting a business-like mentality. Organising such a knowledge ecosystem will stimulate innovation and facilitate entrepreneurs in searching for new markets in an increasingly sustainable and circular world.

Keywords: innovation, business ecosystem, resilience, partnership, IT

1. Introduction

This paper offers solutions for higher education institutions to overcome the challenge of adapting to new circumstances and requirements to establish and manifest the role of a knowledge-sharing entity. According to Cai et al. (2020), the traditional roles of universities, such as education and research, need to evolve with strengthening the knowledge transfer role to become a more relevant but also profitable player in the innovation ecosystem of education.

This article looks for answers to the questions of *how to adapt the traditional roles within a university to enable improving knowledge sharing and whether an innovation ecosystem supports the implementation.*

Given the fact that organisations operate in a highly dynamic environment, they are challenged to adapt and innovate quickly. However, sometimes it is not crystal-clear which route to choose. We have found that properties such as high level adaptivity, resilience, defining the right links and finding partners may help overcoming the imposed uncertainty and the uncomfortable status-quo when forced to innovate. We aim to answer our main research question along with three sub-questions and set knowledge transfer into the centre, building a hub between universities and industry or policy. During our research we were able to identify and discuss the bottlenecks and the opportunities for universities to achieve the task of improving their knowledge sharing capacity. Our sub-questions explore the needs for and the results of change. The first two revolve around restructuring the role of universities within the innovation ecosystem. With a focus on the demands and knowledge sharing, our main question is about the unavoidable adaptation to the new situation. The last sub-question focuses on the results and gains from the transitions. In sum, the sub-questions are:

- How can a university become more resilient to adapt to the ever-changing demands of innovation?
- How to provide knowledge sharing with professional ecosystems whilst remaining an innovation ecosystem?
- What insights can be obtained by sharing knowledge with other partners within the ecosystem?

2. Literary background

Universities have to be adaptive to cope with the fast-changing environment and the rapidly changing world. The challenge to adapt to changes highlights some key aspects, like innovation ecosystem, ecosystem resilience, partners and the role of IT.

2.1 Innovation ecosystem

An innovation ecosystem is a self-organising, self-regulating, self-developing and open ecosystem that enables innovation through cross-border multidisciplinary collaboration and resource utilization by partners within an ecosystem (Jucevičius&Grumadaitė, 2014; Znyiak et al., 2020; Cai et al., 2020; Al-Kurdi et al., 2018). Jucevičius&Grumadaitė (2014), also state that innovation ecosystems can be called smart systems because of their interaction with the environment, emergence, adaptability, tolerance, and flexibility. This means that the true nature of the innovation ecosystem is found in its elements, which continuously adapt to dynamic environments, forging a highly resilient system.

Etzkowitz et al. (2000) discusses the development of universities into entrepreneurial entities and how this comes about. The paper explains internal and external reasons associated with the emergence of 'knowledge-based innovation'. There are two reasons for the entrepreneurial activities of universities: Improve regional or national economic performance and generate funding for the university itself. These dynamics are explained with the help of two models: The 'Triple Helix' (university-industry-governments) and the entrepreneurial academic paradigm. The Triple Helix wants to account for the new constitution of institutional forces that rise within innovation systems, which can lead to either the decline of the Status Quo or the manifestation of a new insular entity. The second model, the entrepreneurial academic paradigm, is a normative but also analytical approach to assess the role of universities in innovation systems. If universities want to function as innovation agents, they must undergo 'academic revolutions' to sharpen their mission in research and claim their role in economic development through extensions in their research and teaching missions.

Cai et al. (2020), identified four different roles that higher educational institutions (HEI) can take on in an innovation ecosystem. The first two are strictly for education and research purposes where they provide human capital for innovation and where they extract information and generate knowledge. The other two are more applicable for an innovation ecosystem. They are the roles of knowledge exchange and strategic information. Knowledge exchange is the most important in the ecosystem since it enables knowledge to be shared outside the walls of the university to ensure the synergy in the ecosystem. Additionally, strategic information is needed to implement the innovations.

However, the emergence of entrepreneurial and socially embedded innovation systems is a subtle process that can hardly be achieved with direct policy measures and incentives. Specifically, researchers and knowledge creators might not be in a position to exchange knowledge or information. Al-Kurdi et al. (2018), identified four possible reasons why researchers might be hesitant to share knowledge such as: individual factors, organizational factors, technological factors, and cultural factors.

This is where creating the right ecological conditions becomes crucial. Establishing an actively cultivated knowledge-sharing environment is essential for knowledge management and exchange across an innovation ecosystem (Al-Kurdi et al., 2018). Therefore, one should define the main agents, relationships, and outcomes resulting from this interaction in every subsystem. Then, one should identify the weakest parts in the system having the greatest impact (Jucevičius&Grumadaitė, 2014). Jucevičius&Grumadaitė suggest four categories to tackle the bottlenecks of information exchange. The four categories are: strategy, agents, links, and resilience. The strategic category aims to set a clear strategy for the system to work as a whole and generate synergy. The agent category involves selecting and attracting the right partners for the ecosystem. The links category encourages innovation ecosystems to cluster links and relationships that are vital and remove the links that do not work. Resilience, the last category, encourages ecosystems to create and maintain the disequilibrium state to keep innovating.

2.2 Resilience

Resilience is a key aspect of an ecosystem. When an ecosystem is considered resilient, it can recover from external perturbations and is able to build adaptive capacity (Ensor, 2011). This may vary depending on which ecosystem is examined.

According to Datta&Adesola (2020), university knowledge transfer or the third stream is now arguably a catch-all to describe the activity of universities engaging with external stakeholders, for various reasons other than teaching and academic research. The scope of the third stream may have appeared to broaden over time. However, this agenda continues to be associated with innovation and/or positive outcomes of economic and social benefits. There is a need in both policy and research for an overarching approach, but one that effectively incorporates the inherent heterogeneity of the domain. Therefore, accommodating newer areas involved in innovation without excluding older ones. Gianiodis and Meek (2020) build on Etzkowitz's model and discuss in detail how the knowledge sharing activities must be embedded. For instance, politicians, governments, and university trustees, as well as local communities, alumni foundations, and university donors need to be committed to partnering with and integrating entrepreneurial initiatives into the regional ecosystem with a long-term time frame in mind.

2.3 Partners

It is not always entirely clear what each partner adds to the ecosystem and what to get out of it (Beelen et al., 2022). So, the evaluation of partners requires a good selection method of partners to optimise the value you gain from the ecosystem. It mentions six categories that are the most important: partner's characteristics, partner's capabilities, partner's product, partner's knowledge assets, partner's sales capabilities, and the orchestrator perspective. Each category has a selection of attributes that are viewed as the most significant. The selection of these attributes was done by performing several case studies to find out what industry leaders' value most in their partners. These categories facilitate the start-up of a new ecosystem, the shift in an existing ecosystem, or the evaluation of the current ecosystem. The categories allow for a more objective view of the partners that are present and new partners that might enter the ecosystem.

Lastly, we discuss the role of IT in the ecosystem of a university. When IT manages and controls interorganizational relationships within a business ecosystem, it becomes a valuable and reusable resource. Additionally, it can enhance robustness in a high velocity environment and support creative work (Kim, Lee & Han, 2010). Furthermore, it assists businesses in lowering costs and establishing new contacts in a generally stable corporate climate. IT also provides for consistent communication between different organizations and aids in the business networking.

Second, IT enables business ecosystems to be more resilient and dependable (Moore, 1999). With the support of IT, organizations can monitor the status of other organizations within the ecosystem and act when something is going wrong. Third, value creation allows organizations to stand out from its competitors while also allowing it to form ties with customers (Kim et al., 2010). Finally, overall productivity has the potential to benefit all ecosystem members substantially (Iansiti and Levien, 2004).

3. Methods

The innovation ecosystem (see figure 1) was composed of findings from the discussed literature. As mentioned, an innovation ecosystem can encounter several bottlenecks that can complicate knowledge sharing and the implementation thereof. By placing the identified mechanisms onto strategic points in the ecosystem, the bottlenecks can be minimised or dissolved. This has an influence on how universities and the industry cooperate with each other. The agent mechanism is all about selecting the right partners from the industry to share knowledge with. The links mechanism explains the interaction with selected partners. Resilience was defined as the encapsulating mechanism that involves every part of the innovation ecosystem, by making sure it remains in an innovative state of disequilibrium.

Even though an innovation ecosystem consists of the three entities university, industry and the government which are interacting with each other, this framework only focuses on the cooperation between universities and the industry. We acknowledge that the government does play an important role indeed. However, the scope of this study was limited to the collaboration of universities and industries. With that said, there is a possibility to

exchange the industry with the government or with society in this framework and work through more findings at a later stage.

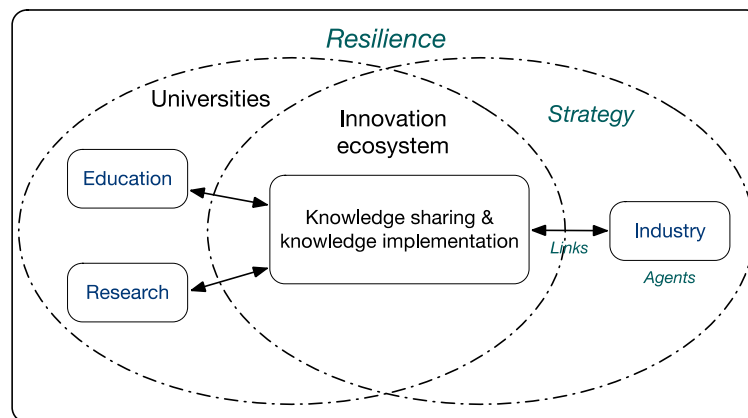


Figure 1: Innovation ecosystem

4. Results

4.1 Knowledge sharing

Essentially, Michels (2020) describes the ‘third stream’ as a catch-all to describe any activity of universities that partner or engage with external stakeholders. A broad body of research that Michels (2020) provides delivers a deep analysis of what policy implications and recommendations are imminent, in order to create vehicles to make knowledge transfer accessible.

A few examples (2020, p.72) are:

- Difficulty in finding partners/accessibility
- Degree of formality
- Cross/beyond-boundary perspective/attitude
- Strategic (institutional/sector) objectives/valorization/clarity
- Effort/negotiation/politics
- Restrictive contracts/ownership issues/bureaucracy
- Flexibility
- Leadership, management

One of the outcomes and conclusions of Michels is that knowledge and knowledge transfer is valuable but needs to be differentiated into three categories: Individual and disciplinary based approaches, organization- based approaches and case study approaches. In summary, individual- based approaches take individual identity into account when assessing linkages between the knowledge owned and valued by the academic and their engagement when participating in knowledge transfer.

Disciplinary-based knowledge transfer is based on motives that disciplines might have. This approach is considered very heterogeneous, and disciplinary differences may be one element in a complex context. Organization- or institutional approaches see the university as a meaningful unit for academia but also policy. Some research incorporates all organizational parties in the knowledge equation but fails to conclude meaningfully for all. There seems to be a tendency for research to focus on one organizational party: firm/university, recipient/creator (Agrawal, 2001). Results about one stakeholder category may not apply to another. “Firm–firm interactions” are not necessarily relevant for “university–firm” interactions (Agrawal, 2001). Insights from industry may not help support academia and vice versa. Lastly, case-study approaches apply a cross-stakeholder attitude. The notion of a partnership concept that takes into consideration both, common ground and differences, an aim for consensus and vision to dissolve dissensus between stakeholders will lead to an integration of knowledge. The variation of perspectives that aim to integrate commonality and accept’ multiple tension’ (or hidden agendas). Resulting on the categorization above, we suggest a few strategic

knowledge sharing activities that may leverage the roles of education and research. They move foremost in the organizational and case study approach because we cannot make any assumptions on the individual and disciplinary level when it comes to the introspection and perception of the actors. The reason is that with cross-sectoral stakeholders, many layers of feasibility need to be met to make this work. So either organizations such as companies need to adapt internal processes in the long term or if they focus on a case study approach, they work out possible tensions ad hoc. Also, we aimed to fit the ideas into Eskowitz' Triple- Helix (2000) model where university, industry and government are involved equally if possible.

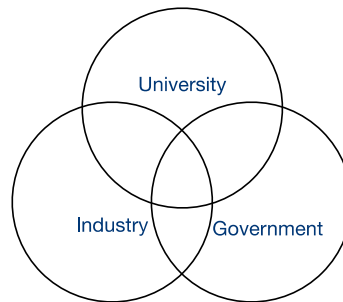


Figure 2: Triple Helix configuration

4.2 Leveraging the research role

Here, the suggestions shall contribute to an expansion of the already existing infrastructure that universities have. Declining funds from traditional sources have forced universities to seek alternative revenue streams, and one opportunity can be the increase of funded, contracted research. Here, industry clients who seek knowledge, innovation and insight from academia can partner with researchers from a discipline and follow through a common research project. Tammi (2009) stated in her results, that such an entrepreneurial approach within the research realm gave universities internal autonomy in important matters and strengthened the quasi-market steering of universities as well as the move towards defining specific performance targets for teachers and researchers. We want to remark at this point that the initiator research team must have a clear picture and vision about the purpose and goal of this project because of course, research and results should not be sold to the highest bidder but should serve a higher purpose to gain knowledge and to share it accordingly.

4.3 Leverage of education role

The role of education can evolve on many levels and can involve many actors, serving Etzkowitz' Triple Helix in various ways. Bespoke executive education as we see it in many Anglo-Saxon universities holds a lot of potential to stay connected and build links to society and the industry. Professional requirements change, and professionals who want to stay on top of their knowledge base can seek knowledge leverage at universities without committing to abandon their career to educate themselves. Here, the university also has opportunities to build reputation and can create a channel to market itself. Lifelong learning tailored to market needs and professional evolution is according to Child et al. (2021) one of the strongest drivers to increase the revenue streams for universities. At this point, the opportunity is used to introduce two more ways how society and even the government can be creatively involved to establish and forge links between universities and their emerging innovation ecosystem. Canada has the Student Work Placement Program (SWPP) which means that a variety of funding opportunities are available for employers to hire students for the purposes of experiential learning. We expect that this can encourage businesses who might reconsider hiring a postgraduate with little experience but fresh academic expertise and knowledge. This funding is being administered by Employment and Social Development Canada (ESDC) through various delivery partners. The Knowledge Transfer Partnership Scheme (KTP's) is another way how the government, industry and universities can work together. KTP are trying to connect businesses that have an innovation idea with the expertise to help deliver it, for example with postgraduates. This example is from the UK as a countrywide program that has been helping businesses for the past 40 years to improve their competitiveness and productivity through the better use of knowledge, technology and skills that reside within the UK knowledge base. A Knowledge Transfer Partnership serves to meet a core strategic need and to identify innovative solutions to help that business grow. KTP often delivers significantly increased profitability for business partners as a direct result of the partnership through improved quality and operations, increased sales and access to new markets. In sum, with the above-mentioned activities, a university could possibly establish stronger ties to research and educational spheres but also kick-start the strategic transformation into a more entrepreneurial organization.

4.4 Knowledge sharing bottlenecks & resolving mechanisms

A university needs to be more open to knowledge sharing with external partners in an innovation ecosystem. Knowledge sharing is essential as it enables businesses to enhance innovation performance (Scarbrough, 2003). Knowledge sharing has several potential bottlenecks in four different categories. First, the individual factors. Knowledge sharing is performed by people, and therefore behavioural factors play an important role. Trust is one of the most critical aspects. A lack of trust can be one of the key barriers in knowledge sharing. Other individual factors are personal attitude, motivation, commitment, norms, personal expectations and the relationship between knowledge and power. Furthermore, there are the technological factors. Knowledge sharing needs a sort of IT infrastructure to be executed. When the systems of a university and the partner cannot cooperate, it will be difficult to share information. Additionally, IT literacy is also a possible barrier for knowledge sharing. Next there are the organizational factors. This includes the organizational culture and climate. If these do not align within a university and the business, then it is hard for a good knowledge sharing environment to be set up. The fourth category contains the cultural factors where a difference in local, national, or international culture can form a bottleneck for information sharing since trust in between cultures can be negative (Al-Kurdi et. al., 2018).

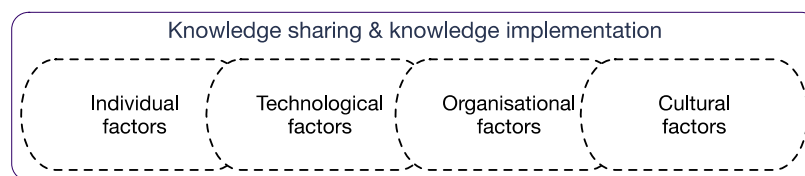


Figure 3: Knowledge sharing factors / bottlenecks

However, these bottlenecks can be countered using resolving mechanisms. Eleven of these mechanisms are identified and grouped in four categories. The first category is strategic mechanisms, where it is important for partners in an innovation ecosystem to set a clear strategy for the system to work as a whole and create a synergy. The second category is about creating the right links between the right partners. Clustering links and relationships that are vital and removing links that do not work to optimise collaboration, is what is needed to make sure that knowledge sharing can be successful. The third category contains mechanisms to make the ecosystem more resilient. This is done by implementing strategies to encourage ecosystems to create and maintain a disequilibrium to keep innovating. The fourth and final category focuses on agents. This category is about the importance of well-functioning mechanisms to select the right partners for the ecosystem. Implementing these mechanisms in the right manner will make sure that a university can remain resilient for the future of knowledge sharing.

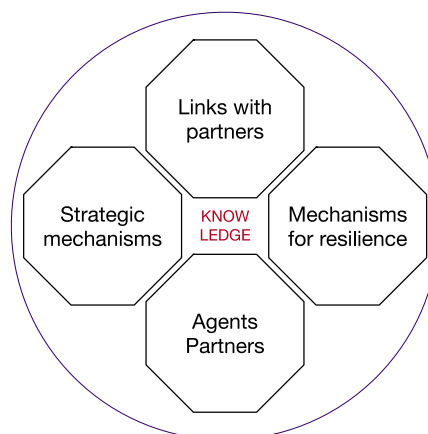


Figure 4: Resolving mechanisms

5. Discussion

Within an innovation ecosystem it is important to have a clear strategy. In that way, every actor in the ecosystem knows which direction the collaboration is headed. This way it is possible to create a synergy that allows the ecosystem to flourish. For universities, this would mean to setup and implement a clear plan to further the coloration within the ecosystem that has clear time frames for each phase of the plan. This would allow a

university to find clear points in time to re-evaluate their position within the ecosystem. Furthermore, evaluating implemented phases halfway through could help with the strategy since it could aid in keeping a good overview.

A very important factor is the strategic evaluation of partners that a university should make to create and maintain valuable links. Creating links is a time-consuming process that requires a lot of money and effort. So, our suggestion is for universities to re-evaluate existing relationships with companies, improve the most crucial links by exploiting further the University-industry relation and thus find the most essential partners and strengthen that link by creating a win-win situation. Moreover, we suggest that it is important to not only ameliorate one aspect of learning, but rather create an environment where students can actually have an opinion on the forming of certain partnerships. This evaluation process should be an ongoing process, because in dynamic environment relationships change and there are possibilities that an existing link might need to be cut. This is not supposed to be an immediate act, but rather a methodised process that would be implemented through certain stages, because a link with a partner cannot just cease to exist. That is why we would strongly recommend that this continuous procedure should be planned and realised carefully so that all existing links with partners are constantly optimal.

When we are referring to partners it is important to get a good understanding of the value that partners have and how to develop a clear and concise strategic evaluation plan. This evaluation can be a very complex task as it is not obvious how much each partner can contribute to the ecosystem. Our suggestion is to select partners based on certain criteria and qualities. Most essential are the characteristics of a partner. More specifically, qualities such as *trustworthiness*, which means that a partner can be trusted to fulfil his obligations, *transparency* in his methods and intentions and the reputation, *credibility*, and *loyalty*, which are key indicators for the formation of prosperous partnerships. Also, the objectives should be aligned for the partnership to work. Moreover, the selection should rely on a partner's capabilities and pose questions, such as "what are the unique competencies that differentiate him from the rest?", "Do they demonstrate a continuous focus on innovation and development?" and "What management capabilities do they possess?".

Furthermore, when an ecosystem is considered resilient it means that it can recover from external disturbances that can cause irregularities. Also, it shows that a system can develop adaptive capacity. So, in our perspective resilience in an educational context can be achieved in the following ways. Universities should make room for new learning modes, such as lifelong learning or hybrid flexible learning that brings the online approach closer to an in-person experience. Use the partnerships for case-based learning and thus reduce the gap of academia approach and real-life problems. Use the university as a knowledge point for paid collaboration. Moreover, another option is to diversify education with collaborative international projects which eventually can lead to the formation of international contacts and cultural appreciation. So, all this eventually creates a feedback loop which can benefit the education ecosystem.

A university should deal with knowledge sharing within a modern innovation ecosystem based on the proposed framework which tackles possible bottlenecks with mechanisms to counter the bottlenecks. The applications of the mechanisms are what this article proposes as the best practices for a strong position in a successful innovation ecosystem. These mechanisms allow exchange between partners and the co-creation of new knowledge. Doing so would increase the resilience of the ecosystem, but also increase the quality of research and education. Research is much more connected to the real world, where new findings can be tested and valorised. Education would benefit since it would be more entangled in the industry, meaning that students would receive relevant and up-to-date knowledge.

Within an innovation ecosystem, the university is the most important partner. Without the innovation that a university provides, the ecosystem would be a regular one. But with society changing, it is the question whether universities should remain in their traditional role of delivering knowledge. The answer this article provides is the fact that knowledge delivery should change in knowledge sharing. And this role can be achieved by altering the way that research is done, and education is given in the university. By shortening the paths from these two roles to the industry via knowledge sharing and implementation, a university could provide and obtain much more than from knowledge delivery. When universities take a predominant role in an innovation ecosystem, it could operate with a more hands-on approach to integrate education and research more in the industry.

When looking at the future of this proposal, the economic feasibility of our views on the solution should be further explored. This is because in our views the partner connection and relationships are more integrated, and this will cost time and resources to complete. Also, the act of severing a relationship could become costly. By researching the hidden and visible costs of this would prove to be worth it as it allows everyone involved to understand the costs that are present in these types of situations.

6. Conclusion

Our main research question was: how the traditional roles within a university must adapt to enable universities to improve their knowledge sharing and how to implement this within the innovation ecosystem?

To answer this question, we explored many facets of the situation and thus we concluded that the education system as a whole should move more towards a project-based system where industry and education can meet to better understand each other and provide valuable insights into the overall views of the industry. The research part of a university should engage in a feedback loop with the industry for validation and implementation. This will result in the capabilities of universities to improve, regarding knowledge sharing within the innovation ecosystem.

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