

# A dynamic viewpoint of institutional logics multiplicity in entrepreneurial universities

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**Abstract**— With the introduction of the third mission concept, universities have been increasingly asked to perform different activities besides teaching and researching, outreaching knowledge outside their boundaries and assuming a leading role in fostering innovation in modern knowledge-intensive societies. However, how do the three academic missions pursued by entrepreneurial universities interact with each other? To what logics do they refer? To address these questions, institutional logics are leveraged as a theoretical lens in this study. Thus, a qualitative system dynamics model (i.e., a causal loop diagram) was developed to investigate how entrepreneurial universities respond to logic multiplicity, providing different implications for both researchers and policy-makers.

**Keywords**—entrepreneurial university, institutional logics, system dynamics

## I. INTRODUCTION

The third mission concept implies that universities are expected to perform several different and diversified activities besides teaching (first mission) and scientific research (second mission) [1], [2]. Third mission efforts may include activities such as knowledge dissemination, technological innovation, social innovation, advisory services, or entrepreneurship [3], [4]. Through third mission activities, universities engage in sustainable, inclusive development and territorial competitiveness by interacting with a wide range of subjects far beyond its students and reference scientific communities [5], [6]. Several researchers also theorized the existence of a fourth mission, which refers to the role of universities in contributing to the development of economies and societies, addressing real-world issues, and co-developing the sustainability paradigm through multi-stakeholder partnerships [7], [8].

Given the above, it can be seen how the third mission transforms universities into key actors of local and/or global ecosystems that are based on innovation and knowledge. Third mission activities vary a lot according to the specific characteristics of each university, territory in which it is located, or intricate nature of relations it has the possibility (or capacity) to build in the entrepreneurial and innovation ecosystems of which it is part. This situation often produces effects that show up not as the direct consequence of a university activity or with delays since they could depend on different factors. Moreover, a second-order problem comes into play due to the intertwined relationships among the three academic missions. In fact, universities usually have scarce resources to invest in performing the variegated academic activities and tensions could arise when those resources need to be allocated among the different missions [9]. In addition to that, each involved actor has different logics

that can be competing with each other or not, leading to possible unintended consequences and further competition between the various missions (or within the same mission) and the multifaceted university's role [10]. Thus, due to the variety of actors and interests that take part in them, entrepreneurial universities can be seen as hybrid organizations influenced by different institutional logics that can be contradictory to each other or not. Following this idea, those organizations are immersed in a complex field of social forces that the literature on institutional studies calls organizational field [11]. So, different institutional logics influence people's behaviors and, consequently, different managerial approaches.

In the face of the challenges ahead, such as the rise of the data-driven economy, the importance of universities' third mission is perceived as steadily growing [12]. This shift has led to the pressing necessity of adopting a participatory, comprehensive, and systemic approach for assessing universities' performances, thus overcoming the mainstream models that are mainly built for evaluating their teaching and research activities and capturing their short-term outcomes [9].

In this study, leveraging the institutional logics theory and based on the typology of institutional logics and KPIs developed in [13], a system dynamics (SD) causal loop diagram (CLD) was developed to capture the systemic and interconnected nature of universities' third mission activities. Indeed, SD is a promising approach that is gaining increasing attention from scholars to build models able to guide decision-making processes in both private and public organizations [14]–[16], identifying the holistic implications of complex systems characterized by the presence of delays, nonlinearities, and multiple feedback loops [17]–[19]. In this way, the limits of traditional, linear models (and subsequent key performance indicators, KPIs) used for assessing universities' performances are highlighted and a possible strategy to overcome such limits is proposed.

## II. LITERATURE REVIEW

According to recent advances in neo-institutional theory, society is made up of inter-institutional systems in which several institutional orders coexist at the same time [20]. Hence, each of these institutional orders may affect people and organizations in various ways. Arising from this theoretical underpinning, the concept of institutional logics can be defined as “the socially constructed, historical patterns of material practices, assumptions, values, beliefs, and rules by which individuals produce and reproduce their material subsistence, organize time and space, and provide meaning to their social reality” [21, p. 804]. According to institutional logics, the organizational field in which an organization is submerged, mediates the relationship between society and a social organization [11], [22]. An organizational field is defined as “a community of organizations

that takes part of a common meaning system and whose participants interact more frequently and fatefully with one another than with actors outside the field” [23, p. 56]. Thus, it comprises governmental entities, professional and trade organizations, financing sources, special interest groups, as well as any other constituent that may impact the organization [24]. As a result, investigating these areas is critical for identifying, comprehending, and abstracting the expectations and behaviors that distinguish a certain organization [25].

According to recent studies, organizational fields may be defined by the existence of various institutional logics, which can be complementary [26] or conflicting [27] to each other. As a consequence, due to the variegated number of actors and institutional logics that characterize them, different studies have investigated logic multiplicity in universities (e.g., [10], [28], [29]). Thus, this research aims to extend the knowledge more about how entrepreneurial universities react to logics multiplicity at the organizational-field level, as well as how this logic diversity is represented in their KPIs and different academic missions.

### III. MATERIALS AND METHODS

An SD qualitative model was developed in this study to identify the intertwined relationships that characterize the three academic missions. Indeed, SD [17] represents an effective tool to frame and visualize organizational processes, as well as finding the patterns and causal relationships that characterize them. Moreover, it can also help in formulating a richly explanatory behavioral model capable of reproducing the dynamic problem of concern [30], [31]. With this aim, a CLD was developed, emphasizing connections between variables that may be positive (in blue) or negative (in red) and that result in delineating vicious or virtuous closed feedback loops [17], [18]. Hence, the feedback loop is self-reinforcing (indicated with an “R”) if each variable is connected by an even number of negative connections (or none). The loop is self-balancing (indicated with a “B”) if an odd number of negative connections links each variable. In contrast, the word “closed” should apply to causally closed loops and should not be confused with its meaning in systems theory, which refers to systems that do not exchange information with other systems [32, p. 241]. The resultant linkages form a system, which Wikipedia defines as “a group of interacting or interrelated elements that act according to a set of rules to form a unified whole”. Thus, system elements influence one another across time through diachronic or synchronous interrelationships (i.e., the feedback loops) [18].

In particular, the different variables included in the CLD and the overarching institutional logics that characterize them were retrieved from the typology developed in [17], who developed an exploratory cross-country comparative case study [33]. In particular, the authors investigated three internationally recognized entrepreneurial universities (i.e., the University of Milano Bicocca, the University of Birmingham, and the University of Hong Kong). Hence, the institutional logics characterizing those universities were identified, triangulating the insights emerging from in-depth semi-structured interviews [34], [35] and the analysis of secondary data sources [36]. The interview, ten in total, were conducted with professors and heads of research and third mission activities in those universities. The secondary data the strategic and/or performance plans of the three institutions for identifying the strategic resources and the KPIs used to assess the universities’ activities, objectives, and performance in

pursuing their three academic missions. Such analysis led to the identification of nine institutional logics, three for each academic mission, as portrayed in Table 1. In brief, the logics individuated are: (1) inclusiveness, vocational, and excellence logic as regards the first mission; (2) focalization, materiality, and excellence as regards the second mission; (3) dissemination, translational, and entrepreneurial concerning the third mission.

To corroborate what resulted from the typology developed by [17], the analysis was accompanied by extensive research in the scientific literature about the topic and investigating the rankings and/or guidelines developed by some of the most important national and international organizations involved in universities evaluation. These organizations are: (1) the Italian National Agency for the Evaluation of Universities and Research Institutes (i.e., ANVUR); (2) ShanghaiRanking Consultancy, which develops the “Academic Ranking of World Universities”; (3) E3M, research project financed by the European Commission and ended in 2011 with the development of the “European Indicators and Ranking Methodology for University Third Mission”; (4) QuacquarelliSymonds, which annually releases the “World University Ranking”; (5) Times Higher Education, which is famous for the “World University Rankings”; (6) U-Multirank, independent consortium implemented on the initiative of the European Commission to rank international higher education institutions.

### IV. FINDINGS AND DISCUSSIONS

In this study, a CLD was developed to represent the intertwined complexity that characterizes the three academic missions as performed by entrepreneurial universities (Fig. 1). In the next sub-paragraphs, the different feedback loops characterizing the diagram are discussed in detail.

#### A. *The interplays between basic and applied research*

Due to the transition toward an entrepreneurial model, universities have increasingly positioned themselves as equal partners in their relationships with industry and government. Hence, each of these organizations can be considered as a helix of the so-called triple-helix model [37]. In this model, knowledge creation and transfer are spurred by the interactions among each of the three helices (government, industry, and university), resulting in an increase in the amount of applied research able to foster regional economic and societal growth [2], [38]. In this sense, universities increasingly play a crucial role in managing innovation in modern knowledge-driven societies [39], [40]. This new function resulted in an academic entrepreneurial spirit that emerged in universities in coexistence with the traditional missions of teaching and conducting basic research [1]. For example, in [41] it was found that academics involved in conducting sponsored research aimed at developing new industrial solutions performed well in obtaining financial resources from both private and public sources without jeopardizing their performance in pursuing the two other academic missions. Hence, in the CLD four reinforcing loops have been identified in relation to the interplays between basic and applied research.

When the university establishes a new partnership with third parties, it will increase the number of conducted projects and the amount of applied research. This increases both research productivity and quality [42], [43], as well as the university’s reputation and its position in academic rankings. This will enable the university to attract even more external partners in the

| Academic Mission             | Institutional Logic   | Definition   |
|------------------------------|-----------------------|--|
| First mission (teaching)     | Inclusiveness logic   | Providing a higher education to as many students as possible   |
|                              | Vocational logic      | Transferring valuable knowledge to students and ensuring their employability   |
|                              | Excellence logic      | Attracting talented and skilled people and promoting the development of human capital  |
| Second mission (researching) | Focalization logic    | Becoming a reference point, at both regional and international levels, on some specific research areas   |
|                              | Materiality logic     | Contributing to solve real world problems through the researching activity   |
|                              | Excellence logic      | Becoming relevant in terms of publication quality and building international networks  |
| Third mission                | Dissemination logic   | Disseminating knowledge outside the boundaries of academia   |
|                              | Translational logic   | Translating researching and other capabilities into addressing real-world issues   |
|                              | Entrepreneurial logic | Fostering innovation and co-developing the sustainability paradigm through multi-stakeholder partnerships for contributing to the development of economies and societies |

Fig. 1. The nine institutional logics associated with each of the three academic missions as identified in [17].

future, leading to deeper research interactions (R1 – *Effect of partnerships on rankings*). Similarly, more applied research also means higher capabilities of the university to deal with knowledge commercialization and technology transfer activities [44], [45]. Hence, a part of the university’s applied research would result in a patenting and licensing activity that can foster companies’ endowments of intangible assets and their competitiveness [46]. This, over the long term would develop the territory in which the company is located and increase the employment rate. Thus, a more robust regional economy results in higher chances for students to find a job, which represents a crucial KPI in academic rankings (R2 – *Effect of patents on regional development*). Moreover, when knowledge is commercialized through patents and the university is able to sell or license them, this results in financial returns (R3 – *Effect of patents licensing on budget*) that can be used to build or empower specific technology transfer offices (TTOs) able to strengthen even more the outcomes of such activity (R4 – *Effect of TTOs on technology transfer*) [3]. A similar path can be observed if the results of applied research programs lead to creating academic start-ups or spin-offs (R5 – *Effect of academic entrepreneurship on regional development*).

However, an increase in the amount of applied research also results in more funds received by industrial partners to conduct this sponsored activity. Hence, more budget can be invested in research tools and equipment [47], which boost scholars’ ability to perform new relevant research and the university’s capability to conduct basic research [48]. Thus, with a delay, the academic reputation would increase together with the possibility to attract third parties for establishing new partnerships (R6 – *Effect of research endowment on rankings*). Moreover, more funding also gives the university the ability to organize scientific conferences and seminars, giving the institution more visibility and increasing its reputation among scholars (R7 – *Effect of organizing conferences on academic reputation*). In addition to that, more budget could mean hiring new researchers, which can further increase research productivity (R8 – *Effect of hiring on research productivity*). Especially the possibility to obtain more funding was proven to be the primary driver for spurring scholars to establish new partnerships in several studies (e.g., [49], [50]). Indeed, such activity is still not well institutionalized and no specific KPIs exist to promote careers’ advancements when new partnerships are established, leaving such activity to a voluntary basis and faculties’ individual relationships [51], [52].

### B. The interplays between teaching and reputation

Besides producing and disseminating knowledge, one of the typical missions of universities is to attract and develop human capital. Hence, allocating part of the university’s budget to hire new scholars not only results in improving its performance on conducting research but also on the quality of teaching (R9 – *Effect of hiring on teaching’s quality*). Indeed, increasing the rate of faculties per student is commonly recognized as one of the key drivers to increase such KPI, which highly impacts the university’s position in academic rankings [53]. Moreover, part of the university’s budget can be invested to expand its facilities and offer teaching opportunities to more students, increasing the acceptance rate. Indeed, universities are traditionally required to foster social cohesion and integration, providing higher education to as many students as possible [54], [55]. So, an increase in the number of enrolled students leads to an increase in the university’s financial resources thanks to the collected tuitions fees (R10 – *Effect of teaching facilities on inclusiveness*). Similarly, if the university’s budget is invested in promotional campaigns to increase the university’s attractiveness, this would mean more students’ applications. Thus, financial returns would derive from that part of students passing the admission phase and paying the tuition fees (R11 – *Effect of promotion on attractiveness*), as well as directly from the application fees paid to sustain the admission test (R12 – *Effect of attractiveness on university’s budget*).

On the other hand, increasing the number of enrolled students can lead to three unintended consequences over the medium to long term. First, a higher number of enrolled students would increase the withdrawal rate and a lower reputation due to an increase in the number of dropouts (B1 – *Effect of enrollments on dropouts*). Second, it will decrease the KPI of faculties per student and, so, the quality of teaching (B2 – *Effect of enrollments on quality of teaching*). Third, such scenarios can be exacerbated by an increase in the admission rate. Indeed, if such rate is increased at the expenses of less rigorous admission criteria [56], the university reputation would decrease over the long term due to an increase in the withdrawal rate (B3 – *Effect of inclusiveness on dropouts*) and an increase in students’ average time to degree (B4 – *Effect of inclusiveness on time to degree*).

### C. The interplays between teaching and regional development

In addition to that, entrepreneurial universities foster human capital development in two ways, directly or indirectly fostering their students’

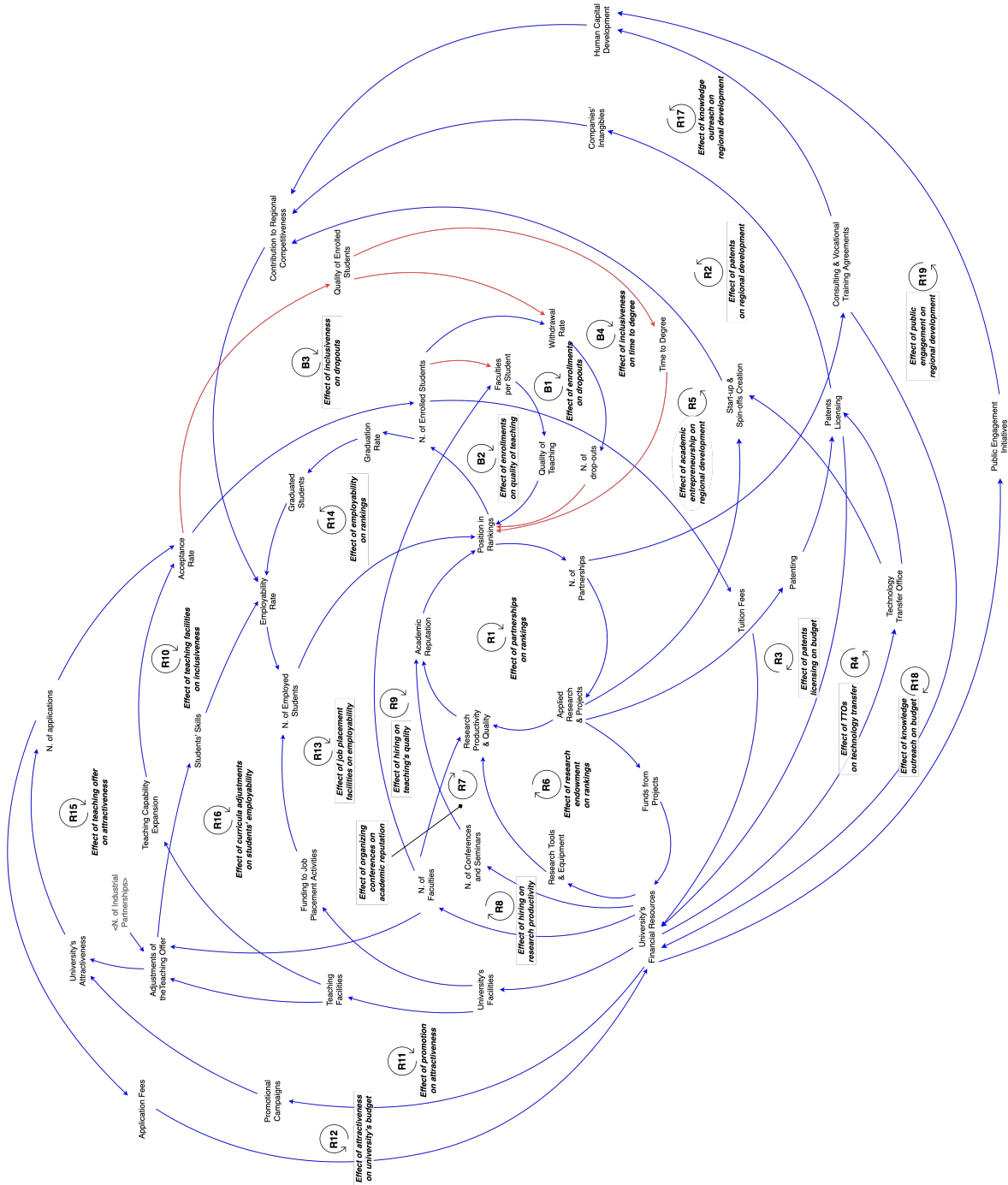


Fig. 1. The causal loop diagram of the three academic missions and their different institutional logics.

employability [57], [58]. First, they need to set up procedures and facilities that directly favor students' entry into the labor market [57], [59]. Thus, it can be observed that a relevant role is played by job placement offices, which bridge between skilled students and firms looking for interns or employees. So, they increase students' probability to be employed, fostering the university's reputation and its position in the rankings (R13 – *Effect of job placement facilities on employability*). Subsequently, a higher reputation would also lead to an increase in the

number of enrolled students, who will in part graduate and find a job through the effect of an employability rate (R14 – *Effect of employability on rankings*), here considered in limitation to the endogenous variables and excluding all the other factors that could affect it but are outside the boundaries of the system.

Second, they must ensure that their students possess relevant knowledge and capabilities, constantly aligning academic curricula to companies' needs [60], [61]. Hence, investing in new facilities and

faculties can lead to adjustments of the teaching offer (e.g., activating new courses). On the one hand, this increases the university's attractiveness and the number of applications (R15 – *Effect of teaching offer on attractiveness*). On the other hand, it empowers students' skills and capabilities and increases the employability rate (R16 – *Effect of curricula adjustments on students' employability*).

However, the third mission includes every activity performed outside the university's boundaries, involving different stakeholders than the scientific community or students [5], [6]. Hence, entrepreneurial universities are also actively involved in knowledge outreach through continuing education and public engagement activities [62]. So, on the one hand, the higher the number of partnerships, the higher the number of consulting and vocational training agreements. This increases the university's contribution to regional competitiveness through capabilities' empowerments of other entrepreneurs or their employees [63], [64]. In the end, the university's reputation and its position in the academic rankings increase as well (R17 – *Effect of knowledge outreach on regional development*). Moreover, such agreements usually generate private funding that increases the university's financial resources (R18 – *Effect of knowledge outreach on budget*).

On the other hand, knowledge spillover and human capital development can occur thanks to public engagement initiatives organized by entrepreneurial universities (e.g., divulging scientific results, participating in the cultural life, developing policies, providing community services) [65], [66]. Hence, another reinforcing loop was identified in relation to the development of human capital resulting from such initiatives and the university's contribution to regional competitiveness (R19 – *Effect of public engagement on regional development*). In this sense, it can be said that entrepreneurial universities act as local agents that drive ecosystem changes stimulating the development of entrepreneurship capital [67], [68].

#### V. IMPLICATIONS, LIMITATIONS, AND FURTHER STEPS

The study provides some interesting practical implications. First, it shows how an SD approach should be implemented to assess entrepreneurial universities' performances and guide policy-makers' decisions. So, the different feedback loops help determine the leverage points that can be manipulated to balance the three missions properly. Specifically, it is interesting to note that the admission policies are one of the critical drivers for the overall system. Second, to limit the possible conflicting interactions among the three academic missions and the different logics they refer to, the model needs to be constantly updated. Hence, this study suggests to universities' heads the relevance of identifying an organizational unit that should constantly gather and update the data necessary to keep the model running.

In addition to that, the article provides some interesting contributions also to theory. First, to the best of the authors' knowledge, this is the first study that proposes an SD approach, simultaneously assessing the performance of entrepreneurial universities' third missions and their impact on the management of common resources (e.g., local competitiveness or a territory's human capital). Hence, it answers to the call of adopting holistic approaches to investigate such phenomena [10]. Second, this research contributes to the institutional logics theory analyzing a context in which more than two logics are at stake. Indeed, to

date, most of the studies addressed the combination of two reciprocally conflicting or complementary logics [26], [27], ignoring the existence of several logics (i.e., logics multiplicity) in complex and dynamic contexts such as the academic one. Conversely, entrepreneurial universities are asked to pursue three different missions that can be reciprocally complementary or conflicting, resulting in paradoxical tensions and competition around key resources allocation if not effectively governed.

However, this study is not free from limitations. The model was created starting from a typology of different institutional logics, which should still be enriched and validated. Moreover, the CLD was developed based on data gathered from the literature and national and international academic rankings. Collecting primary data and creating a quantitative model (i.e., a stock and flow diagram) should be the foundation for future research. Indeed, stocks and flow diagrams allow for graphical representation of the relationships that exist among the strategic resources of the system (i.e., stocks) and the drivers that determine their accumulation or depletion paths (i.e., flows). Thus, they aid in identifying the critical variables required to develop a comprehensive behavioral model capable of replicating the dynamic issue of concern. Furthermore, additional research should be conducted to enrich and validate this conceptual model by introducing a taxonomy of KPIs for measuring both economic and social performance, as well as determining the model's value in a wide range of practical applications, including simulating its application with various types of stakeholder engagements and policies.

#### REFERENCES

- [1] H. Etzkowitz, "The norms of entrepreneurial science: Cognitive effects of the new university-industry linkages," *Res. Policy*, vol. 27, no. 8, pp. 823–833, 1998.
- [2] B. R. Clark, "The entrepreneurial university: Demand and response," *Tert. Educ. Manag.*, vol. 4, no. 1, pp. 5–16, Jan. 1998.
- [3] D. Battaglia, P. Landoni, and F. Rizzitelli, "Organizational structures for external growth of University Technology Transfer Offices: An explorative analysis," *Technol. Forecast. Soc. Change*, vol. 123, pp. 45–56, Oct. 2017.
- [4] G. Secundo, V. Ndou, P. Del Vecchio, and G. De Pascale, "Knowledge management in entrepreneurial universities: A structured literature review and avenue for future research agenda," *Manag. Decis.*, 2019.
- [5] C. Rinaldi, A. Cavicchi, F. Spigarelli, L. Lacchè, and A. Rubens, "Universities and smart specialisation strategy," *Int. J. Sustain. High. Educ.*, vol. 19, no. 1, pp. 67–84, 2018.
- [6] G. Secundo, J. Dumay, G. Schiuma, and G. Passiante, "Managing intellectual capital through a collective intelligence approach: An integrated framework for universities," *J. Intellect. Cap.*, vol. 17, no. 2, pp. 298–319, 2016.
- [7] D. Bienkowska and M. Klofsten, "Creating entrepreneurial networks: academic entrepreneurship, mobility and collaboration during PhD education," *High. Educ.*, vol. 64, no. 2, pp. 207–222, Aug. 2012.
- [8] G. Trencher, M. Yarime, K. B. McCormick, C. N. H. Doll, and S. B. Kraines, "Beyond the third mission: Exploring the emerging university function of co-creation for sustainability," *Sci. Public Policy*, vol. 41, no. 2, pp. 151–179, 2014.
- [9] F. Cosenz, "A Dynamic Viewpoint to Design Performance Management Systems in Academic Institutions: Theory and Practice," *Int. J. Public Adm.*, vol. 37, no. 13, pp. 955–969, 2014.
- [10] F. Ricciardi, P. De Bernardi, C. Forliano, and M. Franco, "Institutional Logics Analysis for Enabling Collaborative DPM Processes: Universities' Third Mission Performance as an Illustrative Example," in *Enabling Collaborative Governance through Systems Modeling Methods*, Springer, Cham, 2020, pp. 277–295.
- [11] M. Wooten and A. J. Hoffman, "Organizational Fields Past, Present and Future," in *The Sage Handbook of organizational institutionalism*, R. Greenwood, C. Oliver, K. Sahlin, and R. Suddaby, Eds. London: Sage, 2008.
- [12] I. Wakkee, P. van der Sijde, C. Vaupell, and K. Ghuman, "The university's role in sustainable development: Activating entrepreneurial scholars as agents of change," *Technol. Forecast. Soc. Change*, 2018.
- [13] C. Forliano, P. De Bernardi, A. Bertello, and F. Ricciardi, "Institutional logics to unveil entrepreneurial universities' performances. A cross-country comparative study," in *University Governance and Performance Management. Current Research and Practice*, E. Caperchione and C. Bianchi, Eds. Cham, Switzerland: Springer Nature.

- [14] E. Bivona and F. Cosenz, "Designing a Multi-Sided Platform business model assessment framework: a Dynamic Performance Management perspective," *Syst. Res. Behav. Sci.*, 2019.
- [15] C. Forlano, P. De Bernardi, A. Bertello, and V. Temperini, "Innovating business processes in public administrations: towards a systemic approach," *Bus. Process Manag. J.*, 2020.
- [16] E. Borgonovi, C. Bianchi, and W. C. Rivenbark, "Pursuing Community Resilience through Outcome-Based Public Policies: Challenges and Opportunities for the Design of Performance Management Systems," *Public Organ. Rev.*, pp. 1–6, 2017.
- [17] J. W. Forrester, "Industrial Dynamics: A Major Breakthrough for Decision Makers," *Harv. Bus. Rev.*, vol. 36, no. 4, pp. 37–66, 1958.
- [18] J. Sterman, *Business dynamics. Systems Thinking and modeling for a complex world*. Boston: Irwin/McGraw Hill, 2000.
- [19] C. Bianchi, *Dynamic Performance Management*, vol. 1. Springer International Publishing, 2016.
- [20] Y. Qiu, H. Chen, Z. Sheng, and S. Cheng, "Governance of institutional complexity in megaproject organizations," *Int. J. Proj. Manag.*, vol. 37, no. 3, pp. 425–443, Apr. 2019.
- [21] P. H. Thornton and W. Ocasio, "Institutional Logics and Historical Contingency Power in Organizations," *Am. J. Sociol.*, vol. 105, no. 3, pp. 801–843, Nov. 1999.
- [22] R. Greenwood and R. Suddaby, "Institutional Entrepreneurship In Mature Fields: The Big Five Accounting Firms," vol. 49, no. 1, pp. 27–48, Feb. 2006.
- [23] W. R. Scott, *Institutions and Organizations*, no. 2. Thousand Oaks: Sage, 1995.
- [24] W. W. Powell and P. J. DiMaggio, *The new institutionalism in organizational analysis*. University of Chicago press, 2012.
- [25] P. Pierce, F. Ricciardi, and A. Zardini, "Smart cities as organizational fields: A framework for mapping sustainability-enabling configurations," *Sustainability*, vol. 9, no. 9, p. 1506, 2017.
- [26] M. S. Kraatz and E. S. Block, "Institutional pluralism revisited," *SAGE Handb. Organ. institutionalism*, vol. 2, pp. 635–662, 2017.
- [27] R. Greenwood, M. Raynard, F. Kodeih, E. R. Micelotta, and M. Lounsbury, "Institutional complexity and organizational responses," *Acad. Manag. Ann.*, vol. 5, no. 1, pp. 317–371, 2011.
- [28] M. Guerrero, D. Urbano, A. Fayolle, M. Klofsten, and S. Mian, "Entrepreneurial universities: emerging models in the new social and economic landscape," *Small Bus. Econ.*, vol. 47, no. 3, pp. 551–563, Oct. 2016.
- [29] M. Ezzamel, K. Robson, and P. Stapleton, "The logics of budgeting: Theorization and practice variation in the educational field," *Accounting, Organ. Soc.*, vol. 37, no. 5, pp. 281–303, 2012.
- [30] K. Maani and R. Y. Cavana, *Systems thinking, system dynamics: managing change and complexity*, 2nd ed. Rosedal: Pearson Prentice Hall, 2007.
- [31] G. P. Richardson and D. F. Andersen, "Systems Thinking, Mapping, and Modeling in Group Decision and Negotiation," pp. 313–324, 2010.
- [32] G. P. Richardson, "Reflections on the foundations of system dynamics," *Syst. Dyn. Rev.*, vol. 27, no. 3, pp. 219–243, 2011.
- [33] R. K. Yin, *Case Study Research: Design and Methods. Essential guide to qualitative methods in organizational research*, vol. 5. Thousand Oaks, California, 2009.
- [34] A. Bryman and E. Bell, *Business research methods*. Oxford University Press, 2011.
- [35] D. Silverman, *Doing Qualitative Research: A Practical Handbook*. Sage Publications, 2013.
- [36] K. M. Eisenhardt and M. E. Graebner, "Theory building from cases: Opportunities and challenges," *Acad. Manag. J.*, vol. 50, no. 1, pp. 25–32, 2007.
- [37] H. Etzkowitz and L. Leydesdorff, "The dynamics of innovation: From National Systems and 'mode 2' to a Triple Helix of university-industry-government relations," *Res. Policy*, vol. 29, no. 2, pp. 109–123, Feb. 2000.
- [38] H. Etzkowitz, "Innovation in innovation: The Triple Helix of university-industry-government relations," *Soc. Sci. Inf.*, vol. 42, no. 3, pp. 293–337, 2003.
- [39] E. Cerver Romero, J. J. M. Ferreira, and C. I. Fernandes, "The multiple faces of the entrepreneurial university: a review of the prevailing theoretical approaches," *J. Technol. Transf.* 2020 464, vol. 46, no. 4, pp. 1173–1195, Jul. 2020.
- [40] A. Iqbal, "Innovation speed and quality in higher education institutions: the role of knowledge management enablers and knowledge sharing process," *J. Knowl. Manag.*, pp. 1–27, 2021.
- [41] M. Kirs, E. Karo, and P. Lumi, "Strategic behaviour of research groups within the entrepreneurial university policy rhetoric: The Estonian biotechnology sector," *Sci. Public Policy*, vol. 44, no. 6, pp. 802–820, 2017.
- [42] A. Hughes, C. Lawson, M. Kitson, A. Salter, A. Bullock, and R. B. Hughes, "The Changing State of Knowledge Exchange 1 UK Academic Interactions with External Organisations," 2005.
- [43] H. C. Kongsted *et al.*, "University Researchers' Engagement with Industry, the Public Sector and Society: Results from a 2017 Survey of University Researchers in Denmark," 2017.
- [44] M. Perkmann *et al.*, "Academic engagement and commercialisation: A review of the literature on university-industry relations," *Res. Policy*, vol. 42, no. 2, pp. 423–442, 2013.
- [45] H. Etzkowitz, "Innovation Lodestar: The entrepreneurial university in a stellar knowledge firmament," *Technol. Forecast. Soc. Change*, vol. 123, pp. 122–129, 2017.
- [46] T. U. Daim, G. Rueda, H. Martin, and P. Gerdtsri, "Forecasting emerging technologies: Use of bibliometrics and patent analysis," *Technol. Forecast. Soc. Change*, vol. 73, no. 8, pp. 981–1012, 2006.
- [47] J. G. Thursby and M. C. Thursby, "Faculty participation in licensing: Implications for research," *Res. Policy*, vol. 40, no. 1, pp. 20–29, Feb. 2011.
- [48] K. Philpott, L. Dooley, C. Oreilly, and G. Lupton, "The entrepreneurial university: Examining the underlying academic tensions," *Technovation*, vol. 31, no. 4, pp. 161–170, 2011.
- [49] R. Iorio, S. Labory, and F. Rentocchini, "The importance of pro-social behaviour for the breadth and depth of knowledge transfer activities: An analysis of Italian academic scientists," *Res. Policy*, vol. 46, no. 2, pp. 497–509, Mar. 2017.
- [50] I. Ramos-Vielba, M. Sánchez-Barriolengo, and R. Woolley, "Scientific research groups' cooperation with firms and government agencies: motivations and barriers," *J. Technol. Transf.*, vol. 41, no. 3, pp. 558–585, 2016.
- [51] V. Galán-Muros, P. van der Sijde, P. Groenewegen, and T. Baaken, "Nurture over nature: How do European universities support their collaboration with business?," *J. Technol. Transf.*, vol. 42, no. 1, pp. 184–205, 2017.
- [52] B. Orazbayeva and C. Plewa, "Academic motivations to engage in university-business cooperation: a fuzzy set analysis," *Stud. High. Educ.*, 2020.
- [53] Quacquarelli Symonds, "QS World University Rankings - Methodology," 2021. [Online]. Available: <https://www.topuniversities.com/qs-world-university-rankings/methodology>. [Accessed: 15-Sep-2021].
- [54] European Commission, "European Universities: Enhancing Europe's Research Base," Luxembourg: Publications Office of the European Union, 2005.
- [55] P. Scott, "Triumph and Retreat: British Higher Education at the end of the Century," *state UK High. Educ. Manag. Chang. Divers.*, pp. 186–205, 2001.
- [56] R. B. Wilkinson, J. S. Taylor, A. Peterson, M. De, and L. Machado-Taylor, "A Practical Guide to Strategic Enrollment Management Planning."
- [57] L. Zollo, M. C. Laudano, C. Ciappi, and V. Zampi, "Factors affecting universities' ability to foster students' entrepreneurial behaviour: An empirical investigation," *J. Manag. Dev.*, vol. 36, no. 2, pp. 268–285, 2017.
- [58] J. A. Cunningham, M. Guerrero, and D. Urbano, "Entrepreneurial universities: Overview, reflections, and future research agendas," in *The World Scientific Reference on Entrepreneurship*, vol. 1–4, Newcastle Business School, Northumbria University, United Kingdom, 2017, pp. 3–20.
- [59] M. Franco, R. Silva, and M. Rodrigues, "Partnerships between higher education institutions and firms: The role of students' curricular internships," *Ind. High. Educ.*, vol. 33, no. 3, pp. 172–185, 2019.
- [60] D. Grimaldi and V. Fernandez, "The alignment of University curricula with the building of a Smart City: A case study from Barcelona," *Technol. Forecast. Soc. Change*, vol. 123, pp. 298–306, 2017.
- [61] C. Plewa, V. Galán-Muros, and T. Davey, "Engaging business in curriculum design and delivery: a higher education institution perspective," *High. Educ.*, vol. 70, no. 1, pp. 35–53, 2015.
- [62] E3M, "Needs and constraints analysis of the three dimensions of third mission activities," 2010.
- [63] M. Klofsten and D. Jones-Evans, "Comparing Academic Entrepreneurship in Europe - The Case of Sweden and Ireland," *Small Bus. Econ.*, vol. 14, no. 4, pp. 299–309, 2000.
- [64] D. Urbano and M. Guerrero, "Entrepreneurial Universities: Socioeconomic Impacts of Academic Entrepreneurship in a European Region," *Gend. Soc.*, vol. 27, no. 1, pp. 40–55, 2013.
- [65] A. et al. Schoen, "Strategic management of university research activities: Methodological guide," 2006.
- [66] A. Vargiu, "Indicators for the Evaluation of Public Engagement of Higher Education Institutions," *J. Knowl. Econ.*, vol. 5, no. 3, pp. 562–584, Sep. 2014.
- [67] D. B. Audretsch, "From the entrepreneurial university to the university for the entrepreneurial society," *J. Technol. Transf.*, vol. 39, no. 3, pp. 313–321, 2014.
- [68] M. Guerrero and D. Urbano, "The development of an entrepreneurial university," *J. Technol. Transf.*, vol. 37, no. 1, pp. 43–74, 2012.