

Chapter 1

Introduction: People, Tensions and Impact in University Interactions



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Abstract University-industry interaction combines several layers of actors, states and effects. *People* make choices, based on their individual characteristics, at different stages of a scientific career, in a highly internationalised profession. *Tensions* arise when university administrators and managers need to strike a balance among different promotion instruments, or when the university or public research organisation tries to solve the trade-offs between long- and short-term relationships, or among new management practices. *Impacts* are related to scientific agendas, the economic returns for firms or the societal benefits. This book adopts a *people-tension-impact* approach to identify key insights, by combining qualitative and quantitative research, established and novel methodologies, and different geographic settings. The chapters in this volume provide new perspectives on university-industry interactions related to gender biases, entrepreneurial involvement of PhD students and the role of international mobility. They also focus on how the positive impacts of university-industry interactions coexist with unresolved tensions linked to policy combinations, long-term contractual relationships, management practices and organisational strategies.

Keywords University-industry interaction · Knowledge transfer · Academic entrepreneurship · Public research organisations · Societal impact

1.1 Introduction

University-industry knowledge interactions are crucial for smart specialisation and sustainable growth. However, they involve problems related to navigating the different university-industry logics, management of the tensions in academic

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organisations and the impact of the interactions on science, firms and society. Several research fields have studied these aspects, using different approaches. The chapters in this book are based on the presentations made at the 2018 Technology Transfer Society (T2S) Conference, held in Valencia, Spain, and discuss some developments related to this *people-tension-impact* approach.

Compared to other works on this topic, this book presents some novelties. First, some of the chapters focus on public research organisations rather than universities, and on society rather than industry, on the grounds that their interactions are based on similar problematisations. The aim is to include a wide range of the players involved in the diffusion of academic knowledge to non-academic audiences and the related themes, such as societal impact, and policy mixes. Second, the book does not adhere to either a quantitative or qualitative bias, but offers a balanced representation of a range of analytical methodologies. Third, the empirical evidence and the study context provide a varied picture of global university-industry interactions, in Germany, Italy, Japan, Slovenia, Spain and other countries, and their importance in either a national or international setting. We hope that the chapters in this book will provide the reader with information on a selection of hot topics that expand both our understanding of and scope for management and policy action.

The book is organised in three parts, following the proposed pillars of university-industry interaction: people, tension and impact, although presented in reverse order for easier reading. The chapters in Part I discuss the effects of university interactions on science, industry and society. Part II describes the policy mix designed to promote university-industry knowledge transfer and trade-offs that universities make among short- and long-term relationships with industry and soft and hard technology transfer practices, and research flexibility or specialisation. Part III examines some unexplored individual aspects of university interactions: gender, youth and mobility.

Part I examines how university interactions affect science, industry and society and, particularly, the effect of corporate involvement on early scientific choices. In Chap. 2, entitled ‘PhDs with industry partners – assessing collaboration and topic distribution using a text mining methodology’, Kilian Buehling and Matthias Geissler discuss whether, in the case of collaborative research, PhD supervisors influence their students’ dissertation topics. The study examines whether there is a significant influence of industrial interests on researchers’ agendas. An original analysis of dissertation contents shows that topic choices remain fixed, regardless of collaborative status.

In Chap. 3, ‘The heterogeneous impact of academic patent characteristics on firms’ economic performance’, by Giovanni Cerulli, Giovanni Marin, Eleonora Pierucci and Bianca Maria Potì, the authors investigate how university technology contributes to increased financial returns for firms. They analyse firm patents with academic inventors, and the characteristics of these patents that contribute to firm financial success. Their analysis challenges the current view that radical and explorative academic patents are the most useful for companies and argue that, by distinguishing between short and long term value, incremental and exploitative academic patents can be also beneficial for firms.

In Chap. 4, ‘Rethinking the role of productive interactions in explaining SSH research societal impacts’, written by Paul Benneworth, Elena Castro-Martínez, Julia

Olmos-Peñuela and Reetta Muhonen, the authors show that societal benefits matter. They study multiple cases of social science and humanities research projects (music, philosophy, theatre) and their ‘productive interactions’ with the wider social systems. They identify the mechanisms that shape societal impact, by coupling user and researcher interests, evaluating their interactions and distinguishing value in useful knowledge practices.

Part II examines the different kinds of tensions that policymakers and organisations are required to manage in their interactions with industry. Chapter 5, by José Guimon and Caroline Paunov, is entitled ‘The policy mix to promote university-industry knowledge transfer’, and provides a comprehensive account of university-industry policies. The authors distinguish among the most frequent policy instruments according to such dimensions as the nature of the instrument, its target group and its implementation. They assess how different policy instruments interact when implemented as part of the same policy mix. Their analysis provides an original and useful framework for understanding the positive and negative interactions between different policy instruments.

Policies and their mix set the framework for the links established by universities with different partners. The aim is to establish and nurture long-lasting relations. However, this is not always straightforward. Tohru Yoshioka-Kobayashi and Makiko Takahashi in Chap. 6, ‘Determinants of contract renewals in university-industry contract research: going my way, or good Sam?’, investigate university-industry research collaborations from a longitudinal perspective. The chapter examines the prevalence of extensions to and renewals of research collaborations between industry and universities, and the factors influencing these decisions. The study uses data on the research contracts with firms, of a leading Japanese research university, over the period 2005–2014. Their findings show that research collaboration extensions and renewals are frequent phenomena. Their results show, also, that high scientific performance by the university partner, measured by paper publications and technological capability, is crucial for the firm’s decision to renew or extend the collaboration.

Technology Transfer Offices (TTOs) are a specific tool used by universities to foster interaction with industry. TTO managers implement a range of practices to achieve their goals. Mario Benassi, Matteo Landoni and Francesco Rentocchini discuss these practices in Chap. 7, ‘The relationship between university management practices and the growth of academic spin-offs’. They examine the impacts of different management practices put in place by universities to support the performance of academic spin-offs, including performance monitoring, target setting, incentive setting and people management. The study looks at the effects of these management practices on the growth of academic spin-off firms, using survey data on university management practices, and a longitudinal sample of 790 Italian university spin-offs (from 42 universities), observed over the period 2006–2014. The findings show that university management practices contribute to explaining the variation in the growth of academic spin-offs, but that the effects vary widely across management practices. The authors point out that these differentiated effects, which may be a result of adverse-selection, short-termism or weak enforceability, suggest

that universities need to give careful consideration to the management practices implemented by university managers, since they could have unintended consequences for the growth of academic spin-offs.

Public research organisations face similar challenges in their interactions with industry. However, they have idiosyncratic coping mechanisms, especially if they are large organisations with expertise in a range of scientific disciplines, spread across the whole national territory. In Chap. 8, ‘Public research organisations and technology transfer: flexibility, spatial organisation and specialisation of research units’, by Ugo Finardi, Isabella Bianco and Secondo Rolfo, the authors study the case of the CNR, the Italian National Research Council, to explore the interactions between its research groups and companies. They find that some characteristics of CNR facilitate the spatial, organisational and cognitive proximity of researchers and firms, and compare this situation to that of university-industry relationships in Italy.

The contributions in Part III address some of most topical person-specific conditions that affect university-industry interactions. The study of gender is peremptory given current efforts to reduce the marginalisation of women in science. Dolores Modic, Ana Hafner and Tamara Valič-Besednjak in Chap. 9, ‘Every woman is a vessel: an exploratory study of gender and academic entrepreneurship in a nascent technology transfer system’, contribute to research on the gender gap in science by examining the barriers to women scientists’ engagement in academic entrepreneurship. The study analyses internal barriers (e.g., work-family balance, risk-taking, experience) and external barriers (e.g., lack of presence, access to finance, peer effect) and contrasts the perspectives of researchers and TTO heads. The authors use a case-oriented approach combining interview analysis and fuzzy-set qualitative comparative analysis, in the context of an emerging university technology transfer system (i.e., Slovenia). They identify particular combinations of internal and external barriers as having a major influence on the gender gap in science. They suggest that internal barriers are perceived as more important than external barriers, by both groups of respondents, and explain the low levels of women scientists’ participation in academic entrepreneurship. However, TTOs and researchers disagree about specific barriers, which, the authors claim, could have a negative impact on the effectiveness of the mechanisms implemented to mitigate the gender gap in academia.

Another individual personal characteristic affecting university-industry interactions is age and the involvement of young scholars in the process. This involvement can take the form of a new business started by doctoral students. In Chap. 10, ‘The effects of the academic environment on PhD entrepreneurship: new insights from survey data’, Alessandro Muscio, Sotaro Shibayama and Laura Ramaciotti emphasise how their situational context conditions their choices. This chapter investigates attitudes to entrepreneurship and entrepreneurship behaviours among early stage researchers – that is, students enrolled in PhD programmes. It focuses on PhD students’ involvement in the formation of new business ventures and their attitudes to entrepreneurship, such as the intention to establish a start-up and abandonment of their entrepreneurial idea. Based on a large-scale survey, conducted in 2016, of Italian doctoral students enrolled in a PhD course between 2008 and 2014, the

authors examine the effect of the university's entrepreneurial environment on PhD students' entrepreneurship. They find that universities with policies supporting academic entrepreneurship, such as clear guidance for potential entrepreneurs and establishment of business incubators, are associated significantly with PhD students' attitudes and behaviours related to firm creation.

The final individual variable examined in this book is mobility. Chapter 11, 'International academic mobility and entrepreneurial opportunity identification: a resource-based view' by Kevin De Moortel, Thomas Crispeels, Jinyu Xie and Qiaosong Jing, contributes to filling a major gap in the literature on university-industry interactions. It provides a conceptualisation of the links to researcher mobility. To our knowledge, this is the first detailed theoretical analysis of this issue. The authors focus on temporary geographical mobility and one aspect of university-industry interactions, namely, opportunity identification. They argue that mobility favours the acquisition of external, heterogeneous knowledge, which is a precondition for the identification of entrepreneurial opportunities. They highlight that mobility generates larger social networks, which fuel knowledge acquisition and entrepreneurship, suggesting a double-effect of international academic mobility.

Some of the contributions in this book hint at multiple types of societal impacts, emerging from different scientific research fields. However, most chapters show that it is only under particular circumstances that certain policy combinations, long-term contractual relationships, management practices and organisational strategies are effective. This suggests that the positive impacts of university-industry interactions are coexisting alongside unresolved tensions and unfruitful endeavours. We hope that the chapters in this book and the messages they convey about the people-tension-impact approach, will inspire practical decisions and future research.