



No Strings Attached? Potential Effects of External Funding on Freedom of Research

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Abstract

Universities are increasingly pushed to apply for external funding for their research and incentivised for making an impact in the society surrounding them. The consequences of these third-mission activities for the degree of freedom of the research, the potential to make a substantial research contribution and the ethical challenges of this increased dependency on external funding are often neglected. The implications of external sponsorship of research depend on the level of influence of the sponsor in the various elements of the research. This paper provides a typology of sponsored innovation management research projects in order to create a common language between researchers and practitioners. Through in-depth analysis of nine innovation management research projects, carried out and funded in Northern Europe, and a rich set of qualitative data, the paper outlines the key dimensions of the projects where researchers and practitioners should agree on the degrees of freedom of the research project. It identifies three different methodological dimensions that can impact the likelihood of generating publishable results from the innovation management research. The three dimensions are *purpose* (e.g. formulating the topic of the research and the research question to pursue), *throughput* (the possibility of the researcher to decide on the way that the research question should be answered) and *output* (the expectations of the funding body on the results that should be generated from the innovation management research). The paper discusses the positive and negative impact of these types of projects and generates implications for the central stakeholders.

Keywords Externally funded research · Research degrees of freedom · Business ethics

Introduction

Universities are expected to create value in the surrounding society through the third mission (Quetglas and Grau 2002). Research should be responsive, not just to policymakers but also to other stakeholders, which increasingly perceive the universities as service-providing organisations (Broström et al. 2020). Whether the universities are publicly or privately owned, they are confronted with an intensified pressure in a more business-oriented environment (McKelvey and Holmén 2009).

With its proximity to real-life challenges in industry and dominance of concepts like open innovation (Perkmann and Walsh 2007) and open business models (Cesaroni

and Piccaluga 2016; Gassmann et al. 2010), the potential of innovation management research to help fulfil the third mission of universities is substantial (Penfield et al. 2014). Creation of a space within the university campus, which can serve as fertile ground for collaborative ventures between researchers and practitioners and, in turn, meet the increasingly complex expectations from the market, could be one of the roles of future universities. Hence, the research could (and perhaps should) be a case of utilising the two “traditional” missions of universities, research and teaching, to generate more or less direct positive impact on the surrounding society (Spaapen and van Drooge 2011). This reorientation of the universities towards a third mission is reflected in the discursive practices of the universities (della Volpe and Esposito 2020).

The increasing external funding may come with a price: The sponsors of research are often stakeholders with their own agenda and goals to pursue, and the engagement with external actors could lead to adverse consequences such as increased secrecy and neglect of fundamental scientific

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inquiry (Perkmann et al. 2021). In light of the pivotal role of companies in most innovation management research, one could expect a rich body of literature on not just the positive aspects of industry–university collaboration and externally funded research but also the potential ethical challenges and setbacks of close collaboration. The expectations of the funding body (whether a private company, an interest organisation or a public institution) about the research being funded are likely to have an impact on the degrees of freedom of the research. A critical perspective on the growing focus on the third mission would emphasise how the universities experience an increasing instrumentalism of the researchers to be servants of government and commerce (Ziman 2003). However, the literature exploring the darker sides of sponsored research seems relatively scarce. Martin Kenney's (1987) seminal article in the *Journal of Business Ethics* raised the fundamental question of whether the transformation of the university into a research institution for industry could have detrimental consequences for the research (quality). The fundamental logic of the industry is to seek profit while the universities should adhere to overall ethical principles of creating public goods in terms of contribution to knowledge and betterment of all citizens (Kenney 1987). More than three decades later, this crucial question does not seem to have spurred an overall discussion of the ethical considerations of sponsored research.

This paper addresses the need to develop an understanding that can inform researchers, practitioners, decision makers, etc., about the nature of the innovation management research and the methodological decisions within the externally funded research. In turn, this can help align the expectations that these actors could have for the research. The close collaboration between universities and researchers evidently holds some ethical implications in terms of impartiality of the research. If the industry sponsors have a direct impact on the results that are generated from the research (or if the sponsors manipulate or “cherry-pick” in the reported findings from the research), then the collaboration has negative impact on the research. Similarly, engagement with industry could have a negative impact on the possibilities to disclose (less opportune) results from the research project (Czarnitzki et al. 2015). Furthermore, influence from the sponsors can come in the form of less direct influence on the outcome of the research. The funding organisation can potentially influence other elements of the research in terms of the overall topic that is scrutinised, the particular aspects that are explored within the research project, the method and methodology employed during the research project and other key aspects of the project.

The paper will explore the impact of externally funded research projects on the research design and methodology of the research. Hence, while the paper does acknowledge that research sponsors can have a direct impact on the (reporting

of the) results from the research, the paper also seeks to understand the more indirect impact on the research in terms of formulation of research question, access to data sources and data analysis.

The aim is to create a generic typology that could help both researchers and practitioners to have an informed discussion and a solid basis for common understanding of what can be expected from externally funded research projects at the university. The institutional context within which this study is carried out is research projects within Northern European, publicly funded universities. The institutional context could play a role in understanding the individual research project. Prior studies (Berbegal-Mirabent et al. 2015; Siegel et al. 2003) have established that private universities tend to be more active and efficient in technology transfer and commercialisation initiatives than public universities. Additionally, the scientific field (medicine, engineering, arts, etc.) could have an impact on the influence of the sponsor on the research that is carried out (Freel et al. 2019). Nevertheless, the unit of analysis of the paper is the *research project*. The ambition is to develop a typology of externally funded research projects in terms of the degrees of freedom of the researcher to design the research, and will stress the ethical aspects of carrying out research within the boundaries of sponsored research.

Ethical Perspectives on the Third Mission

This section will outline overall streams of literature on the third mission of universities, the particular context of innovation management research projects, the potential impact on the freedom of research and the ethical dimensions of these lines of research.

The Third Mission of the University

There is a growing interest in how universities can generate value within the society beyond the long-term value that the teaching and research activities generate. Hence, these two missions should be supplemented by a third mission of seeking to ensure that universities create short-term value through engagement with the surrounding society (Perkmann et al. 2021). This perspective on the value generation potential of the activities carried out at the universities has been labelled *valorisation of the scientific knowledge* (Benneworth and Jongbloed 2010).

Industrial collaboration in innovation management research comes in many shapes and sizes. A seminal article by Louis et al. (1989) outlines five types of academic entrepreneurship: (1) engaging in large-scale science (externally funded research), (2) researchers earning supplemental income, (3) gaining industry support for university research,

(4) obtaining patents or generating trade secrets and (5) commercialisation through forming or holding equity in private companies based on a faculty member's own research. These five types of academic entrepreneurship indicate the wide range of different industry collaborations in which the researchers can engage (Philpott et al. 2011). The more formal collaborations that are resulting in, for instance, patents are often the empirical setting of examination (e.g. Petruzzelli 2011), while more informal collaboration like researchers earning supplemental income from engagement with industry is rarely scrutinised.

The manifestations of the wider societal engagement for the *individual* researcher are diverse and cover a broad range of activities. These can include researchers' participation in councils and committees, boards, radio programmes, Q&A's amongst policymakers, writing newspaper articles, writing publications with industrial co-authors and filing for patents for inventions (Kitagawa et al. 2016; Louis et al. 1989; Mejlgaard and Ryan 2017). Indicators of the third mission can in some cases be both ambiguous and conflicting: for instance, community groups and policymakers on one hand and the technology transfer offices at the universities on the other might have different and somewhat conflicting perceptions of how the third mission should be implemented and measured (Molas-Gallart and Castro-Martinez 2007).

On an *institutional* level, recent literature illustrates how the third mission of universities is not a monolithic phenomenon. Knudsen et al. (2019) outline six models of third missions amongst universities. (1) The Stanford Model seeks to capitalise on the university research by selling patents, (2) the Laboratory Model provides companies with access to the research equipment, (3) the Knowledge-Spill-Over/Collaboration Model is based on consultancy of the researchers towards the companies, (4) the Spin-Out Model is rooted in the creation of value in society through generation of commercial start-ups amongst researchers, (5) the Incubator Model is founded on the internally grown and hosted start-ups and spin-outs, and, finally, (6) the Ecosystem Model focuses on the ability of the university to bring together a broader set of commercial and non-commercial organisations in order to create value in a concerted manner.

An essential part of the Ecosystem Model in particular is the interaction between researchers and practitioners in specific innovation management projects. A definitional characteristic of the term *innovation* is that the process results in a concrete outcome: The activity generates commercial outcome (van de Ven 1986). Moreover, these characteristics can potentially be mirrored in the expectations that the companies or decision makers surrounding the universities have about the innovation management research (Unger et al. 2020): It is also not sufficient that innovation management research lead to publishable results. If the research merely leads to insights from the academic standpoint but has

limited value for the participating practitioners, some of the key actors within the innovation management research might be disappointed and would be reluctant to engage in future research activities. The essence of the role of research in contributing to the innovativeness of the society has spurred a comprehensive debate on the potential trade-off between the rigour and the relevance of the research (Degl'Innocenti et al. 2019).

The Concrete Manifestations of the Third Mission

The third mission is expressed in various ways depending on the institutional and national context in which the universities are embedded.

- (1) *The institutional level*: The mere fact that a university is privately owned is likely to impact the understanding of the third mission (Siegel et al. 2003). Private universities are largely funded directly by students' tuition and other direct infusion of means from private actors (Baglieri et al. 2018; Berbegal-Mirabent et al. 2015). Public universities are more diverse: some universities are aimed at basic research, while others are more applied, and many are a combination hereof (Schnurbus and Edvardsson 2020). In addition, on a university level the third mission can materialise in at least six models (Knudsen et al. 2019), which are founded on different means like company spin-outs, consultancy, business incubation, ecosystem initiation, etc.
- (2) *The project level*: This level is aimed at the specific and time-constrained collaboration between the university and the companies. These research projects, which are often formed as innovation (management) projects with the aim to develop specific products or broader solutions, can be funded directly by the private company or by a private or public research fund (Knudsen et al. 2019).
- (3) *The individual level*: The individual researcher or scientist also plays a pivotal role in the concretisation of the third mission (Mejlgaard and Ryan 2017). The personal characteristics, attitudes and strategies of the researchers towards the outreach activities are likely to impact the level of specific impact that the research can make in the surrounding society (Callaert et al. 2015; Pianezzi et al. 2019).

Although all three levels are relevant for a complete understanding of the third mission of universities, this paper focuses on the project level since this is where the third mission materialises—and hence where the potential positive and negative (ethical) impact is most readily observable.

The wide variety of manifestations of the third mission leads to challenges in the measurement of the extent to

which researchers are collaborating with external partners. Nevertheless, prior research seems to understand industrial collaboration from a “binary perspective”: the research institution or the individual researcher either has collaboration with the industry or not. This dichotomous perspective is most likely a consequence of the quantitative research designs that are predominant within the research area. This approach does not leave much room for the nuances of industrial collaboration: When a researcher is once categorised as someone who is engaged in a research project with industry, the register- or survey-based data rarely hold the potential of understanding the actual nature of the research project. Some research projects with industry are marked by comprehensive (methodological) degrees of freedom to collect data and to design experiments/interventions, while others are more limited in this sense.

The Impact of Externally Funded Research Projects

A pivotal question on university outreach is whether the industrially oriented research has an impact on the quality of the research (Behrens and Gray 2001). The underlying concern is that the orientation towards practitioners could jeopardise the methodological rigour that is a prerequisite of high-quality research (Baldini 2008; Jain et al. 2009). For instance, the dependency on external funding might lead the funding organisation to expect that having “recruited” a leading researcher within a particular field would guarantee the overall success of the project. And this might conflict with the requirement of a high-ranked journal in terms of arm’s-length distance towards the studied phenomenon (Larsen 2011).

In terms of risk of a crowding-out effect between industry-oriented projects and research activities (Baldini 2008), some studies hypothesise that academic ambitions in terms of publishing might be a hindrance to industrial collaboration (Arvanitis et al. 2008). The underlying concern is that a high level of industry involvement in a research project tends to focus on firm-specific technical problems or develop narrowly applicable prototypes rather than having the overall aim of contributing to the collective body of academic knowledge within a research field (Lee and Miozzo 2015). On the other hand, involvement of industry could ensure that the generated findings are relevant to the practitioners and, hence, bring content to the “managerial implications” section of the article. In their analysis of a sample of Norwegian researchers, Gulbrandsen and Smeby (2005) illustrate that the positive vector seems to be the strongest: Researchers with a high level of industry funding report a higher number of publications than their peers with a low level of industry funding. The analysis is based on the researchers’ own reporting of their industry collaboration, and the external funding is measured as a binary variable

(whether or not the researcher has received external funding during the last five years). The scientific performance is measured as a count of academic publications (journal articles, book chapters, books, reports, etc.) and does not differentiate between the quality of the journal outlets. Similarly, Boardman and Ponomarev (2009) identify positive synergies between interactions with industry and subscription to scientific norms amongst tenured and tenure-track scientists in the US. A recent study on university level (as opposed to the level of the individual researcher) presents a somewhat complex relationship between university–industry income (an indicator of the third mission) and research performance (Degl’Innocenti et al. 2019). An increase of efficiency in terms of university–industry engagement can positively enhance the research quality, but the relationship is highly non-linear and depends on, for instance, the age of the university. Callaert et al. (2015) illustrate that the cross-fertilisation between externally funded research activities and scientific quality depends on the individual strategies of the researchers.

Prior literature has neglected the extent to which the industrial collaboration influences the methodological degrees of freedom for the researcher to design the research. Hence, it might be a methodological issue when a research project with an industrial partner is formulated in a manner that does not leave the researcher with the necessary degrees of freedom to design the research so that it complies with the requirements of, for instance, top-ranked journals. This paper seeks to explore this neglected part of the story.

Ethical Concerns in Externally Funded Research Projects

The ethical aspects of externally funded research endeavours are often discussed when the funding organisation is directly promoting particular results from the research or prohibiting disadvantageous findings to be published. Prominent examples derive from pharmaceutical research where a drug proved to have inadequate effect or even to harm the patients (Olivieri 2003). Other examples are contracts with industry that allow companies to delete information or delay publications of results (Blumenthal et al. 1997).

In addition to the direct interference of the funding organisation on the findings from the research (and the publication hereof), prior studies have discussed the two sets of ethics amongst industrial actors and academics. Kenney (1987) describes how the ethical standards by which industry is (and must be) measured are very different from those applied to the university, and that in order not to harm the university, agreements between industry and universities should take this into account.

While the direct influence on research results represent a relatively simple answer to questions about ethical standards

(*Did the funding body promote or hinder particular results from the research (to be published)?*), other studies seek to explore the potentially more difficult questions of interactions between the funding organisation and the researchers. Scott (2003) describes two modes of collaboration. Mode 1 is marked by a clear demarcation between the researcher and the funding organisation: the science is rooted in the conceptual and methodological creativity of researchers, and it is up to the researchers alone to define good science. Conversely, mode 2 is defined by co-creation of meaning between the sponsor and the researcher (Oliver et al. 2019); the generated insights are highly context-specific and the results from the research are only meaningful to the extent that they are implementable in the reality of the sponsor.

The prior literature hints that the ethical challenges of externally funded research are often not merely a question of whether the funding organisation has the final say over the findings generated by the research. The key principle in the idea about the third mission is that the research should make more or less immediate sense to the organisation that funds the research (Pianezzi et al. 2019). In order to ensure this sense-making amongst the practitioners, the funding organisation could potentially be involved in a broader set of activities in the research process (and not just in the final stages of generating and publishing results).

The ethical aspects of externally funded research can be sorted into various categories depending on the level of analysis. As outlined above, the third mission can be understood on at least three levels, and all levels hold evident ethical considerations. A university that is explicitly funded by the government to inform and support policymakers is likely to be confronted with some ethical considerations if the research results point in a direction that is counter to the political tide. Universities in Scandinavia often have such policy support functions, called “authority service” (in Danish *myndighedsbetjening*), in addition to their “normal” research mission (Schnurbus and Edvardsson 2020). Similarly, many countries have both public and private universities (de la Torre et al. 2018) and the overall business model of a university (Baglieri et al. 2018) potentially has an impact on both the research carried out at the university and the ethical dimensions of the research. The expectations of the private or public sponsor of the research are likely to have a certain role to play for not only the research topics but also how the research is carried out and potentially how the results are articulated. Furthermore, ethical concerns on individual level are embedded in sponsored research (Schaller-Demers 2015). Doing excellent, rigorous research from academic standards is not necessarily the same as creating interesting, relevant research from a practitioner perspective (Guenther 2019).

While both the contextual/institutional and individual aspects of sponsored research are evidently important, the

present paper seeks to understand the ethical aspects of externally funded research on a project level. Whether the university is public or private, whether it has a specific third-mission orientation and whether the individual researchers each have their ethical concerns, the actual research project is where the research materialises—and where the specific involvement of the funding organisation is concretised (Unger et al. 2020).

The following section describes the methodology employed to enhance the understanding of the various (ethical) aspects of externally sponsored research projects.

Methodology and Data

This section describes the methodology and data that form the basis of the paper.

Case Selection

To shed light on the research question of the paper, a variety of innovation management projects were selected for further analysis. The selection of cases was based on analytical sampling rather than representivity of the cases. All nine cases are categorised as innovation management research initiatives and all cases are founded on some level of external funding from external partners. All nine research projects are carried out in Northern Europe: ProgressinDEMAND is based on a collaboration between organisations in the Nordic countries and the Baltic States, the Female Entrepreneurship project was funded by the Norwegian Innovation Fund, and the rest of the projects were carried out in Denmark. The researchers involved in the projects were all employed in public universities.

While external funding is a common denominator of the selected case studies, there are significant differences between the projects. Thus, the role of the funding body in terms of the methodological elements of the projects, the role of the innovation management researcher, etc., differ amongst the nine cases. The common denominator (the innovation management research focus) together with the differences between the projects makes the case selection suitable for exploring the aim of the paper.

The nine cases are presented in Table 1.

Data Collection

The empirical basis of this paper consists of a combination of interviews, project material and observations from the case studies. A total of 120 in-depth qualitative interviews were carried out amongst the 9 projects. Depending on the nature of the projects, these interviews were carried out with the involved researchers, the participating companies

Table 1 Overview of the selected case studies

	UseBox	Intelligent Utility	Future Food Innovation	MidtVind	DigiB2B	ProgressinDE-MAND	Intelligent Transportation Box	Regional health innovation ecosystem	Female entrepreneurship
Project aim	Test and development of a specific user-driven innovation method	Development of an inter-organisational network within smart energy use	Enhancing innovation within the food industry in the Central Region of Denmark	Enhancing collaboration between the actors within the subcontractors in a Danish region	Developing a tool for digitalisation of Danish small and medium-sized business-to-business enterprises	Enhance the demand for knowledge collaboration amongst Small and Medium-sized Enterprises	Development of an intelligent transportation box for blood samples	Creating an overview of a regional ecosystem within health care	Explore the existing body of research within female entrepreneurship
Source of funding of the project	National, public Danish research funding	National, public Danish research funding	EU funding and Danish regional funding	EU funding from participating companies	Funding from the Danish Industry Foundation	Association of Nordic Engineers	National, public Danish research funding	Funding from a Danish region	Norwegian Innovation Fond
Defined researcher role	Experts in the particular user-driven innovation method	Observer of the development of the network and continuous input on how to progress	Accompanying research with focus on selected case studies	Accompanying research with focus on the development within the subcontractor network	Accompanying research and action research within the selected case studies	Develop recommendations on policy level for enhancing the knowledge collaboration	Exploring the potential underlying business model of the developed solution	Proven record of carrying out network visualisation and analysis	Literature review of the existing body of literature
Data sources	Interviews Application documents Observations and field notes	Interviews Application documents Observations and field notes	Interviews Application documents Observations and field notes	Interviews and observations Application documents Observations and field notes	Interviews and observations from the companies Application documents	Interviews with programme managers Application documents	Interviews with project participants Application documents Observations and field notes	Qualitative interviews with stakeholders Survey of total population of stakeholders within region	Interviews Workshops Academic databases
Practitioner-oriented outcomes	A guide book on implementation of the user involvement method	Presentation made for the management board on how to embrace inter-organisational collaboration	Report to programme managers on process support for funded projects	Presentation and report for programme managers on the results of the programme	Articles for practitioner-oriented outlets Sparring for the involved companies on how to digitalise their business	Comprehensive report for policy and decision makers Condensed version of the recommendations in a two-pager format	Presentation of an analysis of potential business models for the solution	Written report and presentation of results for the top-level management of the region	Written report and presentations for the key stakeholders and policymakers

Table 1 (continued)

	UseBox	Intelligent Utility	Future Food Innovation	MidtVind	DigiB2B	ProgressinDE-MAND	Intelligent Transportation Box	Regional health innovation ecosystem	Female entrepreneurship
Academic outcomes	Conference papers Journal article (level 4)*	Conference papers Journal articles (level 2)*	Conference paper	Conference paper Journal article (level 3)*	Conference paper	Conference paper Journal article (level 2)*	A conceptual conference paper (not based on empirical findings)	Conference paper on the basis of the generated data	Conference paper (requirement from the funding body)

*Rating on the Academic Journal Guide (ABS 2015)

and the project or programme managers who were heading the initiatives. The interviews covered a wide range of topics, including the interviewee's perspective on the project, perception of his or her own role within the project, understanding of the degrees of freedom to formulate research questions, potential limitations to the exploration of these research questions and other aspects relevant to the methodology of the innovation management research.

In addition, the analysis is based on the application material of the projects and programmes. All nine innovation management projects were funded from national and/or regional public funding and/or private foundations and went through various applications procedures, where the applicant sent in written material containing, for instance, aim of the project, milestones, activities and methods. As part of this, the roles of the researchers, the methodology, expected outcomes from the research, etc., were described.

Finally, for some of the nine research projects, the analysis builds on observations made and documented by the involved researchers. These observations were made during workshops, project meetings, etc., and were documented through field notes and observation protocols (Creswell 2006).

Data Analysis

The extensive data material, which consisted of transcribed interview data, observations from meetings, application material and archival data, was analysed through an inductive, interpretive methodology (Corley and Gioia 2004). The goals of the methodology were to transform the data into a manageable number of variables or themes and to identify potential causal connections between these variables (Noble and Kumar 2010). This methodology encompasses two elements:

- (1) The inductive approach is materialised through an open coding of the collected data that addresses the topic of the paper. Hence, the initial data analysis was not aimed at testing an established theoretical framework on university–industry collaboration but rather at obtaining a more comprehensive understanding of (unforeseen) aspects of the topic.
- (2) The interpretive research element seeks to build an emergent theory from a perspective that addresses the interpretations of the participants (Corley and Gioia 2004).

Thus, the paper adheres to the observation made by Aaboén et al. (2012) that multiple case designs require some sort of pre-structured frameworks to enable case comparison. While the data analysis should give leeway for the rich

details of the qualitative interviews, it should also be guided by the thematic limitation of the paper.

The paper employs a systematic procedure for data analysis (Kumar and Noble 2016). The data analysis is based firstly on inductive elements where the parts of the data material that are aimed at the relations between the funding body and the researcher, and the use of data in this context, are coded. Following the guidelines for inductive research, this part of the process is kept as descriptive as possible (Hargadon and Sutton 1997). The analysis is carried out by searching for pieces of data where, for instance, an interview describes how the funding organisation has been involved during the various phases of the research process. The coding was aimed at both active involvement (descriptions of the funding organisation as (co-)developer of the research aim, collection of data, etc.) and more “passive” actions (descriptions of processes where the funding organisation refrained from engagement).

Secondly, the various coded pieces of material are clustered together on the basis of axial coding into higher-order themes so that each represents perspectives on the role of the researcher, the role of the funding body, methodological considerations, limitations amongst the researchers, etc.

Finally, these themes are gathered into several overarching dimensions that can be linked to the constructs of the theoretical framework: the perspective on the role of the external funding on the degree of freedom of the researcher. An excerpt of the coding is illustrated in Table 2.

A Taxonomy of Innovation Management Research Projects

The nine case studies have illustrated three overall dimensions that can be influenced by the industry collaboration. The data analysis identifies these three dimensions as pivotal in terms of defining the conditions under which the researcher can pinpoint and design her research—and to what extent the funding organisation can influence this degree of freedom. Figure 1 presents these dimensions.

Purpose Definition

The first dimension, the purpose definition, is aimed at whether the researcher has the discretion to formulate the overall aim of the research. If the researcher has extensive liberty to formulate a purpose or a research question on the basis of an identified gap within existing literature without influence from the funding body, then this represents one end of the continuum. This was the case in the UseBox project where the researcher was given the freedom to formulate a research question within the existing literature on

user innovation and, hence, set the scene for an academic contribution.

Conversely, in the MidtVind project, the association that funded the research narrowly defined the research topic: The research should shed light on the development of ties between the subcontractors within the wind industry in a particular Danish region.

Throughput Management

The throughput dimension considers the possibility of the researcher to decide how to shed light on the research question. In some cases, the researcher is given absolute freedom to decide the methodology on how he or she wishes to analyse the research question. This case, which represents one end of the continuum, was true in the project on the regional ecosystem within healthcare innovation. The researchers chose to use a snowballing approach to uncover the total population of the ecosystem and this methodological choice was completely up to the researchers (as long as the choice was able to shed light on the aim of the project). The researchers were able to address a gap in the existing literature and pursue an ambition of making an actual research contribution while at the same time meeting the requirements of the project management.

On the other end of the throughput management continuum, the Future Food Innovation project was marked by relatively strict limitations set out by the funding body in terms of the number of interviews with cases, the participation in workshops, etc., that should be part of the analysis of the project.

Outcome Expectations

The outcome expectations are aimed at what the funding body expects. In some cases, the funding body formulates expectations about academic outputs. This was the case with the project on female entrepreneurs. Here, the funding body (the Norwegian government’s office for innovation) explicitly defined the requirement that the systematic literature review should result in “a publishable paper”. The funding body stressed the importance of rigour in the research, which would make the outcome of the project acceptable to the scientific community and, hence, they “outsourced” the assessment of the quality of the collaborative research project to peer researchers within academia.

On the other hand, some projects are marked by expectations about more popular presentations of the research that is carried out. These can be in the form of policy or market reports. Similarly, some projects require clear implications for the practitioners. This was the case for the project on the Intelligent Transportation Box. Here, the project description stated clearly that the expected outcome of the researchers’

Table 2 Coding procedure (excerpt)

Case source	Quote	Open codes	Axial codes	Overarching dimension
Future Food Innovation	“It was up to us—they [the programme managers] just said: ‘You [the researchers] are the experts. You will probably be able to find something that is worth exploring and write interesting things about [it]’” (Researcher 1)	Interesting things to research	Open research question formulation	Purpose definition
MidtVind	“Well, the boundaries were defined. We knew what you should explore—whether the project spurred innovation” (Programme manager)	Defined boundaries	Narrowly defined scoping of the research	
Intelligent Transportation Box	“Your task was to explore whether there was a market for this [the box]. And this was basically why you were in the project” (CEO and project owner)	Market analysis		
UseBox	“We granted you this amount because we were convinced that you would know how to identify these particular user profiles. It was a matter of trust” (Project manager)	Trust in method	Discretion of the researcher	Throughput management
Mapping of healthcare ecosystem	“We strongly believed that you [the researchers] will be the best at defining the best method to uncover this ecosystem” (Programme manager)	Method definition		
Female entrepreneurs	“The research should be based on a literature review and interviews with a list of experts within the field” (Application definition document)	Literature review	Fixed procedure	

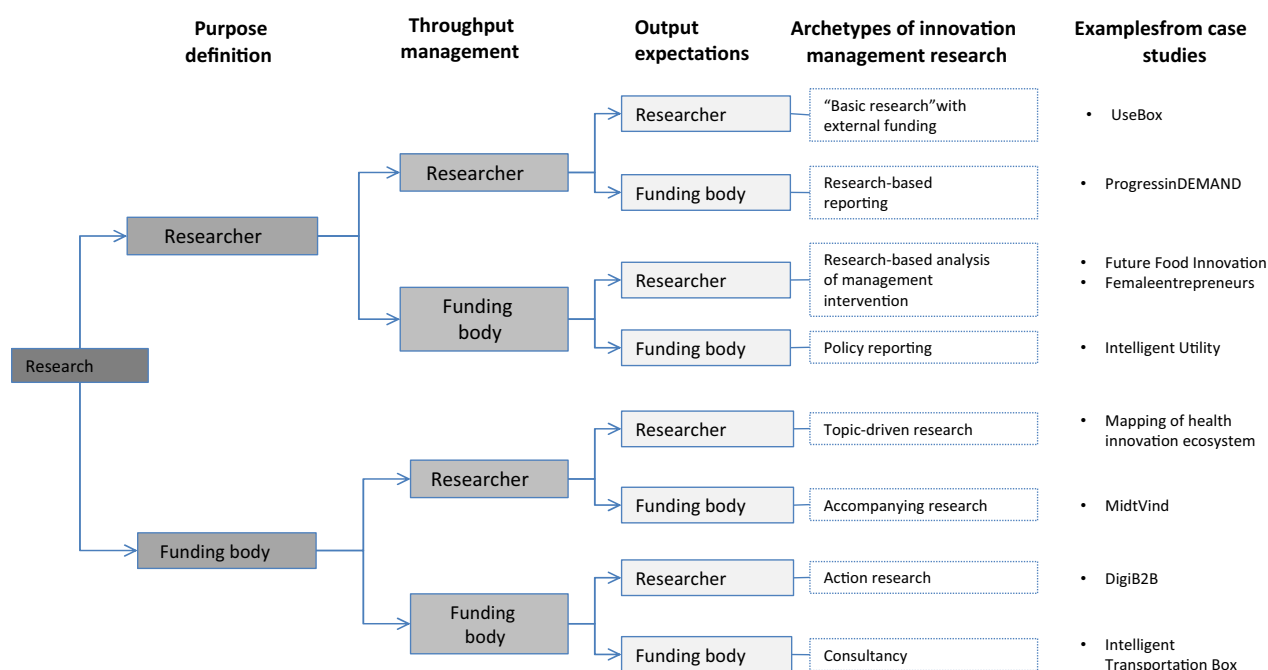


Fig. 1 A typology of the industry-funded research projects

activities was an indication of the most expedient market entrance approach for the developed concept. The allocated resources for generating research-based findings were limited.

Discussion and Conclusion

Universities are increasingly operating in a market-based, competitive reality (Broström et al. 2020) and the fundamental idea behind the third mission of universities is to enhance the relevance of research while maintaining scientific rigour (Perkmann et al. 2021). Innovation management research is an obvious arena for the exercise of the third mission of the universities: The potential of bringing together the three sides of the story of research, teaching and industry value (Etzkowitz and Zhou 2018) seems considerable since innovation management touches upon issues that are inherently close to the challenges confronting businesses. At the same time, the intrinsic business relevance of innovation management research makes it an evident area for industrial (co-)funding. However, the analysis presented in this paper illustrates that, firstly, industrial collaboration is not a simple binary variable (Gulbrandsen and Smeby 2005). A large portion of prior literature has treated industry involvement as a simple yes/no manner (Lee and Miozzo 2015). Fig. 1 illustrates that collaborative, co-funded innovation management research represents various degrees of limitations from a methodological standpoint. These variations

are a natural consequence of the nuances of how the third mission at universities materialise. The resulting archetypes of innovation management research projects cover a wide range, from “basic research” projects where the external funding is principally arms’ length and where the researcher has a maximum degree of freedom to define and design the research that she wants to do—to a consultancy-like innovation management research project where the external funding fundamentally specifies all key aspects of the research.

A consequence of the typology presented in Fig. 1 is that some methodological limitations could jeopardise the possibilities of generating research of the highest possible standards and, hence, contribute to the collective body of knowledge within a research field (Lee and Miozzo 2015). Surprisingly little research has addressed the inherent research ethical challenges of externally funded research since the seminal paper by Kenney (1987). Quality from an innovation management perspective might not be (and is often not) the same as quality from a practitioner perspective. A concrete example of this discrepancy between the two versions of quality is found in the UseBox project. This research was aimed at identifying particularly innovative students amongst a small sample of Danish elementary schools. In order to identify these innovative students, all children were asked to fill in a survey. The practitioners in the project suggested using the digital (and free) solutions available online. However, the researchers involved in the project foresaw methodological concerns by future journal reviewers if the students filled in the survey online: Some

of the questions could be answered easily with an online search engine; hence, the answers by the students would not reveal their actual skills but rather their online search abilities. From a managerial perspective, this risk of “contamination” of the results was acceptable, while from a research perspective the risk could undermine the overall findings of the study. The innovation management research project was structured in a manner that actually allowed the researchers to decide on all pivotal methodological aspects of the research, and this right to decide was pivotal to subsequently publish the findings in a high-ranked journal (based on a journal ranking system like ABS (2015)). However, the practitioners found the data collection unnecessarily complicated and time-consuming.

At the other end of the continuum, the Intelligent Transportation Box project was marked by substantial limitations on the methodological approach by the researcher. The researchers envisaged that they would develop a range of different business models that the company behind the Intelligent Transportation Box could test when launching the concept. This was a topic that was identified as a gap in existing literature. However, this research-based topic was not in line with the anticipated challenges by the funding body and the participating companies: They found a need for a “simple” market analysis more pressing. Hence, the researcher ended up by carrying out an analysis with very limited research potential.

From a publication perspective, some of the research projects outlined in Fig. 1 hold the challenge of research interventions. For instance in the DigiB2B, the funding body expects some level of involvement from the researchers in terms of guiding the case companies and their development of a digital strategy. Some high-ranked journals would find this involvement from the researchers problematic in terms of documenting a development within

the companies. Hence, elements of action research may not be received positively by leading innovation management research outlets that tend to prioritise research on the basis of arm’s-length distance between the studied phenomenon and the researcher (Goduscheit et al. 2008; Pettigrew 2003).

All projects described in Fig. 1 fall into the category of industry-funded innovation management research. However, the substantial difference between the UseBox and the Intelligent Transportation Box projects illustrates that the term “industry-funded research” covers a wide variety—including varying methodological issues.

The case studies illustrate that the value of the involvement of the research sponsor input can be both beneficial and detrimental to the externally funded innovation research project. Table 3 outlines some of the positives and negatives of the three overall phases.

As illustrated in Table 3, the common denominator of the potential negative impact of an active involvement of the research sponsor is the focus on immediate, short-term perspectives of the research. This focus might jeopardise the larger perspective of the research in terms of making a substantial contribution to the existing body of knowledge within a given field. An illustrative example can be derived from the Intelligent Transportation Box project where the research goal was aimed at understanding and developing business models in relation to the blood sample transportation ecosystem but where the CEO of one of the participating companies pushed for the researchers to take part in the marketing activities. Similarly, the Intelligent Utility project, which was founded on a research interest in inter-organisational collaboration within remote monitoring of smart meters, was marked by a constant push by research sponsor to present managerial implications from the project before the research could substantiate these findings.

Table 3 Positive and negative aspects of external funding during the project phases

		Value of research sponsor input	
		Positives	Negatives
Phase of the innovation management project	Purpose definition	<ul style="list-style-type: none"> – Ensure real-life perspectives and relevance of research – Address grand challenges rather than minor incremental issues and self-referral research 	<ul style="list-style-type: none"> – Focus on short-term usefulness of the research – Driven by myopic commercial concerns
	Throughput management	<ul style="list-style-type: none"> – Contribute to identify relevant settings for data collection – Identify testbeds for research experiments 	<ul style="list-style-type: none"> – Obstruct access to relevant informants – Lack of willingness to fund activities that are not perceived as core by the sponsor
	Output expectations	<ul style="list-style-type: none"> – Disseminate findings to a broader audience – Testing the usefulness and feasibility of the results 	<ul style="list-style-type: none"> – Actively opposing findings – Seeking to close down public insight in case of unfortunate results

On the other hand, several of the case studies illustrate how the active involvement of the sponsor has led to positive results on the research. Throughout all the three phases of the ProgressinDEMAND project, the funding organisation was pushing for the researchers to contribute to an enhanced understanding of the “bigger picture”. From its outset, the researchers involved in the project perceived it as a way to collect and analyse the propensity of Small and Medium-sized Enterprises (SMEs) to collaborate with universities and knowledge institutions. The research sponsor, the Nordic Association of Engineers, however, sought to engage the researchers in contributing to the grand challenge of a better matchmaking between SMEs and universities/knowledge institutions. The more normative aspect of the project was pushing the researchers to reflect on causality rather than “just” correlation of the results, which in turn created not merely a better dissemination of the project findings but also a higher quality of the academic papers, which were reported from the project. In that respect, the industrial involvement pushed the researchers to pursue a mission which was closer to the public good ethics of the university (Kenney 1987).

Implications for Research and Practitioners, Limitations and Further Research

Externally funded research is attractive for a number of reasons. An evident reason is the financial aspect: In times of austerity and limited resource allocation from traditional research (for instance through money from the government on publication in journals) and teaching activities (a monetary incentive to bring students to pass the exams), direct funding from industry and other external stakeholders for applied research activities is appealing. An indication of the essence of external funding is the fact that recent literature discusses the “business model” of university technology transfer offices (Baglieri et al. 2018). From a more principal reasoning, external funding is also a sign of relevance of the research being carried out at the university. Hence, companies and other funding bodies would not be interested in supporting research that does not have some level of interest for these practitioners. Universities should be perceived as providers of a public good that should be understood not merely in terms of quantity and excellence but also in terms of relevance and social significance (Unger et al. 2020). The emphasis of the third mission of universities has been an essential element in challenging the non-productive discussion of whether the universities are (and should be) instrumental or non-instrumental to the remaining society (Basu et al. 2017). As illustrated throughout the paper (and condensed in Table 3), the third mission holds a potential in its immanent reciprocity. A positive externality of the responsiveness to a funding body (public or private)

can be a commitment to answer more difficult questions of relevance, which in turn can enhance both the quality and relevance of the research project.

This paper illustrates that from a research perspective, sometimes external funding comes at a high price. All sponsored research has the inherent challenge of arm’s-length distance between the funding body and the researcher. The integrity of the researcher in terms of publishing the findings from the research needs to be guarded (Cossette 2004). Nevertheless, the typology presented in the paper illustrates that other central parts of the research can be affected by the funding organisation. Often, the influence of the sponsor of, e.g., the research question guiding the study and the methodology employed in the research represent a less direct, but potentially substantial, effect on the results that are generated from the research. The recent research stream on the nuances of the third mission tends to accentuate the need for an understanding of the impact of sponsored research projects on the entirety of the research process (Knudsen et al. 2019). On one hand, the evaluation of the influence of the sponsor in the Stanford Model is often relatively simple to make: If the (industrial) research sponsor has funded the invention, which is patented (and subsequently sold), the sponsor’s influence is reflected in the valorisation of the research output. This would also often be the case for the Laboratory Model and the Spin-out Model (Berbegal-Mirabent et al. 2015). On the other hand, the intense interaction and reciprocity of the research activities in the Ecosystem Model challenges the possibilities to tangibly measure the influence of the sponsor. This paper is an attempt to contribute to the understanding of the complexity of such ecosystems, interactive modes of the third mission.

Furthermore, externally funded projects are not necessarily a shortcut to high-ranked publications. Researchers are constantly taking part in a “status competition” with their peers, based on their publication records (Bruneel et al. 2010). Regardless of which career stage a researcher is on, he or she should be aware of a potential flipside to the coin when entering into an externally funded project. These industry-oriented research projects and their various levels of limitations of research methodology often represent both direct and indirect negative implications for the researcher: Direct negative impact since, e.g., involvement in a case study could “pollute” the data that can be generated from the research (e.g. because the managers start to act in a different way than they otherwise would have done). And indirect negative impact because of the opportunity cost: working with projects with intense involvement in companies is often time-consuming and crowds out the activities that the researcher could have alternatively carried out. In order to be successful in combining the third mission’s ideal about making immediate impact on the surrounding society and at the same time creating insights that comply with the

highest research standards, the researcher needs to have a clearly defined strategic approach to the projects, in which he or she engages (Callaert et al. 2015).

The paper raises some questions about the ethical aspects of sponsored research. Prior research has flagged the essence of the fact that universities insist that there should be no restriction on the freedom of inquiry of their academics, or their freedom to discuss their work (Evans and Packham 2003). While the current paper does not question the pivotal role of freedom of research, the analysis illustrates that in research projects the freedom of research comes in many sizes and implies a substantial number of decisions for the researcher in terms of acceptance of influence from the funding organisation. Hopefully, the presented typology of industry-funded projects can represent a central step in helping both researchers and industry to clarify what can be expected of the research carried out in the project.

Consequently, this paper has implications for both the individual researcher and the individual funding organisation—and the university as a whole.

It is essential that both sides of the collaboration are aware of and explicit about the expectations for the innovation management research project. Lack of clarity in communication about the expectations regarding purpose, throughput and output from the project will most likely be harmful for the project. None of the sides should try to “oversell” the research results in order to make the project attractive. Moreover, in some cases it would be expedient to drop a collaborative research project if the chances of meeting the expectations of any of the sides are too slim.

On the university level, decision makers should be aware of the potential setbacks of engaging in industry-funded research. While the externally funded research might be attractive to the university from a financial standpoint, getting involved as a pre-tenure researcher might have direct and indirect costs that could crowd out research activities that would lead more directly to the A-journal publications that are expected from a future assessment board. These concerns should be incorporated into the incentive systems employed at the university.

This paper paves the way for future research within the topic. From this study it is not possible to document a causality between the type of innovation management research on the one hand and the quality of the research on the other. Various other variables (e.g. the quality of the team of researchers) could be essential in this equation. Further research could feasibly scrutinise a potential link between the typology and academic outcomes.

A second limitation to this paper is the categorical approach to the three dimensions in Fig. 1. In some cases, the distinction between the researcher’s role and the role of the funding body is not dichotomous. Sometimes, the formulation of the research question is a product of a discussion

between the researcher and the funding body. Further research could potentially shed light on the impact of this hybrid approach to defining the methodology of the externally funded innovation research.

Thirdly, the present paper explicitly focuses on the individual research project. The analysis does not discuss the potential impact of contextual factors that might influence the ethical dimension of the research projects. The fact that a university is publicly or privately funded could have an impact on the propensity of the researcher to accept a certain level of involvement of the sponsor of the research. Though even publicly owned universities operate in business-oriented environment (McKelvey and Holmén 2009), there could be more profound contrasting logics between privately and publicly owned universities (Berbegal-Mirabent et al. 2015), which potentially have an impact on their respective approaches to the third mission and the overall “business model” of the university (Baglieri et al. 2018; Unger et al. 2020). Similarly, different scientific disciplines might have various approaches to the proximity to the sponsoring organisation. Future research could feasibly include a keen focus on these underlying logics.

Compliance with Ethical Standards

Conflict of interest The authors hereby declare that they have no conflict of interest.

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