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ISPIM Bangkok

Welcome to the August issue of the Technology Innovation Management Review. We invite your comments on the articles in this issue as well as suggestions for future article topics and issue themes.

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Technology Innovation Management Review

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Overview
The Technology Innovation Management Review (TIM Review) provides insights about the issues and emerging trends relevant to launching and growing technology businesses. The TIM Review focuses on the theories, strategies, and tools that help small and large technology companies succeed.

Our readers are looking for practical ideas they can apply within their own organizations. The TIM Review brings together diverse viewpoints —from academics, entrepreneurs, companies of all sizes, the public sector, the community sector, and others —to bridge the gap between theory and practice. In particular, we focus on the topics of technology and global entrepreneurship in small and large companies.

We welcome input from readers into upcoming themes. Please visit timreview.ca to suggest themes and nominate authors and guest editors.

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About TIM

The TIM Review has international contributors and readers, and it is published in association with the Technology Innovation Management program (TIM; timprogram.ca), an international graduate program at Carleton University in Ottawa, Canada.

Editorial: ISPIM Bangkok

Stoyan Tanev, Editor-in-Chief and Gregory Sandstrom, Managing Editor

Welcome to the August issue of the *Technology Innovation Management Review*. This month features papers from the ISPIM Connects Bangkok Conference - Partnering for an Innovation Community, held on March 1-4, 2020. The publication of this special issue was driven by Dr. Xavier Parisot and Dr. Thierry Isckia, Professors at Bangkok University. An additional paper by another regular ISPIM participant rounds out the list of contributions. The special issue is a wonderful example of ongoing cooperation with the leaders of the ISPIM society in promoting innovation management research.

The issue opens with **Karl Joachim Breunig** and **Tale Skjølsvik**'s paper, "Understanding the Strategy-Innovation Link in an Era of Disruptions". Their conceptual research focuses on links between strategy and innovation in leading management journals. In the background are the organizational capabilities and environmental turbulence of companies aiming to capitalize on innovation. The authors note, "Most contemporary organizations face challenges related to achieving sustainability and advantages in periods of market change" (p. 9). Their findings are relevant for managers seeking to develop strategies "while increasing their innovative abilities and capacities" (p. 10), and business leaders aiming to navigate through an era of disruptive technological development.

Christina Öberg follows with "Open Marketing: Conceptualizing external parties' strategic marketing activities". Öberg's paper provides a typology including four types of roles and role keepers involved in marketing. She discusses how or whether "open marketing" changes the traditional view of marketing, based on two case studies, of a joint venture partnership between an IT company and a marketing agency, and a web-based community for product development built on recycled materials. In addition to addressing marketing role temporality, the author points out that "control over marketing is … increasingly exchanged for parties that act based on their own understandings", where "marketing roles may also be shared among several different parties" (p. 24). The paper proposes a balance between control over internal company resources and external party interests to participate, formally or informally, in marketing a company's products or services.

The next paper provides "A Triadic Actor View of Value Co-creation in Business Incubation" by **Ronald Beckett** and **John Dalrymple**. The 'triadic view' goes beyond the traditional incubator-client value creation arrangements, to include other service ecosystem stakeholders. The authors take an 'actor-oriented' approach by highlighting four different cases of incubators and other service entities that support startups' development. This involves co-working spaces, knowledge-sharing, innovation infrastructure, financing, and technology assets in value co-creation initiatives. The results show that "Incubator actors need to actively engage with investors and demonstrate the benefits of incubation realized" (p. 35). The authors insist that "an actor-centric view may offer greater appreciation of startup incubation dynamics than a business model view" (p. 36).

Hiromi S. Nagane and **Koichi Sumikura** present the final paper: "Which Factors Influence a Company's Evaluation of the Contribution of Basic Research to Innovation?" The authors make an empirical analysis of "how individuals in companies evaluate the contributions of basic research by universities and public research institutes to industry" (p. 39), in order to assess the 'health' or 'sickness' of innovation in Japan. The paper inquires into the factors that influence a company's evaluation of the contribution of basic research to innovation, regarding pharmaceutical companies and biotech startups. The study's results reveal that "inventors with extended research careers tended to assign low values to public research contributions, while inventors with a Ph.D. tended to assign high values" (p. 48). They conclude that "if companies lack talent that can adequately discern and evaluate academic research, engagement with external basic research outcome stagnates" (p. 51).

The TIM Review currently has a Call for Papers on the website for a special edition on "Aligning Multiple Stakeholder Value Propositions". For future issues, we invite general submissions of articles on technology entrepreneurship, innovation management, and other topics relevant to launching and scaling technology companies, and solving practical problems in emerging domains. Please contact us with potential article ideas and submissions, or proposals for future special issues.

Stoyan Tanev, Editor-in-Chief
Gregory Sandstrom, Managing Editor

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Understanding the Strategy-Innovation Link in an Era of Disruptions

Karl Joachim Breunig & Tale Skjølsvik

> *"The best way to predict the future is to create it."*
>
> Peter Drucker

Whereas innovation and strategy traditionally are treated as two separate fields of expertise and research, this conceptual paper aims to identify how strategy theory can be linked to recent developments within the innovation field. Innovation research seeks to explain the process of creating new products and services. Strategy research, in turn, intends to explain how businesses create lasting competitive advantages. In recent years, research in strategy has shifted towards explaining how organizational capabilities and environmental turbulence are related, increasingly recognizing that it is difficult to retain sustainable competitive advantages, unless market dynamics and business renewal are addressed. To establish a systematic integration and analysis, we present the results of an extensive literature review of 1,268 research articles published between 2007-2017 to address the question: *To what degree, and how, have strategy and innovation been linked in leading management journals?* Our analysis reveals that research addressing both strategy and innovation is limited, but highly cited. Moreover, we identify 5 main themes, which in turn reflected 12 subsidiary themes addressed in extant research. These themes combine to give important insights about the research that been done and what is likely to be needed going forward.

1. Introduction

The essential role of innovation and entrepreneurship in the sustainability of a firm's competitiveness was pointed out by Schumpeter (1949). However, it remains conceptually unclear how extant strategy frameworks explicitly integrate and build on a Schumpeterian paradigm. Despite efforts to develop an improved understanding of how strategy and innovation theory can be integrated (e.g. Ramanujam & Mensch, 1985; Pisano, 2015; Teece et al. 2016), strategy theory has only to a limited degree become fused with ideas from innovation theory. In a contemporary business environment where the biggest and most valuable technology firms (FAANG: Facebook, Apple, Amazon, Netflix, and Google) are distinguished by their innovation capacity and capability, it is problematic that innovation activities predominantly remain outside the strategy theory domain.

To fill this void, we offer the results from a structured literature search in the Web of Science and EBSCO databases that attempt to integrate strategy and innovation research. In particular we review the highest ranked journals in the area of innovation and strategy from 2007-2017 and map to what degree and how innovation and strategy have been treated together in prior research. We identify themes covered in this research and reveal that the papers that link these research areas are extensively cited. Still, a lot of work remains to be done, and fusing core properties of strategy theory with recent ideas from innovation literature we believe is both obtainable and prudent at the present time.

The structure of this paper can be described as follows. First, we present extant strategy and innovation management theory to highlight similarities and differences across these two bodies of research and pose our research question. Second, we explain the method applied in the search, review, and analysis of the reviewed papers. Third, we present the findings from our analysis of the extant body of literature addressing strategy and innovation. And, finally, we offer a concluding discussion with implications on future developments for research and practice.

2. Theory

Going back to Schumpeter and the notion of 'creative destruction' (Schumpeter, 1949), the need for innovation

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and entrepreneurship is recognized in most firms as a way to guarantee their sustained competitiveness. However, innovation and strategy have traditionally been treated as two separate fields of expertise and research. Innovation research seeks to explain the process of creating new products and services (Burns & Stalkers, 1961). Innovation is largely regarded as a social process consisting of three core activities (Newell et al., 2009). The first activity is the generation of new solutions, also referred to as 'invention'. Then the act of diffusion follows, which denotes the process of spreading the new solution to other individuals so that they also get an understanding of it. Finally, the innovation process depends on implementation, that is, other individuals and communities also start using the new solution.

Innovation strategy refers to articulating the role of innovation in achieving organizational aims (Cooper, 2001), by aligning the overall business strategy with innovation decisions (Menor & Roth, 2007). Recent innovation management research has documented how firms utilize their resources and capabilities for the development of innovations, such as new products, services, or processes (Hill et al., 2015), and explicitly link resources and processes to innovation success (Froehle & Roth, 2007; Aas et al., 2015). Furthermore, research has shown a positive relationship between the implementation of innovation activities and future business performance (Bowen et al., 2010; Rubera & Kirca, 2012). Indeed, several authors (Easingwood, 1990; Johne & Storey, 1998) stress that it is important to set clear goals for the innovation program as a whole. Empirical studies similarly suggest that leading firms are likely to have an explicit innovation strategy (Cooper et al., 2002). In recent years, the focus of research on innovation management has primarily been concerned with innovations related to physical products (Droege et al., 2009), while limited work has also been done to systematically review and categorize the different attempts to create a more explicit strategy-innovation link.

In contrast, strategy research aims to explain how businesses create lasting competitive advantages (Porter, 1985). The field of strategic management is nevertheless fragmented and overlaps with a number of theoretical fields, such as economics, sociology, marketing, finance, and psychology (Nag et al., 2007). In the late 1970s, the field was in its infancy and re-labelled from 'business policy' (Schendel & Hofer, 1979). Due to the diversity of the field, a coherent established definition of strategic management has been lacking (Mintzberg et al., 1998). Based on a major survey of other scholars' research, Nag et al. (2007) defined 'strategic management' as "intended and emergent initiatives, taken by managers or on behalf of the owners, involving utilization of resources, to enhance the performance of firms in their external environment".

Strategic management research was in its early days largely rooted in what is referred to as the Structure-Conduct-Performance tradition. It is most notably captured in Porter's influential contributions (Porter, 1980, 1985), in which competitive advantage is assumed to be based on industry or strategic group, a group of companies within the same industry that have a similar strategic profile, and are only to a limited degree linked to innovation. In parallel, Mintzberg and colleagues (Mintzberg, 1978; Mintzberg & Waters, 1985; Mintzberg & McHugh, 1985) argued for an alternative view on strategic management, proposing that not all formal strategies are implemented as intended, and that many implemented strategies emerge from outside of the scope of ex ante analyses and plans. Innovation was thus not a key orientation of these earlier theories on strategy.

More recently, research in strategy has shifted towards explaining how organizational capabilities and environmental turbulence are related, increasingly recognizing that it is difficult to retain sustainable competitive advantages unless market dynamics and business renewal are considered (Teece et al., 1997). Given rapid market changes and innovation pressure, caused for example by digitalization, an explication of how strategy relates to innovation is needed. To succeed in a globalized business environment characterized by hyper-velocity (Francis & Bessant, 2005; Crossan & Apaydin, 2010), it has been claimed that organizations need to manage change in increasingly volatile and complex service eco-systems (Yoo & Kim, 2015). Under such conditions, dynamic capabilities possessed by firms have been linked to their sustained competitiveness (Eisenhardt, 2004), and claimed to be central to innovation (Tidd, 2012). However, the ability to replicate dynamic capabilities and innovation success over time has not been firmly established in extant research.

In the early 2000s, an entrepreneurial perspective on strategy gained ground, emphasizing value creation rather than appropriation (Hitt et al., 2001). The multiplicity and complexity of strategic management, as

well as the need to consider balances and paradoxes, have also been recognized in recent strategy research. Some examples include dealing with business ambidexterity (Tushman & O'Reilly, 1996; Birkinshaw & Gibson, 2004) by balancing exploration (innovation) and exploitation (the productivity of existing solutions and products), and managing paradoxes (Eisenhardt, 2000). Still, strategy theory has to a limited degree been fused with ideas from innovation theory (Markides, 2006; Lightfoot & Gebauer, 2011; Pisano, 2015; Teece et al., 2016). The blue ocean strategy (Kim & Mauborgne, 2004), business model innovation (Christensen & Johnson, 2009; Teece, 2010; Osterwalder & Pigneur, 2010; Zott et al., 2011; Foss and Saebi, 2017), dynamic capabilities (Kogut & Zander, 1992; Barnett et al., 1994; Teece et al., 1997; Eisenhardt & Martin, 2000, Helfat & Peteraf, 2003), and disruption theory (Christensen, 1997; Markides, 2006; Manyika et al., 2013; O'Reilly III & Tushman, 2016) are notable exceptions.

3. Methods

The aim of this study is to review research that aims to bridge strategy and innovation in highly ranked journals. In doing this, we took an inductive approach, with both qualitative and quantitative analysis. This approach enabled us to develop a solid understanding of the areas where strategy and innovation has been interlinked. It also enabled us to tease out dominant themes in this research, as well as potential avenues for future research.

3.1 Data collection and compilation

In doing a systematic literature review, one typically goes through three main phases: planning, which involves the identification of the research question and defining boundaries; conducting, which involves searching for and analysis of relevant literature; and reporting, that is, formalizing the findings and developing implications (Tranfield et al., 2003; Ashby et al., 2012). The first two phases will be described here, while the third phase is described in the Findings section.

In the planning phase, we first formulated our research question. We then defined the boundaries of our study to include academic articles published during the period 2007-2017 in the eight top strategy and innovation journals globally, as listed by 2015 Association of Business Schools academic journal guide (ABS list) (Harvey, 2012). The ABS-list has separate categories for both innovation and strategy with four top journals at level 4 in each field. These journals are for strategy: *Strategic Management Journal, Global Strategy Journal, Long Range Planning, and Strategic Organization; and for innovation: Journal of Product Innovation Management, Research Policy, R&D Management,* and *Technovation.*

The ABS list is the most comprehensive and frequently used ranking list among business research scholars around the world when choosing publication outlets. It is the dominant source used to evaluate business research across Europe and the US. Thus, limiting the scope of journals to the ABS list suggests that the research included in the literature review is likely to be of high quality and reliability.

After having identified the research question and the scope of the study, we continued to the conducting phase. In this phase it was important to develop a database of articles that integrates innovation and strategy. In doing so, we used The Web of Science Social Sciences Citation Index (SSCI). Due to different search categories and search methods, we had to use different search terms across databases. We used the search terms innovati* strateg*, where the asteric means all words that include this start, thus allowing 'strategic' and 'strategy' as well as 'innovative' and 'innovation' to be part of the search. Our investigation covered a search term in Web of Science referred to as Topic, which includes abstract, author keywords, and Keywords Plus, the latter which are index terms created by database managers based on frequently occurring words in the titles of references cited in an article. Thus, our search basically covered all relevant available information in Web of Science, as full text searches are not possible.

The search resulted in a total of 1,268 hits. To limit the scope of the qualitative analysis and to ensure relevance of the included papers, only papers with both strategy and innovation in the abstract among these papers were compiled into a separate dataset of 381 papers. This was done by using the EBSCO database, which allows for specific searches in the abstract, a function not available in Web of Science.

3.2 Data analysis

The data analysis included both quantitative and qualitative components. In particular, the analysis was conducted in two main phases: 1) familiarization and description of the data based on quantitative methods, and 2) identification and analysis of key research themes based on qualitative methods and descriptive

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quantitative analysis of the identified themes. In the familiarization phase, we developed an overview of the research that include both innovation and strategy. In particular, the following variables was mapped: 1) number of papers over time, 2) emphasis across journals, and 3) citations. These could be directly mapped form the results of the search. In addition, we did qualitative analysis in order to classify the different papers. This was done based on a classification of the content of the abstract. In particular, each abstract was first classified inductively and based on a research centric orientation, following Gioia et al. (2013). In turn, these classifications were further compared to research-based themes and classified at a more aggregate level for comparison. To the degree that the abstract mentioned theory and methodology used in the paper, it was included in the classification of the paper and added to the database.

4. Findings

The findings will be presented in the two parts: (1) A descriptive overview of number of papers, journals and citations over time, and (2) The main themes covered in the research, including count.

4.1 Descriptive overview of papers

The number of papers in this area has been relatively stable over time, with some fluctuation over the last 4 years. The general trend is a slight increase, but no significant trend. Among other reasons, this is partly caused by the limited number of journals that cover this area, in which only so many papers are published every year. Please see figure 1 for a general overview of the data over time. In the figure, the Web of Science search as explained above covers the 1,268 papers, while the EBSCO search only incorporates the 381 papers with both innovation and strategy in the abstract. The trend of greater elaboration and a database with both innovation and strategy in the abstract is very similar.

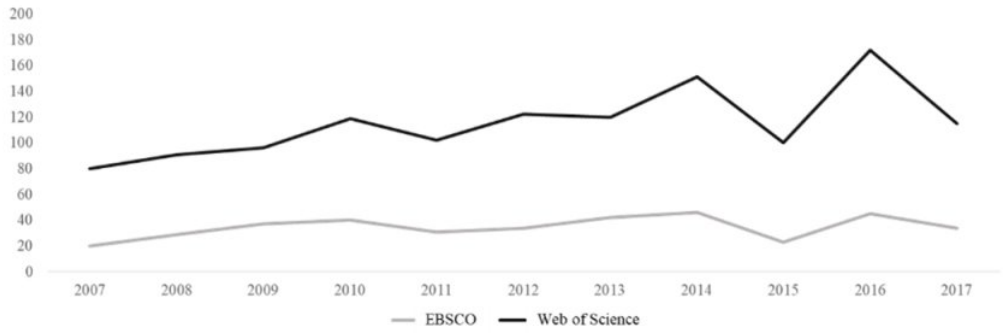

Figure 1. Overview of number of selected publications over time

In terms of the types of journals covered in the search, the top journals within the innovation discipline seemed to consider strategy to be an important area of research.

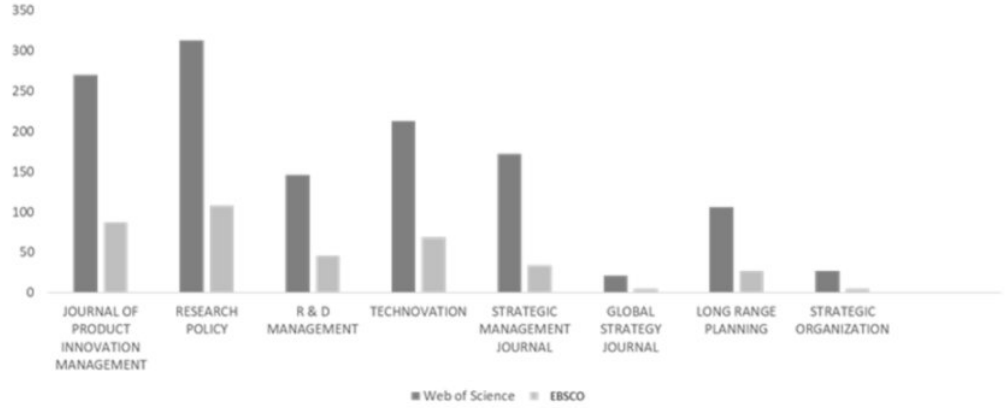

Figure 2. Overview of identified publications per selected journal

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In contrast, primarily only two of the top strategy journals have papers that link strategy and innovation, while interest within the field of strategy is much more limited. Figure 2 provides an overview of the identified publications outlets.

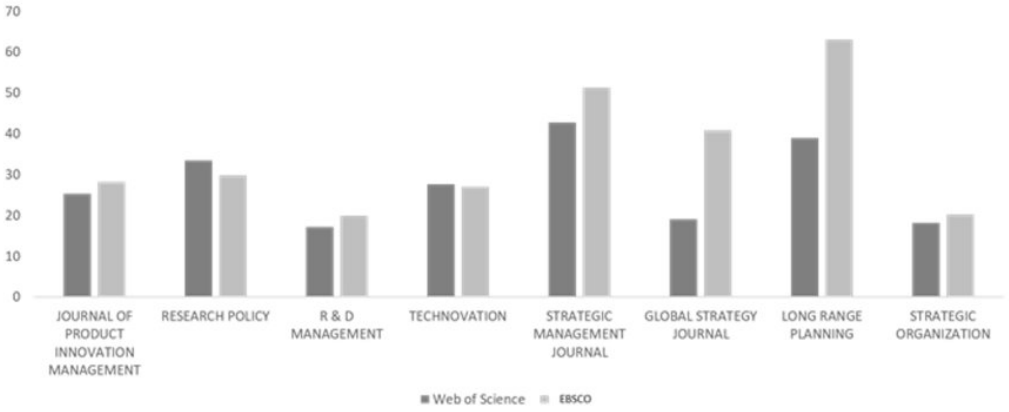

Figure 3. Overview of selected journals measured in citations (March 2018)

When one looks at the impact of research that has been done that deals with both innovation and strategy, the average citation rate in all the journals is very high. Thus, scholars in other fields have shown interest in the work that is being done in this area.

Figure 3 shows that the average number of citations per paper is extremely high for papers that cover both areas. As the selection of papers gets more narrow - as in the case where only papers with the concepts of innovation and strategy in the abstract is included - the number of citations in 6 out of 8 journals increase. Further, the number of citations in the strategy journals is considerably higher than in the innovation journals.

4.2 The main themes covered in the research

Through a tedious classification process explained under that data analysis section above, the 381 papers were inductively reduced into 5 main themes, which in turn reflected 12 subsidiary themes. Of these 5 themes, 3 of them was primarily oriented towards innovation and marketing with a more limited relevance to strategy. These were: conditions of ecosystem, business relationships and policies, fundamentals in terms of governance and technology, and value creation in terms of design, product, and customer. Additionally, two areas were identified that illustrated the bridge between strategy and innovation as opposed to emphasizing primarily one over the other: value appropriation in terms of the choice of an open versus protected

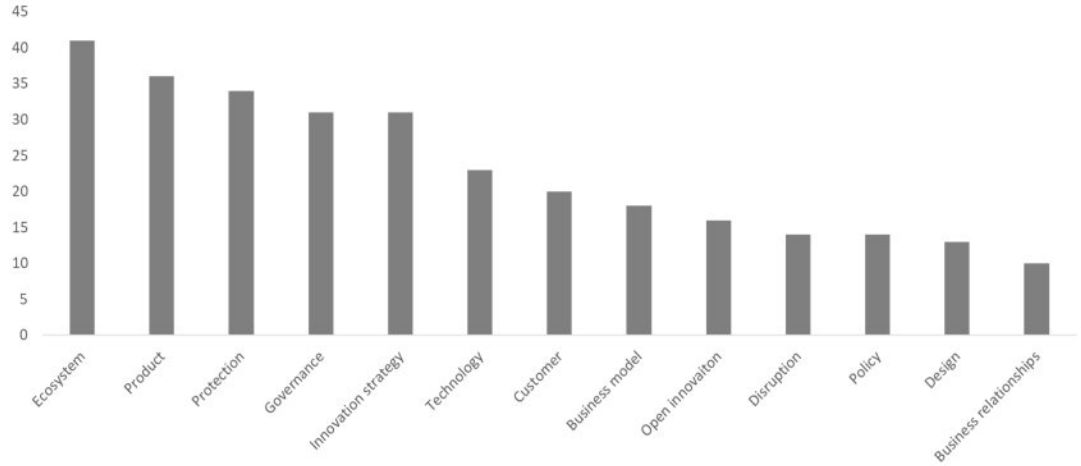

Figure 4. Overview of identified themes

approach to innovation, and the strategy-innovation link, which includes business models, innovation strategy, and disruption.

4.3 The strategy-innovation link

The research where strategy and innovation are linked concerns 3 main areas: business models, disruption and innovation strategy. Business models had the highest total number of citations, with an average of 79 citations per publication. Of the 18 publications, a conceptual paper by Teece (2010) was cited 1,047 times and largely drives this number, as a seminal paper on business models. For the rest of the papers, the average number of citations was 21. Many of these papers are relatively recent and all the papers were published between 2010-2017. In particular, various papers deal with the concept of a business model (Baden-Fuller & Morgan, 2010; Teece, 2010; DaSilva & Trkman, 2014) and different ways of making innovations in the business model, for example, based on pricing and payment models as well as resources (Corrocher and Zirulia, 2010; Denicolai et al., 2014; Winterhalter et al., 2017). Some of the later contributions, (Spieth et al., 2014; Cortimiglia et al., 2016) identify the interlinkage between business models and strategy-making.

In addition to business models, innovation strategy is mentioned as a key area. This area emphasizes several different strategic decisions that companies need to make in their innovation efforts. In particular, it concerns short and long term decisions in R&D (Artés, 2009; Flammer & Bansal, 2017), the decision to exploit versus explore knowledge (Hernández-Espallardo et al., 2011; Bauer & Leker, 2013; Piao & Zajac, 2016; Enkel et al., 2017), internal versus external R&D resources (Hagedoorn & Wang, 2012), and whether to offshore R&D activities (Nieto & Rodríguez, 2011; Rodríguez & Nieto, 2012; Steinberg et al., 2017).

Finally, disruption deals with how existing industries face disruptive business models or technology innovations. A lot of what has been written with regards to strategy and innovation in this area deals with incumbent reactions (Awate et al., 2012; Huesig et al., 2014) and the role of the government (Ruan et al., 2014).

4.4 Value appropriation

In addition to the direct link between strategy and innovation in existing research, the literature points to value appropriation as an essential area of research where these fields are integrated. In particular it deals with the strategic difference it makes in an organization when it comes to choosing openness or protectionism, which seems rooted in the dichotomy of a relational versus a transactional orientation in organization. Two main areas have gained interest: patents and intellectual properly strategy (IPS) versus open innovation. These areas stand in strong contrast in most cases and represent an important strategic choice in the area of innovation strategy.

With regards to open innovation, a number of areas have been studied, such as motivations (Appleyard & Chesbrough, 2017) and trade-offs between openness and protection (Raasch et al., 2009; Knudsen & Mortensen, 2011). In the area of IP protection, several papers have dealt with how organizations make protection decisions (Gallié & Legros, 2012), the use of licensing (Gallié & Legros, 2012; Großmann et al., 2016), standard catch-up collection and use of patents (Schmidt, 2013; Jell et al., 2017).

5. Discussion

Most contemporary organizations face challenges related to achieving sustainability and advantages in periods of market change. This is particularly salient in times of digital disruption and in the face of the so-called '4th industrial revolution'. These changes demand innovation to be integrated as a central part of a company's organizational strategy. In addressing the societal level, a key emphasis is now placed on 'ecosystems' and 'value networks', with extensive research focusing on the innovation context beyond organizations, such as within cross-organizational collaboration or caused as a response to particular policies and regulation. At this level, the main focus is on innovation theory, which has identified a few links to strategy theory.

At the organizational level, business strategy is increasingly being merged with the core properties of innovation theory, which are to obtain scalability and differentiation into "blue ocean strategies". Likewise, visionary and transformative leadership styles are merging with ideas from entrepreneurship research to address creativity and values. At the value creation and appropriation level, the core issue relates to protection of innovation advantages, where open source innovation and a proprietary approach stand in strong contrast to each other. This value creation and appropriation

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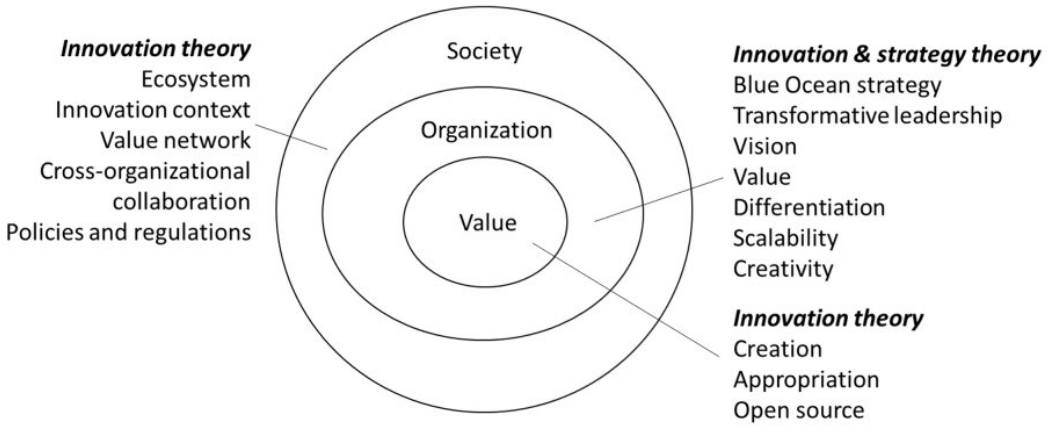

Figure 5. Levels and details of the strategy-innovation link

tradition is also largely rooted in innovation theory tradition. These different levels are illustrated in Figure 5.

The core of the strategy-innovation link incorporates a combination of theories that directly look at business models, disruption, and innovation. Future research should use these different levels to further develop an understanding of how innovation can be transformed into and integrated with strategy.

6. Conclusion

In this study we have conducted a structured literature review to assess to what degree strategy and innovation have been linked in research conducted in leading management journals. The analysis shows that links between the two main concepts have been made at three different levels of analysis: 1) at the societal level, 2) the organizational level, and finally 3) at the value creation and appropriation level. Additionally, the review shows a theoretical link between the concepts business model, disruption, and strategy innovation.

By discussing how innovation and market characteristics affect business strategy, the paper contributes to knowledge on the strategy-innovation link. The conclusions reported here may provide considerable assistance to managers who are searching for better ways to develop strategy and manage their organizations, while increasing their innovative abilities and capacities. By pointing to different theoretical positions, managers can get a sense of which theoretical perspectives to consider in their efforts to develop their organizations into the future. While strategy in many organizations has up until now used analyses in the form of five forces, the Boston Consulting Group's (BCG) matrix, the resource based view of the firm, and other approaches, we believe that managers in the future should think freshly in terms of the types of theories they build their strategy work on, if one of their key objectives is value creation and innovation, as opposed to value appropriation. The paper suggests that as innovation to a larger degree becomes a key objective in many saturated organizations under conditions of change, business model theory, disruption theory, and innovation strategy should take place as core theoretical perspectives for organizations in their strategy processes.

Nevertheless, the conceptual nature of the study has limitations and further empirical research is needed to explore and test if the conclusions of the discussion are to reach beyond the provided categories.

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About the Authors

Karl Joachim Breunig is a Full Professor of Strategic Management at the Oslo Business School, Oslo Metropolitan University —OsloMet, where he is heading the research group on Digital Innovation and Strategic Competence in Organizations (DISCO). He received his Ph.D. from BI Norwegian Business School, and holds a MSc from London School of Economics. Prof. Breunig's research concentrates on the interception of strategy and innovation theory, and involves topics such as service- and business model innovation as well as digitalization in knowledge intensive firms.

Tale Skjølsvik is a Full Professor of Technology Management, and the Vice-Dean of Research at the Faculty of Technology, Art & Design at OsloMet. She holds a Ph.D. in Strategic Management from BI Norwegian Business School and has experience as a management consultant from Bain & Company and Gemini Consulting. Tale develops and runs executive education within strategic management and digital transformation, consults organizations and does ostensive public speaking. Her research interests concentrate on the strategic management, innovation, digitalization and procurement of knowledge intensive services and firms.

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Open Marketing: Conceptualizing external parties' strategic marketing activities

Christina Öberg

"You can't expect to just write and have visitors come to you - that's too passive."

Anita Campbell

Open marketing as conceptualized in this paper refers to how external parties take part in strategic, integrative marketing activities. To distinguish this more recent trend in marketing from traditional meanings of marketing, the paper provides a typology on roles and role keepers in marketing. Four types of roles and role keepers are outlined: 1) marketing as solely being performed by actors in the supplier company communicating offerings, 2) an activity shared among functions of the supplier company, 3) external parties communicating offerings, and 4) external parties contributing to strategic marketing. Using the concept of 'roles' in marketing helps to structure activities and actors - or roles and role keepers - and provides a basis for understanding that marketing results from what is done, not merely from who performs it. The paper underlines how new ways of conducting business also have implications for a company's marketing beyond its borders.

Introduction

When Day and Wensley (1983) described the strategic orientation of marketing, and hence laid the groundwork for strategic marketing as a key concern, they broadened the marketing concept to include functions both inside and outside of a company. They thereby guided people away from simply targeting customers (consumers) as an operational level problem, a view which had dominated earlier marketing studies. Although marketing in recent years has gained more depth and increasingly included resources and stakeholder concerns, strategic marketing ideas still depart from the individual firm and its circumstances. Recent developments in terms of the collaborative economy and open innovation (Ritter & Schanz, 2019; Öberg & Alexander, 2019; Sanasi et al., 2020) denote how parties both internal and external to a company participate in processes that are not only communicative, but which form a company's strategy (Whittington et al., 2011).

This paper discusses the inclusion of external parties in marketing, which is referred to as *open marketing*. Open marketing conceptually links to open source software and open innovation (Dahlander & Magnusson, 2005; Gassmann et al., 2010) in its calling. To indicate its strategic approach, open marketing is compared to a more traditional view of strategic (integrative) marketing, and to marketing as communication efforts on company-centric and external-party levels. The purpose of this paper is *to provide a typology on roles and role keepers in marketing, and specifically to conceptualize integrative marketing that includes parties external to a company as open marketing*. The following research question is addressed: *How does open marketing change the traditional view of marketing?*

The paper outlines four types of roles and role keepers: marketing as (i) solely performed by actors in a supplier company that communicate market offerings (operational marketing as referred to, for example, by Day & Wensley, 1983, and Jain, 1983), (ii) external parties communicating offerings (word of mouth and social media exposure, for instance, Marshall et al., 2012; Taylor, 2017), (iii) an activity shared among functions of the supplier firm (that is, strategic, integrative marketing, see Kumar, 2015), and (iv) external parties that contribute to shape offerings and participate in strategic marketing activities (open marketing). The paper focuses empirically on the open marketing idea discussing the concept of roles in marketing.

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In the organizational buying behaviour literature, the gatekeepers, decision makers, and others who pursue buying activities have already long been widely recognized (Webster & Wind, 1972; Johnston & Lewin, 1996). Their marketing counterparts, however, have not been as well studied (Kjellberg & Helgesson, 2007; Hagberg & Kjellberg, 2010). The current paper adds to our understanding of marketing in how external parties may perform strategic marketing activities. While literature has either included external parties in the marketing communication discussion (social media and word of mouth), and while it has denoted how marketing in supplier companies reaches beyond mere communication aspects through emphasizing strategic or integrative marketing, less is known about external parties' activities related to strategic marketing.

Hartwick and Barki (1994) along with Jun and King (2008) investigated the role of users in information system development. Moreover, Song and Thieme (2009) explored the role of suppliers in market intelligence gathering. Examples like these are few, however, and when the roles of external parties are included, a specific actor is normally described and more often related to the innovation literature than to marketing research. The present paper includes several external parties in the analysis of strategic marketing. Using the concept of roles in marketing helps to structure activities and actors included in marketing, and also provides a basis to better understand marketing from what is done, rather than merely from who performs it. The paper underlines how new ways of conducting business also have implications for a company's marketing strategy.

The paper is structured as follows. The next section explains the concept of roles and role keepers, and develops an analytical tool based on these dimensions. Thereafter I present the data collection method, then provide two empirical examples that portray the roles of external parties in strategic marketing, along with a brief analysis. The analysis section includes a discussion of various dimensions of marketing roles. The paper ends with conclusions, managerial implications, and ideas for further research.

Theory

Roles

The concept of a 'role' defines a function performed by someone or a description of what someone does (Parsons, 1951; Gross, 1958; Levinson, 1959; Williams, 1969; Turner, 1985). The current literature indicates a distinction between seeing roles foremost as predefined (Turner, 1985; Ashforth, 2001: for example, the role of a customer), or as dependent on the *activities* performed (Mead, 1934; Blumer, 1969; Klose, 2020: for example, a customer acting as a co-developer of a solution). Such roles as the latter emerge from role keepers acting on circumstances in a given context (Gross, 1958; Williams, 1969; Goffman, 1983; Laverie, Kleine III, & Kleine, 2002; Harnisch, Frank, & Maull, 2011; Schneider & Bos, 2019), thus shaping their role based on temporal and contextual embeddedness.

Roles can be analyzed in terms of *role keepers* (the predefined role) and *role activities* (what the party does), showing how a party can hold a predefined role, while also acting a different one (such as the example of a customer co-developing a solution, Öberg, 2010). The literature has addressed role conflicts and ambiguities (Pettigrew, 1968; Miles, 1976; Singh & Rhoads, 1991) based on how parties may act beyond expectations based on their predefined roles, as well as how the expectations of others may conflict with what the role keeper thinks is its expected behaviour. But while the literature has primarily discussed role conflicts, the reality is that both predefined and activity-based roles can be expected to co-exist. Business structures, including company governance, for instance (Pettigrew, 1968; Yapp, 2004), can expect to guide behaviours towards predefined roles, while other contexts may actually promote parties acting beyond their predefined roles. In this paper, the concept of roles refers to activities of parties, while still defining them based on the position they hold in relation to a supplier company. This means that the party holding a predefined role can also act beyond it.

Analytical framework

Assuming roles can be either predefined or based on activities of parties, this paper discusses these two dimensions and makes a distinction regarding predefined roles (described as role keepers) between actors as part of the supplier firm (that is, the unit whose products or services are marketed), and parties external to that company. The role keepers are in turn described based on their predefined roles vis-á-vis the supplier company, that is, their roles are based on their position relative to another firm (see Freeman, 1984 on various company stakeholders). The paper discusses the activities they pursue as roles related to marketing as communication, as well as in strategic marketing (see

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Day & Wensley, 1983; Jain, 1983; Pitt & Treen, 2019). Strategic marketing is defined by Varadarajan (2010) as the:

> "organizational, inter-organizational and environmental phenomena concerned with (1) the behavior of organizations in the marketplace in their interactions with consumers, customers, competitors and other external constituencies, in the context of creation, communication and delivery of products that offer value to customers in exchanges with organizations, and (2) the general management responsibilities associated with the boundary spanning role of the marketing function in organizations."

This resembles how the American Marketing Association (2007) underlined that marketing is a *company* activity, rather than a function performed exclusively by a marketing department (Homburg, Workman, & Jensen, 2000; Mullins, Walker, & Boyd, 2008; Geiger & Finch, 2009). Kumar (2015) refers to this as *integrative* marketing, which underlines that marketing reaches beyond marketing or sales staff communicating about a product or service to potential customers.

To capture the different dimensions of marketing, the paper thus uses parties' predefined roles and activities, and distinguishes between the supplier company and external parties, as well as between communication and strategic marketing activities. Figure 1 outlines this framework.

Method

To depict open marketing, I provide two empirical examples below. Their function in the paper is to illustrate various roles in marketing (Siggelkow, 2007), both related to internal and external role keepers and activities pursued. The illustrative function aims to clarify the open marketing concept, rather than claiming to describe all companies' marketing strategies today. The specific examples were chosen because they represent new, and at the same time quite divergent, ways of working with marketing and marketers. They complement each other in that they demonstrate additional aspects of taking or assigning roles in marketing. For practical reasons, two domestic Swedish examples were selected. Both companies are SMEs, which means that their reliance on external parties for marketing is likely greater than if they were large or international firms. For confidentiality reasons, the companies' names have been altered.

Data collection

The first example of E-collaboration was studied as part of a thesis, since one of the companies (the IT company) was an external project party for the thesis. During the thesis project, the researcher closely followed the company for three months, investigating customers' views on customer management systems. Data capturing methods for the research included interviews, participation in informal meetings, and a questionnaire. For this paper, the data collection provided for the thesis was complemented with secondary data including company presentations and a newspaper article review.

In the second example with WebDevelopment, the data collection was based on participatory research (Sarantakos, 1998; Bryman, 2001). The company was studied for four years, including the researcher attending several company meetings per year. In addition to formal and informal contacts with the company owner and participation in business and auditor meetings, I analysed the company's business plan and other secondary data material specifically for this paper. A secondary data analysis allowed for

	Activity performed	
Role keeper	**Marketing as communication**	**Marketing as a strategic, integrative activity**
Supplying company		
External parties		

Figure 1. Analytical tool: Roles and role keepers in marketing.

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systematizing the data (Huettman, 1993; Welch, 2000) that had previously been held as informal and non-structured information about the company. It also provided details on the business model and added a broader perspective on external parties and marketing activities. For both examples, primary and secondary data sources allowed the capture of the company's development from 2006 onwards.

Analysis procedure

The data analysis was processed using a categorization and recombination of data techniques (Glaser, 1992; Strauss & Corbin, 1998; Charmaz, 2000). Specific attention was given to categorizing individual actors' or companies' roles, and to deciding whether and how each role contributed to marketing. Extracted roles were labelled in a matrix that connected predefined roles (supplier, intermediate, etc.) with activities performed (see Figure 1). This was done for the individual examples, then during a second step, for the two examples combined. To distinguish between the marketing roles and predefined roles of suppliers, production staff, customers, and so forth, the former is referred to as *marketing activities*, while the latter is described as *predefined functions* or *role keepers*. Analytically, this combines a position-related predefined view on roles with an emergent perspective.

Two Examples

E-Collaboration

E-Collaboration is a joint venture partnership between an IT company and a marketing agency. The IT company started working with the agency because it lacked competencies in communication and marketing, which were considered essential for the systems it develops. Cooperation between them had run for several years, focusing on various projects. The IT company was founded in 1998 to work with small and medium-sized companies in Sweden. The marketing agency, which was founded in 2006, is situated in the same town as the IT company. It consists of two co-owners who are also active in the agency as project and customer manager, and designer, respectively. The two owners work with other marketing agencies and self-employed individuals that provide services in photography, illustration, and copywriting.

The IT company had developed a system for electronic customer interaction management (e-CIM), with the marketing agency as its collaborator. Such a system is like customer relationship management (CRM) solutions in how it organizes and manages a company's customer base. Yet while a CRM system allows suppliers to collect and systemize customer data, the e-CIM system is also based on mutual interaction between customers and suppliers, where both parties affect what data is actually collected and processed. The system provides marketing tools and builds customer databases, marketing research tools, and implementation for customer communication and response. Through the system, customers impact what products are offered, from design to sales and services. E-CIM solutions also take into account word-of-mouth among customers, and this way passive customers become part of the system, as data is captured from and about potential customers who have not yet made any purchases, based on what they indicate they are looking for.

The specific system developed by the IT company and the marketing agency is directed to shopping centers, nightclubs, and other marketing agencies. The specific aim of the system is for these companies to use it in their interaction with customers: shopping centers visitors, individual stores, night club patrons, and marketing agencies. Marketing agencies also use it in their work with customer companies (those ordering advertising campaigns) and direct customers (those who buy products or services based on the campaigns). They are active in providing data on themselves, their needs and wants, and on what data should be collected for each of these parties. The data is then processed to be used for marketing analyses, thus providing input for wider marketing activities. Shopping centers offer collected data to individual shops, thereby connecting customer input with those who intend to meet customers' needs.

Looking at the various parties and their roles with E-Collaboration, it seems apparent that both the IT company and the marketing agency work on marketing the e-CIM system. Both E-Collaboration companies (the IT company and the marketing agency) offer the system directly to shopping centers and nightclubs, as well as to other marketing agencies. In addition, and related to the broader definition of marketing, consumers at shopping centers and visitors to nightclubs provide information to the e-CIM system, with shopping centers and nightclubs acting as customers for such information. The consumers consequently also act as producers in that sense. To complicate the picture further, the party requesting the information (that is, the shopping centers and nightclubs), together with the customers that

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provide it, impacts what information is collected. Furthermore, shopping centers can provide this service to individual stores in the centers, thus acting as information suppliers to the stores.

WebDevelopment

WebDevelopment was founded in 2006 by a young innovator who had the idea to develop a protective shell for Apple computers. The shell was manufactured from a

Table 1. Marketing roles - two examples.

		Activities	Marketing as communication	Marketing as a strategic, integrative activity			
	Predefined role		Communicating	Creating offerings	Delivering	Exchanging	Maintaining relationships
E-collaboration	IT company	Creating the system. Selling offering to shopping centers, marketing agencies, and nightclubs. Participating in shopping centers' and night clubs' use of the system.	X	X	X	X	X
	Marketing agency	Communicating system to external parties. Helping in system development.	X		X		
	Customer/ consumer	Providing data and input for what products to offer. Affecting what data is collected.		X	X	X	
	Shopping centre/night club	Marketing system data to shops. Providing input on what data to collect.	X	X	X	X	
WebDevelopment	Innovator	Developing ideas on waste product use. Marketing waste products to stores. Marketing concept to producers of goods and package manufacturers. Communicating about web community to	X	X	X	X	X

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Table 1. Marketing roles - two examples (cont'd).

	customers and web users. Building relationships with collaboration partners and package manufacturers.					
Collaboration partners (designers, etc.)	Marketing web community to web users and customers. In collaboration with innovator, communicating with package producers and goods manufacturers, and maintaining relationships with these.	X	X			X
User of web community	Providing input about products, design, and materials to reuse.		X	X	X	
Customer	Providing input about products, design, and material to reuse to benefit also other customers.		X	X	X	
Producer of goods	Marketing itself as environmentally friendly based on waste material use.	X			X	
Package manufacturer	Marketing itself as environmentally friendly based on waste material use. Communicating with the web community and material to goods manufacturers. Designing ideas on packages to be reused.	X	X		X	

specific material that would protect the computer, and a great deal of effort was made to design the shell and market it to customers. To give the shell an environmentally friendly niche, a specific plastic consumer package was designed. The idea was that the package could be reused by consumers to create a lampshade. Once that plastic material was found, however, the direction of WebDevelopment's business changed. While the innovator continued to market the computer shell, operations began to focus on the use and reuse of materials. In addition to the plastic material, other waste products were recycled for new business ideas.

At the time, the innovator also started to collaborate with four other innovators specializing in areas such as product development and design. Together, they created a web-based community for product development built on recycled materials. The core business model consequently came to involve sustainable product development based on community input. External parties were allowed and encouraged to contribute ideas and solutions on how to use the materials provided, as well as how other waste products could be recycled. The

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Table 2. Marketing roles

View on marketing	Marketing as communication by supplying firm (operational view)	External parties communicating offerings	Strategic, integrative marketing	Open marketing
Roles				
Activities included	Persuading customers; selling. Marketing own products.	Communicating and marketing. Collaborating in marketing.	Creating, communicating, delivering, and exchanging offerings. Maintaining relationships. Marketing own products.	Creating, delivering, and exchanging offerings. Maintaining relationships. Third-party contributions. Marketing oneself through another party's product. Collaborating in marketing. Contributing to the shaping of offerings.
Predefined or temporal roles	Roles are (semi-)permanent. Predefined function = role.	Predefined function temporarily extended to include word of mouth.	Roles are both semi-permanent and temporary. Predefined function frames role, yet degree of freedom to act outside such functions.	Roles are mostly temporary. Predefined function separated from role.
Traditional, added or new roles	Traditional.	New role.	Added.	Added and new roles.
Shared or coexistent	Single entity as carrier of role.	Coexistent.	Shared.	Shared and coexistent.
Coordination	Structure.	Own understandings.	Structure.	Own understandings.
Role keepers				
Representatives	Supplying firm.	External parties (customers dominating).	Supplying firm.	External parties.
Parties included	Marketing and sales staff of supplying company.	Mainly customers.	Distribution staff; product staff; production staff and service staff of supplying company.	Collaboration partners, business partners and other external parties.

innovator and the collaboration partners also established relationships with some fifteen industrial designers and consumer package designers for the purpose of reaching waste materials, accessing design ideas, and collaborating on production and production ideas.

For suppliers of goods, WebDevelopment, its collaborators and users in the web community design and provide solutions for recycling materials. In terms of package materials, goods manufacturers can launch packages as environmentally friendly solutions, thus creating an argument in their product marketing. The

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package manufacturers in turn use similar arguments with the goods manufacturers. Through partnerships facilitated by the web community, innovators provide package manufacturers with cutting tools to manufacture packages, as reusage sometimes determines how the package is designed in the first place. Package suppliers help to market WebDevelopment's ideas to goods manufacturers. In addition, manufacturers of both goods and packages showcase their use of recycled material products for marketing purposes, and the innovator enables them to put their brand names on such products. Packages that are recycled into new functions make consumers into producers of new products. Participants in the web community provide new ideas as solutions for how customers can reuse materials. These solutions in turn benefit goods manufacturers, package producers, the companies behind the web community, and consumers.

In addition to packages, the recycling undertaken by WebDevelopment involves other waste products from production. This means that WebDevelopment manufactures or designs goods based on waste material, thus focusing on more than only how consumers can reuse packages. Such waste product solutions are then sold separately through stores. Also, in this product development and design approach, users of the web community contribute ideas, as do manufacturers, collaboration partners, WebDevelopment as a company, and also designers. One innovation that came out of this is a clothespin; another is building blocks made from the waste of formed plastics.

The roles and role keepers in this example include the innovator marketing the ideas of a web community to users and consumers, as well as to potential collaborators. WebDevelopment and its partners also market their products to users, as well as to goods manufacturers and package companies. Users of the web community affect the designs and materials choices, thus contributing to a broader scope of marketing activities that attract additional users, product manufacturers, package producers, and consumers. Manufacturers of goods to be packaged market themselves and also the collaborators and package designers to their customers. In coordination with ideas provided by users and the innovator, manufacturers impact what is produced and also what waste material is available. Package designers are those who market the material to manufacturers of goods to be packaged using the recycled materials. They also contribute with ideas on design and collaborate with the web community on finding solutions. Those offering ideas to the web community are either customers themselves or people who use the web community primarily for reasons connected with creativity.

Analysis

The two examples above illustrate various marketing roles and role keepers. Parties involved (role keepers) include the supplier companies, along with external parties: collaboration partners, direct and indirect customers (that is, customers and customers' customers), marketing agencies, web users, suppliers to customers, and suppliers' suppliers. The parties act to communicate the product, provide input for product development and new ideas, decide on ideas to produce, and supply data that is used for the product. Likewise, they act through marketing the product, the companies (E-Collaboration and WebDevelopment), and their products and companies to others. This emphasizes roles that are both related to the communication of offerings and include integrative, strategic marketing activities, such as the creation, delivery, and exchange of offerings, and the maintenance of relationships (Varadarajan, 2010; Kumar, 2015). Hence the roles capture both the resource side and customer interaction side of marketing, as seen in the E-Collaboration example. The activities also extend beyond a party's impact on product decisions to the dyadic level, and describe how a party decides on products and their design for others. It also blurs the view on who (or whose product or service) is marketed, as seen for instance in the WebDevelopment example, where package and goods manufacturers also marketed themselves through WebDevelopment's products.

The examples thus demonstrate that roles may be held by supplier firms and external parties. Further, while the ways to conduct business may introduce new role keepers and activities related to marketing, the existing parties also continue with more traditional roles (for example, communications). Table 1 summarizes the marketing roles in the two examples. The division into role keepers and activities follows the framework outlined in Figure 1, while the various activities are inductively captured from the examples. These activities should not be seen as exclusive, but are rather identified to indicate how various parties act within several marketing roles that belong to 'integrative marketing', as referred to by Kumar (2015).

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The two examples above further indicate how a business actor can combine or abandon (Yapp, 2004) a predefined function in the company they work at for an additional temporal role. In many senses, the examples point to how the roles of customers, suppliers, and partners get mixed together. The roles executed include the extensions of predefined functions, parties acting in other roles while remaining with their predefined one, and parties abandoning their predefined function for other roles (see Öberg, 2010 on traditional, added, and transferred roles).

A *traditional role* in a company describes how the marketing staff of a supplier company markets the company's products, thus identifying coherence between role keeper and activities performed. *Added roles* outline how a customer affects the offering provided (Normann, 1991), and also participates in gearing offerings to benefit others, that is, a party acting its expected role while also participating in additional activities. *Transferred roles* describe how a customer stops being a customer in order to develop products to benefit others, as seen in the WebDevelopment example, and in terms of the shopping center organizations that became suppliers to E-Collaboration, while at other times acting as its customers. Roles defined as activities pursued thus further indicates the *coexistence of various roles* held simultaneously by a single actor. At the same time, several parties may engage in the marketing role, thus sharing it, not only on the level of performing marketing activities, but also in terms of providing input to shape offerings, for instance, as seen with users of the web community, customers, and the innovator in the WebDevelopment example.

A typology on roles

If returning to Figure 1, a typology of different role keepers and roles can be developed. Marketing can be defined as (i) solely being performed by actors in the supplier company that communicate market offerings (operational marketing as referred to by Day & Wensley, 1983; Jain, 1983); (ii) external parties communicating offerings (word of mouth and social media exposure, for instance, Marshall et al., 2012; Taylor, 2017); (iii) being an activity shared among functions of the supplier firm (meaning strategic, integrative marketing, Kumar, 2015); and (iv) external parties contributing to shape offerings and participate in strategic marketing activities (open marketing). Table 2 summarizes these, to which the discussion below turns.

Marketing as communication by supplying firm (operational view)

The operational view of marketing portrays marketers as those communicating a company's offering. This is how marketing was treated in its early development (Coutant, 1936; Converse, 1945; Bartels, 1951, 1974). It involves marketing as campaigns rather than as integral parts of the company's operations. It also depicts marketing as operational or tactical, rather than strategic. While marketing and sales staff of supplier firms are central in marketing, there are also, as discussed below, other actors that contribute.

External parties communicating offerings

Early marketing ideas acknowledged intermediates and marketing agencies, and more recently, customers have been seen as communicators of supplier firms' offerings (Kumar et al., 2007; Taylor, 2017). Marketing can thus be pursued by parties external to a supplier company, where such parties may interact with the supplier company (for example a marketing agency) in campaigns, or share their feedback on the company's products or services to others in the business ecosystem beyond the actual control of the supplier company (for example customer word of mouth and social media, Marshall et al., 2012; Dessart et al., 2015). This focus is not on an interactive view of marketing, but rather on how external parties participate in marketing to other parties. Word of mouth, for example, denotes that a customer promotes a product or service to other customers (Kuokkanen, 1996; Kumar et al., 2007) in such a way that they act similarly to marketing and sales staff, according to the marketing view described above. The activities that they pursue are communicative in orientation, while as parties in the business ecosystem, they are external to the supplier company. The parties thus act in temporary roles, while still being predefined as customers (and marketing agencies).

Strategic, integrative marketing

When referring to marketing as an integral part of a company (Kumar, 2015), it seems apparent that the role of marketers is shared among various actors in the supplier company. Early literature (Shaw, 1912; Levitt, 1960) depicted marketing activities as being closely related to communication activities. McGarry (1950), for instance, referred to the contractual, merchandising, pricing, propaganda, physical distribution, and termination functions of marketing. Since then, strategic marketing has come to refer to decisions and behaviours related to resource supply, competition, customers and other stakeholders for a

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company (Pitt & Treen, 2019). Within the company, an integrative view includes staff working on distribution, product, and production, along with service staff, as well as management. This does not, however, mean that everything these parties do counts as marketing. Rather, their roles as marketers relate to specific situations and contexts, constituting more temporal roles.

Open marketing

As described in the previous section activities beyond just communicating business offerings could also be accounted for as marketing (Varadarajan, 2010). When a customer acts as co-producer in services or takes active part in innovation processes, that customer would not be a marketer, because their efforts do not co-produce offerings *for others*. However, there are situations in which a customer, or other external parties, play a completely different role than as a participant in exchange activities. In these cases, the customer stops being just a customer and instead works on designing the company's product, for instance.

Research has focused on open innovations (Chesbrough, 2004; Kirschbaum, 2005; West & Gallagher, 2006; De Wit et al., 2007; van de Vrande et al., 2009; Ili et al., 2010) and open source software (Dahlander & Magnusson, 2005). Open marketing echoes the idea of 'openness' from these concepts. Yet, open marketing extends the idea of 'open' as described in most open innovation literature on inflows and outflows of knowledge, as open marketing is not controlled by a single focal firm. It rather depends on external parties' active participation in marketing and includes how external parties perform activities that complement what the firm does. It is also different than open source software in being more simultaneous, strategic, integrative, and complex, compared to the often sequential development of open software solutions. Parties in open marketing further include external parties that may not have or intend to have a relationship with the supplier company, such as the web users in WebDevelopment, who were not contracted by any party, and yet provided ideas without being potential customers to the company. Compared with the strategic integrative view of marketing, open marketing increasingly involves parties acting based on their *own understanding* rather than controls. In the end, there may not be any actual coordination between the different marketing roles.

Thus, in sum, the typology identified above points out complementary, but also alternative ways of considering roles in marketing. These span from traditional to added and transferred roles, from predefined functions to temporal ones, and from coordination by structure to be driven by individual understandings, and reveal roles as both shared and coexistent. Moving from a communications view on marketing to including external parties in strategic marketing reveals that role keepers comprise supplier companies and their collaborators, as well as other external parties that do not intend to have a business relationship with the supplier firm.

Conclusions

The purpose of this paper has been to provide a typology on roles and role keepers in marketing, and specifically to conceptualize integrative marketing that includes parties external to a company as open marketing. The paper distinguished role keepers from the activities pursued by them. We can thus now return to the following question: How does open marketing change the traditional view of marketing? As shown in the paper, open marketing expands marketing both in terms of activities pursued and the types of actors conducting the activities. It means that external parties participate in integrative, strategic marketing, and thereby put focus on both extended roles (Öberg, 2010), and stakeholder participation in marketing.

The implications of open marketing can be thus summarized as follows:

- Within the scope of a predefined role, a role keeper can start fulfilling other activities. Temporary roles may take place together with predefined ones, add dimensions to them, or mean that a predefined role needs to be temporary abandoned for a new role. Open marketing thus increasingly emphasizes the *temporality of roles*.

- External parties that appear to market offerings have the following predefined functions: parties collaborating with the supplier firm, direct or indirect customers or suppliers to it, or external parties with no actual or intended relationship with the supplier firm. Control over marketing is thus increasingly exchanged for parties that act based on their *own understandings*. A party may carry out several temporary roles, yet marketing roles may also be shared among several different parties.

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Roles in marketing have not been widely researched (Kjellberg & Helgesson, 2007; Hagberg & Kjellberg, 2010). Using the concept of roles in marketing helps to structure marketing activities and actors, and provides a basis for understanding that marketing results from what is done, not merely from who performs it. The theoretical contributions of this paper are as follows: Firstly, the new conceptualizing of 'open marketing' is the prime contribution. It captures recent trends in marketing, while also theorizing about the open marketing construct. Secondly, marketing roles can now be seen as more fluid, simultaneous, and shared than previously thought. This enables both researchers and practitioners to expand their current notions of roles, while maintaining that the separation between roles as activities and role keepers helps to create structure as roles become increasingly complex and blurred.

Managerial implications

This paper illustrates various parties' roles in marketing. It specifically highlights external parties as marketers. Open marketing in this way sheds new light on marketing activities and helps to understand contemporary marketing. Open marketing impacts companies behaviour in the market and in their interaction with others, as well as in creating their offerings, and resource decisions (see Varadarajan, 2010's defintion of strategic marketing). In short, companies need to act much more adaptively in terms of their marketing options. Essentially, a company adopting open marketing becomes an open system with an open marketing strategy.

However, the degree of inclusion of various parties also relates to a company's business model. To a certain extent, a company can choose to include external parties in its marketing activities, or not. For companies that include external parties, such inclusion may help them reach customers and improve their products. It adds to company strategy and communication.

From a management point of view, designing business models that include external parties or rely on external parties in marketing can positively impact company development and sales. However, including external parties in marketing increases a company's dependence on such parties, which can serve to make the company more vulnerable. Such vulnerability results from losing part of the control over how the company's products and services are marketed, and involves a risk that external parties will move the company in an unintended direction, or even promote the company's products in a negative manner. In addition, and because of competition, certain external parties may make other parties unwilling to enter into business deals with the company. For managers, it is therefore wise to consider what effects various parties' involvement in marketing may have. Healthy balancing is needed between reaching additional competencies and getting input from users, and the risk of losing sales to other parties. Additionally, there is a simultaneous balancing between control over resources, ideas and communication strategies, and external parties' willingness to participate.

Further research

This paper illustrated various roles in marketing through two company examples. For further research, it would be of interest to study additional cases, deepen the data collection, and thereby see whether, for instance more studies confirm or add to the findings presented in this paper. In addition, each party's role could be researched more closely, along with investigating each party's impact on the marketing and sales of goods or services. Lastly, it would be worthwhile to study the interaction between intra-company and external marketing activities, as well as companies' decisions to include or exclude external parties in their marketing efforts.

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About the Author

Christina Öberg is Professor/Chair in Marketing at Örebro University, Visiting Professor at Leeds University and associated with the Ratio Institute, Stockholm. She received her Ph.D. in industrial marketing from Linköping University. Her research interests include mergers and acquisitions, brands and identities, customer relationships, and innovation management. She has previously published in such journals as *Journal of Business Research, European Journal of Marketing, International Marketing Review,* and *Industrial Marketing Management*.

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A Triadic Actor View of Value Co-creation in Business Incubation

Ronald Beckett and John Dalrymple

> *"I think it's smart to always keep an eye on companies that sit within incubator communities, which bring together the skills and expertise needed to grow an enterprise."*
>
> Whitney Wolfe Herd
> American entrepreneur
> Founder of Bumble

In this paper we view an incubator as a service entity that may take different forms. We contribute to the literature by exploring the utility of the service-dominant logic (SDL) paradigm (Vargo & Lusch, 2016) to better understand incubation operations. Value co-creation is a central axiom of SDL, as is engagement with a supporting service ecosystem. Whilst some studies have considered dyadic incubator-client value creation arrangements, we extend this to include interaction with other service ecosystem stakeholders that we characterise as investors. This way a triadic interaction model is presented. We consider four different cases of a service entity supporting start-up development from this actor-oriented perspective. Adopting a client company perspective, we draw a parallel between various kinds of incubation services and department stores, where clients may access what they need when they need it from a variety of offerings, and obtain the assistance they require.

Introduction

The globalization of business, combined with technological and demographic changes, is impacting the world's regions in different ways. Nevertheless, a common response to emergent conditions is to encourage the establishment of new businesses (or the growth of established businesses), facilitated by some form of business startup incubation support. Some studies (Bruneel et al., 2012) have suggested that further research is needed to look beyond providing incubator service to also consider firstly, how regional conditions shape the incubator business model rationale, and secondly, the extent to which incubator value propositions and client profiles are aligned. In this paper, we take up these suggestions in our analysis.

In a previous study of two commercial incubators started by serial entrepreneurs, we utilized a business model view to characterize and compare them. We noted there were associated businesses investing in the incubator and that there was a good fit between the niche client groups chosen and regional strengths. Put another way, the business model view was useful but incomplete. In this paper, we consider additional matters of context.

The paper is organized as follows: from the literature review we frame the incubator as a service entity embedded in a service ecosystem that may take several forms. We contribute to the business incubation literature by adopting the service-dominant logic (SDL) paradigm (Vargo & Lusch, 2016) to consider how value both is and may be delivered to investors in an incubator, as well as to incubator clients. This leads to our research question: *how might an actor-centric view of incubation programs be used to draw out matters of context and practice?* We present a model with a triadic view (investor, incubator, incubatee) of value co-creation and illustrate its utility by drawing on four case studies.

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Some Observations from the Literature

Incubators, incubation support processes and supporting ecosystems

Fernández Fernández et al. (2015) considered business incubation "as an evolving and interactive process of the provision of value-added services within an entrepreneurship ecosystem". They identified some patterns of service provision that were conditioned by ownership, scale, partnership activities, and the effectiveness of cooperation with private, public, and university sectors. Autio et al. (2014) stressed the importance of context in stimulating entrepreneurial innovation, including the experience level of the entrepreneur and a supportive ecosystem. Valkokari (2015) suggested that enterprises of all kinds are embedded in broader business, innovation, and knowledge ecosystems. Engagement with such ecosystems can provide access to complementary resources, while each encounter differs in terms of its outcomes, interactions, logic of action (rules of the game), and actor roles.

A study by the UK innovation foundation, NESTA, examined the question: how do support programs fulfil different roles for startups within startup ecosystems? (Dee et al, 2015). The study observed that what had become known as 'incubation' meant not just the services provided by a self–identified 'incubator', but rather was an umbrella term for a range of startup programs. Terms used for programs included accelerators, coworking spaces, active seed investors, courses, competitions, and others. It was suggested that incubation programs could be differentiated in the market by how they made money from startups, and when programmes intervened in a startup's origin story and development. Potential sources of revenue identified were rent, membership fees, service fees, equity, % of earnings, sponsorship, public funding, introduction fees, events and catering. In terms of intervention points, it has been broadly observed that entrepreneurs need different kinds of support as their enterprise grows from a fragile startup to one with significant growth potential. Likewise, some kinds of incubator may specialize in supporting a particular stage of startup development. The NESTA research, which considered incubation activities in Germany, the UK, and Israel, also suggested there were links between how developed an ecosystem was and the likely success of innovation programs.

It is suggested in the literature (Von Zedtwitz & Grimaldi, 2006: Bruneel et al, 2012) that an incubator may be classified according to its 'business model'. Currently on offer are university, regional, commercial, company-internal, and virtual models. Chase and Webb (2018) conducted a multinational study of incubator and accelerator business models on behalf of Saudi Arabian and Australian business and government interests. They suggested that financial independence for incubators and accelerators was unlikely, that their continued operations relied on some external form of government or corporate support, and that in many regions the investment of time by volunteer mentors, accountants, legal advisors, and other professions was needed and could help reduce financial requirements.

The concept of value co-creation

Supplier-customer value co-creation practices are widely reported in the management literature, and may relate to co-production, for example, the development of enhanced value propositions or new product requirements, or to value-in-use: the customer's experiential evaluation of the product or service proposition beyond its functional attributes (Ranjan & Reed, 2016). Rice (2002) viewed a business incubator as a producer of support programs developed in conjunction with the community it is embedded in. It was noted that both parties bring knowledge to the co-production relationship and that time available for co-production was a significant influencing factor.

Eriksson et al. (2014) saw business incubation as a process where a service entity sought to orchestrate collaboration with other actors. They noted that prior research on incubation concentrated on a dyadic relationship between incubation actors and their clients. They also explored an alternative view of micro-level activities that considered engagement with other actors (customers of the clients and technology researchers), finding that mutual trust was seen as a prerequisite for active collaboration.

Hughes et al., (2007) argued that while incubators offer opportunities for value creation, how client firms chose to use them dictates the extent to which value by 'incubation' is realised. Their research identified two value-stimulating behaviours: resource pooling (resource-seeking behaviour) and strategic network involvement (knowledge-seeking behaviour). Drawing on responses from a survey of 211 UK incubator client

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firms they characterised four different client practices:

- *enclosed incubation*, where a firm undertakes very limited resource pooling and network involvement to protect their intellectual assets.
- *specialised incubation*, where the firm undertakes extensive resource pooling, but only limited knowledge-based interactions. These firms may link complementary assets, while seeing little value in sharing knowledge.
- *community incubation*, where a firm is involved in extensive networking with limited resource pooling. Here, firms recognise their co-dependence, but may realise faster development, innovation, and learning.
- In *dynamic incubation*, firms practice both resource pooling and knowledge seeking, needing to operate in a very open and ethical way with their partners. Thus, several potential risks must be managed.

Introducing the Service-Dominant Logic (SDL) paradigm

Value co-creation is at the core of widely accepted SDL concepts developed by Vargo and Lusch (2016), in supporting business model innovation and service innovation (Maglio & Spohrer, 2013). Table 1 presents five axioms associated with the SDL paradigm and our interpretation of them in a business incubation context. A model framing this viewpoint is shown in Figure 1.

Table 1. An interpretation of Service-Dominant Logic axioms in a startup business incubation context

SDL Axiom	*Incubation Context*
Axiom 1/FP1: service is the fundamental basis of exchange.	A service entity (an incubation program of some kind) is responsible for orchestrating the process of value co-creation and for integrating requisite resources.
Axiom 2/FP6: Value is created by multiple actors, always including the beneficiary	Value creation and delivery involving multiple actors are orchestrated via one or a set of customers (incubatee) interaction events, with different kinds of events supporting the customer at different stages in the growth of a startup firm
Axiom 3/FP9: All social and economic actors are resource integrators	A service entity business model identifies a value proposition supported by social and economic resources required to deliver value
Axiom 4/FP10: Value is always uniquely and phenomenologically determined by the beneficiary	Desired and realised outcomes are determined by the beneficiary, but other stakeholders will also have an interest in value realised from their own perspectives. One outcome is the development of mutual trust.
Axiom 5/FP11: Value co-creation is coordinated through actor-generated institutions and institutional arrangements	A service-oriented ecosystem that includes businesses, knowledge diffusion, innovation, and technological elements has infrastructure actors (e.g. investors) aligned to an institutional tenet that supports entrepreneurial activities.

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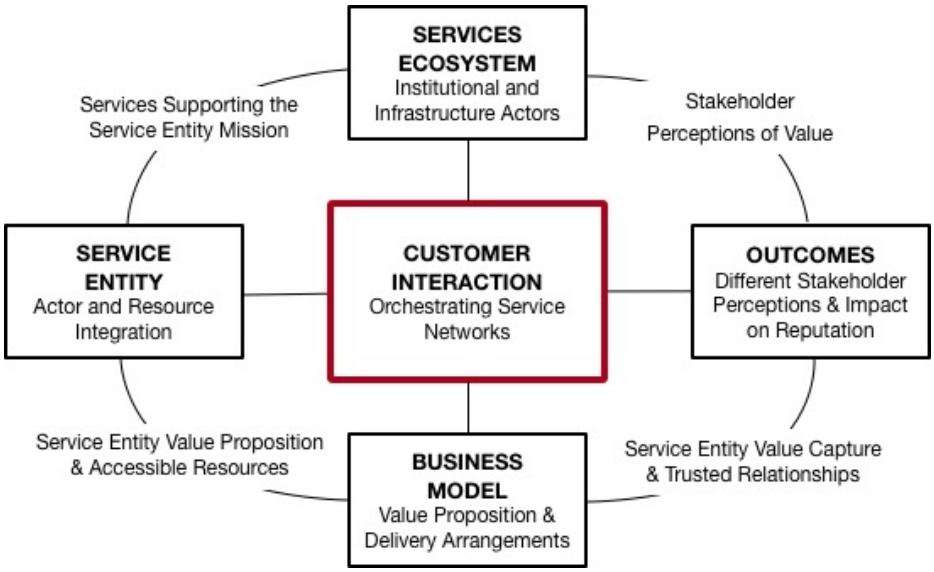

Figure 1. A Service Systems View of Customer Engagement

Note that we have included peripheral elements in this model that do not directly involve the customer:

- Access to ecosystem services supporting the Service Entity mission may be negotiated separately (for example, access to financing or infrastructure).
- Ecosystem actors have their own rationale for engagement and may expect to realise value outcomes independently of what the customer values.
- The Service Entity value proposition and access to resources negotiated with external stakeholders informs the Service Entity business model, drawing on customer value co-creation events.
- While customers seek value-in-use, the Service Entity also seeks value capture from transactions, along with outcomes that build trusted relationships with both customer and ecosystem actors.

A triadic view of value co-creation

From an SDL perspective, *value is co-created by multiple actors, always including the beneficiary.* In figure 1, value co-creation is facilitated via customer interaction events involving the service entity and service ecosystem actors. Research into triadic business relationships (Andreassen et al., 2018) has identified two modes of operation. In one mode, an intermediary performs a broker function having simultaneously associated dyadic relationships with buyers and sellers (for example, a realtor and an apartment seeker). In the other mode, an intermediary facilitates negotiations between a buyer and seller via a platform of some kind (Uber taxi services).

Drawing on the literature previously presented, we propose an interaction model where:

- Service ecosystem actors include investment actors, as they all seek to add value to their present operations in some way, whether contributing assets (financial, knowledge, infrastructure, technology) or time (for example, mentoring, advising, networking).
- Incubator actors participate in service entities of various kinds (providing courses, social events, coworking spaces) .
- Incubatee actors serve as the intended beneficiary, that is, startup firms, whether or not they are engaged in a coworking space or a formal incubation program.

A model showing both a triadic relationship and the associated dyadic relationships is presented in figure 2.

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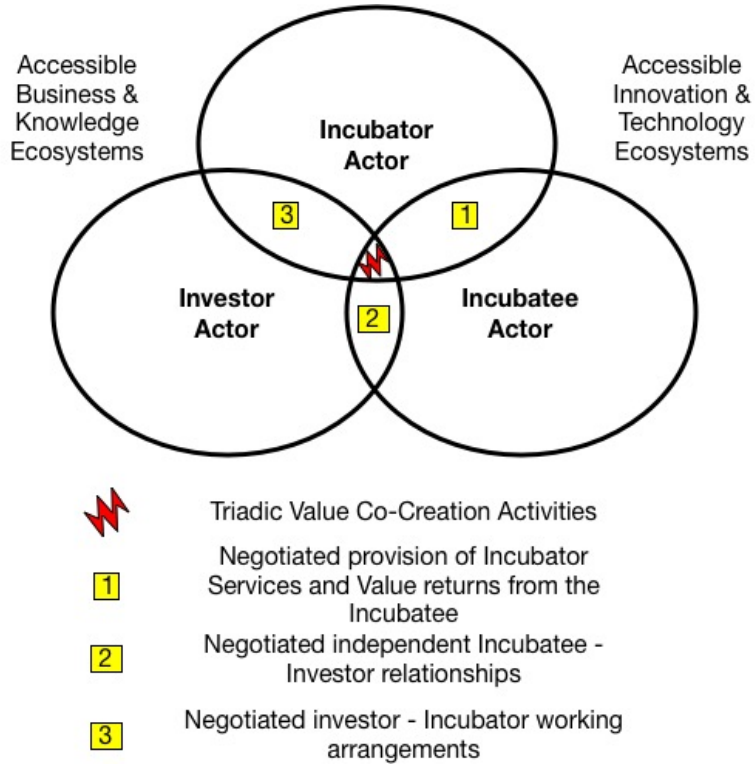

Figure 2. An incubation service triadic actor interaction model

In the context of figure 2, we represent the broader entrepreneur service ecosystem shown in figure 1 as four subsystems: *business* (finance, market, logistics, and human resources actors), *knowledge* (research, consulting, and education actors), *innovation* (idea exploration and exploitation actors) (Valkokari, 2015), and *technology* (technology platform and interconnected component actors) (Wareham et al., 2014). The rationale here is that some startups are primarily oriented towards one subsystem, for example, establishing a knowledge-based enterprise, but may also need to access the others, such as engaging the business ecosystem.

Dyadic relationships between incubator and incubatee actors have already been researched extensively, while dyadic relationships between investor and incubatee actors have also been explored, particularly in the venture capital literature. Dyadic relationships between incubator actors and investment actors have been explored to a lesser extent. It was suggested earlier (Von Zedtwitz & Grimaldi, 2006; Bruneel et al., 2012) that an incubator may be classified according to its 'business model', which has been represented by university, regional, commercial, company-internal, and virtual models. We suggest this categorization could also be applied to identify classes of investment actor (for example, a university investor). We could then ask each of the actors in this ecosystem why they invest and how. In this sense, we would see a virtual model form through cooperation.

Vargo and Lusch (2016) suggest two SDL foundation principles , that 1) *actors cannot deliver value, but can participate in the creation and offering of value propositions*, and 2) *value is co-created by multiple actors always including the beneficiary.* We interpret this as requiring organised negotiation and delivery events, where the delivery of something based on a service entity value proposition facilitates a beneficiary realizing it as value-in-use. We recognize that value-in-use may not be realized until some time after the delivery event, but instead focus on delivery events themselves and their impacts.

This way of thinking leads us to the following propositions for gaining insights into incubation support practice:

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- Incubation support practices should be framed in terms of the kinds of events managed (for example, course or workshop delivery, networking events, incubatee milestone events)

- Consideration of the roles of incubator, incubatee and investor actors in relation to each event should recognize that some actors may take laregly passive roles (for example, incubatee actors may endorse a grant proposal submitted by an incubator actor to an investment actor).

The Research Approach

Our research question is: *how might an actor-centric view of incubation programs be used to draw out matters of context and practice?* Yin (2014) suggested that a case study method is appropriate in considering such questions as how and why in a contemporary setting. Our unit of analysis is an incubation support service entity. We selected cases situated in one region, which means they are embedded in essentially the same business ecosystem. This region has seen recent job

Table 2. Overview of case study entities

Case Study Entity and Goal	*Brief Description of Activities*
LaunchVic: a Victorian state government initiative aimed at enhancing the scale and scope of its regional entrepreneurial ecosystem.	Rather than work directly with a myriad of startup companies, this program provides grants to established incubation support actors of various kinds to both build on regional strengths, and address market failures. The case highlights an investor view of incubation programs.
Maroondah Bizhub: A local government initiative aimed at supporting the establishment and growth of small / micro businesses in its region.	Home-based businesses represent a large proportion of businesses in this area. The local government authority (Maroondah City Council) wishes to encourage nascent entrepreneurs to start businesses and enhance the survival rate of already established ones. In response to feedback from local business leaders, a coworking space was established.
Social Startup Studio: A university research centre initiative aimed at enhancing the sustainability of social enterprises.	The Swinburne University of Technology's Centre for Social Impact is supporting a small number of startup social enterprises through the stages of sustainable business development. It includes researching lessons learned along the way.
Innovation Precinct Incubator: A university initiative utilising startup companies as one means of facilitating technology diffusion.	The Swinburne University of Technology has clustered together manufacturing engineering, IT and design centres of excellence, where multidisciplinary development projects can be hosted. This innovation precinct includes a multi-purpose incubator space.

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losses resulting from various causes and is promoting a culture of entrepreneurship in response. In two of the cases, a government entity is the primary investor, while the other two are a university.

A brief overview of the cases is shown in table 2. Each case was analyzed from the value co-creation viewpoint outlined above, which also facilitated cross-case analysis. We collected case data from websites, newsfeeds, and, where practical, publicly accessible internal reports supplemented with interview data. We then assembled and summarized the data in a secure university wiki project space to help organize the data in various ways.

Findings

The LaunchVic case
LauchVic, the primary investment actor, was established in 2016 to lead the enhancement of a globally connected startup ecosystem by supporting startups and investors in the State of Victoria. Up to mid-2019, more than $45m AUD had been provided through 110 service entity grant projects.

The funded service entities performed four kinds of activity: researching the incubation ecosystem, organising awareness-raising events, managing calls for incubation service entity grants, reviewing outcomes, and celebrating successes. Research had indicated there were more that 120 incubation service entities in the State. The 2018-2019 annual report indicated there had been nine differently targeted calls for grant proposals, some targeting areas of strength (for example, the health sector) and some targeting market failures (for example, regional and aboriginal incubators).

In terms of incubatee actor selection and their ambitions, research indicated there were more than 2,700 startups in Victoria. While there was considerable diversity in the target market segments, the largest (44% total) were in the health, media/entertainment, social enterprise, and commerce sectors.

The Maroondah Bizhub case
A local government in Australia that wishes to support startup firms and enhance the sustainability and growth prospects of small/micro businesses in its region constitutes the primary investment actor. Rather than funding or structured programs, Maroondah Bizhub offers the provision of services and a conveniently located coworking facility. Bizhub draws on external knowledge via specialist consultants, and state government service providers. In 2019, an independent assessment of value-added indicated the Bizhub had contributed $19mln to the local economy over the preceding 3 years.

The service entity, Bizhub, organises knowledge sharing events to support startups and help grow small businesses, along with managing the co-working facility. It has a dedicated co-working space manager and staff that organise events. More than 650 clients have attended events over the preceding three-year period. Various levels of co-working space access offer a range of full time, full service to casual membership, where access to the space or meeting rooms can be booked on a day-to-day basis. 115 co-working clients all receive a monthly newsletter on forthcoming events, opportunities, and success stories. The co-working clients rarely attend general information events, citing problems with time or timing, while individual sessions with a subsidised ‘expert in residence’ (business coach) may be booked.

The co-working clients are mostly professional or IT services firms employing 1-5 people. They cite co-working benefits like those identified by other researchers. Although some networking events enable mingling and networking, otherwise few instances arise for synergistic relations to develop. A ‘show and tell’ series of events was planned for Maroondah Bizhub in 2020 to help clients learn from each other, which was underway until the covid-19 pandemic emerged. Clients wishing to apply for a government grant may also receive assistance on request.

The Social Startup Studio case
The investment actors in this case were the Swinburne Research Centre for Social Impact (CSI). It is networked with five other similar centres throughout Australia and with financial services firms that establish and manage socially responsible investment portfolios. The CSI engages Startup Studio client firms in an action research program. It has been expanding its portfolio of research projects, and the financial services firms are looking for startup investment opportunities. The CSI also has developed strong social services industry connections associated with its research work.

A Startup Studio Director with prior social enterprise management experience manages the program and external links, a studio manager is responsible for day-to-day client interactions, and a third manager is

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responsible for overseeing the co-working space that is available for clients within the research centre. Startup Studio clients are advanced through foundational studies, focused on activity detailing, business modelling, and social enterprise construction stages of development. This draws on educational material from a master's program offered by CSI with links to subject matter experts negotiated on a needs basis.

In 2019, an initial batch of five Startup Studio clients (incubatees) was selected from 38 registrations of interest. An earlier CSI study of the Victorian social enterprise sector had indicated that startups commonly last no more than 3 years, or have difficulty growing and scaling. The incubatee firms wish to establish a strong foundation for their enterprises to avoid this situation with the help of professional guidance.

The Innovation Precinct case

The investor actors are again Swinburne University, represented by the Deputy Vice Chancellor Research and Development and leaders of the university's "three pillars [as] centres of excellence": the Factory of the Future, the Digital Innovation Lab, and the Design Factory Melbourne (the latter which is one of seven similar collaborating operations around the world). Each of the "pillars" has an extensive network of industry contacts.

The key incubator actors are the Director of the Innovation Precinct, the Director of Commercial Innovation Programs, and the Director of Innovation and Entrepreneurship (who has direct experience in establishing and growing startups). The Precinct is regarded as providing an innovation ecosystem that supports both large and small projects that involve both industry and student engagement.

The incubator program offers access to a co-working space and an entrepreneur-in-residence. A variety of services are offered as different kinds of events, along with a program of forthcoming events published on the website. These include: (a) a startup lean canvas workshop oriented towards taking an idea to market, (b) a five-week pre-accelerator program, (c) a 12-week accelerator program aimed at helping startups become 'venture ready'. Selected participants receive some funding, access to experienced mentors, a co-working space and masterclasses or workshops for an extended period. (d) various 'pitch' competitions held in the facility.

The incubatee actors are generally Swinburne students, staff or alumni, and participation in each type of event has its own selection criteria. Incubatees have opportunities to learn from each other through 'pitch' events and workshop activities, and they may co-create artefacts of value through engagement with a centre of excellence investor in the program. For example, a product prototype may be manufactured using Factory of the Future 3D printing facilities.

Discussion

Investment actors may offer funding (LaunchVic case), access to specialist knowledge (Social Startup Studio and Innovation Precinct cases), innovation support (Innovation Precinct case), access to physical assets such as co-working spaces (all except LaunchVic), or prototype production facilities (Innovation Precinct case). Investment actors in all cases expect some form of return on their investment. It may be enhanced regional wealth generation and distribution, better employment opportunities, enhanced engagement with social issues, new knowledge generation, or simply new ideas and professional networking.

Incubator actors need to actively engage with investors and demonstrate the benefits of incubation realized (all cases). Incubator actors may facilitate investment actor - incubatee actor engagement (Social Startup Studio and Innovation Precinct cases). Incubator actors may offer access to a range of services that incubatees can choose from (Maroondah Bizhub and Innovation Precinct cases), or bundled packages of services (Social Startup Studio).

Most startups are still in the early stages of development. Inexperienced entrepreneurs especially may prefer to join a structured program (Social Startup Studio case). Not all startups are always in a growth phase while stabilising current operations, but may find operating from a co-working space beneficial (Maroondah BizHub case). Not all incubator offerings are equally valued. Startups may strategically choose some support offerings, while rejecting others (Maroondah BizHub and Innovation Precinct cases). Matters of time allocation and timing may impact what is accessed and when (Maroondah BizHub and Innovation Precinct cases).

We argue that incubators are only sustainable first, if they attract suitable clients, and second, if they retain

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investor support. Chase and Webb (2018) have observed that very few incubators are self-sustaining business operations. It has been shown that not all startup firms may benefit from engagement with an incubator, or that they may move from one kind of incubator program to another as their needs change (Lukosiute et al., 2019). Incubator usage thus depends on the prior experience of a startup team, what they need to learn at a given point in time, and the nature of any innovation being introduced. In addition, some startups may realize value from their engagement by combining resource-seeking and knowledge-seeking behaviour in different ways, thus influencing the type of interaction they have with an incubator (Hughes et al., 2007). Whilst an incubator may have a client selection process, clients will usually have incubation service entity selection options.

From an incubator actor perspective, different kinds of support may be sought by different incubatee clients at different stages of their enterprise's development. This may require the incubator actor to flexibly access a network of actors and resources. In a networked environment, it has been suggested that an enterprise can improve value co-creation opportunities by adopting business models that have a "high degree of internal and external configurational fit" (Nenonen & Storbacka, 2010). In the model presented here, this would involve harmonizing the interests of three kinds of generic actor.

Concluding Remarks

We return then to our research question: *how might an actor-centric view of incubation programs be used to draw out matters of context and practice?* Utilizing the Service-Dominant Logic paradigm (Vargo & Lusch, 2016), we found that:

- An incubator actor is viewed as a service entity integrating actors and resources to offer a value proposition to its clients. Whilst SDL has been widely used as a tool in a variety of business studies, it has rarely (if at all) been used in incubator studies, and we offer this as a contribution to incubation theory.

An incubator program provides an environment where clients can mature and grow. It may be associated with the provision of a co-working space. Whilst some firms may 'graduate' from an incubator program, continuing growth may need to take place within the incubation environment. Value is co-created not only through service entity-client interaction, but also in concert with an external services ecosystem (see figure 1). We have represented this ecosystem aspect of interaction as being provided by an investor actor(s) who also has a particular engagement rationale.

In this paper, we explored incubation instances via four illustrative case studies that offer access to some form(s) of asset - financial, knowledge, innovation infrastructure or technology assets - delivered via one-on-one negotiations, courses, workshops, or external relationships. In reflecting on our case studies, we saw an analogy with a department store stocked with commonly needed items organised in different sections. Each section relates to the stage of development of a client. Whilst all stores may stock the same basic items, some may specialise, for example, having offerings associated with one technology or development stage. The store may also operate as a passive entity, where clients choose what they need when they need it (the Maroondah Bizhub case), or offer guidance, helping clients with appropriate selections and advice about how to use each selection (the Social Startup Studio case). There may be an emphasis on access to financial resources (the LaunchVic case), or to innovation or technology resources (the Innovation Precinct case).

It is thus up to the individual client (incubatee actor) to determine what they need and when. Nevertheless, in every visit, which we view as an event, something of value must be exchanged for whatever is accessed. Payment may be immediate (for example, payment for training) or may be deferred (for example, stimulating regional employment). What is valued will also depend on the store owner (investor actor) - it may be economic or social capital, access to additional assets, or some combination of these things.

From a practitioner perspective, an actor-centric view may offer greater appreciation of startup incubation dynamics than a business model view. What services are provided in which incubators and why? Incubation support may be framed as a series of value co-creation events, but how is value co-created, and who is involved in each kind of co-creation event? In practical terms, if one of the actors does not see any value in engagement in any given incubator, then no events will take place there. One limitation of the research presented here is that it only considers two kinds of investment champion - regional governments and universities - whereas other types have been noted in the literature: commercial, company internal, and virtual (represented as various

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kinds of business models). Another limitation relates to the cases themselves. While we collected enough detail on each case to support a set of single case study papers, this would have required more space than available here.

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About the Authors

Ron Beckett is an industry practitioner with more than 30 years of experience in the implementation of creative change and innovation management in Aerospace and Manufacturing. He frequently works at the academia–industry interface, with a focus on Learning to Compete. Ron is an Adjunct Professor at Swinburne University, and he has held similar appointments at several other universities. He has authored or co-authored more than 100 conference papers, journal articles, and book chapters related to the pursuit of best practice in extracting value from innovative ideas, knowledge management, and effective collaboration implementation.

John Dalrymple holds a BA (Hons) from the University of Stirling and a PhD from the University of Strathclyde in Scotland where he worked with the Scottish Enterprise Foundation to improve the performance of small and medium-sized companies. He was Founding Director of the Centre for Management Quality Research at RMIT University. John, the staff, and students of the Centre were regular recipients of "Best Paper" awards at international conferences. His publications have attracted more than 1100 citations to date. John was the Editor of the Quality Assurance in Education journal from 2003 until 2019. He has supervised over 20 PhD candidates to successful completion. In October 2018, John was presented with the J. M. Juran Award by the Australian Organisation for Quality.

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Keywords: Incubators, service entities, co-working, knowledge-sharing, stakeholders, service ecosystems, investors, value co-creation, service-dominant logic, triadic relationships.

Which Factors Influence a Company's Evaluation of the Contribution of Basic Research to Innovation?

Hiromi S. Nagane & Koichi Sumikura

> *"Progress in the war against disease depends upon a flow of new scientific knowledge. New products, new industries, and more jobs require continuous additions to knowledge of the laws of nature, and the application of that knowledge to practical purposes."*
>
> Vannevar Bush
> Director of the Office of Scientific Research and Development

This paper empirically analyses how individuals in companies evaluate the contributions of basic research by universities and public research institutes to industry from multiple perspectives: manager as a spokesperson of the company (science-based industry or others), position within the company (managers or inventors), affiliations of inventors (large pharmaceutical companies or biotech start-ups), and educational background. This paper focuses on the case of Japan. Questionnaire surveys were sent to managers and inventors in established companies and start-ups across several industries. This study found that, 1) the more science-oriented the company, the higher their managers evaluate academic research, 2) inventors evaluate academic research more highly than managers, 3) inventors from biotech start-ups evaluate academic research more highly than inventors from large companies in the pharmaceutical industry, and 4) the more advanced their educational background, the more highly inventors evaluate academic research. This study suggests that 'closeness to science' is an important factor for companies to evaluate contributions of basic research to innovation. The findings also suggest that problems within the current educational system are an indirect cause of the innovation crisis in Japan.

Introduction

Basic research is the fountainhead of innovation. Basic research is defined as an experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view (OECD, 2002). Breakthrough discoveries made in basic research have led to the creation of many unique technologies. For example, Nobel Prize-winning research has proposed innovative technologies that improve our lives and society. The outcomes of basic research are crucial for science-based industries, including applied fields like the pharmaceutical industry.

Basic research is rarely conducted voluntarily in the marketplace. Yet knowledge produced by basic research satisfies both non-exclusivity and non-rivalry as a public good. First, once a public good is made available, users cannot be prohibited from using it, even if property rights have not yet been clearly defined, thus guaranteeing non-exclusivity. Second, knowledge is non-rivalrous in that once generated, it is neither depleted nor diminished by use. It imparts significant benefits to society, yet the company that conducted the relevant basic research cannot monopolize it, despite their having made a substantial investment in producing knowledge. Companies therefore have less incentive to conduct basic research voluntarily. Furthermore, basic research can be subject to great uncertainty, and the potential outcomes of new technology and product development are often difficult or impossible to predict. Consequently, basic research often constitutes a high-risk investment for private companies, which cannot justify focus on conducting basic research simply based on having strong financial power.

Which Factors Influence a Company's Evaluation of the Contribution of Basic Research to Innovation?

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Some private companies around the world have taken the initiative to conduct basic research due to financial luxury or business need. However, the private basic research sector has shrunk significantly, for example, in the United States, as managers consider the role of research laboratories of companies conducting basic research to be shrinking in importance (Rosenbloom & Spencer, 1996). There is a similar situation in Japan, which is the national case study for this paper. Although private companies in Japan have long conducted basic research, many companies have reviewed research laboratories of companies and decreased their association with them owing to poor performance.

Private companies have recently begun to introduce and employ external research units, giving rise to a trend of 'open innovation' (Chesbrough, 2003, 2006). Universities and public research institutes in Japan are important external providers of basic research outcomes to private companies. They can conduct research independent of market mechanisms by taking public funding to conduct research.

However, universities and public research institutes are shrinking in Japan. Until 2019, Japan ranked sixth in number of Nobel Prize winners. However, the number of Japanese academic papers is declining, including its share in the total number of papers and top cited papers (NISTEP, 2019). Many scientists, including Nobel Prize winners, have warned of a crisis in the basic science sector in Japan.

It is important to understand how basic research by universities and public research institutes contributes to industry and society. Innovation will not be promoted if companies do not use the newest knowledge acquired through basic research conducted by universities and public research institutes. We should therefore adequately evaluate and explain the contribution of basic research outcomes by universities and public research institutes as a way to promote knowledge transfer from these organisations to industry. This is what leads to the question we arrived at for this research and for the paper's title: *which factors influence a company's evaluation of the contribution of basic research to innovation?*

It is difficult to assess the extent to which research outcomes from universities and public institutions contribute to industry. The dissemination of basic research takes various routes, and it is therefore difficult to predict or to trace spillover of outcomes and knowledge into industry. Nevertheless, ev/idence-based analysis is required for knowledge management and policy planning. Evidence-based policy is manifested as a global trend known as the 'science of science policy' (Jaffe, 2006), which emphasizes the importance of quantitative methodologies, including econometrics. An evidence-based approach is also important for companies to formulate management strategy. Many countries share this issue and reconsider their understanding on how academic research impacts industry. Thus, there is a need for more research that could contribute to examining the relationship between academic research and its impacts on industries.

The present study empirically analyses the degree to which individuals on the side of industries evaluate the need for research outcomes from universities and public research institutes in industrial applications. It does this from multiple perspectives: manager as a company spokesperson among different industries (science-based industries or others), various positions within an industry (managers and inventors), affiliations of inventors (large pharmaceutical companies or biotech start-ups), and educational background of inventors.

Research Insights from Existing Literature

Both objective and subjective data can be employed to quantitatively analyse the ways in which scientific knowledge from academic research is absorbed and used. Academic papers and patent data are often considered representative objective data. Narin and colleagues (1997), for example, focused on papers cited in patents, showing that approximately 75% of papers cited in corporate patents in the United States were based on public research.

McMillan and colleagues (2000) also analysed U.S. biotechnology IPO companies based on patent references, indicating that this industry depends much more heavily on publicly produced science than other types of industry. Furthermore, some studies have analysed co-author status in printed publications to investigate how relationships between academic and corporate researchers affect pharmaceutical companies' performance. Cockburn and Henderson (1997) focused on scientific papers co-authored by publicly funded and pharmaceutical company researchers, and showed that the proportion of co-authorship with universities correlated with the companies' research performance in drug discovery, as indicated by several important patents granted per research dollar. Such findings

indicate the importance of companies maintaining close connections with the upstream scientific community.

Zucker and Darby (2001) analysed research papers co-authored by celebrated university scientists together with Japanese company researchers in biotechnology, and showed that such collaboration improved companies' patent productivity by 34%, product development by 27%, and product commercialisation by 8%. Zucker and colleagues (2002) also analysed the number of research articles written jointly by company scientists and leading scientists in biotechnology, most of whom were working at top universities, as an indicator of companies' tacit knowledge capture from academia. They used panel data to show that co-publications by company scientists and leading scientists and/or scientists in the top 112 US research universities served to increase the number and citation rate of company patents. They also found that articles published jointly with leading scientists increased these rates significantly more than articles co-authored with the top 112 university scientists. Zucker and Darby (2007) also analysed changes in the performance of biotechnology leaders with relationships to start-ups, who have co-authored papers with start-ups, or held positions in start-ups. They showed that leading scientists who both held positions in start-ups and co-authored joint papers with them had significantly higher numbers of citations than leading scientists who only co-authored joint papers with start-ups. Zucker and Darby (2007) suggest the so-called 'virtuous circles in science and commerce', where scientists can improve their research achievements, and companies can enhance their corporate performance when leading scientists and companies are involved in some way. For example, the study by Zucker and Darby found that 35% of leading bioscientists were involved with companies in commercialising their discoveries in the United States and Japan.

Another study focused on the patents themselves, specifically, the number of partner pharmaceutical companies that jointly applied for patents (Saito & Sumikura, 2010a), and promoted indexing the amount of scientific knowledge companies assimilate from universities and public research institutes. The index the created was used to verify whether the acquisition of scientific knowledge influences corporate performance. The authors showed that the index was positively significant for patent application and patent propensity, but not significant for the number of approved drugs, implying that scientific knowledge assimilated from academia is effective for boosting technological performance in pharmaceutical companies.

However, such an index of objective data does not adequately explain the effects of basic research on industry. The papers and patents used as data by previous studies are considered as the 'outcome of successful research'. Research, however, is known to not always succeed. It may not produce results like papers and patents. However, it also demonstrates that 'failure teaches success'.

Our research found that companies absorb knowledge from universities and public research institutes in diverse ways that are broadly distributed. Fernandez-Esquinas and colleagues (2016) listed the following types of interaction between companies and universities: informal networks, in-company training of university postgraduates and internships, joint research and development (R&D) projects, consultancy work, training of company workers by the university, R&D projects commissioned from universities, use or rental of facilities, exchanges of personnel, patent exploitation, participation in spin-offs and start-ups, joint ventures with universities, and other types of collaborative activities (types listed in order of % of respondents answering 'yes'). De Fuentes and Dutreint (2016) listed channels of public research organization-industry interaction accordingly: publications, conferences, informal information, training (grouped as 'information and training'), hiring of recent graduates (grouped as 'human resources'), contract R&D, joint R&D, consultancy (grouped as 'R&D projects and consultancy'), technology licenses and patents (grouped as 'intellectual property rights'). Most of the research paths on information, training, and human resources are not supposed to produce measurable outputs.

Fig. 1 categorises the knowledge paths from universities and public research institutes to companies based on broadness of scope. Previous works have resulted injoint papers or patents, with academia as indicators of these knowledge paths (Fig. 1-1). Papers and patents are the outcomes of successful research. If the research trajectories fail, then papers and patents do not appear. Industry-academia collaboration such as joint research (Fig. 1-2) facilitates knowledge flow, even if the research does not produce papers or patents, thus indicating a more formal relation. When contracts between companies and academia exist, the relation can be captured visually. However, it is difficult to capture the informal relations depicted at the base of the pyramid in

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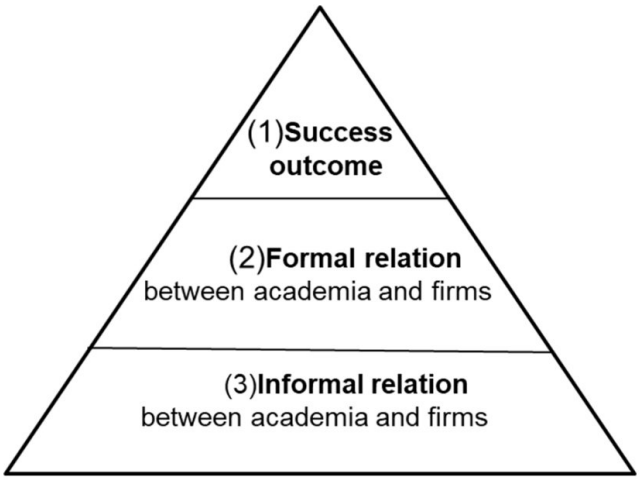

Figure 1. Categories of knowledge paths from universities and public research institutes to industry

Fig. 1-3, since companies can also absorb scientific knowledge from academic research through informal contacts with academia, such as at conferences or symposiums, and in personal exchanges.

Therefore, if we evaluate the contribution of academic knowledge to industry using only information that can be visually captured, it runs the risk that knowledge derived via informal routes may be overlooked.

As previously mentioned, the biotech/pharmaceutical industry has been shown to have great proximity to basic research. According to Stevens and colleagues (2011), 153 of the vaccine and drug products that received U.S. Food and Drug Administration (FDA) approval over the past 40 years were developed through public academic research activities. Notably, biotech/pharma products were not limited to vaccines and drugs. Relevant subjective information can also be useful for grasping the extent to which academic research contributes to a company's products and can be obtained through methods such as questionnaires or interviews.

Mansfield (1991, 1998) randomly sampled major American companies to determine the number of products that could not have been developed without the outcomes of basic research. Using an adapted questionnaire survey following Mansfield (1991, 1998), we applied this inquiry to Japanese companies to analyse how industry representatives in Japan evaluate the contribution of academic research outcomes. Unlike Mansfield, we asked not only managers, but also inventors in private companies.

Research Method

The objective of this study is to analyse how companies evaluate the contributions of basic research to industry from multiple perspectives empirically. We used data from two surveys conducted with different industry respondents: (1) management staff or operations staff in Japanese companies in all fields, and (2) inventors in pharmaceutical companies and biotech start-ups.

Survey for company managers

For survey (1), we designed our questionnaire according to Mansfield (1991, 1998) and delegated the survey conducting task to the research company, Teikoku Databank (TDB). TDB has associations with many companies in all industry types in Japan. The survey was conducted over 20 days, from December 17, 2008 to January 5, 2009. Questionnaires were sent via email to 20,455 companies, of which 10,731 provided effective answers (response rate of 52.5%). Questionnaires were directed to management staff or divisions (hereafter, 'management' also refers to administrative staff, unless otherwise specified). We regarded managers as spokespersons of their companies. Saito and Sumikura (2010b) explain the survey procedure and descriptive statistics of this data in detail.

Survey for company inventors

In survey (2), we focused on inventors engaged in R&D activities with large pharmaceutical companies and biotech start-ups in Japan. Survey (2) was conducted because we found great differences in the responses to survey (1) by industry, especially between science-based

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Table 1. Definitions and descriptive statistics for the inventor survey

Variable	Definition	Obs	Mean	S.D.	Min	Max
Large company	1 if an inventor belongs to a large pharmaceutical company, 0 if s/he belongs to a biotech start-u	159	0.465	0.500	0	1
Research year	The number of years spent by the inventor at the current affiliation	146	11.531	7.087	0	35
Ph.D.	1 if an inventor's highest qualification is doctoral degree, 0 otherwise.	154	0.390	0.489	0	1
M.A.	1 if an inventor's highest qualification is master's degree, 0 otherwise	154	0.429	0.496	0	1
B.A.	1 if an inventor's highest qualification is bachelor's degree, 0 otherwise	154	0.136	0.344	0	1
Junior college	1 if an inventor's highest qualification is Junior college, 0 otherwise	154	0.013	0.114	0	1
Tertiary college	1 if an inventor's highest qualification is Tertiary college, 0 otherwise	154	0.019	0.139	0	1
Career college	1 if an inventor's highest qualification is Career college, 0 otherwise	154	0.013	0.114	0	1
High/Junior high	1 if an inventor's highest qualification is High/Junior high shool, 0 otherwise	154	0.006	0.081	0	1
Commercialization	Q: "What percentage of your company's products and services could not have been created without research outcomes of universities and public research institutes? It is not necessary to confirm the accurate numerical value. Please answer as you feel is appropriate:" 8 if a respondent said all (100%), 7 if very large (more than 30% but less 100%), 6 if large (more than 10% but less than 30%), 5 if moderate large (more than 3% but less than 1%), 4 if moderate small, 3 if small (more than 0.3% but less than 1%), 2 if very small (not zero but less than 0.3%), 1 if nothing.	149	5.322	1.729	1	8
	Q: "At which stage of business were research outcomes of universities and public research institutes helpful?(muptiple answers)"					
Process1	1 if a respondent utilized research outcomes of universities/public research institutes to substitute for in-house basic research (outsourcing) in the business, 0 otherwise.	152	0.283	0.452	0	1
Process2	1 if a respondent utilized research outcomes of universities/public research institutes to complement in-house basic research in the business, 0 otherwise.	152	0.586	0.494	0	1
Process3	1 if a respondent utilized research outcomes of universities/public research institutes to complement a new product or production method, or for having ideas for a service in the planning stage in the business, 0 otherwise.	152	0.401	0.492	0	1
Process4	1 if a respondent utilized research outcomes of universities/public research institutes to complement a new product, production method and service in the developing stage in the business, 0 otherwise.	152	0.289	0.455	0	1
Process5	1 if a respondent utilized research outcomes of universities/public research institutes for receiving hints to solve problems that the company have in technology in the business, 0 otherwise.	152	0.447	0.499	0	1
Process6	1 if a respondent utilized research outcomes of universities/public research institutes to have a theory for their company's technology, which is solely empirical in the business, 0	152	0.151	0.360	0	1
Process7	1 if a respondent utilized research outcomes of universities/public research institutes to verify the effectiveness of their company's technology, 0 otherwise.	152	0.283	0.452	0	1
Process8	1 if a respondent utilized research outcomes of universities/public research institutes to verify the direction of the technology to develop in that particular field in the business, 0 otherwise.	152	0.250	0.434	0	1
Process9	1 if a respondent utilized research outcomes of universities/public research institutes to enlighten, broaden the perspective, and inspire people in charge of research and development in their company in the business, 0 otherwise.	152	0.309	0.464	0	1
Process10	1 if a respondent utilized research outcomes of universities/public research institutes to obtain information that may give us a way to enter a new field of business, 0 otherwise.	152	0.211	0.409	0	1
Process11	1 if a respondent utilized research outcomes of universities/public research institutes to receive hints that enabled you to circumvent other companies' technology in the business, 0 otherwise.	152	0.178	0.383	0	1
Process12	1 if a respondent utilized research outcomes of universities/public research institutes to complement sales promotion of their products in the business, 0 otherwise.	152	0.092	0.290	0	1
Process13	1 if a respondent utilized research outcomes of universities/public research institutes to complement building of their our reputation and brand in the business, 0 otherwise.	152	0.053	0.224	0	1
Process14	1 if a respondent utilized research outcomes of universities/public research institutes in ways other than above in the business, 0 otherwise.	152	0.013	0.114	0	1
Process15	1 if a respondent said that nothing was contributed by the research outcomes by universities/public research institutes in the business, 0 otherwise.	152	0.007	0.081	0	1

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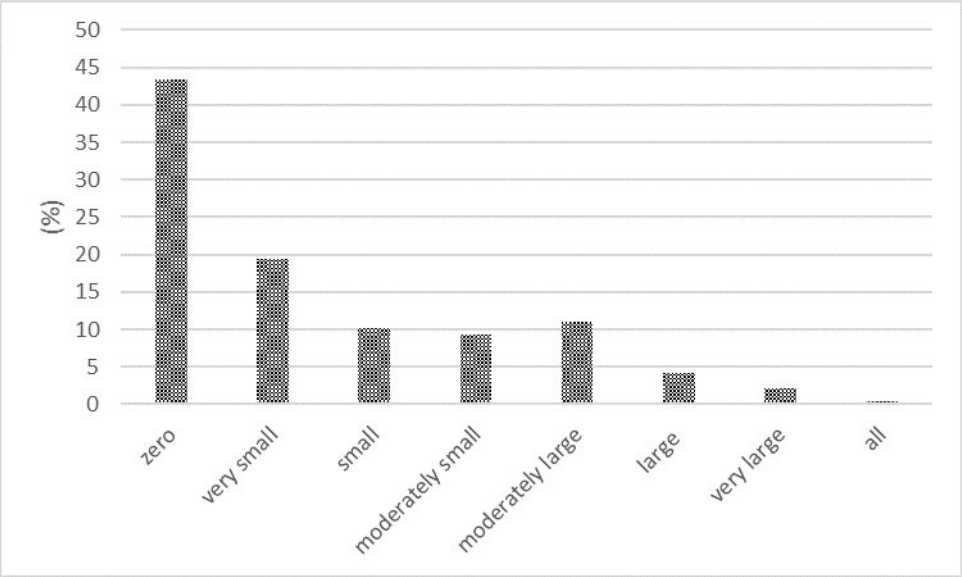

Figure 2. Percentage of products that could not have been developed without research outcomes from universities and public research institutes
Firms in all industries: N=5, 173
Source: Saito & Sumikura (2010b), Fig. 19

industries and other industries. We selected inventors named in important patents, the 10 best-selling companies in 2008 (excluding foreign companies) based on IMS pharmaceutical market statistics, and the 23 companies listed in September 2009 as biotech start-ups in Japan.

As random sampling in this study may result in the inclusion of low-value patents, therefore, using the patents applied for after 2005, we conducted purposive sampling to ensure subjects were included based on the importance of their patents. For this purpose, we used Patent Score, an index used to extract important patents by Patent Result Co. Note that the inventors in this survey did not necessarily belong to the selected companies.

We selected the top 15 inventors in the Patent Score index from among each company's patent applications after 2005. For each large pharmaceutical company, 15 inventors were selected. After excluding two inventors residing abroad, the total number of inventors was 148. A similar approach was used to select biotech start-up inventors. For biotech start-ups that had fewer than 15 inventors after 2005, as many inventors as possible were extracted, and the total number of biotech start-up inventors was 184. Questionnaires were sent to all 332 inventors. Of these, questionnaires sent to six inventors from large companies and 23 from biotech start-ups were returned because of incorrect addresses. The initial investigation period was December 1-18, 2009. However, respondents were also prompted to return questionnaires after the deadline. The final analysed sample was comprised of 160 respondents (response rate of 48%), including inventors from 74 large companies and 85 biotech start-ups. The company type of one respondent was unknown.

Table 1 provides the definitions and descriptive statistics of the sample. The number of observations for both large company inventors and biotech start-up inventors is identical. The mean number of years inventors spent on research was about 11.5, and most respondents (42.9%) held a master's degree (M.A.).

Summary of Results

How do managers evaluate the contribution of academic research outcomes?

Following Mansfield (1991, 1998), we asked managers what percentage of their products they would not have been able to develop without the research outcomes generated by universities and public research institutes. The questionnaire provided eight alternatives: all

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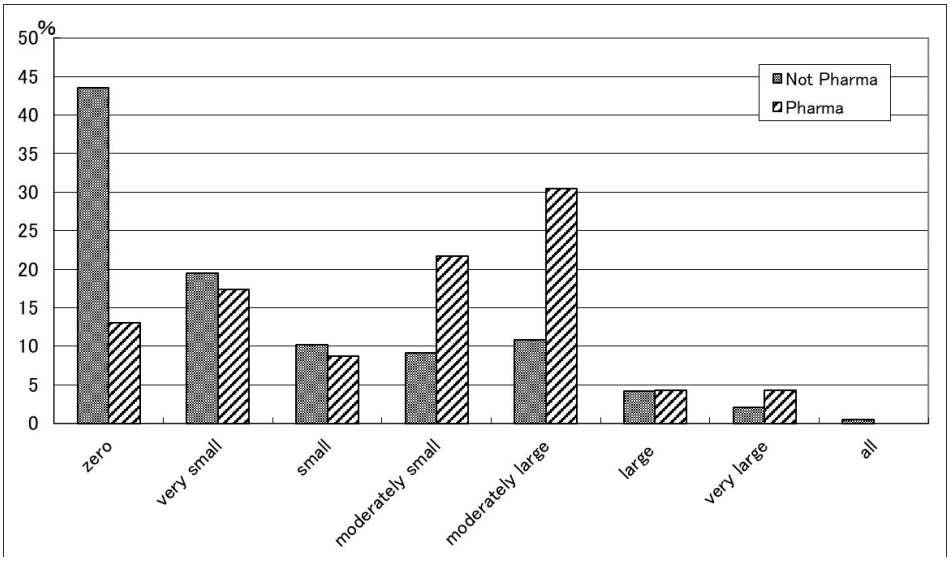

Figure 3. Evaluation of public research contributions to product innovation by managers: Comparison between non-pharmaceutical firms and pharmaceutical firms
Pharmaceutical firms: N=23; Non-pharmaceutical firms; N=5150

(100%), very large (more than 30% but less than 100%), large (more than 10% but less than 30%), moderately large (more than 3% but less than 10%), moderately small (more than 1% but less than 3%), small (more than 0.3% but less than 1%), very small (not zero but less than 0.3%), and zero (0%). Fig. 2 shows the results for managers among all industries.

As seen in Fig. 2., an overwhelmingly large number of respondents selected 'zero' for the contribution extent of academic research, indicating that Japanese companies generally consider the potential contribution of academic knowledge to be of low value.

However, a review of the data by industry highlights interesting aspects of the findings. Fig. 3 distinguishes the results of pharmaceutical companies, a representative science-based industry, from those of others. Most pharmaceutical companies (23) answered 'moderately large', whereas most non-pharmaceutical companies (5,150) answered 'zero'. In addition, the distribution of responses from non-pharmaceutical companies showed disproportionate weights for low evaluations ('moderately small', 'small', 'very small', and 'zero'), which was the expected result. Pharmaceutical companies, as part of a 'science-based industry', require scientific knowledge to produce new products. The closer companies are to science the higher their evaluation of academic research will be.

Note that most respondents were in management or general affairs divisions. Managers indirectly engage in R&D, but may still fail to comprehend the basic research process leading to practical applications of resulting technology, even if they can evaluate commercialisation in the final stage. This may explain their low evaluations of research outcomes. However, inventors who engage in R&D understand precisely how basic research affects product innovation, and so they more fully appreciate the contribution of basic research to technological development. Therefore, we focused on inventors, specifically those in science-based industries.

How do inventors evaluate the contribution of academic research outcomes?

We asked inventors the same question as what was asked to the managers. Fig. 4 shows the distribution of respondents' evaluations of commercialisation based on public research outcomes. The distribution has two peaks: the most frequent response is 'very large', and the second most frequent is 'moderately large'. Compared with managers, the inventors we surveyed attached much higher value to product innovation based on the outcomes of public research.

As previously noted, inventors directly engage in R&D. Therefore, they may have a better understanding of the importance of academic research for R&D than managers. Furthermore, as stated above, the closer a

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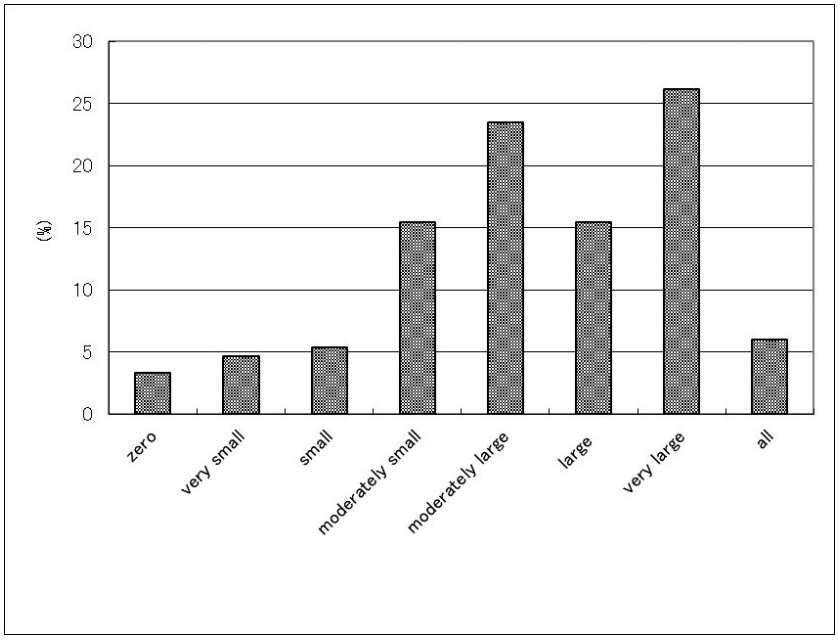

Figure 4. Evaluation of product innovation and market value based on public research by inventors
N=148

company is to science, the higher is likely to be its evaluation of academic research.

Differences between inventors in large pharmaceutical companies and biotech start-ups

We examined the variation in responses between inventors belonging to large companies and those belonging to biotech start-ups. We expected inventors from biotech start-ups to have higher evaluations of public research contributions to commercialisation than inventors from large companies. This was because some biotech start-ups originated out of public research, while large companies typically conduct research and develop products independently. However, this relationship was not necessarily evident in the analysis above. Moreover, differences were expected in terms of the importance of acquiring external knowledge between large pharmaceutical companies and biotech start-ups. We therefore examined whether inventors from biotech start-ups assigned a higher value to the contributions of public research to commercialisation than inventors from large companies.

Fig. 5 illustrates the distribution of responses. The black bar indicates the evaluations of inventors from large companies, while the light bar indicates evaluations of those from biotech start-ups.

The distribution of evaluations by inventors from large companies is slightly skewed to the right side of the diagram, but it is an approximately normal distribution. However, the distribution of evaluations by inventors from biotech start-ups is obviously skewed to the right. The results therefore confirm that inventors from biotech start-ups more highly evaluate the contribution of public research to commercialisation, compared with inventors from large companies.

At which stage are academic research outcomes helpful for companies?

We found that the degree of evaluating academic research contributions differed between inventors from large companies and those from start-ups. This difference might be due to how they use academic research. We thus examined how large pharmaceutical companies and biotech start-ups identified different uses of academic research outcomes. For the former, the purpose of research may be to produce new drugs, while for the latter, it may be to produce research tools. Our survey did not collect the necessary information to distinguish between these uses. However, we were led to assume that the stages at which large pharmaceutical companies and biotech start-ups use academic research outcomes differ, since their products differ significantly. In this regard, some questions asked in our survey were relevant for these evaluations. Each respondent was

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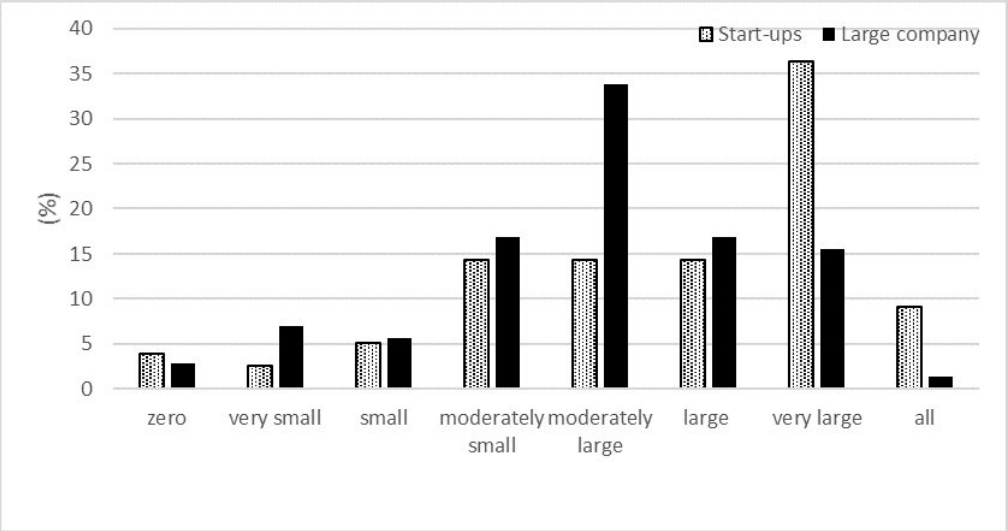

Figure 5. Evaluations of public research contributions to commercialisation: Large firm inventors vs. biotech start-up inventors
N=148 (Large company: 71; Start-ups: 77)

asked, 'At which stage were research outcomes from universities and public research institutes helpful for your company?' Respondents could select from the 15 alternatives shown in Table 1. Fig. 6 shows the responses by affiliation.

The results demonstrate the similarities and differences between large pharmaceutical companies and biotech start-ups in their use of academic research outcomes. A test of statistical independence indicated that biotech start-ups utilised academic research outcomes more frequently than large pharmaceutical companies, with significant differences in Process 1 (Substitute for Basic Research), Process 7 (Confirmation of Effectiveness of Tech), and Process 12 (Complement for Merchandising). The results also showed that large pharmaceutical companies utilised academic research outcomes more frequently than biotech start-ups, with significant differences in Process 5 (Hint for Technological Problem-solving) and Process 9 (Enlightenment for R&D Workers). Here, we note a tendency for biotech start-ups to utilise academic research outcomes directly as R&D to substitute for their own basic research, while large pharmaceutical companies utilise them to indirectly support their R&D, as enlightenment for workers.

Which inventors highly evaluate public research contributions to industry?

The above analysis did not identify the factors on which respondents base their evaluations of the contributions of public research to commercialisation. Although the outcomes of public research depend on multiple factors, we focused on whether inventors were affiliated with large companies or biotech start-ups. However, we acknowledge that the evaluation of public research also depends on other factors, for example, research experience and educational background. Furthermore, differences in evaluating the contributions of academic research outcomes to products may reflect differences in the stage at which the respondent utilises the outcome; alternatively, it may reflect other respondent factors. Therefore, an ordered probit (probability unit) model was used to control for these factors and to analyse how inventors' backgrounds affect their evaluations. The stages of use of academic research outcomes were also controlled for.

Eight order alternatives for commercialisation were taken as dependent variables. The ordered probit model was also used to analyse how public research outcomes enabled company performance. Eight ordered answers were proposed for the contribution to commercialisation as ordered variables. The model is given by:

$$y_i^* = X_i a + e_i \quad e_i \sim N(0, s^2)$$
$$y_i = j \quad if \quad \mu_{j-1} \le y_i^* \le \mu_j, \quad j = 1,...,J, \quad \mu_0 = -\infty, \mu_J = +\infty$$

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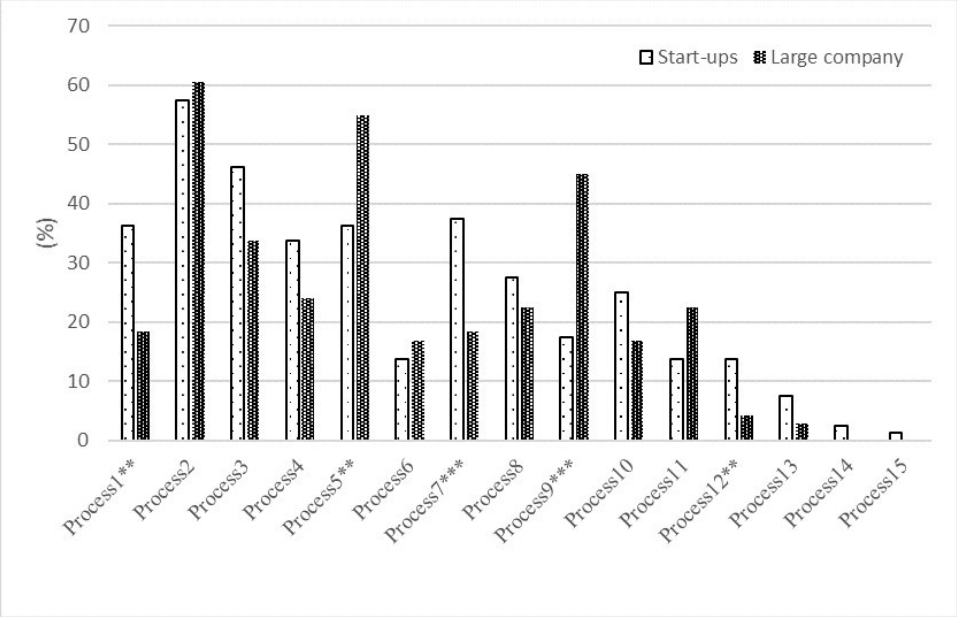

Figure 6. Stages at which academic research outcomes are helpful for firms' business by affiliation
Test of independence: ** significant at 5%; *** significant at 1%.

where y^*_i is an unobservable latent variable, and y_i is an observable variable. *j* corresponds to 8 if a respondent indicated 'all', 7 if 'very large', 6 if 'large', 5 if 'moderately large', 4 if 'moderately small', 3 if 'small', 2 if 'very small', and 1 if 'zero'. *a* is a parameter. *X* is a dummy variable for inventor background (see Table 1). We suppose that the error term e_i exhibits a logistic distribution. However, Processes 14 and 15 were omitted from the independent variables because no pharmaceutical company answered 'yes' to them.

Table 2 below shows the estimation results for the contribution of academic research to products.

Both Wald tests were rejected. The baseline educational qualification is 'High/Junior high school'.

Model (1) controlled for only the basic attributes of inventors. In addition to these factors, Model (2) controlled for the stages of using academic research outcomes, excluding the affiliation with 'large company'. This was done to avoid an estimation bias resulting from the possibility that use stages depended on affiliation. In Model (3), all variables were controlled. The results for 'Research year', 'Ph.D.', 'Junior college', and 'Process 3 (Complement for Idea/Planning)' were found to be robust because they were significant in any models. However, 'junior college' does not have important implications in this study because only two participants were junior college graduates. Therefore, we excluded the result for 'junior college' here.

Our results indicate that inventors with extended research careers tended to assign low values to public research contributions, while inventors with a Ph.D. tended to assign high values. Inventors with a Ph.D. are expected to understand the contents of advanced technology and thus appreciate the outcomes of public research. Further, inventors were found to assign high value to academic research outcomes when companies utilised them for aspects such as 'Complement for Idea/Planning'.

Discussion

This study found that:

1) Managers of pharmaceutical companies evaluate academic research more highly than other industries do.

2) Inventors evaluate academic research more highly than managers in pharmaceutical companies or biotech start-ups.

3) Inventors from start-ups evaluate academic

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Table 2. Estimation by ordered probit model based on 'Product'

		(1)				(2)				(3)		
	Coef.	S.E.	Z-value		Coef.	S.E.	Z-value		Coef.	S.E.	Z-value	
Large company	-0.45	0.21	-2.18	**					-0.31	0.24	-1.27	
Research year	-0.04	0.01	-2.48	**	-0.04	0.01	-3.34	***	-0.03	0.02	-2.27	**
Ph.D.	0.96	0.45	2.15	**	0.59	0.31	1.92	*	0.77	0.34	2.29	**
M.A.	0.39	0.46	0.85		0.13	0.31	0.42		0.33	0.35	0.94	
B.A.	-0.53	0.51	-1.04		-0.75	0.43	-1.74	*	-0.68	0.45	-1.52	
Junior college	1.19	0.47	2.54	**	1.42	0.38	3.71	***	1.56	0.41	3.8	***
Tertiary college	-0.29	0.69	-0.41		0.50	0.95	0.52		-0.28	0.64	-0.43	
Career college	1.50	1.00	1.5		1.05	1.07	0.98		1.34	1.05	1.27	
Process1					0.31	0.24	1.33		0.22	0.24	0.95	
Process2					-0.11	0.19	-0.56		-0.03	0.19	-0.17	
Process3					0.41	0.21	1.92	*	0.38	0.22	1.74	*
Process4					0.09	0.21	0.42		0.09	0.21	0.44	
Process5					-0.21	0.18	-1.19		-0.12	0.18	-0.64	
Process6					-0.16	0.26	-0.6		-0.20	0.27	-0.76	
Process7					0.30	0.19	1.59		0.26	0.20	1.34	
Process8					0.13	0.19	0.67		0.20	0.20	0.96	
Process9					0.02	0.18	0.08		0.01	0.19	0.07	
Process10					-0.11	0.24	-0.48		-0.15	0.25	-0.61	
Process11					-0.14	0.21	-0.65		-0.03	0.23	-0.15	
Process12					0.42	0.35	1.23		0.36	0.36	1	
Process13					-0.54	0.51	-1.05		-0.54	0.55	-0.99	
cut1	-2.47	0.57			-2.49	0.55			-2.36	0.57		
cut2	-1.85	0.52			-1.88	0.49			-1.72	0.51		
cut3	-1.45	0.49			-1.50	0.46			-1.33	0.48		
cut4	-0.80	0.47			-0.83	0.45			-0.65	0.47		
cut5	-0.05	0.47			-0.05	0.43			0.14	0.46		
cut6	0.46	0.46			0.49	0.43			0.69	0.45		
cut7	1.84	0.50			1.85	0.45			2.13	0.48		
Obs	140				141				140			
Pseudo R2	0.08				0.10				0.11			
Log pseudolikelihood	-234.36				-232.57				-228.03			

research more highly than inventors from large companies in the pharmaceutical industry or biotech start-ups.

4) Ph.D. holders evaluate academic research more highly than inventors without a Ph.D.

We therefore suggest that the closer a business person is to science the higher his or her evaluation of the contributions of academic research will be. Fig. 7 shows the relationship between closeness to science and evaluation of academic research.

Based on these results, we examined the 'health' or 'sickness' of innovation in Japan. As mentioned, the basic research sector has recently diminished in Japan.

Which Factors Influence a Company's Evaluation of the Contribution of Basic Research to Innovation?

Hiromi S. Nagane & Koichi Sumikura

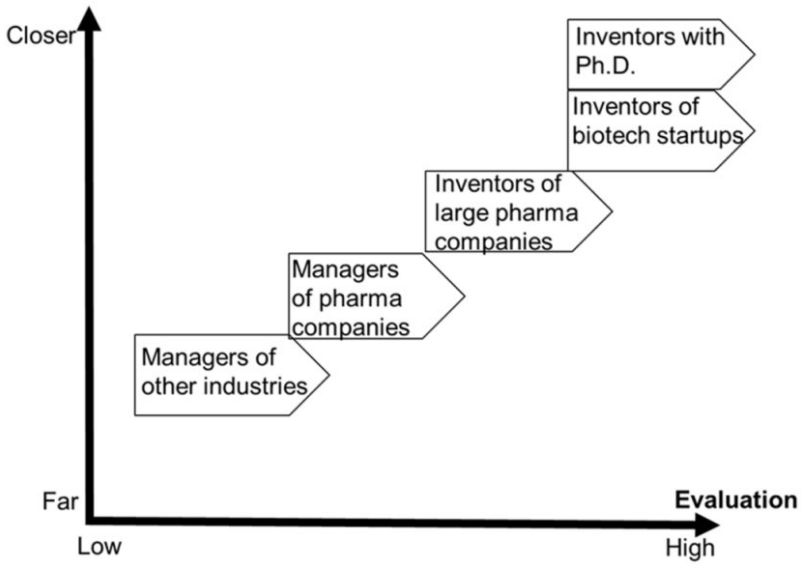

Figure 7. Relationship between evaluation of contributions of academic research and closeness to science

This is true for industry as well as for universities and public research institutes. The level of basic research that is important for innovation, however, is still unknown. One reason may be due to Japan's specific organizational structure. In Japan, many officer-class executives graduate from liberal arts courses (Toyokeizai, 2018), and those without a natural science background may not understand the importance of basic research. Moreover, there is little interaction between the liberal arts and natural sciences domains in Japan, as also between managers and inventors.

Furthermore, the Japanese educational system requires students to choose a single program – 'liberal arts' or 'natural science' – at an early stage, during first year in university or high school. Many countries have similar systems to this, but, in Japan, there are few opportunities for students to interact with both fields after graduation. This 'division' leads to a basic problem in technology management. The roles are fixed: individuals from liberal arts backgrounds are managers, while those from natural science backgrounds conduct R&D. We believe to overcome this gap in communication that platforms should be created where individuals from these backgrounds can communicate with one another. Furthermore, the educational system in Japan should be reformed to enable more interdisciplinary interaction. We believe that the curriculum should be re-designed in order to facilitate the study of both liberal arts and natural sciences, at least at some level, for all Japanese students.

Conclusion

This study concluded that 'closeness to science' is important to companies' evaluations of the contributions of basic research to innovation. It found that 1) the more science-oriented the company, the higher the evaluation of academic research by managers, 2) inventors evaluate academic research more highly than managers, 3) inventors from biotech start-ups evaluate academic research more highly than inventors from large companies in the pharmaceutical industry, and 4) the more advanced their educational background, the more highly inventors evaluate academic research. This study suggests that the closer individuals in companies are to either doing or understanding science, the higher will be their evaluations of the contributions of academic research.

Existing literatures have already empirically studied the impact of basic research on industry. However, most studies have based their evaluations on formal outcomes, such as papers and patents. In contrast, this study contributed to existing literature in that it empirically gave shape to a potential evaluation for basic research.

What is the importance of these findings? When basic research outcomes are transferred from university and

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public research institutes to industries, companies can create breakthrough technologies as well as new products and services. If companies lack talent that can adequately discern and evaluate academic research, engagement with external basic research outcome stagnates. Companies generally separate workplaces, however, between management and R&D departments. If companies were to help educate managers in properly evaluating the value of basic research, or assign individuals to advise managers on technology, it could help companies induce basic research outcomes.

The Japanese educational system divides students into 'liberal arts' and 'natural sciences' programs at an early stage, in high school, or in the first year of university. For this reason, technology management programs that have recently developed in university graduate schools could end up playing a significant role in Japan.

This study used survey data in Japan. However, we suppose that it is possible to generalize the results if a similar survey were to be conducted in other countries. This is an issue for the future.

This study has some limitations. First, we could have additionally introduced qualitative methods, such as case studies or interviews, along with the quantitative approach. Furthermore, interviewing managers and inventors belonging to the same company would significantly enhance the research insights. Second, while this paper focuses on Japan, the research can be extended in the future to include other countries. This would serve to provide a way to verify whether our results extend to other countries as well.

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About the Authors

Hiromi S. Nagane is Professor of Graduate School of Social Sciences at the Chiba University in Japan. She earned her Ph.D. in Economics from Hitotsubashi University. Her research interests are health economics, economics of innovation, science and technology policy, higher education policy, and industry-academia collaboration. She has published articles about health regulations, the relation between firms' performance and absorptive capacity, the productivity of academic articles, leading scientists, and so on. She also received a category award for her article about science and technology policy from the Japan Society of Mechanical Engineers in 2020. She holds the post of visiting scholar of the National Institute of Science and Technology Policy (NISTEP) of the Ministry of Education, Culture, Sports, Science and Technology (MEXT).

Koichi Sumikura is Deputy Director, GiST Program, GRIPS Professor. He earned his Ph.D. from the University of Tokyo Graduate School for Engineering in 1998 and is now a visiting assistant at the University of Tokyo's Research Unit. His specialty is in intellectual property rights, bio-technology, and industry-academia collaboration. He is a visiting scholar of NISTEP.

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