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The 14 Faces of Commercialization

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Abstract

The 13 faces of Commercialization

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Background

This is a journal focused literature review. The focus is on The Journal of Product Innovation Management which can be argued to be among the top innovation management journal and it is hence a proper place to investigate the state of commercialization research and definition acceptance in innovation research, which is the aim of the paper.

Abstract

The ultimate purpose of new product development is commercialization of the results. That is, creating returns for the investment. The authors investigate to what degree research published in Journal of Product Innovation Management has contributed to further our understanding of the concept and meaning of commercialization. The paper finds that only

8.3% of the published research in the last 30 years has contributed in some way to further our understanding of commercialization. Furthermore, a definition that is broadly accepted and applied has not materialized. Based on the existing publications, a definition, and a further research agenda is developed. A part of the papers contribution is the application of a focus-based view on the classical New Product Development roadmap.

The 14 faces of commercialization

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Abstract

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[REVIEWER NOTE: THIS IS 10.584 WORDS. HOWEVER AS THIS IS A LITERATURE REVIEW, SO 2858 IS THE REFERENCE LIST. WE APOLOGIZE FOR BEING OVER 10.000 WORDS FOR THIS REASON).

Introduction

When an organization commits its limited resources to innovative endeavors it expects new revenue streams or increased profitability. This return on new product investment can only be achieved by bringing the new product to customers. This is generally referred to as commercialization. What follows is a literature review of commercialization research in *Journal of Product Innovation Management (JPIM)*. JPIM was chosen because it, along with *Research Policy*, is the authoritative and main source on new product innovation research (Thongpapanl, 2012), and deals explicitly with the new product innovation management. Further within JPIM (Ernst & Fischer, 2014) point out that research in, and a definition of, commercialization is needed and (de Jong et al., 2014) highlight the interest in sales and subsequent commercialization by practitioners.

So while commercialization is central, its academic treatment is not; over the last 30 years of research published in JPIM only 347 sources uses the term. This picture deteriorates when we look at which of these sources are research sources that actually contribute to the term in more than just a passing manner; only 93 papers, or just ~8% of the total research published. We find this is a low level of interest for the step in new product development which is likely to be of the largest interest to the shareholders of commercial organizations engaged in innovation. That is why we believe this literature review is needed to lay the groundwork for further work in the understanding of commercialization.

This paper contributes in three significant ways; 1) we investigate and map the different understanding of commercialization, 2) propose a shared definition 3) we collect the insights on commercialization gathered in the 30 years of JPIM. These contributions matter greatly for several reasons. Firstly, they address the research gap and practitioner demand for commercialization research, and subsequently support further work by others in the area. Secondly, in the background debate of first mover advantage versus fast second it is vital to investigate what commercial capabilities can turn innovators into profiteers. Thirdly, important insights have been gained in the JPIM on the roles of R&D and marketing specifically, as well as the cooperation between, while sales have been given a relatively smaller interest (although this does seem to be changing). We believe a shared theoretical understanding of commercialization can help future scholars to go beyond the department approach and truly investigate how innovations are given a staying place in their respective potential markets.

This paper proceeds in the following way. In section one we outline the methodology. In section two we outline the bibliometric picture of commercialization research within the JPIM. These insights

are further expanded in Appendix 1. In section three we present and use an novel method of analyzing commercialization research based on organizational focus within the classic new product development roadmap. Based on our analysis we present a definition that transcend and can help to clarify commercialization. In section four we present an overview of the commercialization research published in JPIM. In section five we suggest ideas for further research conclude.

Methodology

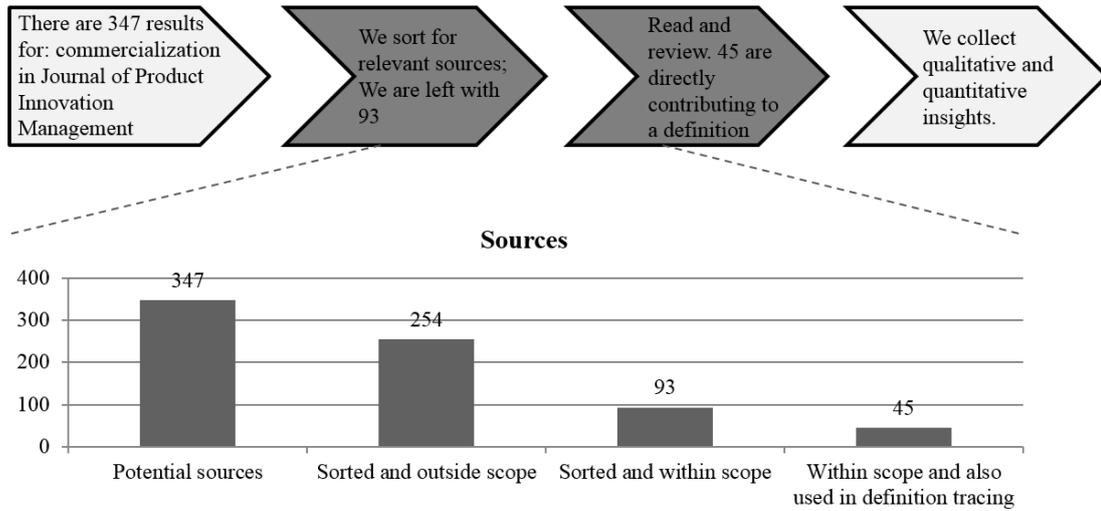
In this section we outlay our methodology of how we came about our sample population and how we treat it. First, we performed a Boolean search in all the issues of JPIM up to and including the July 2014 issue for the term “commercialization” via Wiley online. This resulted in a list of 347 sources mentioning the word. Searching with deviations such as “commercializing” did not reveal additional material of relevance¹. Next, a screening of the material identified 63 publications as letters from the editor, book reviews, abstracts, and such, which were removed from our sample before proceeding as we aimed only to include original research work. Next, we removed papers where commercialization was mentioned only in passing, as these did not add to our understanding of the concept.² The 93 remaining research publications were subsequently added to a database containing their core data dimensions (like year, author, etc.) and dimensions added by us such as methodology and Research Design³. All 93 articles where reviewed in their entirety and not just in their abstract. Of these, 45 where further included in a definition analysis, as they in our view directly contribute to define commercialization.

¹ A potential criticism of our narrow focus on the word commercialization and close alternatives in itself would be that we miss articles dealing with specific or narrow aspects of commercialization, such as for instance “product launch”. We make the assumption that for such works to be relevant they have to mention commercialization directly. After all, many of the aspects one might put under the term commercialization but without defining it does not need to be motivated by commercial aspirations at all. A company can launch a product for the sheer reason of doing it¹ for instance.

² For an illustration see (Teotia & Raju, 1986)

³ See (see Guo, 2008 P 28). We used this categorization, as it has previously been applied in JPIM.

Figure 1: Method

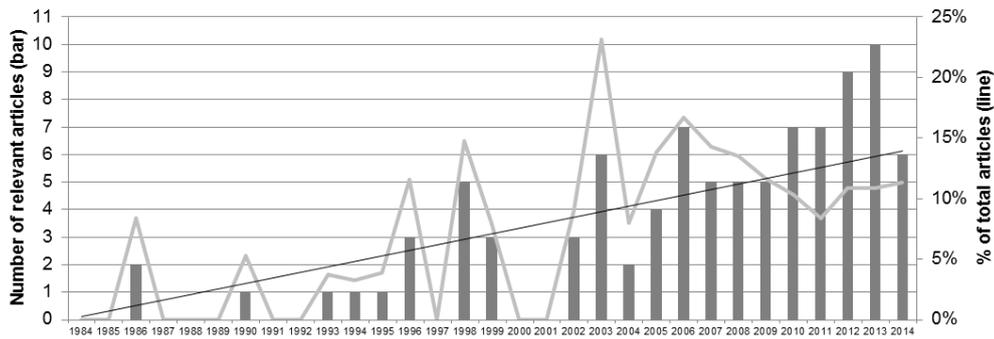


Having worked with the sample population in detail we would like to shortly draw attention to two potential pitfalls in the approach. While we believe we present a complete picture of direct commercialization research in JPIM we can have missed some relevant contributions. Commercialization can be missed by our approach if the researchers have assumed it away or overlooking the relevance by having it as just a stage or natural consequence. We denote this macro blindness. Commercialization can also be missed by our approach if researchers already believe it so established a function that only a small fraction of it is dealt with. Examples include: supplier involvement, strategic alliances, tech trans. We denote this micro blindness. Such macro or micro blindness would not have been captured by our approach and we do not deal with it, but advice readers to complement our research with the specific area of their interest.

Bibliometric findings

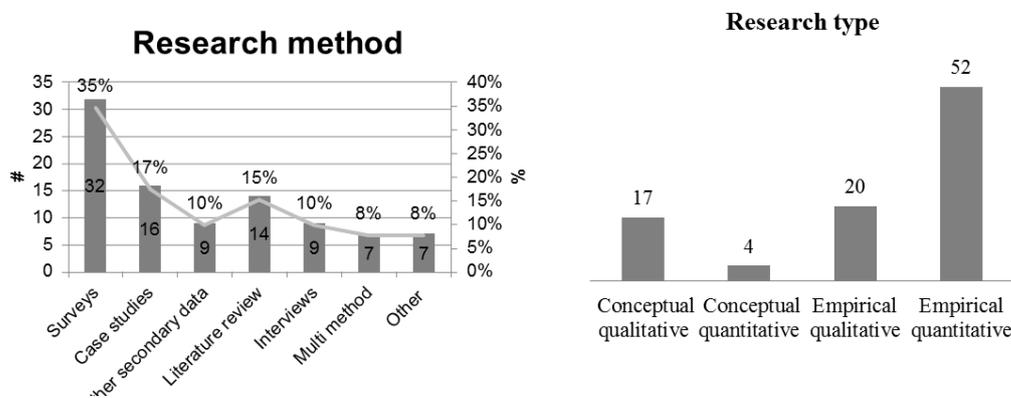
In this section, we examine the bibliometric attributes of our sample. We do so in order to illuminate if any clear publication or research method trends are present. We first look into the year of publication of our sample. This is shown in Figure 2. The pattern is that commercialization has become a steady fixture every year since 2002. This point to a growing trend of interest in the area in JPIM. But the issues and number of articles per issue have also grown in the same period, so another result would have been surprising indeed. Overall, we find that 8.3% of the published research contributes directly at some level to further our understanding of commercialization. In the last 10 full years (2003-2013) of our sample this has risen to just below 12%.

Figure 2: Year of publication
Year of Publication



The next step is to look at the methodology and research design of the papers in the sample. These numbers are presented in Figure 3. We find that the sample papers are mainly empirical in their method. This result was expected, as commercialization success is often easy to measure ex post (either in direct sales figures or anecdotal) as the result of the commercialization process would be apparent even in the shorter term. Commercialization appears, in other words, to be an area that is easy to investigate empirically. The conceptual papers we find tend for the largest part to deal with literature reviews.

Figure 3: Research design



We have done further bibliometric analysis and these results are presented in Appendix 1. The main takeaways from these are that no clear research careers or school of thought seem to be dedicated to commercialization or have taken a clear lead in its shaping in JPIM. It is in other words still an open field, which further underscores the need for a common definition to support further research. Another take away is that most papers are from North America and written by academics. This could indicate a potential benefit of further practitioner involvement and for comparative work – after all commercialization could vary from region to region, just like from industry to industry.

In order to test the robustness of our bibliometric results we turn to Guo (2008) who have done a literature review of the first 22 years of JPIM. He attest that 15.4% of published research in JPIM

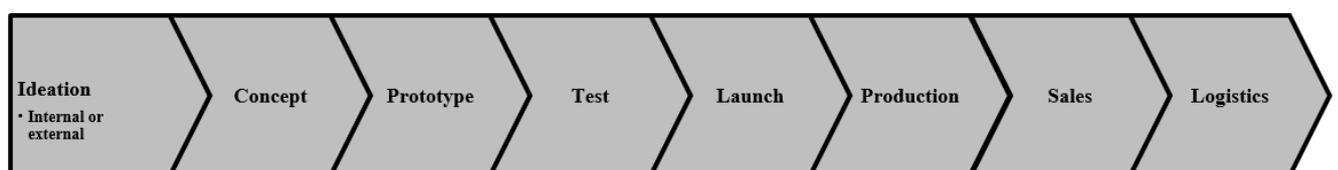
deals with commercialization. If we only investigate the same period, we find that only 5.5% deals with commercialization, which is a significant difference. The difference is found in methodology. Guo examines abstracts, and rather than using the term commercialization he includes certain functions (1: Launch strategy, 2: Launch tactic, 3: Competition and external environmental influences, 4: Diffusion, adoption and consumer evaluation of product attributes, 5: General launch management) as being commercialization. Such an approach of categorizing papers based on abstracts risk widening the sample by including papers that are not about commercialization, while at the same time limiting the sample by excluding papers that are about commercialization but falls outside the used categories. We believe our approach is the most correct as it examines the papers in their entirety.

The final test of our bibliometric results is to ask: “How much commercialization research can be supported by data?” A tentative idea of this level can be found when comparing to Markham & Lee (2013). According to them, the commercialization rate was 19% in 2012 while it was 24% in 2004. It is interesting to note the mortality curves for North America, Asia, and Europe are similar, although North America has a measurably higher success rate than Asia and Europe. This might give some idea that there seem to be enough data to support further work in the area across all regions and likely within most industries, which would make our result of 8.3% a disproportionately low level of research attention.

Towards a definition

An important aim of this paper is to map, and potentially advance, a shared definition of commercialization. After our bibliometric analysis presented above, the next step for us was to map to which degree one or more definitions exists. Since we are especially looking for new product or service commercialization, and because a large body of literature exist in JPIM which explicitly or implicitly resolves around a New Product Development roadmap model in one take or another, an idealized version of a NPD roadmap became our starting point for grouping the 45 sources contributing to a commercialization definition.

Figure 4: Stylized New Product Development Process



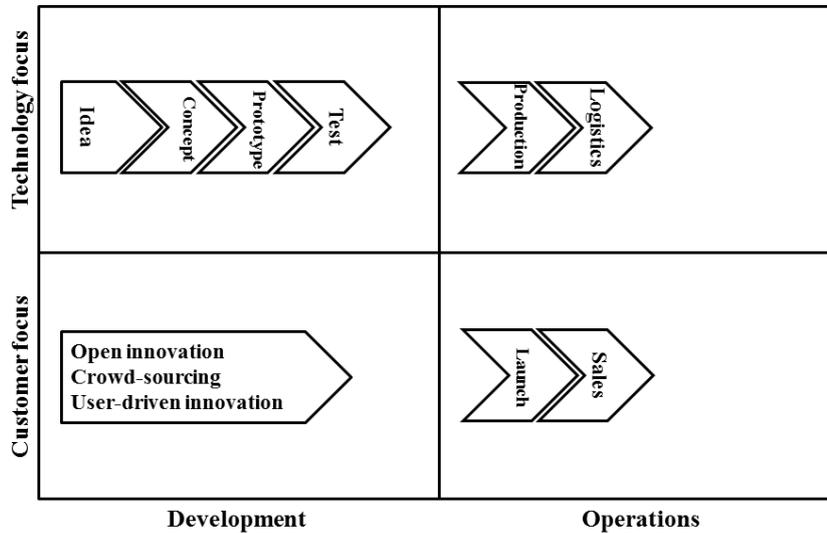
Unfortunately it became clear that a straight linear approach was too narrow an optic for the commercialization definitions we found; we risked missing the very nuances that made the different definitions different from one another. At this point our analysis benefited from the point raised in Abernathy et al. (1985) that “*The first step in developing a categorization of innovation is to get straight the question of perspective.*”⁴ In short, some innovations are relevant from a technical perspective while others from a user perspective, and some for both. Our reading of their point relating to perspective in relation to commercialization, is to assume that commercialization contains an element of exchange by external and voluntary market actors. To test if that holds true we develop and apply a 2x2 matrix of focus versus stage. On the x axis we have technological focus and customer focus, while on the y axis we have development stage and operations stage.

In figure 5 we present the model that result from combining an idealized NPD roadmap model with the perspective matrix. We go on to present how to read each quadrant⁵, and present a table that contains the definitions placed here by our analysis, as well as our evaluation of them. Next, we present a table of the definitions that cannot be contained within our combination of a linearity and perspective; this we denote as our error term. To make reading easier we start from the upper left quadrant, and consequently also present the definitions that grow out to spread to other quadrant from that quadrant.

⁴ We are unable to utilize their framework directly as it deals with Innovation type and is based on work within competitive position, which is a different aim than ours.

⁵ The joint model is not meant to reflect organizational structure, i.e. the marketing department or the R&D department can typically work in many of the stages. Projects can also crisscross, and feedback loops likely occur formally and informally within the model.

Figure 5: Dividing the NPD



Technology & Development - Upper left quadrant.

In this quadrant we find the focus of “what can we create” as an organization. This contains ideation, concept, prototype, and test. It is home to definitions that see commercialization as the conclusion of the efforts in the previous steps taken in NPD. The premise is that since a technology is needed in order to have something to commercialize, the whole NPD process should be viewed as a commercialization process. In some managerial eyes this might ring true as a visionary statement, but from a scholarly viewpoint, such an approach will miss important complexities and differences from company to company. In this quadrant we also find the definition that commercialization is “test plus launch plus production”. While a test phase can be aimed at testing the market as well, it is still very much internally focused and primarily serves the initiating company's interest, like risk coverage and production planning. Furthermore, even a successful test with selected customers cannot testify to the product survival in an ongoing voluntary market process. Growing from this quadrant, we also find the slit view and the bridge view. The former contributes with a clear distinction between the technical development and the operations of delivering products to customers. The latter contributes with the view that in order to commercialize, a bridge between the technical and the customer focus, as well as between the development and the operations are needed. The source found here is of particular interest, as it directly mentions the design of business models as part of commercialization. The mention of business models is oddly rare in our review, but in this source, it takes a prominent place as it is formed not just by one department or quadrant in our model, but is shaped holistically by a committee.

Definition	Model placement	Frequency & sources
All steps Commercialization is completing all steps in a new product development roadmap	Upper left quadrant & both right quadrants	1 Wood & Brown, 1998.
The split view Commercialization is the clear difference between technical development and business operations	Interstice between quadrants	2 Song & Montoya-weiss, 1998; Veryzer, 1998.
The bridge view Commercialization is a bridge between technical development and business operations	Interstice between quadrants	1 Jaspers et al., 2012
Launch + Production + Test Commercialization is the test stage	Upper left and both right quadrants	1 Durmuşoğlu et al., 2013

Customer & Development: Lower left quadrant

In this quadrant we find the focus of “what do people want us to create” as an organization. This is various externally focus product developments tactics, such as open innovation, crowd sourcing, lead user innovation etc. We find no commercialization definition that fits here in our literature review.

Definition	Model placement	Frequency & sources
-	-	0

Technology & Operations: Upper right quadrant

In this quadrant we find the focus of “what can we deliver” as an organization. This is production, logistics and the classic discipline of operational management. Here we find the life-cycle management view on commercialization. It implicitly assumes that sales are taking place and commercialization is a matter of efficiently meeting the sales demand with a supply. We however believe that to assume sales is missing an important aspect of business practice, risk exposure and scholarly relevance. We also find a simplified view on this in seeing commercialization as the production resulting from launch.

Definition	Model placement	Frequency & sources
Production from launch Commercialization is the production stage	Rights quadrant	1 Song & Thieme, 2009
Life-cycle management Commercialization is producing and distributing products	Upper right quadrant	2 Marion et al., 2012; Dröge et al., 2000.

Customer & Operations: Lower right quadrant:

In this quadrant we find the focus of “how do people want what we have created” as an organization? This is product launch and sales. It includes the definition that commercialization is purely launch. We find this definition problematic. Mainly because to launch a product is in and by itself not commercial, in the sense of involving commerce or external voluntary actions of other agents. It is possible for any organization to launch a product without ever selling a single unit. It is, despite what might be believed at a casual glance at the word, a company-centric and internal step. The quadrant also includes the definition of commercialization as outside of the firm adaptation. This is an interesting view stating that commercialization requires that customers adapts the product, and that sales people will need to help customers reap the full benefits. With such a view, it is a fair question to ask if commercialization is part of new product innovation at all? We also in this quadrant find the Schumpeterian approach to innovation where the goal of commercialization in the very definition of innovation itself. Finally the quadrant contains works that sees commercialization as after market impact. From this perspective commercialization deals with what happens with a product after it reaches the market; How is it sold? The degree to which adaptations can be said to be widespread or dominant? Etc. It is also a view that it is not before other actual competing products, as the customers view them, are known in the market place, that commercialization has taken place. It is the point where a company’s strategy is manifested in reality, but can also be a stage that still pivots the revenue or delivery model to best fit the customers. A final note is that while NPD literature often views the frontend as being ideation, this definition can challenge that and state that from a customer point of view, the commercialization stage is the true front end. That last point we believe holds large managerial relevance.

Definition	Model placement	Frequency & sources
Launch Commercialization is the launch stage	Lower right quadrant	12 Guiltinan, 1999; Thieme, 2003; Bayus et al., 2007; Kleinschmidt & Brentani, 2007; Bruce et al., 2007; Artz et al., 2010; McNally et al., 2011; Wooder & Baker, 2012; Chiesa & Frattini, 2011; Frattini et al., 2014; Malshe & Biemans, 2014; Bianchi et al., 2014
Outside of the firm adaptation Commercialization is when an innovation is adopted outside the firm	Lower right quadrant	3 Athaide, 1996; Li et al., 2008; Athaide & Klink, 2009
Schumpeterian General description of innovation as commercialization	Lower right quadrant	3 Caerteling, 2008; Blindenbach-Driessen & Van Den Ende, 2010; Pullen et al., 2012.
After market impact Commercialization is after a product has reached a market	Lower right quadrant	9 Astebro & Michela, 2005; Cooper, 2008; Breznitz et al., 2008; Ulrich, 2011; Luchs & Swan, 2011; O'Connor & Rice, 2013b; Bohlmann et al., 2013; O'Connor & Rice, 2013a; Holahan et al., 2014.

Error term: Outside framework

As with most analytical models, ours are not able to capture the world in its entirety, however what is not captured, our error term, can be analyzed as well and provide insights exactly by being outside the ability of our model to capture. Here we find the socialized description of commercialization; The metapoint of the single source, dealing with lead user innovation and the Danish toy manufacture Lego, is that in order to truly denote a product a commercialization the product has to create benefits or even economic rents that can be shared among several agents. Or in more precise terms, a product is commercialized when the value it creates for customers enables customers to create new value not thought of by the original seller or innovator. We believe this to be a truly important argument and worth a solitary grouping in our review. We have also in this grouping grouped the non-descriptive and pre-definition approaches to commercialization research. The former are papers that while attempting various degrees of definitive work, it is either self-fulfilling, circular, or not contributing. They are in their own merit good works of research, but for this task they are not contributing. The latter are papers that helps us understand that commercialization is external in nature, which in turn diminishes control and increases uncertainty. Ultimately, we in this quadrant also find the argument that commercialization is a purely practical matter and viewed as such, and therefore not truly incorporated as part of a new product evaluation process.

Definition	Model placement	Frequency & sources
Socialized description Socialized view on commercialization	Outside framework	1 Hienerth et al., 2014
Non-descriptive A contribution that is circular, empty or self-filling	Outside framework	6 Lee et al., 1994; Brettel et al., 2011; Marion et al., 2012; Frishammar et al., 2012; West & Bogers, 2014; Cheng & Huizingh, 2014.
Pre-definition Adds to our understanding of the nature of commercialization	Outside framework	2 Kahn et al. 2012; O'Connor & Rice 2013a.
Not relevant The argument that Commercialization is a practical matter and not part of innovation research	Outside framework	1 Alam (2003), Hart et al. (2003).

Together the above forms the 14 faces of commercialization we have found in JPIM. Generally the framework appears to be able to contain most definitions which shows the frameworks analytic value. A couple of immediate conclusions arise as well: First off, there are no articles in the lower left quadrant. This is likely due to the fact that there the commercial aspects are present before or at the onset of a company's involvement with a product, meaning that the process of making an innovation commercial is not needed as a separate step. The second conclusion is that the single largest "face", counting >25% of the papers, sees commercialization as just launch.

It seems clear that the body of literature finds commercialization can contain both a customer and technological focus, as well as both operations and some development aspects. In other words, a definition that can contain the insights gained from research must acknowledge the organizational capability aspect of commercializing, meaning activities and process needed in various steps along the new product development roadmap that supports the innovations' exposure to external market actors. That is, the innovations' ultimate exposure to the perspective of users.

One question remain for our intellectual curiosity: The matter of return on investment? Whether an innovation must be commercially successful in order to be considered commercialized. A strict approach could argue so, however our reasoning is that since commercial success goes from zero to infinity it is hard to set a certain threshold, like ROI above 10%, based on objective criteria that does not change from one actor to the next⁶. Based on the mixed picture in research we state that at the very least commercialization is exposing a product to be judged by other market actors, their eventual and precise judgment is not relevant for commercialization definition research.

⁶ This point relates strictly to research. We acknowledge that from a management point of view this might work. Some companies based on past industry performance might be happy with a 5% ROI while others 15%.

We end this part of our analysis by proposing that in JPIM the following definition of commercialization is prevalent: Commercialization is “the proven level of commercial capabilities of a market actor to undertake activities and manage processes that ultimately exposes products or services to the voluntary actions of other market actors, whose actions significantly impact the knowledge regarding the demand and subsequently degree of commercial success of the product or service in question.”

Overview of commercialization research

So far, we have reviewed the work on commercialization in JPIM from a bibliometric angle, and in detail dealt with the sources that contribute to define commercialization. We have also supplied our attempt at a general commercialization definition for the work published in JPIM. What remains to be done before suggesting further research is to collect the insights on commercialization published in JPIM. To group this very diverse group of insights, and to help the reader appreciate the applicability of the proposed commercialization definition, we group the findings in relation to the definition. Up to now, we have avoided taking the potential difference between commercialization of incremental and radical innovation into account. We continue with this generalist approach except where explicitly stated otherwise in the following overview of commercialization research.

Commercialization efforts will create demand knowledge

Nobody can know if a new innovation will have commercial success in the market place *ex ante*. Knowledge about demand is always learned *ex post*. This is a recurring theme in the commercialization literature where innovation processes are transactions and as such not free for the organization, which is testified by the fact that the cost of innovating accelerate towards commercialization (Kelley & Lee, 2010; Chiesa & Frattini, 2011; Kahn et al., 2012), while the same is true of the validity of the market data and ultimate demand knowledge (Schmidt & Calantone, 1998). Creating such demand knowledge is costly in other words, and as a result firm size matters for the discussion, as large companies have more resources to commit than small ones (Basu & Wadhwa, 2013) and can afford to be unsuccessful more often or even to promote unprofitable products longer.

Creating demand knowledge is also ambiguous; the new innovative product might directly provoke fear among market participants. Either fear surrounding the product itself (will it work, does it cost me more in the long run, is it safe to use, do I know how to use it, etc) or of what the product is believed to entail (if people can date online, why should they socialize in real life, punk rock

destroys moral values, etc). Such aspects of communicating new products is dealt with in Lee & Colarelli O'Connor (2003). They identify that a “coping” strategy for such consumers can be to delay or forgo purchase of an, in theory, beneficial new innovation (they might actually like punk rock). This logically raises the issues of time and therefore resources of the producer when commercializing new products, and hence it becomes an internal matter of the firm if they are capable of commercializing at all, in a knowledge creating sense. They go on to comment that “... if the product’s novelty lies primarily in the extent to which it causes new markets to develop but the technical uncertainty is relatively low, then the impact of innovativeness on the producer is more intense during the commercialization stage than in the development stage... ...A product that requires technology that is new to the firm necessarily may not be unfamiliar to the marketplace; indeed the firm simply may be expanding its own competency base into competitive territory. The resultant product may not be very innovative as far as the market is concerned.”

These issues are counted by some companies dividing specific teams for what they (not necessarily the potential customers) consider novel (or radical) innovations (O'Connor & DeMartino, 2006). In all when it comes to creating new markets for breakthrough innovations O'Connor & Rice (2013b) found that too often firms rely on the market to create itself and does not actively manage this process. A further learning of this is that general exploratory learning might be a wiser strategy than single focused commercialization. Continuing commercialization is in fact a matter of access to the right well-functioning knowledge networks coupled with a commitment to constant market experimentation according to Snow et al. (2011). As Slater & Mohr (2006) have argued that what the goal is, and which organizational capabilities do we wish to promote to achieve this, and how do we understand customer needs, are important, because “*In order to successfully develop and commercialize disruptive innovations, not only does the firm need to conceptualize and develop the innovation in the first place; it must also be successful in reaching more than just a niche market of innovators—early adopters.*” This ties nicely to one of our initial points, maybe some firms, such as start-ups are good inventors, but poor at commercialization, and other companies are the opposite. Interestingly, already in 1986 a similar critique of the assumed joys of being first was proposed in JPIM by Olleros (1986).

Commercialization as a process and capability

Above we already touched on the skillset or capabilities of organizations when attempting commercialization; this is indeed a prevailing, in one form or another, theme in our literature review. One skillset organizations can attempt is to turn to licensing as their strategy for commercialization.

Udell et al. (1993) scopes commercialization as an either or between new venture creation or licensing, this view is nuanced a bit in Boyd & Spekman (2010) which states “*Licensors that emphasize value creation may wish to follow a less restrictive commercialization of their products so as to generate funds faster for future R&D activity. Alternatively, a firm emphasizing value appropriation may wish to follow a more restrictive distribution strategy to enter the market itself at a later date.*” Bianchi et al. (2014) add that due to the smaller number of sales people needed to support licensing opportunities versus direct sales, the commercialization via licensing is more cost effective for innovators. A path to licensing is alliances and Deeds & Rothaermel (2003) argues commercialization is the reason for strategic alliances within R&D. No matter the choice between licensing and new venture creation, the question of protecting the rents from the innovation is a concern and there are research supporting the positive relationship between patenting and commercialization (Andries & Faems, 2013).

Process are carried out by people and our literature review found a substantial focus on people in relation to commercialization. As a product moves towards the market, insights and skills likely need to travel in the organization for instance, like allowing R&D and Marketing employees to move down or upstream in the NPD process respectively (Griffin & Hauser, 1996). Brettel et al. (2011) has worked with such relations empirically such as between the R&D and Marketing departments or between the Sales and Manufacturing departments, and found such cooperation have various degrees of influence on the success of commercialization depending on the department and nature of the innovation (incremental or radical). When it comes to truly radical innovation Durisin & Todorova (2012) argues that new capabilities can be needed to be added to the company altogether. This is supported by Ziamou (2002) finding that companies directly invest in capabilities via people to counter market risk and uncertainty. These views are directly challenged by McNally et al. (2010) who states that existing skill proficiency can be transferred to new markets.

Another of “people & commercialization” study is Khilji (2006) who looked at R&D managers and their ability and mindset for commercialization, and found that while the majority was intent on commercialization, they lacked the understanding and ability to do it. To help R&D employees become better at commercialization outside help might be beneficial and Udell (1990) looks at the patent advisors of inventors and finds they too lack such capabilities. Souder (1998) proves that precisely commercialization is positively affected by integrating the R&D employees with the marketing department or directly the customers, this as the only step in new product developments.

Lee et al. (1994) also support that R&D capabilities are important for commercialization success, especially in relation to the relatedness of the innovation to the already existing business lines.

The size of the organization also seems to play a role in commercialization capabilities as stated above. There is further a marginal return to innovation efforts precisely because of the constrain of the time and resources that commercialization requires (Siguaw et al., 2006) so while big companies can handle more commercialization efforts and hence diversified their exposure even they will meet a cut off point. Knowing this cut off point is likely a very important top management matrix.

Durmuşoğlu et al. (2013) also concludes that cross-functional teams are among the specific commercialization efforts needed to succeed with innovations. All this together gives a clear incentive for research to avoid departmentalization (Markham et al., 2010) and scholars like Daniel Sherman et al. (2005) have argued convincingly for cooperation in the firm to matter greatly for successful commercialization. How cooperation across departments is done in practice is also important, and Ettlie & Elsenbach (2007) find that virtual teams are more likely to achieve commercialization. Other scholars have shown that conflict within companies and firms can actually boost commercialization Ginn & Rubenstein (1986) too.

If commercialization is a “peoples game” as argued convincingly by many others (McNally et al., 2010; Chiesa & Frattini, 2011; Libaers, 2014) then leadership and subsequent agency issues are relevant as well. Li et al. (2008) has investigated commercialization in Chinese technology firms and how commercialization are influenced by incentives and the entrepreneurial orientation of managers. They find that especially in markets where technology turbulence is high, entrepreneurial orientation matters to a large degree for commercialization, but it is always a positive influence. Another angle on the leadership of commercialization is found in (Lichtenthaler & Ernst, 2009; Kelley & Lee, 2010) where commercialization is driven by certain persons or champions. Going outside the firm further in terms of people Athaide & Klink (2009) investigate hoe prior relationship between sellers and buyers fosters the needed knowledge sharing required for successful commercialization.

When we view commercial capabilities as processes and people it is likely that the speed of innovation and commercialization that a given organization is capable of is important as well, but only slightly over a third of R&D directors emphasize this aspect (Athaide 1996) . This leads us to an important point of critique: why is commercialization the last step in many innovation models? Is that rightly so? Meaning, does companies just hires researcher and then try to commercialize whatever they come up with? Often commercialization ideas or desires actually runs first and then how to fulfil the demand is then worked out. One argument in favor of this is Stevens et al. (1999) who argue that

having the right creative people and then teaching them an innovation methodology is more likely to be successful than vice versa. Such a view is also found in Hienerth et al. (2014) where the wish to achieve commercialization is indeed present from the offset. Again, the reader will remember that we found no definition papers in lower left quadrant. We will however maintain that while the term “fuzzy frontend” is used for pre-ideation on many stagegate innovation models, from a commercialization viewpoint the frontend is the market.

Managing commercialization activities

Building further on the critique above, we turn to the large tradition, mainly growing out of the New Product Development tradition, where commercialization is used either *ex ante* as a business case is derived for an innovation or *ex post* by sales figures and other matrixes to set commercialization as the evaluation criteria of whether an innovation was successful (Bond & Houston, 2003; Kahn et al., 2006; Easingwood, 2006; Khilji, 2006; Griffin & Hauser, 1996; Ziamou, 2002; Tomkovick & Dobie, 1995; Schmidt & Calantone, 1998; Souder, 1998; Stevens et al., 1999; Athaide & Klink, 2009; Markham et al., 2010; Brettel et al., 2011; Kahn et al., 2012; Frattini et al., 2014; McNally et al., 2013). However some evidence suggest that the closer the innovation comes to market, the degree of method formalization decreases, and often the actual commercialization seems down to informal skill sets and almost luck. It is more touch and go is the argument. But Leenders et al. (2007) argue that the opposite is true when looking strictly at design processes. This is supported by Candi (2010) who look at the relevance of aesthetic design for advertisement, marketing and commercialization.

For a product to be evaluated *ex-post* as successful or not, commercialization also requires that the product is “finished”, or at least at a level where it is no longer experimental to use. To achieve this Filippini (2004) argues that the innovation method itself can benefit from early customer involvement. Such adoptive strategies are linked to the timing issues however (Swan et al., 2005). On the other hand Veryzer (2005) find that often innovations have left the hands of the innovators in the company by the time commercialization is attempted.

Kuscumarski (in Peters 2006) argues that the very formula best used to find ROI on innovation should exclude commercialization cost altogether. While this is great for establishing the innovative capabilities of a company it says very little of commercial capabilities or reasons behind the return. Kahn (2002) have actually found that the existence of forecasts themselves influence how commercialization is pursued and can in itself explain a lot of the process: “new product forecasts drive a variety of multifunctional decisions. These would include manufacturing decisions on raw

materials procurement, manufacturing schedules, and finished goods inventory levels; logistics decisions on physical distribution planning and transportation schedules; marketing decisions on marketing budgets and promotion schedules; sales decisions on support materials and salespeople training; and finance decisions on corporate budgets and financial expectations for the new product. Given this breadth of decisions, any forecast error at the commercialization stage has definite company-wide ramifications that can translate into significant bottom line consequences. Company management is therefore very interested in finding ways to improve the new product forecasting effort, and thereby minimize forecast error.” So, to the degree forecasting can limit the exposure to voluntary actions of external market agents in relation to our definition, companies will attempt it. This is backed up by Astebro & Michela (2005) who argues for an important difference between commercialization and long term market survival in relation to forecasting and decision making, and states that uncertainty of demand is only affecting the decision to commercialize if decision makers are risk adverse. It is simply harder to predict survival than short-term commercialization success and parameters differ, while the size of the initial investment impact differently too. Further the internal choices in the commercialization process are likely to effect the external choices of customers (Chiesa & Frattini, 2011).

But what about the overall company strategy that innovation efforts should ultimately support? No matter the precise NPD process, evidence is found by Barczak et al. (2009) that the closer the innovation is to the overall strategy of the company the more likely is it to achieve commercialization success. Also according to (Benner 2009), commercialization can also be a counter strategy in itself and a survival move in the strategy of companies operating in markets with changing knowledge signals.

Ideas for further research and conclusion

Coming to the end of our literature review the last remaining step is to propose ideas for further research and conclude. Despite special issues dedicated to commercialization and interest from the editorial board and the greater community of researchers around JPIM, there is still plenty of unanswered question regarding the commercialization of innovations. It is our hope that our work here and the proposed definition can help further the agenda of new product commercialization research. It seems to us based on the above work that commercialization is often at risk of becoming what the philosopher Martin Heidegger refers to as a 'Seinsvergessenheit' or “forgetfulness of being” (Heidegger, 1921). A state that happens precisely because aspects close to our heart are often the

hardest to think about, as we take them for granted. It is not until they break or does not act as we expect that we start to think about them. It is our hope we can help rescue commercialization from its 'Seinsvergessenheit' with this paper. As we have shown there is a lot of good research around commercialization, even if around 25% have the narrow focus on launch, but to us the following perspective seems interesting and particular under-researched.

The first approach we find that could benefit from further attention is commercialization in relation to transaction cost economics. Like Stumpa et al. (2002) we see the tradition put forward by Coase and Williamson (1975, 1979), which shortly states that the boundary of a firm is given when the marginal return of one more transaction within the firm is more costly than on market, to hold potential for insights. Especially asset specificity and hybrid organizations, both integral parts of Williamson's contributions. Song & Thieme (2009) have touched on transactions costs, and argued that as a product goes from predesign to commercialization the less uncertainty remains, meaning that the boundaries are indeed becoming clearer. We see the potential for a lot of other work in this area.

A large part of the literature, and subsequently our definition, deals with commercial capabilities. There still seem room for work relating to such capabilities, such as what exactly do they consist of and in? Do they materialize from conscious choice or more by chance, and are they transferable? One attempt to answer this could come from applying the concept of bricolage which was used only 1 time (Senyard et al., 2014) in our review. Another way forward could be to investigate more of the role of sales people in innovation commercialization and commercial capabilities. This is a growing interest in JPIM, but the area is far less engaged than alternative commercialization strategies like licensing.

Markets with only one customer like governments, or where new product development is highly regulated should also be investigated further. Especially testing commercialization in such markets against more free markets. If for instance a private road is introduced with a law demanding all to patronize only that road, the commercialization would be instant or at most a matter of putting up ticket collection booths. According to one source in our review, external incentives such as government schemes can definitely shape or even create a market which in turn both influence the commercialization efforts and method, however it is not without tradeoffs for the companies involved (Pinkse et al., 2014). In highly regulated markets such as pharma there is, as expressed in Blau & Pekny (2004), almost a tendency to assume commercialization will happen once the product is approved as long as the company can keep up supply.

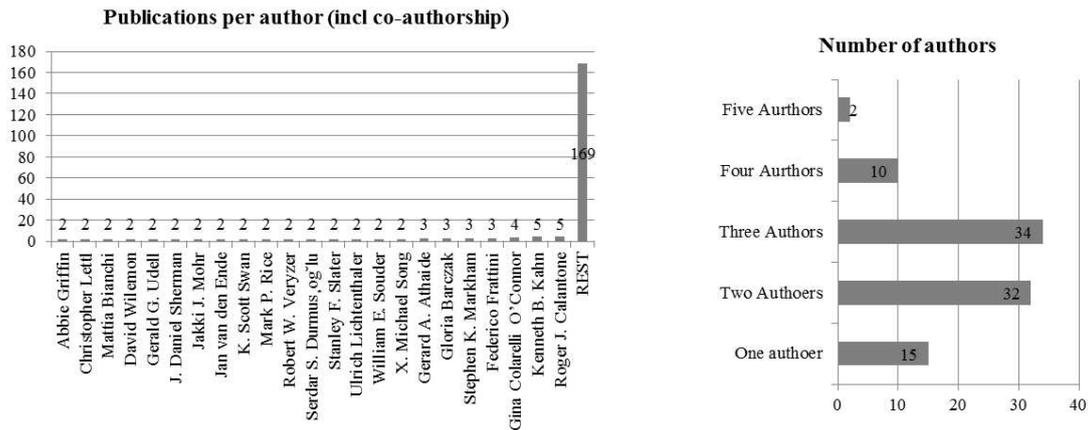
Finally, it surprised us a great deal to find business model design and value proposition logics so absent from our sample. These are growing research traditions that are clearly linked to innovation. Combining those traditions and insight with commercialization of new product research should hold promise for insights. If nothing else, an alignment of the traditions and approaches would be appreciated by the authors.

In conclusion, we believe we have sufficiently surveyed and presented the state of commercialization research in JPIM. We found a level of research interest that was at a level that was surprisingly low to us. We also found that a clear and generally accepted definition on commercialization was missing, but we were able to construct one: Commercialization is: “the proven level of commercial capabilities of a market actor to undertake activities and manage processes that ultimately exposes products or services to the voluntary actions of other market *actors*, *who’s actions* significantly impact the knowledge regarding the degree of commercial success of the product or service in question.”.

Appendix 1: More Quantitative findings

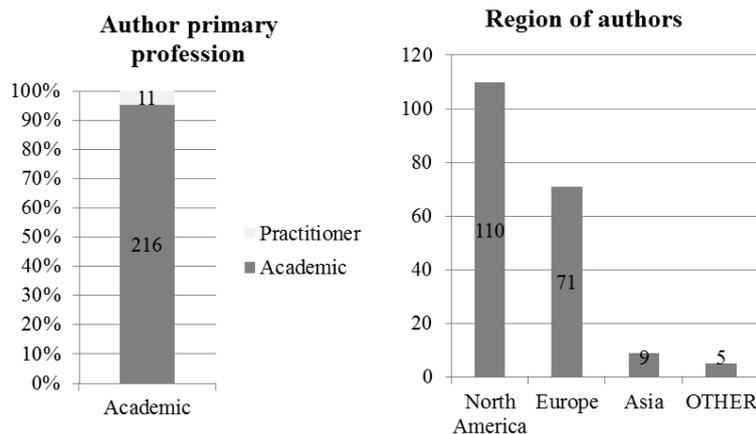
The total number of papers in our sample amount to 93 and the total number of authors who have contributed to our sample is 195. 71% of the sources have two or three authors and 169 authors have only contributed to one paper in the sample. In other words, no clear research careers or school of thought seem to be dedicated to this area or have taken a clear lead in its shaping in the journal.

Figure A1: Publications per author and number of authors per paper



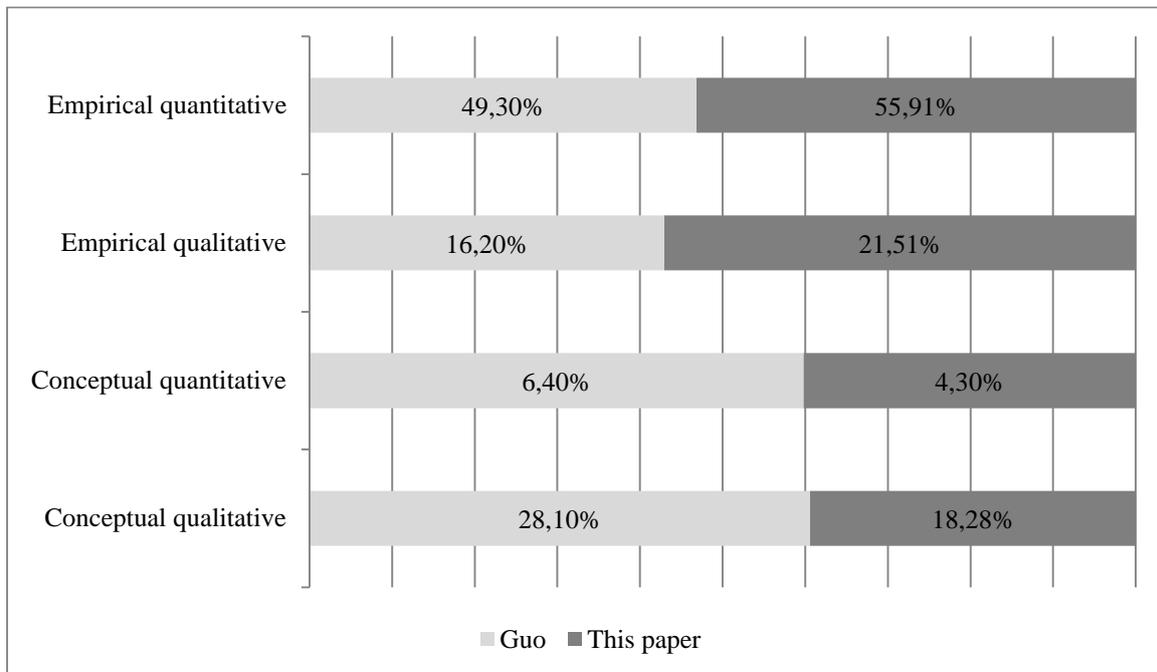
When we go further into the professional and regional background of the author-base in the sample it seems that North American and Academic is the most likely to have taken an interest in the area. On a side note, 70% of the papers with a practitioner (co)-authorship is empirical in nature.

Figure A2: Author background



If we again refer back to Guo and use more of his findings as a baseline, we can find some interesting indicators. It is important to note that these are only indicators, due to his sample ending in 2005, while ours is ending almost 10 years later – a period that contributed 61 papers or well over half our total sample. If we start with comparing regions, Guo finds that North America almost produces 75% of the publications in the journal. In our sample, the European share is larger in ours, but North America is still the biggest contributor. This is not odd really, as the North America does have a superior track record in commercialization. Guo does raise the flag that more regional diversity is beneficial and it is nice to see here, while we are still far from an equal picture, especially empirical work accessible from Asian authors should hold interesting insight on commercialization. Finally, in terms of research design the area of commercialization research does seem more empirically oriented than other fields. Again this could be an effect of the later date of the sample.

Figure A3: Research design in commercialization research vs general innovation research



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