From Creative Ideas to Innovation Performance: The Role of Assessment Criteria

Marianne Harbo Frederiksen and Mette Přest Knudsen

This article aims to make idea screening studies even more relevant to innovation management by coupling a set of assessment criteria so that they can be used for identifying early product ideas with innovation potential. We develop a framework, which integrates the complementary theoretical perspectives from the creativity and innovation literatures. The approach draws novelty and usefulness insights from the creativity literature and combines these with novelty and market potential insights from the innovation literature. The resulting framework encompasses novelty of a product idea and its usefulness to the intended recipients, but with a distinct focus on the value to the firm that can be created through market potential. This set of criteria makes it possible to couple creative ideas for new products directly to potential innovation performance. For the study, industry and market experts made assessments of 106 student-generated projects; these assessments underline the distinctiveness of the three criteria and support the value of each criterion’s independent role in assessing the innovation potential. Two student project cases particularly shed light on the relevance of each criterion and on its unique relationship within the framework.

Motivating the Research

Firms pursue product innovation because it may allow them to conquer the best market spots for commercial success (Tushman & Nadler, 1986). Seeing market opportunities and meeting these with the most appropriate product offerings are core challenges for every industrial firm, especially as they must perform in the face of increased competition. Many efforts to introduce new products fail (Markham & Lee, 2013) and, as a consequence, the risk of investing in new product development grows while resources available for pursuing a targeted innovation strategy often are limited. This makes the appropriate handling of activities in the front end of the innovation process crucial (Poskela & Martinsuo, 2009). In this regard, selecting ideas that have a higher likelihood of delivering future performance can reduce risk, focus the development efforts, and ultimately enhance competitiveness by enabling the firm to provide faster market delivery of desired products. Such front-end activities encompass, among other things, the early identification of product ideas with the highest expected innovation performance in terms of payoff to the firm.

Innovation types other than new and qualitatively better products exist, including process innovation, organizational innovation, administrative innovation (Damanpour, 1987), marketing innovation (Oslo Manual, 2005) and business model innovation (Birkinshaw, Bouquet, & Barsoux, 2011). This article, however, focuses on product innovation and specifically conceptualizes a set of criteria for ensuring that assessment processes related to the early selection of product ideas entail a focus on potential innovation performance.

Innovation, as the result of an idea, is a central mechanism for firms to create value. However, innovation is only one of many mechanisms for creating value. The literature has suggested that creative ideas are precursors of innovation (e.g., George, 2007; Baer, 2012). For an idea to be creative it must be novel, useful and seen as having the potential to create value to the firm (George, 2007). However, the creativity literature (e.g., Bissola & Imperatori, 2011; Cropley, Kaufman, & Cropley, 2011) conceptualizes useful ideas only as value to the users.
and not as value to the firm that markets the product. Accordingly, this article argues that the creativity literature can be only partially successful in advising firms about how to seek and ensure innovation performance of product ideas.

In contrast with the creativity literature’s evaluation of product ideas from the user perspective, the mainstream innovation literature brings in a firm-relevant market perspective and argues for novel ideas and commercialization as the pathways to firm success. The innovation literature traces back to the influential work of Schumpeter (1983 [1934]), who emphasized that innovation is the result of an invention being developed into something new to the market and that is then exploited economically. Therefore, by broadly connecting the new product with market potential and successful commercialization, the innovation literature is concerned with innovation performance as seen from a firm perspective. Some of the innovation literature further refines the definition of innovation and claims that to be novel a product has to create a change of practice, i.e., it has to lead to a new way of doing things. The implication is that there is no innovation until the new product is put into use (Damanpour, 1987) and adopted by the recipients (Denning & Dunham, 2010). However, if a new product is to be adopted and to change existing practices, it must be perceived as useful by the recipients. This entails that the user-centric usefulness criterion from the creativity literature should also be considered when assessing the innovation potential of product ideas.

The purpose of this article is two-fold: (1) to develop a framework which integrates the theoretical perspectives from the creativity and innovation literatures; and (2) to apply an empirical methodology to define and verify the criteria for assessing potential innovation performance of early ideas for new products. In this way, the article contributes to creativity and innovation management research by bringing the literatures together with respect to front-end product innovation activities. In particular, the article argues that innovation performance is achievable if new product ideas are novel (from the creativity literature and the innovation literature alike), useful (from the creativity literature and implied in some parts of the innovation literature), and have market potential (as argued in the innovation literature). The logic is that novelty is needed for some degree of differentiation to be achieved compared to existing products; usefulness is needed for creating value to the recipients and making them adopt the change of practice that a new product implies; and sufficient market potential is needed for expected economic exploitation of a new product and, thus, generating value to the firm. Through this integrative approach, the article reveals that although a novel and useful product may lead to innovation because it is adopted by the market (Denning & Dunham, 2010) and entails a change of practice (Damanpour, 1987), an additional requirement for arriving at innovation performance is the existence and later exploitation of sufficient market potential.

Thus, the article adds a critical conceptual input to the discussion about what is required to go from no innovation through innovation and, ultimately, to innovation performance. We question whether criteria and measurements used by creativity researchers are sufficient and adequate to inform firms about ideas with the potential to lead to innovation performance. In the same way, we question the mainstream innovation literature’s focus on novelty and commercialization as sufficient and adequate by themselves for living up to the innovation requirement for adoption and change. We find each view to be individually too narrow and suggest expanding the notion of creative ideas as not simply precursors of innovation but as precursors of innovation performance.

**Theoretical Exposition**

Ideas are not the sole ingredient of innovation (Flynn & Chatman, 2001; Denning, 2011). Nonetheless, they are important, as a firm pursuing a product innovation strategy needs ideas for new products. Fleming (2007, p. 69) in his work on the ‘long tail’ of innovation forcefully argues that the challenge is not to come up with ideas but that the distribution of the value of ideas is highly skewed and almost ‘all inventions are useless’. Therefore, firms need to consider which ideas – from amongst a large pool of options – are the ones with higher potential innovation performance, and which ideas are at best mediocre. Ideas for new products that are expected to have the highest potential to lead to payoff to the firm should be prioritized and receive investment, whereas the remaining ideas should be discarded with a minimum of resource investment.

It is widely demonstrated in the new product development literature that firms seek to identify new product performance already when screening the first ideas for new offerings (e.g., Hart et al., 2003; Carbonell-Foulquié, Munuera-Alemán, & Rodríguez-Escudero, 2004; Schmidt, Sarangee, & Montoya, 2009). This is a relevant approach, as assessments of ideas, especially in the front end of innovation, impact whether the final product will become
a success in the marketplace (Bacon et al., 1994; Poskela & Martinsuo, 2009). Moreover, there is value to be gained in terms of saved time, focus of resources, as well as higher success rates (Cooper, 1985). It is certainly not an easy task to ensure the early identification of the most promising product ideas, also because existing research points to a large number of assessment criteria, including technical feasibility, strategic fit, and financial issues, to mention a few. However, the chances of new product success increase by keeping the goal of product innovation in sight (Markham & Lee, 2013). This speaks in favour of considering a few but distinct criteria for assessing new product ideas. But what are they?

Keeping the Goal in Sight

Although creativity and innovation scholars agree that ideas are crucial to innovation (e.g., Amabile et al., 1996; Day, 2007; Bledow et al., 2009; Artz et al., 2010; Baer, 2012), there are apparent differences within and across the two streams of literature in terms of what characterizes the best ideas. Table 1 displays references from the creativity and innovation research selected to show the variety of viewpoints that each emphasizes as prerequisite(s) for innovation.

Innovation is basically about change (Damanpour, 1987), and the innovation and creativity literatures alike agree that novelty is a prerequisite for change. Novelty is both conceptualized as absolute (something new) and in relative terms (a degree of uniqueness compared to existing alternatives). However, according to the creativity literature where creative ideas are seen as precursors of innovation (e.g., George, 2007; Baer, 2012), novelty alone is insufficient: ideas must also be useful (e.g., Flynn & Chatman, 2001). In particular, Amabile (1997, p. 40) stresses that ideas ‘can’t be simply bizarre; they must be appropriate to the problem or opportunity presented’ in order to be implemented successfully and create value to the firm. Even though value creation to the firm is mentioned by her and other creativity scholars (e.g., George, 2007), this firm focus is neither explicitly researched nor linked to the idea assessments. There are important benefits of including novelty and usefulness as criteria for assessing the innovation potential of ideas. First, some degree of novelty makes a product stand out in the marketplace (Rogers, 1983). Second, the usefulness criterion will focus the assessment on the appropriateness, or value, of a product idea (Amabile, 1997). However, novelty and usefulness are almost always measured as one construct in the creativity literature (see the review by Sullivan & Ford, 2010), which makes it difficult, if not impossible, to detect whether and how also the value to the firm is taken into consideration. Therefore, one may ask: ‘useful or valuable to whom, and for what?’ (Bilton, 2007, p. 4). The assumption could be that if users are happy with the product offering and adopt the product, then, seen from the firm’s perspective, the product may also provide the expected commercialization and subsequent income. We question this automatic implied causality between arousing users’ interest by meeting their needs with a novel and useful product, and innovation performance in terms of successful commercialization and value to the firm.

The usefulness-to-the-recipients requirement is rarely found in the innovation literature. In fact, ‘useful’ is not mentioned in any of the 60 definitions of innovation reviewed by Baregheh, Rowley, & Sambrook (2009). As shown in Table 1, one recent exception is, however, Bledow et al. (2009) who include ‘useful’ in their definition. The Oslo Manual (2005) offers one of the most widespread and used definitions of product innovation but emphasizes solely novelty OR significant improvements as needed for product innovation. Although the concept of ‘significant improvements’ may be related to ‘usefulness’, such interpretation cannot be directly inferred from the manual’s definition. Rather, the innovation literature generally emphasizes commercialization, along with novelty, as the important prerequisites for innovation (e.g., Utterback & Abernathy, 1975; Schumpeter, 1983 [1934]). With this focus, the innovation literature raises attention to the ability of new products to create value for the innovating firm which, in a business context, is also the ultimate reason for focusing on product innovation.

Interestingly, Denning (2011, p. 22) emphasizes that ‘the key to success is adoption of practices, not the invention of ideas’. As mentioned, novelty is needed for capturing the attention of the potential recipients of a new offering; but, if the users do not value the novelty nor perceive the change as useful, then they may not adopt the new product. And even though some people are stimulated to buy a product simply based on its newness, the majority of users expect more (Rogers, 1983). For instance, if a novel product is purchased impulsively based on its immediate desirability or a wish to follow a trend and it turns out not to be useful, then it will most likely not be adopted by the users. However, if the new product is also perceived as useful compared to existing alternatives, it might satisfy users sufficiently to lead to their change of practice.

This perspective lengthens the time perspective of the innovation process, because it takes
<table>
<thead>
<tr>
<th>Reference</th>
<th>Prerequisite(s) for Innovation</th>
<th>Novelty</th>
<th>Usefulness</th>
<th>(Successful) Commercialization</th>
<th>Adoption / utilization</th>
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<tbody>
<tr>
<td><strong>The Creativity Literature</strong></td>
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<tr>
<td>Amabile (1997, p. 40)</td>
<td>‘The successful implementation of (those) novel, appropriate ideas.’</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>O’Quin and Besemer (2006, p. 35)</td>
<td>Novelty (new materials, new processes, new concepts, etc.), resolution (people can understand how to use it), and elaboration and synthesis (how the product presents itself to the customer) of ideas.</td>
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<td><strong>The Innovation Literature</strong></td>
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<tr>
<td>Cropley and Cropley (2012, p. 35)</td>
<td>‘selling the result of the creative process to other people.’</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
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<tr>
<td>Schumpeter (1983 [1934])</td>
<td>An invention being developed into something new to the market and then being exploited economically.</td>
<td>✓</td>
<td></td>
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<td>✓</td>
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<tr>
<td>Utterback and Abernathy (1975, p. 642)</td>
<td>‘a new technology or combination of technologies introduced commercially to meet a user or market need.’</td>
<td>✓</td>
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<td>✓</td>
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<tr>
<td>Damanpour (1987, p. 676)</td>
<td>‘a new idea [is] put into use […] when its</td>
<td>✓</td>
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<tr>
<td>Oslo Manual (2005, p. 48)</td>
<td>actual utilization. .. has begun. ‘the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses.’</td>
<td>•</td>
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<tr>
<td>Bledow et al. (2009, pp. 305 and 308)</td>
<td>‘the development and intentional introduction of new and useful ideas.’</td>
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<td>Denning and Dunham (2010, p. 6)</td>
<td>‘the adoption of a new practice in a community.’</td>
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time for adoption to occur with newly introduced products to the market. It is far from trivial to get users to adopt a new product and alter their practice in using it. The process of adoption starts with passive acceptance which, after a persuasion period, may or may not lead to active acceptance and later to the intention to adopt the new product. The process of adoption may end in failure, either due to immediate passive resistance to novelty or due to later rejection of the product (Talke & Heidenreich, 2014). There is a risk that the user gets disappointed as they encounter challenges or unsolvable problems in use, which may potentially lead to dismissal of the product and even bad word of mouth. The latter could easily and negatively impact the success rate of commercialization (Talke & Heidenreich, 2014) as the potential market diminishes.

Figure 1 illustrates how we define the innovation process as a multi-stage process with a set of activities starting from the preliminary examination of the idea and into the actual product development process. After development and market introduction of a new product, the process of adoption (or rejection) of the product by the recipients will impact the extent of commercialization, i.e., whether it will be successful or not, and ultimately the innovation performance. Additionally, the adoption patterns of the users may serve as input for improving the product towards the next generation (illustrated by the dotted line going back into the new product development process).

Thus, Figure 1 serves to illustrate the fundamental basis of the article and shows the overall progression during an innovation process. The mainly linear sequential illustration is not to be taken literally, as the process of innovation consists of iterations of inseparable and simultaneously coupled stages (Galbraith, 1982). Moreover, the stage-gate new product development process, which is indicated by the grey and white rhombuses, is only to be regarded as an example of how firms can apportion activities relating to the process of new product development. Product ideas are screened at the ‘Idea selection’ gate in order to establish their potential and decide whether to commence new product development. Cooper and Kleinschmidt (1993) suggest that more, minor gates can precede this point: first, an initial screen based on a set of ‘must meet’ and ‘should meet’ criteria; second, a rough assessment of market, technical, financial, legal and other organizational aspects based on an inexpensive, preliminary investigation; and, finally, after investigating the idea thoroughly and building a business case including, for example, detailed market studies, a competitive analysis, manufacturing assessments and a financial analysis, it is decided whether to move to actual new product development. Thus, idea screening can be made in more steps, with the list of criteria being tougher from gate to gate (Cooper & Kleinschmidt, 1993). However, in order to emphasize that firms spend more time on actual new product development than on initial investigations, our division and naming of stages in Figure 1 is different from that of Cooper and Kleinschmidt (1993).

Judging from the differing viewpoints that are listed in Table 1, product innovation can occur at three different points in time: (1) when the product is introduced on the market; (2) when the product is put into use and adopted by the recipients; or (3) when the product is exploited economically. The definition as illustrated in Figure 1 is clearly aligned with the second view. We infer that a novel product – an invention – that is introduced on the market does not in itself change existing practices. Rather, ‘inventions become innovations only when they are adopted into practice’ (Denning & Dunham, 2010, p. 6). This points to potential shortcomings in the mainstream innovation literature as it does not focus on adoption driven by the usefulness of a new product as a prerequisite of innovation. We suggest that for innovation to happen, a product must be both novel and useful so that it meets the needs and wishes of the recipients and has the potential...
to be adopted by them. However, we also infer that for arriving at *innovation performance* as seen from a firm perspective, the product has to be exploited economically.

Interestingly, the most important determinants of new product success are (apart from dedicated human resources and quality execution of key new product development activities): product advantage, meeting customer needs and market potential (Cooper & Kleinschmidt, 1993; Henard & Szymanski, 2001). The first two determinants clearly relate to novelty and usefulness, and the latter confirms the need to also consider the potential market.

Based on the above, we suggest three criteria consisting of *novelty, usefulness* and *market potential* for assessing the innovation potential of early new product proposals. Apart from reflecting the most important determinants of new product success, the criterion-concept also supports that both the user perspective and the firm perspective are taken into account when assessing early product ideas. Therefore, while we criticize the mainstream innovation literature for not addressing the usefulness of a new product, we also urge the creativity literature, when assessing new product proposals, to focus on firms by considering specific commercialization aspects in relation to the product.

**Different New Product Strategies**

We suggest that different combinations of novelty, usefulness and market potential of new product proposals will lead to different outcomes.

Chasing product innovation by introducing products that live up to the three criteria is just one of many pathways that, depending on the firm strategy, may be considered successful. Although it is seldom legal, firms can also choose to stake on imitated goods, such as copies of a popular bag or a watch, i.e., products that are known as being both useful and desirable and have market potential because they are cheaper than the original (illustrated as U + MP in Figure 2). Owing to their imitative nature, these are not characterized as novel.

Another path to successful commercialization could be to introduce a one-day wonder, i.e., a novel and immediately desirable product which, however, is not useful but sells well due to an intensive marketing push strategy (illustrated as N + MP in Figure 2). Importantly though, neither imitated goods nor one-day wonders can be regarded as product innovation. A one-day wonder may be novel and immediately interesting and, based on this, lead to a sufficient number of people acquiring it as an impulse buy, but if it is useless it will neither be adopted nor change user behaviour. An imitated good may be just as useful as the original (yet cheaper) and therefore be bought by a sufficient number of people, but it is not novel and so it does not qualify as innovation. Rather, we argue that for innovation to occur a product has to be both novel and useful (N + U) in the sense that the new features (including the change of practice they imply) are adopted by the recipients. An example of product innovation could be that an ingenious man conceives and makes – free of charge – a device that will enable his disabled friend, who has an extremely rare build, to sit in and drive a car. It is a tailored product that is both novel and useful and has a huge potential for changing a practice (or rather leading to a new practice). It is, however, not (and does not automatically have the potential for being) exploited economically. Thus, product innovation does not always lead to innovation performance in terms of profit. Maybe it is not intended to, or maybe the market size is too small to lead to return of investment. For innovation performance to be accomplished, in a business context, a novel and useful product also has to sell well. Thus, it has to live up to all three criteria (N + U + MP).

**Empirical Investigation**

We explore the relevance of each of the three criteria in an educational setting with university students. In order to establish the distinctiveness of the criteria, we asked industry and market experts to rate novelty, usefulness and market potential of student-generated product proposals.
Setting, Population and Sample

The data for the empirical investigation were collected in the autumn terms 2012–2014 in connection with a recurring project-based course, *Experts in Teams*, at the Faculty of Engineering at the University of Southern Denmark. The overall purpose of this ongoing course is for the students ‘to apply their technical knowledge to develop a business idea’, i.e., to strengthen the students’ ability to generate ideas and work with entrepreneurship in cross-disciplinary teams. The course description further states that ‘a business idea is the innovative idea that solves a problem or fulfills a need. It can be a completely new product/service or it can be an improvement of a product/service, a production method or a new way of doing sales.’ Hence, the course description allows for a relatively broad spectrum of ideas.

A few hours a week over a period of 3½ months, the students worked in teams and each team created a product idea as well as investigated market and business aspects thereof. In total, 858 students were engaged in the course with 216 students in 2012, 260 students in 2013 and 382 students in 2014. At the beginning of a course, each student chose an overall engineering theme to work within, such as ‘New Energy Sources’ or ‘Offshore Wind Power’, which were used to form the project groups by the supervisors (average of six students per group). The supervisor ensured that at least three different lines of study were represented in each project group.

The supervisor was strongly involved in the development of the ideas and in guiding the groups through the work by providing regular feedback. Therefore, the research team has excluded the supervisors as evaluators in the analysis for the research, as they would be unable to provide unbiased assessments of the projects. This is only natural, as the supervisor role is comparable to the project management role in a firm setting, and project managers are expectedly also biased in assessing their own projects in comparison to other projects running in parallel within the business.

The vast majority of the students were studying in the Bachelors of Engineering program, but within different specializations such as electronics, energy, manufacturing, mechanics, integrated design, and product development and innovation (in total 17 lines of study). Approximately 3% of the students came from other educational institutions and studied to become, for example, multi-media concept developers. Each year a number of participants were exchange students from other countries, mainly studying within the fields of civil, manufacturing and mechanical engineering.

Each project group consisted of a number of students, who all received a few hours of idea-technique training and basic knowledge of innovation and business planning in the pursuit of an innovative idea. Every year, at the end of the project period and prior to the exam, each group handed in a report consisting of a product idea description and a rough business plan. Although the groups did investigate and report certain business aspects and also sketched their product idea in a computer-aided-design system so that it looked more like a finished concept, the outcome was merely equivalent to what is presented and assessed in a business setting at an initial idea screening gate (as illustrated in Figure 1; equivalent to Cooper & Kleinschmidt’s gate 2). Thus, despite the fact that the groups worked on their projects over a period of 3½ months, the product ideas were not yet conceptualized to a level that would justify comparison to what is typically presented at a later gate encompassing more detailed assessments.

The level of analysis is the project. The unit of analysis is the innovative product idea which the students presented in their project report at the end of the course. The sample consists of 106 product ideas, i.e., the proposals made by 106 groups (out of 136 groups, a participation rate of 77.9%). The sample by year: 2012 = 33 out of 33 product ideas, i.e., 100%; 2013 = 28 out of 41 product ideas, i.e., 68.3%; 2014 = 45 out of 62 product ideas, i.e., 72.6%.

Experts and Assessments

The assessments of the novelty, usefulness and market potential of the product ideas were made by external examiners in conjunction with the project exams in January 2013, January 2014 and January 2015.

The external examiners (*n* = 15, of whom some participated more than one year) were professionals with more than 16 years of relevant work experience (except one who had more than 10 years of relevant work experience); all of them were managers at some level and highly knowledgeable about business trends and technological development in a range of relevant industries. In most cases, they were selected by the supervisor teams to ensure the best fit between the engineering theme and the expertise of the external examiner. Thus, these experts were included in the examinations to represent the market and business perspectives. They can be characterized as being outside academia and inside business, i.e., as industry and market experts.

One expert filled out a rating sheet for each product proposal submitted by a group, which resulted in one expert assessment per group.
Thus, each expert had an exclusive sub-sample of projects to assess, and no project was assessed by more than one expert. The number of projects each expert assessed differed from expert to expert (as an example, in 2012 the average was approximately five). Without revealing the research purpose to the experts, they were asked to rate the product proposals on novelty, usefulness and market potential separately. The external examiners were remunerated by the university for participation in the exam and for reading the reports, but the assessment of the projects for the research was not part of this remuneration and was, instead, done voluntarily as an additional task.

Table 2 shows the 0–100% assessment scales used by each expert to evaluate their assigned projects on the three criteria of novelty, usefulness and market potential.

### Empirical Results

The purpose of the following empirical analysis is first to establish the distinctiveness of the three criteria as well as to illustrate the relevance and implications of applying the criterion-concept.

Table 3 shows the descriptive statistics of the 0–100% assessment made by the experts of the product ideas for the three combined sample years. The assessments reveal that market potential is on average rated lowest (39.50), whereas novelty and usefulness are rated higher and somewhat similar (49.58 and 51.49).

In order to assess whether the three criteria are independent, we examine their mutual correlations. If the criteria are dependent on each other, we expect to find correlations around 0.8 or higher. Table 3 shows that novelty is correlated with usefulness and market potential to a lower degree (0.289 and 0.362) than the mutual correlation of market potential and usefulness (0.565). But all three are well below the dependence threshold; hence, the three criteria are independent and we can observe that usefulness and market potential have a tighter, though distinct, connection. Similarly, we performed the analyses on the yearly sub-samples, and these confirmed that novelty has a lower correlation with usefulness and market potential than these two have with each other.

Due to their moderately strong correlation, one might still expect that usefulness and market potential could, in fact, become one construct. To investigate this hypothesis, and further test the independence of all three variables, we performed a principal component analysis (Table 4). The component values ≥0.940 (shown in bold) support that the three criteria are independent. Thus, these results indicate the distinctiveness of the three criteria and, thereby, support the theoretical arguments for separately assessing new product proposals on novelty, usefulness and market potential.

### Illustrations of Student Assignments According to the Framework

Setting the threshold for potential high performance at ≥75% per assessment criterion, we made a comparison of the framework presented in the theoretical exposition (Figure 2) and the 106 student-generated product ideas. It shows that only seven product ideas can be characterized as having the potential to lead to innovation performance (N + U + MP = 6.6%). These seven cases are simultaneously a subset of the ten cases that can be characterized as innovation (N + U = 9.4%). Only four of the cases are characterized by potential performance, but no innovation (U + MP = 3.8%). In total, this illustrates that 14 product ideas (13.2%) are part of

| Table 2. Descriptions Provided to the Experts for Carrying Out the Assessment of the Three Criteria for Identifying Innovation Performance |
|-----------------|---------------------------------|
| Criterion       | Assessment Description |
| Novelty         | 0 = There is nothing new or original in the product idea/proposal (only known solutions and knowledge passed on in a new way). 100 = The product idea/proposal is entirely new and original. |
| Usefulness      | 0 = The product idea/proposal does not fit the needs and wishes of the target group(s), (i.e., the potential customers/users). 100 = The product idea/proposal is entirely aligned with the needs and wishes of the target group(s), (i.e., the potential customers/users). |
| Market potential| 0 = The product idea/proposal is unlikely to attract sales and be sufficiently profitable to bring onto the market. 100 = The product idea/proposal will likely attract sales and be sufficiently profitable to bring onto the market. |
the framework and the remaining 92 product ideas (86.8%) are what would be characterized as no performance and no innovation. This high share of product ideas with no performance follows the argument of Fleming (2007, p. 70) that ‘almost all inventions are useless’. In a business setting, using the three criteria, the majority of product ideas should therefore likely be discontinued early in the process.

We conceptualize innovation potential as novelty plus usefulness of ideas. Nonetheless, we also tried to identify the innovation cases as they are defined in the mainstream innovation literature (N + MP = a novel product that is commercialized successfully). This category is missing from the empirical sample. This does not imply that the category does not exist conceptually, only that the students were less able to produce ideas that were also characterized by market potential. For further scrutiny, we selected those product ideas that were most radical (as represented by the extent of novelty). In total, 18 product proposals (17%) were characterized by high novelty (75% or above), but with low (below 50%) or medium (between 50 and 74%) usefulness and market potential.

To illustrate the combinations further, we present two cases from the student projects: one of potential innovation performance (the project with the highest rating of all 106 proposals) and one of only high novelty but lower usefulness and market potential. Thus, these projects comprise one case of novelty mainly (and some usefulness) and one case of innovation performance (according to the framework). One of the supervisors, who supervised both project groups and was present at both their exams, together with the external examiner (expert), has confirmed the descriptions below. Based on the dialogue during the exams, he had insights into the reasoning behind the expert ratings.

**Case 1: Accessibility to offshore wind turbines (novelty)**

This product idea was rated high on novelty (80%), slightly above average on usefulness (59%), but low on market potential (12%). The group of students affiliated with the engineering theme ‘Offshore Wind Power’ presented this idea of how to ensure better and safer accessibility from ships to offshore wind turbines when a turbine needs maintenance. Currently, the approach to the wind turbine from the ship is made by jumping from the ship to a ladder and then climbing up the turbine. However, the challenge is that the slightest movement caused by waves can complicate access or even have fatal consequences such as technicians falling or getting stuck between the ship and the turbine. The group suggested to approach

### Table 3. Descriptive Statistics of the Expert Ratings, 2012–2014

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<tr>
<th>Ratings by Experts 2012–2014</th>
<th>N</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean</th>
<th>Std. dev.</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Novelty 0–100%</td>
<td>106</td>
<td>2</td>
<td>95</td>
<td>49.58</td>
<td>26.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Usefulness 0–100%</td>
<td>106</td>
<td>2</td>
<td>100</td>
<td>51.49</td>
<td>25.83</td>
<td>0.289**</td>
<td></td>
</tr>
<tr>
<td>3. Market potential 0–100%</td>
<td>106</td>
<td>0</td>
<td>90</td>
<td>39.50</td>
<td>24.52</td>
<td>0.362**</td>
<td>0.565**</td>
</tr>
</tbody>
</table>

**Correlation significant at the 0.01 level (two-tailed). 100% = highest level.**

### Table 4. Principal Component Analyses of the 0–100% Assessments (2012–2014)

<table>
<thead>
<tr>
<th>Ratings by Experts 2012–2014</th>
<th>N</th>
<th>Component 1</th>
<th>Component 2</th>
<th>Component 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novelty 0–100%</td>
<td>106</td>
<td>0.979</td>
<td>0.122</td>
<td>0.161</td>
</tr>
<tr>
<td>Usefulness 0–100%</td>
<td>106</td>
<td>0.130</td>
<td>0.950</td>
<td>0.283</td>
</tr>
<tr>
<td>Market potential 0–100%</td>
<td>106</td>
<td>0.178</td>
<td>0.291</td>
<td>0.940</td>
</tr>
<tr>
<td>Extraction: % of variance</td>
<td>60.7</td>
<td>25.0</td>
<td>14.3</td>
<td></td>
</tr>
</tbody>
</table>

Note: Rotation Method: Varimax with Kaiser Normalization. Rotation converged in four iterations.
Based on the idea description, the project can be seen as comprising some of the work preceding actual new product development. The report presented at the exam included preliminary calculations for determining the feasibility of the magnet solution and budgeting, including payback period scenarios. The group further argued that their solution would make it safer to do maintenance, as the solution would stabilize the ship and the turbine and thus be more useful than existing solutions on the market. However, the group also estimated that the product would take up more deck space, be heavier, require more power and, last but not least, be more expensive than the main competitor’s product.

The expert ratings reflect that the product idea is a novel (N) way of using magnets in the particular context, and it would probably be more safe to use (U) compared to the competitor’s product. However, the downsides with regard to size, weight and power consumption (all related to U) prevented a higher score on usefulness. Also, since salt water and electrical equipment rarely go well together, it is reasonable to assume that the solution would probably not work (U) in an offshore marine environment. Moreover, the higher cost would result in a more expensive product and would likely also make it less attractive (MP) than the existing solution. Clearly, the group presented an early idea that needed further validation but it is still likely that the shortcomings identified already at this stage would result in limited sales and, thereby, lead to commercial failure. Thus, it may be that the new product, if introduced on the market, would be adopted by a few recipients that prioritize safety above all and, therefore, are ready to pay the higher price despite the mentioned downsides. But, it is more likely that the ‘firm’ would not invest in developing the product idea further due to the anticipated challenges and downsides. Hence, the product idea could be regarded as having innovation potential (N + U), but it is unlikely that it would lead to innovation performance (N + U + MP).

Case 2: Electrification of bus shelters using solar panels (innovation performance)

Only seven product ideas were rated high by the experts on all three criteria and, therefore, constituted the possibility to achieve innovation performance. One of these product ideas (novelty = 95%; usefulness = 88%; market potential = 87%) was made by a group of students within the engineering theme ‘Solar Panels’. This project group suggested to integrate solar panels into existing types of bus shelters. Their idea was to mount LED spots and light up the bus shelters from energy derived from the solar panels, and to also add new features such as Wi-Fi and rechargers for electric devices, for people to use while waiting for a bus.

The report presented at the exam included a stakeholder analysis, an estimation of potential target groups, and a competitor analysis for the product idea. Moreover, they added investment calculations based on rough estimates including, for example, target costing, and they also made some preliminary strain and load calculations to render probable the solution with mounting solar panels on an existing bus shelter. This project can also be seen as comprising some of the work preceding actual new product development.

The expert rated this idea as high as 95% on novelty, usefulness at 88% and market potential at 87%. Hence, the product idea was deemed to potentially become an innovation success and to likely present options for adoption by a sufficient number of potential customers to become a case of successful commercialization. The product idea can be characterized as drawing upon a combination of previously unrelated but known technologies. Basically, the expert saw it as a creative idea (N + U) with innovation potential seen from a firm perspective (also MP), i.e., a further development of the idea and subsequent market introduction of the final product could lead to relatively fast innovation performance. Despite its high ratings, the idea ultimately represents a potential incremental innovation (combining existing elements in a new way) with low barriers to copy for competitors.

Discussion

The purpose of this article was two-fold: (1) to develop a framework which integrates theoretical perspectives from the creativity and innovation literatures; and (2) to apply an empirical methodology to define and verify the criteria for assessing potential innovation performance of early ideas for new products. The framework presents three criteria: novelty, usefulness and market potential. The criteria are derived from the creativity and innovation literatures respectively. These literatures agree on the importance of the novelty criterion as a prerequisite of innovation, whereas the creativity literature adds usefulness to the potential recipients of ideas (e.g., O’Quin & Besemer, 2006), and the innovation literature brings in the business perspective, adding a requirement for returning value to the firm from developing and
commercializing a new product (e.g., Schumpeter, 1983 [1934]).

While the creativity literature assumes that a novel and useful idea eventually will also be sold and hence bring income to the firm, we argue that the market potential must be considered explicitly in parallel with novelty and usefulness. A focus on the market is needed in order to know what to compare to; i.e., how novel and useful is a product proposal compared to existing offerings in the market. Moreover, what is the estimated market size and what are the economic consequences (cost, price and potential market share)? This view represents the firm perspective: can the firm earn profits on the solution? By including the market potential criterion alongside novelty and usefulness as an overall criterion for creative ideas to lead to innovation performance, we emphasize that as a ground rule the potential financial performance should be represented already in the early phases of the idea development process.

The findings from the student setting show that novelty, usefulness and market potential represent dimensions to consider separately. Certainly, the weighting may differ for the different criteria and likely across different product groups and even industries. This means that an idea may not automatically be discarded due to weaknesses related to one of the criteria alone.

A set of overall criteria probably matters the most when assessing early and sketchy ideas (Hart et al., 2003). However, we acknowledge that for a detailed understanding of the strengths and weaknesses of an idea, it may indeed be relevant to assess a range of sub-criteria. In a firm context, the early assessment of ideas would be accompanied by considerations of technical feasibility (Hart et al., 2003). This criterion can be seen as closely linked to novelty (the need for/the risk of new technology) and considerations of how difficult or easy it would be to realize the novel idea. Firms would also consider the stakeholders of a new product proposal, including those potentially buying and those potentially using the product; customers and users do not necessarily share needs and wishes (Kotler, 2003) for which reason the usefulness criterion encompasses stakeholder nuances. Moreover, the usefulness criterion can be seen as tripartite, as explained by Sanders (1992), as a new product must be both useful (users need and will use the product), usable (the product is either easy to use or requires an acceptable time of learning) and desirable (customers and users want the product). Finally, strategic fit and financial issues may also be taken into consideration when screening product ideas.

The assessment criteria’s direct relationship with actual innovation performance is highly relevant; equally important is the distinct role of each criterion. It is, however, beyond the scope of this study to investigate and verify the sub-criteria and the weighting of the overall criteria, and as such we leave these investigations for further research.

This article makes a theoretical contribution to the creativity and innovation management literatures by complementing and combining the existing criteria. Identifying creative ideas with the potential to lead to innovation performance requires a multi-dimensional assessment focusing on novelty, usefulness and market potential. Our theoretical framework suggests different constellations of the three criteria, which lead to different types of performance. Two of these constellations are particularly interesting to the field of creativity and innovation: a product idea that is novel and useful has the potential to change existing practices and, thus, the potential to become innovation, whereas ideas that likely live up to all three criteria have the potential to lead to innovation performance. The framework, together with the findings regarding the criterion-concept, gives rise to a (re)consideration of the definitions of what constitute creative ideas with innovation potential. Therefore, we suggest that creativity and innovation management studies utilize the framework to more specifically illustrate what is being studied and describe how it is done.

The student product cases exemplify two of the constellations in the theoretical framework. The idea for electrification of a bus shelter by means of solar panels is a case of potential innovation performance due to the high rating on all three criteria. The conclusion is that it is a valuable idea worth developing further. The idea for using a magnet to connect a ship and a wind turbine was assessed by the expert as high on novelty but medium on usefulness and very low on market potential. This case, in particular, demonstrated that the idea was challenged by an existing alternative in the market, which would imply both a more expensive product as well as a heavier and larger solution. These insights indicate the importance of involving competitor analysis as well as the economic conditions in the market when assessing an idea. Most likely, such observations would form part of the assessment of the product idea in a business setting and would result in a decision that the idea should not be pursued further. Along these lines, Amabile (1998, p. 83) cautions that ‘not every new idea is worthy of consideration’ and emphasizes that ‘managers look for reasons to not use a new idea instead of searching for reasons to explore it further.’ There is a risk that
highly novel (although potentially useful) ideas are rejected at an early stage by those assessing them. Therefore, we emphasize that managers should try to make decisions regarding ideas for selection or discontinuation based on the greatest possible degree of objective assessment of the ideas. The framework we provide is a useful starting point for such deliberations. It can be used for deciding a new product strategy, e.g., whether to pursue an innovation strategy \( (N + U; N + U + MP) \) or not \( (N + MP; U + MP) \). It can also be used for considering the firm’s project portfolio, including whether it should consist only of new product proposals that are expected to lead directly to profit or whether other innovative proposals are also worth pursuing, i.e., those that are novel and useful but lack market potential. The latter may create brand value to the firm.

In general, innovation in business is associated with radical rather than incremental offerings, which implies an elevation of novelty above usefulness (Bilton, 2007). However, not all offerings are or need to be radically new to bring value to the recipients or to the firm, which again implies that a product does not have to excel on all criteria. Magnusson (2009) suggests that for radical innovation, originality (novelty) is the most important factor, whereas originality is, by definition, low for incremental innovation for which user value (usefulness) matters the most.

We looked at the student projects that were assessed at 75% or above on the three criteria. This led to only seven product ideas with the potential for arriving at innovation performance according to our framework in terms of high novelty, usefulness and market potential. The findings substantiate the claim by Fleming (2007, p. 69) that radically new products are rarely seen, which may be because ‘almost all inventions [ideas for new combinations] are useless; a few are of moderate value; and only a very, very few are breakthroughs.’

In the sample, there are an additional 18 cases of high novelty but low or medium usefulness and market potential, as well as a few cases of high novelty and usefulness but low or medium market potential. These product ideas would not be candidates for innovation performance according to our framework, as they are not rated high enough on all three criteria. However, as mentioned, we suggest that it may be too early to merely disregard ideas that are not rated high on, for example, usefulness and market potential. The criterion-concept is to be seen merely as a means to make the first assessments of new product proposals and should not be used for instantaneous killing of ideas. Some novel ideas may turn out to be highly valuable to the users and to the firm even though such potential results are not readily apparent when screening the idea. Focusing merely on novelty (and thus ignoring the iterative process of new product development) will also lead to an even more skewed distribution of ideas (Fleming, 2007). A further investigation of the potential of highly novel ideas may reveal (not yet thought of) areas of use and market potential. Moreover, it is easy to imagine that ideas with high novelty, high usefulness and high market potential may, after the entire product development process, end up with only a mediocre outcome or even just incremental innovation. Hence, the insights gained and decisions made throughout the product development process, along with the results achieved, potentially reduce the radicalness of the final offering to the market. An important further line of research is needed to establish this link between the creativity of an idea and the radicalness of the product adopted by the users. Such research will require access to specific product development projects and the ability to study these over an extended period of time. The value of performing such research is nevertheless potentially very important for progressing an understanding of how creative ideas lead to innovation performance.

To sum up, our research points to the following two prominent research topics:

1. Theoretical arguments for, and empirical research on, uneven weighting of criteria.
2. Empirical research on the link between assessment criteria for identification of innovation performance, in particular how different criteria support either incremental or radical product innovation.

**Studying Student-Generated Product Proposals and Potential Limitations**

The student setting was chosen for our investigation due to its resemblance to firms’ new product development teams that are often heterogeneous with regard to expertise and, to some extent, nationality. The teams for this study were composed of individuals specialized within different study areas, such as software engineering, mechanical engineering, design engineering and product innovation, but also with some students having more extensive training in business aspects. The controlled setting (allowing for differences of qualifications, nationality and age), combined with the aim of the projects, makes it a solid and relevant area for investigation of the research focus. Moreover, the study has allowed us to collect a sufficient number of projects for analysing the criteria at this early stage of conceptualization and validation.
which would have been extremely difficult to obtain from a firm setting. Therefore, we argue that despite its constructed nature, the student setting has allowed us to investigate the criteria and establish the framework, which we may in later studies apply in a business setting for further validation and application relating to the implications for innovation managers and professionals.

Even though this study is of an exploratory nature, it is a shortcoming that we used only one assessor per product idea. However, each assessor can be regarded as an industry and market expert and therefore also as capable of assessing novelty, usefulness and market potential of product ideas. We do, however, urge future studies to use more than one assessor in order to be able to check for inter-rater reliability.

Notes

1. Extract from the (most recent) course description: http://www.sdu.dk/om_sdu/fakulteterne/teknik/ledelse_administration/administration/studieordninger_a/pdi_civbach/moduler_el15

2. The students were: Christian Englund Christensen, Rafik Daka, Ahmad Omar El-Kassem, Mikkel Wiggers Hyldgaard, Sinisa Popadic and one more student. The latter student did not wish to be mentioned by name. They have all kindly given permission to include the excerpt of their project report in this article.

3. The students were Simon Falden, Ivar Órn Pálsson, Michael Rasmussen, and Dlair Younus. They have all kindly given permission to include the excerpt of their project report in this article.

References


Marianne Harbo Frederiksen (mha@iti.sdu.dk) is Associate Professor at the Department of Technology and Innovation at the University of Southern Denmark. Her research focuses on creativity and idea management throughout the innovation process. In addition, she focuses on the emergence of eco-systems and the market potential for new technologies. She has an MSc in Architecture with a specialization within industrial design from the Aarhus School of Architecture in Denmark. She has been co-owner of a design company and has worked in and together with several industries as a designer and R&D Manager. She has also been an adviser in public-private research projects focusing on the development of use scenarios, ideation, idea development, implementation, mapping of user experiences, and other aspects related to new product development.

Mette Præst Knudsen (mpk@sam.sdu.dk) is Professor of Innovation Management and Director of the Centre for Integrative Innovation Management, Department of Marketing & Management at the University of Southern Denmark. Her research focuses on open innovation and ways to operationalize openness in firms’ innovation activities. As part of this research, she is also concerned with the relationship qualities and knowledge-sharing abilities of the partners involved in open innovation projects. She has also investigated the links between creativity, organizing for creativity, and the effects on innovation performance. Finally, her research is concerned with the emergence of eco-systems for new technologies and the development of commercialization capabilities of firms. Her research has been published in journals such as Journal of Product Innovation Management, Technovation, International Journal of Engineering and Technology Management and Industrial and Corporate Change.