The world’s most innovative companies: a meta-ranking

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Abstract

Purpose – The purpose of this paper is to develop a meta-ranking of the world’s most innovative firms, which underscores the importance of external perceptions of innovativeness and of an innovation-based view on firm performance, including product, service, process, business model, management and organizational innovation.

Design/methodology/approach – This is an exploratory empirical paper, which integrates the results of five rankings of the world’s most innovative companies.

Findings – The five innovation rankings include a variety of companies based on different methods and strategic focus. This variety underscores the importance of a meta-ranking, whose multiple aggregation methods lead to consistent results. Only the following 11 companies are mentioned in at least three rankings, leading to a list of the 11 most innovative companies in the world: Amazon, Apple, Tencent, Google/Alphabet, Netflix, SpaceX, Tesla, Microsoft, IBM, Intel and General Electric. Overall, the meta-ranking is dominated by US companies from various industries with firms from China gaining importance.

Originality/value – The paper contributes to research into innovation antecedents and consequences by illustrating the importance of innovation perceptions. The meta-ranking highlights the need for pursuing different types of innovation, following the innovation-based view on firm performance with first-order and second-order innovations. Moreover, the results deepen our understanding of digital transformation and of capturing value from innovation in the digital economy because a considerable portion of the leading innovators has a business model emphasizing artificial intelligence and digital platforms, which have led to the generation of new and to the disruption of established markets.

Keywords Organizational transformation, Digital transformation, Strategic renewal, Innovation ranking, Innovation-based view, Top innovators

Paper type Research paper

Introduction

Innovation is a major determinant of firm performance (Damanpour, 1991; Zhong and Nieminen, 2015), and superior innovation can lead to a sustainable competitive advantage (Hess and Rothaermel, 2011; Ahuja et al., 2008; Swift, 2018). A large variety of studies have shown positive performance effects of systematic innovation activities, and recent reviews and meta-analyses further underscore the importance of innovation for financial firm performance (Rosenbusch et al., 2011; Anderson et al., 2014). The relevance of innovation for creating and capturing value is particularly strong in the context of the digital economy, which provides new opportunities and challenges for profiting from innovation (Teece, 2018; Helfat and Raubitschek, 2018). Here, the platform-based business models of companies in various sectors, such as Amazon, Airbnb and Uber, have received particular managerial attention. As such, innovation is a primary driver of recent disruptive evolutions across different industries (Christensen and Overdorff, 2000; Bughin, 2017).

On this basis, innovation also is an important determinant of a company’s market capitalization (Sood and Tellis, 2009). These conceptual arguments and empirical findings have also led to the development of an innovation-based view of firm performance (Lichtenthaler, 2016b). In this regard, innovation may affect a firm’s financial performance because it enables, for example, additional revenues from new products or higher margins from specific services and superior business models (Knudsen and Mortensen, 2011; Sherman et al., 2005; Wang et al., 2018). This logic assumes a relatively direct link between innovation and financial performance through revenue growth and higher margins. In addition, however, innovation may also affect financial performance more indirectly...
In particular, innovation activities may strengthen the image and reputation of the firm and of its products and solutions (Chiang and Hung, 2010). In turn, this positive image and reputation may enable the company to achieve superior financial results, for example, based on a higher brand value than competitors’ brands (de Jong et al., 2005).

This indirect link between innovation and financial performance focuses on external perceptions of a firm’s innovativeness. If a company is innovative – and if it is perceived as being innovative – its innovation activities may have an even higher return because of the indirect link on financial performance. Therefore, it often pays off to be considered as innovative, and many companies like Apple and Amazon actually put considerable emphasis on their innovation communication. Even if many of their innovations derive from close collaborations with a variety of external partners (Amit and Zott, 2012; Gassmann et al., 2010; Lichtenhalter, 2016a; Martynov, 2017; Alvarado-Vargas et al., 2017), the communication of new product launches typically highlights the internal innovation strength of the organizations.

In light of the high importance of innovation perceptions, there are rankings of the most innovative companies in many countries. In addition, there are several well-known rankings of the world’s most innovative companies. Many of these rankings are published by newspapers, magazines and consultancies, and these rankings are often based on a combination of expert opinions along with some additional quantitative data. Every year, for example, the rankings of the world’s most innovative companies by Forbes and MIT Technology Review as well as the Boston Consulting Group receive strong managerial and public attention. In light of the considerable differences in the methods and results of these rankings, this paper aims at developing a meta-ranking of the world’s most innovative companies.

Based on the high relevance of perceived innovativeness, a meta-ranking is a step toward a consistent understanding of which companies actually are among the most innovative firms – according to external experts (Calantone et al., 2010; Parmigiani and Rivera-Santos, 2011; Wei et al., 2018). From an innovation-based perspective, a meta-ranking further helps to deepen our understanding of whether perceptions of innovativeness are relatively homogeneous across different rankings with varying methods and distinct focus (Geyskens et al., 2009). More importantly, a meta-ranking provides new insights into the link between innovation and financial firm performance through a firm’s innovation image and reputation (Ramani and Mukherjee, 2014; Okuyama, 2017). These external perceptions of innovativeness are driven by a large variety of innovation types, such as product, process and service innovation, as well as disruptive transformations of business models in established and new companies (Thrane et al., 2010; Markides, 2006). Thus, this paper addresses the following questions: Which firms are considered the leading innovators, and is there a consistent understanding which firms are among the top innovators? To what degree do perceptions of innovativeness differ according to a distinct focus of multiple rankings? Which influence do digital innovation activities have on innovation perceptions?

As such, this paper provides new conceptual and empirical insights, and it offers several contributions. First, the paper contributes to research into innovation antecedents and consequences by illustrating the importance of innovation perceptions (Hung and Chiang, 2011; Perrons et al., 2005). Second, the meta-ranking offers new insights into the innovation-based view by highlighting the different types of innovation, which jointly lead to a strong perception of innovativeness (Lichtenhalter, 2016b; Kelley et al., 2009). Third, the paper contributes to research into organizational transformation by underscoring the importance of renewing a firm’s innovation activities over time (Agarwal and Helfat, 2009; Ben-Menahem et al., 2013). Fourth, the paper deepens our understanding of capturing
value from innovation in the digital economy because a considerable portion of the leading innovators has a business model emphasizing digital platforms (Helfat and Raubitschek, 2018; Teece, 2018; Lichtenthaler, 2018). Fifth and finally, the paper contributes to entrepreneurship research by demonstrating how the generation of new markets leads to perceptions of innovativeness (Choi et al., 2008; Short et al., 2010).

Conceptual background

Following the innovation-based view on firm performance (Lichtenthaler, 2016b; Kelley et al., 2009), a firm’s financial results strongly depend on the combination of various innovation activities. These first-order innovations comprise product innovation, service innovation, process innovation, business model innovation, organizational innovation and management innovation (Birkinshaw et al., 2008; Galunic and Eisenhardt, 2001). Due to the typical focus of digital innovations on new products, processes or business models, most digital innovations may be considered first-order innovations. There are major interdependencies between the different types of innovation, and their performance effects are often complementary (Cassiman and Veugelers, 2006; Tödtling et al., 2009). Thus, a firm focusing exclusively on new product development may not be successful because the performance of its products on the markets may significantly depend on complementary service and business model innovations (Damanpour et al., 2009; Carayannis et al., 2015). These interdependencies among different types of first-order innovations are particularly pronounced in many industries that have experienced substantial digital transformations in recent years (Dellermann et al., 2017; Andriole, 2017).

Beyond these first-order innovations, an innovation-based perspective underscores the importance of second-order innovations, which refer to dynamically transforming a firm’s innovation activities (Doz and Kosonen, 2010; Lichtenthaler, 2016b). Most digital transformation activities also involve the transformation and adaptation of innovation processes and may therefore often be considered as second-order innovation activities. Specifically, it may be necessary to reconfigure a firm’s innovation activities, for example, in order to place additional importance on business model innovation and service innovation beyond well-established product innovation activities (Wagner et al., 2017; Henderson and Clark, 1990). The reconfiguration of innovation activities may also require a realignment of the interfaces of the innovation activities in order to achieve strategic fit with new objectives and interdependencies (Capron and Mitchell, 2009; Kwee et al., 2011). Beyond gaining a competitive advantage at one moment, the second-order innovations are particularly important for sustaining an innovation-based competitive advantage over time (Pacheco-de-Almeida and Zemsky, 2007; Teece, 2007). Consistent with the growing importance of interdependencies among first-order innovations, these renewal processes have been particularly important in light of the recent digital transformation of many sectors (Berman, 2012; Westerman and Bonnet, 2015).

In fact, the innovation activities of many firms now include a substantial portion of digital innovations. While the focus on digital innovation has long been a fact for companies from the information and communications sector, it now also applies to many firms from traditional industrial sectors, such as machinery, automotive, retail and logistics (Amit and Han, 2017; Nambisan, 2017). In many companies in these sectors, innovation and digital transformation are increasingly inseparable. In the initial wave of digital transformation, many executives have focused on capturing efficiency gains. Now, the focus in many companies is increasingly on digital innovation to generate completely new solutions in order to achieve growth opportunities and new revenue streams (Remane et al., 2017; Rometty, 2016). Thus, the relevance of digital innovations for innovation output and impact has strongly increased in recent years (Iansiti and Lakhani, 2014; Porter and Heppelmann, 2014).
Overall, these digital and non-digital innovations derive from first-order and second-order innovation activities (Danneels, 2012; Leitner, 2014). On the one hand, these innovation activities affect a firm’s financial performance, e.g. by means of additional revenues or higher margins. In addition, Figure 1 illustrates that the innovation activities influence the perceived innovativeness of a company (Hansen, 2014; Shu et al., 2005). In turn, this perceived innovativeness is related to a firm’s financial performance. While the path from perceived innovativeness to financial performance highlights the indirect effect of innovation on performance, the opposite direction may also play a role at least in the longer term, with a firm’s current financial performance affecting its perceived innovativeness and reputation in the future (McGrath and MacMillan, 1992; Pehrsson, 2006). For the meta-ranking in this paper, the key relationship is between the innovation activities and the perceived innovativeness of a firm.

**Methods**

**Data sources**

To generate the meta-ranking of the world’s most innovative companies, the results of five existing innovation rankings were used which have received considerable public attention by the innovation community and beyond. Each of these rankings is published annually and includes at least 50 firms which are considered the most innovative companies worldwide. If more than 50 companies were listed in a ranking, only the top 50 companies were considered for the meta-ranking to ensure a high level of comparability across the different rankings. The information about these rankings was collected online in April 2018. Thus, the rankings refer to the second half of 2017 or the beginning of 2018. Since general innovation perceptions provide the basis for most of the rankings, they consider first-order and second-order innovation activities. Only the fourth ranking focuses on technological innovations, which typically emphasize product and process innovations. Therefore, that ranking concentrates on first-order innovation activities and only indirectly considers the relevance of second-order innovation activities.

The first of the five rankings is entitled “The most innovative companies 2018,” and it has been published by the Boston Consulting Group (www.bcg.com/de-de/publications/collections/most-innovative-companies-2018.aspx). According to the information provided in the study, the ranking is based on a survey of senior executives from firms in various sectors worldwide. These survey results are complemented by an analysis of selected financial indicators, particularly total shareholder return.

The second ranking is entitled “The world’s most innovative companies 2018,” and it has been published by Forbes magazine (www.forbes.com/innovative-companies/list/#tab:rank). According to the methodological information provided in the article about the ranking, the order of the companies is determined by their innovation premium, i.e., the difference of market capitalization and net present value of existing business cash flows.

![Figure 1. Conceptual framework](image-url)
These metrics are calculated with an algorithm from Credit Suisse HOLT. To be eligible for the ranking, seven years of public financial data are required as well as $10bn in market capitalization, and the firms need to be active in industries with a measurable investment in R&D, excluding, for example, financial services firms. For some companies, the ranking includes individual business units or regional units. Specifically, Unilever was mentioned twice with Hindustan Unilever and Unilever Indonesia. On this basis, only the higher rank was considered for the entire company Unilever.

The third ranking is entitled “The world’s most innovative companies 2018,” and it has been published by Fast Company magazine (www.fastcompany.com/most-innovative-companies/2018). According to the information provided for this ranking, more than 30 editors and contributors of the magazine surveyed thousands of companies in 36 categories. Many of the firms that were examined had been identified by means of a public submission process. The target and focus of the analyses was to identify the most important innovations of the previous year. On this basis, the innovations’ impact on businesses, sectors and the larger culture were studied. As a result of this analysis process, the most innovative companies overall and for different sectors were identified.

The fourth ranking is entitled “The world’s 50 most innovative companies” in 2018, and it has been published by USA Today (www.usatoday.com/story/money/business/2018/01/12/worlds-50-most-innovative-companies/1023095001/) based on an analysis of 24/7 Wall St (https://247wallst.com/special-report/2018/01/10/the-worlds-50-most-innovative-companies/2/). According to the information provided in the article about the ranking, it draws on patent data analyses. In particular, it relies on information from patent research company IFI Claims Patent Services. The US Patent and Trademark Office granted firms more than 320,000 patents in the previous year. As many patents belong to the same parent organization, 24/7 Wall St combined patents for the same parent firm in order to identify the world’s 50 most innovative companies. Each company in this ranking was granted at least 700 patents in the previous year, the top companies were granted thousands. In fact, a very limited number of firms account for a large share of patents. More specifically, 50 firms, including Apple, Google, Microsoft and Amazon, accounted for about 30 percent of patents.

The fifth ranking is entitled the “50 smartest companies 2017,” and it has been published by MIT Technology Review (www.technologyreview.com/lists/companies/2017/). According to the information given in the article about this ranking, the editors of the magazine every year select those firms that best combine innovative technology with an effective business model. In contrast to some of the other rankings, this ranking is not based on quantitative indicators, such as patents or R&D expenditures. There is not a specific submission form, but the editors are open for suggesting a company that may deserve to be included. Some companies in the ranking are large established firms, such as Amazon and IBM, but the list also includes relatively new companies and startups.

Analytical procedures
To generate the meta-ranking, the results of the five individual rankings were aggregated. For cross-validation purposes, this aggregation was done in three ways. The first and most basic aggregation method is to consider the number of times that a company is included in a ranking. If the company is included in a ranking, this measure is 1, otherwise 0. Accordingly, the specific position in a ranking (between rank 1 and 50) is not taken into account. The minimum value for this first aggregation method is 0 points, whereas the maximum value is 5 points, which would refer to a company that is included in all five rankings.

The second aggregation method considers the specific rank between 1 and 50. To calculate a measure that indicates a higher position with a larger number of points, a firm’s position in a ranking was transformed according to the following formula: number of points = 51 – original rank. Thus, the company in the first place of a ranking receives
50 points, whereas the company on rank 50 receives 1 point. If a company is not included in a ranking, it receives 0 points. Accordingly, the minimum value for this second aggregation method is 0 points, whereas the maximum value is 250 points if a single company would score the top rank in each of the five rankings.

The third aggregation method further considers the particular value of the top positions in a ranking. This approach acknowledges the specific challenges of achieving a rating among the top 10 companies rather than the top 50 companies. Accordingly, this method does not assume an equal distance between the ranks in each ranking. In fact, there are not any absolute or relative numbers given as a basis for the ranking results for most of the five rankings. Therefore, this is assumed in the third aggregation method. Here, the number of points increases by 1 for the bottom ten firms in each ranking. Thus, rank 50 receives 1 point, whereas rank 41 receives 10 points. Then, the number of points increases by 2 for the next ten firms. Accordingly, rank 40 receives 12 points, and rank 31 receives 30 points. Afterwards, the number of points increases by 3 for the next ten firms. Thus, rank 30 receives 33 points, and rank 21 receives 60 points. For the subsequent ten firms, the number of points increases by 4. Consequently, rank 20 receives 64 points, and rank 11 receives 100 points. For the top 10 firms, the number of points increases by 5 for each rank. Accordingly, rank 10 receives 105 points, and rank 1 receives 150 points. On this basis, scoring rank 1 and rank 50 in two rankings (150 + 1 = 151 points) is worth more than scoring rank 25 and 26 (48 + 45 = 93 points). If a company is not ranked in a particular ranking, it receives 0 points. Thus, the minimum value for this third aggregation method is 0 points, and the maximum value is 750 points if a single company would score the top rank in each of the five rankings.

Results

A surprising initial finding of the meta-ranking is the large number of companies that are mentioned among the 50 most innovative companies in at least one of the five rankings. Specifically, 203 different firms are part of the five top 50 rankings which had led to a theoretical maximum of exactly 249 places since two different regional units of Unilever had been included in the Forbes ranking (please see Methods section for further details). Thus, there are only very limited overlaps among the five rankings. Rather than providing a relatively consistent understanding of the world’s 50 most innovative companies, the different methodological approaches and strategic focus of the five rankings lead to very divergent lists of companies. In fact, only the 31 companies listed in Table I are mentioned in at least two of the five rankings. The points for the first aggregation method show that only 11 companies are ranked in at least three of the rankings. Two companies are part of four rankings, and only one firm is mentioned in all five rankings.

Thus, the limited consistency of the results of the five rankings of the most innovative companies worldwide is one major finding of this meta-ranking. Therefore, the first aggregation method may actually be considered the most important approach because being mentioned in multiple rankings is a strong signal of innovativeness since the overlaps of the ranking results are so limited. Accordingly, Table I lists the top companies based on their points for the first and third aggregation method. On this basis, Amazon leads the meta-ranking based on five points for the first aggregation method. There are also two clear runners up with Apple and Tencent being mentioned in four rankings. Then, the following eight companies result in a clear top 11 for the meta-ranking based on being mentioned in three rankings: Google/Alphabet, Netflix, SpaceX, Tesla, Microsoft, IBM, Intel and General Electric. Interestingly, the group with three points for the first aggregation method comprises four firms, which are relatively young “technology” companies, i.e., Google/Alphabet, Netflix, SpaceX and Tesla, as well as four firms, which are large and more established companies, i.e., Microsoft, IBM, Intel and General Electric.
To understand the underlying reasons for the ranking results, two of the rankings, i.e., the third ranking by *Fast Company* magazine and the fifth ranking by *MIT Technology Review*, provide more detailed information for the companies that are included beyond the patent counts in the fourth ranking by *USA Today*. This brief information gives some more specific insights into why the companies are considered innovative. Here, a relatively strong focus of the arguments in the *MIT Technology Review* ranking on digital transformation and artificial intelligence topics needs to be taken into account. On this basis, the following information is given for the top 11 firms. Amazon is primarily considered because of its enormous presence in different fields and its strong competencies in artificial intelligence. In a similar vein, Apple is assumed to deliver the future today in various areas, including artificial intelligence. Tencent is highly regarded for its large user base and for honoring content as key. With regard to Google/Alphabet, the key role in artificial intelligence is highlighted. Netflix is mentioned with regard to changing its industry and mastering different sizes of screens. SpaceX is included because of putting outer space within reach. For Tesla, the focus is on its bold plans, such as the giant factory. For Microsoft, the strong role of the cloud business is underscored. Concerning IBM, the applications of blockchain technology and artificial intelligence are highlighted. In a similar vein, artificial intelligence is mentioned with regard to Intel, while the focus for General Electric is on industrial analytics.

In contrast to the limited consistency of the results of the five rankings, the three aggregation methods for the meta-ranking lead to very consistent results. Of the top 10 companies,
are identical according to each of the aggregation methods. As expected, the ranking is dominated by US companies, with 19 out of the 31 top companies from the USA. While this indicates the innovative strength of US companies, the origin of the five rankings, which are all compiled in the USA, may also play a role. In addition, four Chinese companies are considered among the top innovators with Tencent on rank 3, Alibaba on rank 21, DJI on rank 26 and Huawei on rank 27. Three companies are from Germany, i.e., Siemens (rank 23), Adidas (rank 29) and Daimler (rank 30), and two companies from South Korea, i.e., Samsung (rank 12) and LG (rank 16). The top 31 companies are completed with one firm from Japan (Toyota on rank 14), one company from the Netherlands (Philips on rank 31) and one company from the UK/the Netherlands (Unilever on rank 16).

With regard to the industry distribution of the most innovative companies, there are many “technology” companies among the top firms, including the top 3, i.e., Amazon, Apple and Tencent. Overall, however, there is quite some diversity with respect to different sectors, including automotive firms, such as Toyota and Daimler, as well as industrial giants, such as GE and Siemens. Among the top 31 firms, there are also several “digital natives,” such as Facebook and Netflix, but also well-established firms from other sectors, such as Adidas and Unilever. In addition, two companies that are strongly influenced by a single individual, i.e., Elon Musk, are part of the top 10, with SpaceX on rank 6 and Tesla on rank 7. With regard to innovation, many of the companies do not focus exclusively on product innovation, but they are also well known for service innovation and especially business model innovation according to the information provided in the articles about the rankings. On this basis, several of the companies are well known for successful transformation processes and/or for disrupting their industries, e.g., Amazon, Netflix and SpaceX.

Discussion
Implications
The findings of the meta-ranking have several important implications. First, the results have implications for research into innovation antecedents and consequences because they underscore the relevance of innovation perceptions (Hung and Chiang, 2011; Perrons et al., 2005). In particular, the meta-ranking has shown the distinct findings of the five underlying rankings. While all of these five rankings claim to identify the world’s most innovative companies, their results are very different based on distinct procedures and strategic focus in preparing the rankings. The results of the individual rankings vary strongly, and there does not seem to be a lot of agreement which 50 companies specifically are the most innovative companies in the world. This surprisingly low consistency of the individual rankings can be interpreted as a strong signal for the diversity of ways in which a company can innovate – and for the diversity of ways in which a company may be considered as innovative.

In contrast to the limited consistency of the individual rankings, the different aggregation methods for generating the meta-ranking lead to very consistent results. Thus, it is possible to identify a convincing list of the most innovative companies with different methods based on the results of the five underlying rankings. Due to the consistent results of the cross-validation analyses with the three aggregation methods, the results of the meta-ranking help to understand which firms are perceived as the leading innovators (Barczak et al., 2009; Kahn et al., 2012). While the perception of a company as being among the top innovators in a single ranking varies strongly across multiple rankings, the aggregation methods lead to consistent findings.

Second, the findings of the meta-ranking provide new insights into the innovation-based view by underscoring the importance of different types of innovation, which together lead to strong perceptions of innovativeness (Lichtenthaler, 2016b; Kelley et al., 2009).
According to the information provided in the articles about the five rankings, the top companies in the meta-ranking are well known for product innovation and service innovation (Artz et al., 2010; Atuahene-Gima and Ko, 2001), whereas process innovation, management innovation and organizational innovation seem to play a less important role in public perception. Arguably most important, however, for an innovative public perception is business model innovation. There are many companies in the ranking, including Amazon and Apple, which are well known for convincing customers with new business models. These business models are often considered superior by customers relative to established business models. Consequently, the new business models have played a key role for the companies becoming financially successful. In many cases, the new business models are complementary to other types of innovation, such as product innovation and service innovation (Brown and Eisenhardt, 1995; Crossan and Apaydin, 2010), and this complementarity of multiple first-order innovations provides support for the innovation-based view on firm performance.

Third, the results provide new insights into organizational transformation because they highlight the relevance of renewing a firm’s innovation activities over time as a basis for innovative public perceptions (Agarwal and Helfat, 2009; Ben-Menahem et al., 2013; von Hippel, 2005; Muethel, 2013). Following the logic of the innovation-based view, these findings suggest that second-order innovations, which refer to reconfiguring and realigning a firm’s innovation activities, are particularly important in external perceptions of innovativeness (Zahra et al., 2006; Hossain and Kauranen, 2016; Roth et al., 2017). For instance, SpaceX and Netflix are well known for disrupting established industries based on transformative innovation activities. Consequently, these findings provide further support for the innovation-based view because they show the relevance of these second-order innovations for innovation performance on the one hand and for a high level of perceived innovativeness on the other. Thus, there may be a lot of additional potential in terms of disruptive innovation, which is currently not achieved by many companies even if these firms are relatively innovative in other ways. In the medium to long term, it is insufficient for executives to focus on different types of first-order innovation, such as product and service innovation. Instead, second-order innovations play a growing role to keep a firm’s innovation activities up to date.

Fourth, the results of the meta-ranking offer new insights into capturing value from innovation in the digital economy (Helfat and Raubitschek, 2018; Teece, 2018). Overall, there are companies from many different sectors among the most innovative firms according to the meta-ranking. Thus, it is important to note that the ranking is not exclusively dominated by “technology” companies which focus on software and information technology. Nonetheless, a significant part of the leading innovators has a business model emphasizing digital platforms (Gawer and Cusumano, 2002; Ross et al., 2017). These companies are “digital natives,” and they dominate a large part of their markets based on offering an essential platform, e.g. Amazon and Facebook. Digital innovations now play a major role in the innovation activities of most large companies, but the prominent position of these leading digital innovators further emphasizes the need for an innovation-based view toward understanding competitive advantage. By highlighting the complementarity of multiple types of innovations, including multi-sided platforms as a major business model innovation, the innovation-based view provides a helpful framework for understanding competitive advantage in the digital economy.

Fifth and finally, the findings of the meta-ranking provide new insights into entrepreneurship research by illustrating how the generation of new markets leads to external perceptions of innovativeness (Choi et al., 2008; Short et al., 2010). The top companies according to the meta-ranking comprise old companies in established industries, such as General Electric and Daimler, as well as relatively young companies from growth sectors.
These relatively young companies, such as Tencent and Netflix, have grown very rapidly in recent years, and a lot of this substantial growth may be attributed to creating completely new markets for their products and services, at least in their respective regions. The leading companies in these new markets are considered particularly innovative, and this public perception helps them to sustain their innovation-based competitive advantage over time. Accordingly, they are able to keep their innovative pace while transitioning from start-ups on the markets to corporate entrepreneurship in large companies (More et al., 1998; O’Regan and Ghobadian, 2004; Schumpeter, 1942; Sood and Tellis, 2009).

Limitations
The results of the meta-ranking are quite robust in the cross-validation analyses with three different aggregation methods. Nonetheless, several limitations of the meta-ranking are worth noting. First, the meta-ranking depends on the five individual rankings and their methodological procedures. In this regard, some rankings only consider a subset of all companies, for instance based on the availability of multiple years of public financial data. Second, the underlying rankings partly exclude some sectors. For example, the Forbes ranking does not consider financial services firms. Hence, it is more difficult for companies from these sectors to achieve a high position in the meta-ranking. Third, the ranking by USA Today focuses exclusively on the patent position of innovating companies. However, the importance of patents for innovation strongly differs among industrial sectors, and these sector differences may also affect the results of the meta-ranking. Fourth, the relative dominance of US companies in the top positions of the meta-ranking may partly be explained by the USA as the country of origin of the publications with all five individual rankings although these rankings claim to include the most innovative companies worldwide. Fifth, the aggregation method has some influence on the results of the meta-ranking. While the three aggregation methods lead to largely consistent findings, minor differences in the ranks of individual companies should be examined cautiously. Sixth, this paper does not empirically examine performance relationships of the ranking results. Thus, the analysis of objective innovation outcomes as well as subsequent financial performance in a longitudinal study is highlighted as a specifically interesting topic for future research.

Conclusion and outlook
Innovation is a major driver of firm performance, and an innovation-based view on competitive advantage may considerably deepen our understanding of performance discrepancies among firms (Ozer et al., 2013; Mokter, 2017). Thus, a thorough understanding of the most innovative companies has important academic and managerial implications. In this respect, the importance of a meta-ranking was underscored by the diverse results of the five individual rankings, which include a variety of companies based on different methods and strategic focus. On this basis, the meta-ranking’s multiple aggregation methods enable cross-validation analyses, and they lead to consistent results. Only the following 11 companies are mentioned in at least three of the five rankings which leads to a list of the 11 most innovative companies in the world: Amazon, Apple, Tencent, Google/Alphabet, Netflix, SpaceX, Tesla, Microsoft, IBM, Intel and General Electric. Overall, the meta-ranking is dominated by US companies from various industries with firms from China gaining importance.

The importance of innovation is already extremely high today, and it may even further increase in the future (Tura et al., 2017). One major reason for this expected further increase is the growing trend toward the digital economy which calls for developing completely new solutions besides optimizing existing products and processes to achieve higher levels of efficiency (Rometty, 2016). In order to fully capture the benefits of digital transformation, companies need to pursue different types of innovation, including product innovation,
service innovation and business model innovation. The complementarity of these different types of first-order innovation may only be achieved by pursuing second-order innovations to transform a firm’s innovation activities over time (Lichtenthaler, 2016b). Most of the top innovators in the meta-ranking excel in multiple first-order innovations as well as in managing second-order innovation. This systematic innovation management enables them to capture value from digital innovation because innovation and digitalization are increasingly inseparable in many of these firms, and this particular importance of digital innovation is likely to continue over the next years.

References


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