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Where Do Good Innovation Ideas Come From? Exploring the Influence of Network Connectivity on Innovation Idea Quality

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This paper aims to add to innovation management theory and practice by exploring the interrelationship between innovation idea quality and idea providers' network connectivity, using social network analysis. The study uses a database from a company that has worked systematically with idea management over a long period of time and today has a well-established information technology system that collects ideas from a large number of employees. In addition to the idea database, a number of interviews with key individuals within innovation were conducted to create rich contextual knowledge and understand more in detail how ideas are handled in the company. The analysis indicated that there is a clear interrelationship between the network connectivity and the quality of the innovation ideas created. The analysis was done for all the innovation ideas and then for ideas created by single individuals and by groups, respectively. In all three analyses the proportion of high-quality innovation ideas increased, as a step function, between the least connected group and the group thereafter. There is apparently a need for a certain amount of relations to increase the proportion of high-quality innovation ideas generated. Regarding only ideas provided by single individuals, more connections within the network resulted in a higher proportion of high-quality ideas. A different pattern was seen for ideas provided by groups as the proportion of high-quality innovation ideas grew with some increase in the connectivity of groups but declined with a further increase in connectivity. The findings suggest a number of implications for ideation management. To increase the number of high-quality innovation ideas created by individuals, the possibility to interact with other people should be supported and facilitated. However, in these settings, where individuals work with others in different groups, the most connected groups perform worst in terms of the proportion of high-quality ideas generated, which points to the necessity to consider a multitude of factors when managing ideation.

Introduction

Globalization and increased speed in business intensify competition, and most firms need to continuously innovate to ensure long-term competitiveness. Consequently, they also need a continuous stream of ideas as fuel for innovation. It is thus not surprising that the early stage of the innovation process, where innovation ideas are generated and identified, has been recognized as an important phase that has high impact on the success and costs of innovation (Koen et al., 2001; Reid and de Brentani, 2004; Zhang and Doll, 2001).

On an overall level, the literature related to innovation idea generation and identification is extensive, drawing on theories about, for example, creativity, learning, and innovation. Existing research has among other things dealt with where, by whom, and under which circumstances ideas are generated. At a fundamental level, Koestler (1989) explains the genesis of an idea as something emerging from new intersections of already existing knowledge or assumptions. An important part of this development is of course the exposure to and acquisition of information, and the propensity of individuals to create innovation ideas is therefore not only a result of innate creativity but largely also is an effect of their position in relation to information flows, something explicitly shown by Allen (1977) in his seminal work on the flow of technology. Ideas are created by individuals, but the knowledge of individuals is a result of their being part of a social context, interacting with other individuals in this specific context (Spender, 1996). In particular, informal knowledge networks, for instance so-called communities of practice, have been pointed out as highly important for learning and innovation (see, e.g., Brown and Duguid, 1991; Wenger and Snyder, 2000). While the ideas about communities are theoretically well developed, the literature in this field is primarily based on a limited

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number of case studies and ethnographic studies, and there are only a few examples of studies addressing the role of informal social networks for generating and identifying innovation ideas with data that allow investigation of more general patterns.

Lately, the development of social network analysis has opened up new opportunities for analyzing the role social networks have for learning and innovation. Management of innovation ideas is not a new area, either in theory or in practice. The deliberate handling of employee ideas through the use of suggestion boxes has been a way to coordinate and manage creativity (Ekvall, 1971) and has been a cornerstone of the continuous-improvement movement, in which the exploitation of every single organizational member's knowledge is one of the basic goals to strive for. However, the underlying focus in these idea management systems has been on creating a large number of incremental improvement ideas, and less attention has been given to more substantial innovation ideas. An issue related to this is that ideas leading only to minor improvements may actually cost more to handle than their resulting effects on business justify. While this can be understood if the primary objective of suggestion boxes is to create participation and willingness to change, it can be questioned if the purpose is to focus on bringing about business value and growth through innovation. Idea quality therefore stands out as an important, but to some extent neglected, factor to consider when addressing innovation ideas.

This paper aims to add to existing theory and practice by exploring the innovation idea network of an organization to find out how this affects the generation of innovation ideas. Furthermore, a special emphasis is put on innovation ideas of high quality. More specifically, the paper explores the interrelationship between innovation idea quality and idea providers' network connectivity, using social network analysis. Based on this investigation, new insights about the generation of high-quality innovation ideas are obtained, and implications for management of ideation are discussed.

BIOGRAPHICAL SKETCHES

Jennie Björk is a Ph.D. student in the Center for Business Innovation at Chalmers University of Technology. Her main research interest is ideation and then in particular the design and management of ideation systems in large firms. Ms. Björk holds an M.Sc. in electrical engineering specialized in management and economics of innovation from Chalmers University of Technology.

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Innovation Ideas

Innovation can be seen as ideas that have been developed and implemented (Van de Ven, 1986). Such a perspective means that all innovations originate from ideas and that, to successfully innovate, firms need to have a sustainable flow of ideas from which to choose (Boeddrich, 2004).

Firms that successfully innovate have an ability to implement more and better ideas than their competitors and thereby to gain an advantage (Francis and Bessant, 2005). Innovation ideas evolve and develop over time and can also be recombined with other ideas over time. Schroeder et al. (2000, p. 108) explain that "the process of innovation centers on the temporal sequence of activities that occur over time in developing and implementing new ideas from concept to concrete reality." Innovation can take place in many different ways—through products, processes, or the positioning of the firm or its products or by redefining the dominant paradigm of the firm (Francis and Bessant, 2005). Irrespective of the type of innovation, the starting point is an innovation idea starting with a new insight of a single individual. To turn new knowledge in the form of an idea into an innovation, the idea in question also has to be made explicit so that the knowledge can be shared with other organizational members and realized through action.

Where Do Innovation Ideas Come From?

Idea generation has been studied in both the fields of creativity and innovation management. On an overall level, the literature about creativity and idea generation is extensive. A topic that has received much attention in previous research is where innovation ideas come from.

Traditionally, firms' research and development (R&D) departments have been seen as an important source of innovation. As the definition of innovation ideas today has been broadened to include not only products and services but also other types of innovation ideas such as new business models, the importance has increased of expanding the traditional sources of ideation—and in particular R&D—to a much wider set of potential sources both inside and outside the company, including employees, customers, collaborators, partners, and private inventors (Cooper and Edgett, 2007). It is stressed that the sources for innovation ideas cannot rely only on a few individuals or a specific function and that ideation "is now a business function or activity requiring the involvement of everyone in the business and even those external to, but affiliated with, your business" (ibid., pp. 19–20). A narrow focus on R&D overlooks that information relevant to different types of innovation is acquired and developed to a large extent outside formal R&D systems (Baldwin and Hanel, 2003).

Well-known sources for innovation are universities and governments, firms' research and development departments, and individual inventors. Allen (1983) added that firms also can invent by a process he calls collective invention. This means that firms release their technical information to actual and potential competitors and that actors in an industry thus build on each other's expertise. The free exchange of technical information generates new technical knowledge (ibid.). In the so-called open innovation perspective, it has been emphasized that firms can benefit from using external sources of knowledge concerning both technology and market when innovating (Chesbrough, 2004). At the core of this perspective lies the understanding that exchange of information creates new technical knowledge and thereby enhances innovation (Allen). Von Hippel (1978) highlights the importance of customer involvement to bring in ideas from outside the firm. Along the same line of reasoning, it has been observed that both formal and informal interaction with customers and suppliers within supply networks constituted an important source of innovation ideas in ICT firms in Australia (Hyland et al., 2006).

Innovation ideas potentially stem from all parts of the organization as well as from the internal interfaces and from outside the organizational boundaries. Irrespective of where an idea emerges, it is clear that what is crucial for creating innovation is knowledge (Howells, 2002). Hence, the sources of innovation can be found anywhere good opportunities exist for accessing information and for creating new knowledge. From a managerial standpoint, the fact that innovation ideas like other types of knowledge (Tsoukas, 1996) are distributed not only in the formal organization but also throughout informal networks gives rise to a set of challenges. It is clear that traditional approaches to managing individual actions and behaviors have limited or no applicability when the critical means of production is knowledge held by the employees. Instead, ways of tapping into the knowledge residing in social networks stand out as a more viable approach. This, however, calls for a thorough understanding of how networks in which innovation ideas are created actually function.

Innovation Idea Networks

The knowledge needed to discover, invent, and innovate often involves not only existing knowledge but also the generation and acquisition of new knowledge, shared knowledge, and learning (Howells, 2002). Social networks have been identified as important for increasing learning (Liebeskind et al., 1996) and the creation of new knowledge. Communities of practices are spontaneously formed groups of people that exchange knowledge and thereby foster learning and innovation (Brown and Duguid, 1991). These informal networks of people "share expertise and knowledge in free-flowing, creative ways that foster new approaches to problems" and have been recognized as important for innovation and learning in organizations (Wenger and Snyder, 2000, p. 147). While the literature on communities of practice highlights the informal dimension of knowledge work in organizations in a fruitful manner, it still suffers from a relative lack of empirical evidence from large-scale studies applying statistical analysis tools.

The structural and relational aspects of social networks within an organization can be explored with social network analysis. Significant advances can be made by using the social network approach in research in organizational settings (Tichy, Tushman, and Fombrun, 1979). Empirical research on social networks has, for example, studied the interorganizational network of biotechnology firms and has identified how the structure of the network affects how new relationships are established (Walker, Kogut, and Shan, 1997) and offers an approach to evaluate the potential of teams (Reagans, Zuckerman, and McEvily, 2004). Previous research that has focused on network characteristics' influence on performance in the field of innovation has, for instance, studied (1) business units' connectivity in an intra-organization network regarding the innovation and performance of the unit (Tsai, 2001); (2) firms'positions in an industry network and the firms' innovation outputs (Ahuja, 2000); and (3) managers' likelihood to come up with good ideas depending on their position within a network (Burt, 2004). Tsai (2001) found that the business units' connectivity in the network was positively correlated with the innovation and performance of the unit. A central network position for the unit in the network enhanced the possibility to access new knowledge and expertise in other units. However, it should be noted that the measurements used by Tsai were quite far from single-innovation ideas and individuals, which may imply some caution in generalizing based on this former study. To measure the variable for units' innovation, Tsai used the number of new products introduced in a unit in a particular year divided by the unit's target number in that year; to measure the variable for units' performance, he used a profitability achieved rate—a unit's return on investment in a particular year divided by its target return in that year (p. 999). Hence, the measurements used in the study in question were on an aggregated level, revealing a need for empirical studies at a more detailed level of analysis. Ahuja (2000) defined the relations in the network after collaborative arrangements that involved a technological component, measured the innovation output in patent frequency for each firm, and found that direct and indirect ties have a positive impact on innovation output but that increasing structural holes has a negative impact on innovation output. Other research has identified the structural holes in the network as important to understand the network. Being close to a structural hole means that the person has information and control advantages "of being the broker in relations between people otherwise disconnected in social structure" (Burt, 1998, p. 233). Burt (2004) studied managers and identified that the managers who are close to a structural hole are more likely to come up with good ideas than those who are not. Using a survey, people in the network were asked to propose an improvement, and these ideas were then evaluated by the top management.

By focusing on the innovation idea network of a firm, including all individuals and groups generating innovation ideas, the present research aims to contribute to the discussion on where good innovation ideas are generated. Where the innovation ideas are generated in terms of inventors' connectivity in the intraorganizational network is studied in relation to the quality of the ideas that are generated. The underlying logic is that the position in the network might affect the individuals' or groups' access to knowledge and information. A group that is more central within a network has a greater possibility of reaching a wider expertise available within the network (Everett and Borgatti, 2005). Ideas that are generated by persons or groups that have worked with more persons consequently have access to more information and knowledge from which to draw when innovating than less connected persons or groups. Taking these established ideas concerning the functioning of social networks as the point of departure, this research investigates the possible relationship between network centrality and the quality of the innovation ideas generated.

Method

The data used to investigate the interrelationship between idea providers' network connectivity and innovation idea quality come from a Swedish company, which over a long period of time has used an information technology (IT)-based system for capturing and storing innovation ideas. Both researchers are active at a research center that has a formal long-term partnership with the firm in question and, through this collaboration, have been given access to the innovation idea database that the firm has accumulated. Given the size of this database, and the rich information available regarding each idea, it offers great opportunities to learn more about innovation ideas. In addition to the database, a number of interviews with key individuals within innovation were conducted to create rich contextual knowledge and to understand more in detail how ideas are handled in the company. Each innovation idea in the database was carefully graded on a five-graded scale by a committee composed of 10 persons in the company. Ideas were evaluated according to two criteria: (1) the novelty of the idea; and (2) the usefulness of the idea for the company. These criteria, and the process by which the ideas are graded, are well known by people involved in innovation within the company. To capture the social network, known to be particularly conducive for innovation, social network analysis was used. This specific type of analysis focuses on the relational ties between actors (nodes) in a network.

The data processing and analysis were done in three steps: (1) The innovation idea network was created; (2) the normalized degree centrality for each innovation idea was computed; and (3) the possible interrelationship between normalized degree centrality and the quality of innovation ideas was explored.

The first step was to create a network of the providers of ideas during a period of three years at the selected firm. This resulted in 1,740 ideas generated by 364 persons. The time period was chosen after careful consideration of how the system had been established and modified. The first years of use of the system constituted a turbulent period when the grading system was gradually fine-tuned. After a couple of years, the way of working with capturing and evaluating innovation ideas was stabilized, and the persons providing innovation ideas came to know how and according to which criteria the ideas were evaluated. The data for individuals and groups that had provided ideas were imported into UCINET to analyze their social network. If the idea had been created by more than one person, a tie (an indication of relationship) was created between the nodes (persons). This generated a network of idea providers in which the ties between them correspond to whether they have provided ideas together.

In the second step, the degree of centrality of the inventors was computed for each innovation idea. With UCINET the degree centrality measure was used. This is a centrality measurement corresponding to the number of nodes that are adjacent to the selected node, that is, have direct connections with the node where the idea was generated (Freeman, 1979). In the cases where ideas were generated by more than one person, the group degree centrality was calculated according to Everett and Borgatti (1999). The basic calculation is illustrated in Figure 1. The three filled nodes have generated an idea together, and the degree centrality for this group of providers is five. Everett and Borgatti (1999) define group degree centrality as the number of non-group nodes that are connected to group members. Multiple ties to the same node are counted only once (ibid.). The group degree centrality was normalized according to Everett and Borgatti by dividing the group degree by the number of non-group actors within the network. In this way the normalized degree centrality for ideas created by one person can be compared with the normalized group degree centrality for the ideas created by more than one person.

The third step explored the interrelationship between the idea providers' positions within the network and the quality of innovation ideas generated by using

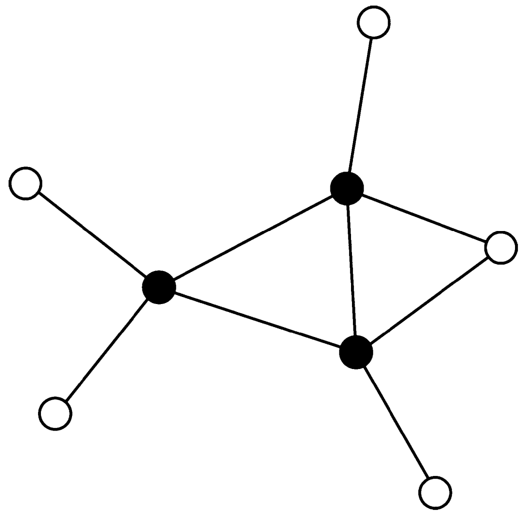

Figure 1. Group Degree Centrality

the grading of each idea as an output performance measure. The data were not linear and not normally distributed, and consequently linear regression analysis could not be applied. Hence, the possible interrelationship between the position within the network and the quality of ideas generated had to be explored in another way, and a generalized linear model approach was used to model the data (Olsson, 2002). Only a few ideas received the points 5 (2) and 4 (56), and to be able to compare the high-quality innovation ideas with the low-quality innovation ideas a categorizing of better and worse innovation ideas was first done, resulting in two quality categories. The first category included the ideas that had received the points 3, 4, and 5 and were the ideas regarded as novel and useful for the company. The ideas with 1 and 2 points were grouped in the second category. These ideas were already well known within the organization or were not useful and thus were not seen as good innovation ideas.

The extracted normalized centrality degree for each innovation idea was also categorized into different groups. This was done because of the distribution of the ideas. Only a few ideas had been created by individuals and groups with the highest centrality degree measure, and it would therefore not be adequate to group according to different centrality scores without taking the distribution of ideas created into consideration. Grouping was done with MATLAB, using *quantiles* to create four basically equal-sized data subsets: groups A, B, C, and D. Combining the two idea quality categories and the four centrality categories resulted in a 2×4 cross-table. A χ^2 test was thereafter done with MATLAB to test if the variables were independent (Olsson, 2002). The same method was used to analyze the innovation ideas created by individuals and groups, respectively. The four normalized degree centrality categories for all the innovation ideas—the innovation ideas created by individuals and those created by groups—are therefore not the same and consequently, are not comparable in a strict sense.

Empirical Results

The results showed that there were no linear relationships between the connectivity of the innovation idea providers and the quality of the ideas generated. The cross-table for the four centrality degree groups created and the distribution within each group of high- and low-quality innovation ideas is found in Table 1. Of the 1,740 ideas, 392 were graded as high-quality innovation ideas, whereas the remaining 1,348 ideas were considered to be of low quality. A χ^2 test showed that there was a strongly significant ($\chi^2 = 19.8$, $p = .00019$) interrelationship between network centrality degree of idea providers and the quality of innovation ideas.

Put in more straightforward terms, innovation idea providers with a high centrality in the network provide innovation ideas that tend to be of higher quality than the ones provided by idea providers who hold less central positions. For the least connected group of innovation idea providers, centrality degree group A, the percentage of high-quality innovation ideas amounted to 15%. For the three more connected innovation idea groups (B, C, and D), this number was higher, ranging between 24% and 26%.

In Table 2, the cross-table for the innovation ideas created by only one person is shown. Of the 1,112 ideas created by individuals, 244 were considered to be of high quality, and 868 were low-quality innovation ideas. A χ^2 test was performed also for this subset of ideas, with clearly significant results ($\chi^2 = 15.87$, $p = .0012$).

A clear difference from the previous results was noted, as the interrelationship between network centrality and idea quality appeared to be linear when only individual idea providers were considered. Briefly put, for innovation ideas created by individuals, the percentage of good innovation ideas increased with higher centrality measure.

In Table 3, the distribution in terms of idea quality within each of the different centrality degree groups is presented for the innovation ideas with more than one single provider. Of the 628 innovation ideas created by more than a single person, 148 were found to be high-quality innovation ideas and the remaining 480 of lower quality. A χ^2 test showed no significant interrelationship between the two variables investigated ($\chi^2 = 5.2$, $p = .16$).

For innovation ideas provided by more than one individual, the percentage of good innovation ideas increased from 22% in the least connected group A to the 31% for the group at the next level of centrality degree. Thereafter, however, the percentage of good ideas decreased to 24% and 20% in groups C and D, respectively.

Table 1. All Innovation Ideas

	Centrality Degree Group A	Centrality Degree Group B	Centrality Degree Group C	Centrality Degree Group D
High-Quality Innovation Ideas	62 (15%)	89 (24%)	112 (26%)	129 (25%)
Low-Quality Innovation Ideas	357 (85%)	286 (76%)	312 (74%)	393 (75%)

Table 2. Innovation Ideas Generated by Individuals

	Centrality Degree Group A Individuals	Centrality Degree Group B Individuals	Centrality Degree Group C Individuals	Centrality Degree Group D Individuals
High-Quality Innovation Ideas	34 (14%)	51 (20%)	49 (22%)	110 (28%)
Low-Quality Innovation Ideas	204 (86%)	199 (80%)	176 (78%)	289 (72%)

Table 3. Innovation Ideas Generated by Groups

	Centrality Degree Group A Groups	Centrality Degree Group B Groups	Centrality Degree Group C Groups	Centrality Degree Group D Groups
High-Quality Innovation Ideas	34 (22%)	42 (31%)	31 (24%)	41 (20%)
Low-Quality Innovation Ideas	123 (78%)	93 (69%)	98 (76%)	166 (80%)

Analysis and Discussion

The results show that there is a significant interrelationship between the idea providers' connectivity in the network and the quality of the innovation ideas generated. Looking at all the innovation ideas, the statistical test showed that there was a positive effect on the percentage of high-quality ideas from more connected centrality categories in comparison with the centrality category that was least connected. However, after a certain level of network degree centrality, a further increase in centrality did not correspond to a significantly higher proportion of good ideas generated. Viewing the centrality degree as the amount of different sources of information and knowledge to draw on when generating new innovation ideas, it thus seems that the most crucial part is to have access to a certain amount of sources but that after a certain level of connectivity the proportion of good innovation ideas created does not increase. One way to interpret this is that the creation of high-quality innovation ideas can be seen as a step function; that is, a certain level of network centrality will further high-quality innovation but above that level the effect of being better connected is not necessarily positive.

Looking only at the innovation ideas created by an individual, it was seen that the quality of the innovation ideas created increased in a linear manner with increased centrality degree for the individuals. Hence, the more sources that are available for an individual to acquire knowledge and information, the higher the proportion of high-quality ideas generated. Existing research on the development of individual knowledge sets has stressed the influence of human interaction and externally acquired information as important elements of the development of individuals' knowledge set (Howells, 2002). The more connected the individuals are within the network, the more information and knowledge are available to draw on when innovating, which the results revealed to have a positive effect on the quality of the innovation ideas created. The results of this investigation thus support the empirical findings of Tsai (2001), namely, that the degree centrality positively influences innovation performance. A major difference with respect to Tsai's study is, however, that the empirical material used here is at the microlevel of innovation and is of a much more detailed nature, which makes it more reasonable to consider causal relationships between the different variables.

For innovation ideas that have been generated by more than an individual, the test was not statistically significant. The least connected category revealed lower performance in terms of innovation idea quality than the subsequent higher category. A different pattern was, however, seen thereafter, revealing a difference between ideas provided by individuals and ideas provided by groups. As the connectivity of groups increased further, this corresponded to a decreased proportion of high-quality ideas. The underlying reasons for the difference are not possible to determine based on the performed analysis, but one possible explanation could be that the network's effects are stronger for individuals than for groups. The groups' performance in terms of coming up with good innovation ideas might be more closely related to the creative process within the groups and arguably less affected by the external connections to other nodes in the network. Another factor that may explain the differences is the internal group process leading to a suggested innovation idea. Important to remember is that these ideas are *innovation ideas*; the ideas are evaluated after *usefulness* and *novelty*. New ideas that are generated by well-connected groups are subject to many persons' attention and might be affected by consensus. The new ideas created in highly connected groups are constantly accommodated to a large part of the network. Another aspect is the intergroup dynamic processes that evaluate and filter ideas before an idea can be presented for evaluation. Here it is important to consider that the network is created by the relations when creating ideas together in groups.

An important addition to previous research is, first of all, the use of microlevel data, which eliminates some of the risks of other variables influencing the interrelatedness between network characteristics and innovation performance. Moreover, the results of this study suggest some modifications to existing theory. It appears that the interrelationship between connectivity and innovation idea quality resembles a step function; that is, a certain level of connectivity leads to more innovation ideas of high quality, but a subsequent increase of connectivity does not lead to more good innovation ideas. Even more important is the clear observation that connectivity does not seem to play the same role for individuals and groups generating ideas. Arguably, the processes of collecting information, creating innovation ideas, and making them explicit do not work in exactly the same way for individuals and groups in networks. To increase the understanding of the process of ideation more knowledge is needed about what happens after the creative part of ideation in a group: the innovation idea formulation; refinement; and communication of the idea. Increased understanding is also needed of how group dynamic and group composition affect the ideation process of groups.

Conclusions

The present analysis indicates that there is a clear interrelationship between network connectivity and the quality of the innovation ideas created. In all three analyses, it was found that the more connected category performed better than the least connected category. There is apparently a need for a certain amount of relations to increase the proportion of high-quality innovation ideas generated. For individuals, more connections within the network resulted in a higher proportion of high-quality ideas. The results for the groups did not show the same linear pattern but instead indicated that increased connectivity may have diminishing, and even negative, influence on the generation of high-quality ideas. The ideation process taking place in groups stands out as more complex and appears to be harder to understand and explain with the external connections to the network than for individuals.

Just generating a larger number of ideas does not necessarily result in more good ideas and at the same time leads to higher costs for handling the ideas. To support and facilitate the ideation process, the knowledge about what influences the quality of the ideas created is therefore important. By studying innovation idea networks and the structural and relational factors that influence the creation of innovation ideas, increased understanding of what leads to high-quality innovation ideas can be obtained, with implications for management.

From a managerial point of view, the findings clearly show that, to increase the number of high-quality innovation ideas created by individuals, the possibility of interacting with other people should be supported and facilitated. One way to enhance the possibility of individuals increasing their connectivity could be to create arenas and meeting points where exchange of information and knowledge relevant for innovation can take place. Examples of this include creating and supporting communities, using idea generation techniques in projects and other groups, increasing formal collaboration between individuals from different departments, and improving sharing of information and knowledge by other available means, such as knowledge management systems and idea databases.

It is unquestionable that to increase innovation capabilities, management needs to give individuals and groups the possibility of connecting with other persons inside and outside the company and of promoting knowledge-sharing without destroying the innovation network. However, whether it is more fruitful to formalize ideation work or to try to use informal social structures in a more subtle manner (Dahlander and Magnusson, 2005) is a question that does not seem to have a simple answer. Formalization of ideation activities can provide direction and attention to the important work of generating new innovation ideas and may also allow management to explicitly support their development. On the other hand, a clear direction may have a negative impact on the ideation work spontaneously taking place in the informal network of an organization. It might also lead to the missing of more peripheral opportunities, such as potential radical or discontinuous ideas, and formal mechanisms for evaluation and selection of ideas may increase this risk even further. Just like many other questions related to innovation, this one also may in fact be a matter of balancing counteracting forces, where the answer rarely is to be found in one of the extremes.

Having started to explore the structural and relational influences on the quality of innovation ideas created, it is clear that there are more aspects of interest to study to understand in greater depth what influences the quality of innovation ideas. Applying a network perspective on ideation can help us understand more about innovation activities. It would also be interesting to study the evolution of such networks to see how they evolve and develop over time. Yet another innovation dimension to investigate is how different kinds of innovation, such as study the network characteristics of where ideas are generated that leads to product and business-model innovations. Yet another question that should be considered is how network characteristic influence the creation of different types of ideas, such as product innovation ideas and business model innovation ideas. Similarities and differences could then be highlighted, and factors influencing the qualities of the different types of innovations could be identified. By distinguishing among different types of innovation ideas the ideation process can be understood in a more comprehensive manner.

For innovation teams, it was evident that a certain level of network connectivity had a positive effect on innovation idea quality but that highly connected groups did not provide a higher proportion of high-quality ideas. It is not possible to say what factors are behind this observation based on the performed analyses but provides an interesting starting point for future studies. Topics that stand out as particularly fruitful for further investigation are the heterogeneity of groups, differences between informal and formal groups, and the sheer size of groups.

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