

# Evaluating Innovation Potential of Digital Social Networks: A Quantitative and Qualitative Survey Approach

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**Abstract**—Digital social networks should enhance innovation potential as they create novel combinations of resources, knowledge and ideas in the Schumpeteriansense of innovation. Evaluating the innovation potential of these social networks during this digital revolution is the research question this study seeks to answer. There is no doubt that social networks are a disruptive form of innovation, however do they foster innovation in return and if so, how? To answer this question, both quantitative and qualitative surveys methods have been combined.

It appears that the interactive nature of social networksshould foster innovation by enabling diversity and information exchange between a wide variety of groups.

Surprisingly, the empirical results from our surveys, both the personal interviews as well as online surveys provided somewhat negative results in regards to the “perceived” innovation impact of social networks.

We refer to this as the “Digital Paradox”, an expression coined to illustrate that the diversity enabled by digital is not being leveraged to its full potential. Although a diverse group member is only a click away, thanks to digital, this does not necessarily create heterogeneity. On the contrary, it seems that digital is sometimes counterproductive by promoting heavy clustering between homogenous groups. Respondents acknowledged the benefits of social networks only at the very last stages of innovation, which also seems surprising. Furthermore we understand that the innovation potential of social networks is not fully realized at present within many enterprises due to organizational boundaries.

**Index Terms**—Collaborative tools, digital paradox, innovation potential, social networks.

## I. INTRODUCTION

Initially this research aimed to document best innovation practices through social networks, such as LinkedIn and Yammer, in order to import these successful innovation patterns to other enterprises [1]-[5]. This approach was based on the assumption that social networks [6] necessarily enable innovation since they allow the creation of resource diversity amongst teams, information requests and expertise searches. Or in other terms, there is a common perception that diversity breeds creativity, which fuels innovation. However as described in this paper, the research focus evolved as more information was uncovered on this topic.

Manuscript received March 24, 2017; revised May 27, 2017.

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To summarize, social networks allow creating heterogeneous teams, which should enable more innovation.

The creative benefits of diversity, data and digital are widely acknowledged, as analyzed by T: Evgeniou, V. Gaba and J: Niessing [7]; “Does Bigger Data Lead to Better Decisions?”: “Indeed, management scholars and practitioners have long recognized the benefits of diversity. It is widely accepted that heterogeneous teams are more creative than homogeneous ones. Diversity, if managed well, yields divergent thinking and the pooling of a broader base of knowledge results often in better strategic choices.”

Building on the assumption that interacting with diverse groups of individuals creates optimal conditions for innovation, this study aims to evaluate to which extent digital social networks, as an increasingly present communication medium, enable different types of innovation:

The exponential nature and development of social networks make it possible to meet with a wide range of diverse individuals from different backgrounds, and thus create cross fertilization [8] of knowledge. Consequently it is logical to assume that if digital social networks enable heterogeneity; this should translate into the fact that these social networks foster innovation.

However this conclusion could prove to be simplistic and possibly privy to confirmation bias [9]. Consequently this current approach and study aims to

- 1) confirm or rebut the previous statement
- 2) go beyond this first conclusion to better understand the dynamics of innovation fostered by the use of social networks such as organizational patterns, specific types of innovations fostered, use distinction by age, geography, size of the organization, detect clusters and categories as well as correlations.

## II. DEFINITIONS

Defining the concept of innovation for this paper has been elaborated through both academic literature review as well as practitioners business management readings. Current understanding of innovation has been influenced by the work of J. Schumpeter [10], M. Porter [11], C. Christensen [12] and more recently H. Chesbrough [13], R. Adner, [14], E. von Hippel [15] to name some of the key thought leaders. In the case of this analysis, the following definition was used in view of rendering the survey, the analysis tool, as simple as possible:

Generally speaking, innovation is referred [16] to as an improvement of products, service or processes such as

meeting new customers' requirements [17], increasing quality or reducing costs by creating willingness to pay. Two types of innovations are distinguished: disruptive innovation [18] and incremental innovation [19]. Disruptive innovation brings radical changes or creates completely new products or services. Incremental innovation, on the other hand, represents the major part of innovation and consists in introducing small changes without radically modifying the object of innovation. Within this survey, in addition, a functional definition of innovation is introduced, with three distinct categories as listed below [20].

- 1) Company internal Innovation such as Business Model Innovation, Network Innovation, Structure Innovation and Process Innovation
- 2) Product Innovation such as Product Performance and Product System Innovation
- 3) Customer Experience Innovation such as Service Innovation, Channel Innovation, Brand Innovation, Customer Engagement Innovation

This paper defines digital social networks as follows: "these networks are considered as the second generation of internet based communications. They bring new possibilities to compensate the first generation limits without altering previous advantages" [21]. Consequently social networks enable users to: exchange and share different types of electronic content by reaching out easily to complete strangers, building communities that share the same interest and give feedback and express opinions.

These features reinforced the social character of electronic/internet based communication, allowing it to increase social interactions and to enlarge in general social circles, thus fostering communications between individuals of heterogeneous groups.

In brief, we define these social networks as collaborative tools based on electronic communications platforms [22] that enable interactions between people. This specific feature is critical in regards to innovation because it is considered as key in fostering communication diversity [23].

Given the large variety of social networks within the network economy [24], a choice for the analysis was made according to the criteria of critical mass [25]. Although the goal was to study their innovation potential in general, eight Social Public Networks with the highest adoption [26] numbers were chosen, namely Facebook, LinkedIn, Twitter, Pinterest, Google+, Tumblr, Instagram, You Tube. Alternatively one could have chosen a highly focused social network that specializes in a specific industry or social networks that target innovation challenges. Finally it was considered that the most used social networks would be most representative in terms of statistical value due to their general presence and mainstream usage according to the Metcalfe principle [27]. Concerning enterprise internal social networks, the same logic was applied by mentioning the most common internal social networks in our survey.

### III. HYPOTHESIS

A theoretical literature review on innovation [28], innovation ecosystems [29], and innovation potential [30] indicates that diversity and new combinations of resources, knowledge and ideas foster innovation [31]. Consequently

various forms of social networks [32] should in theory foster innovation.

However many new technology introductions [33] such as social networks are viewed with a positive bias. It could thus be feared that many interviewees would be reluctant to show skepticisms toward the innovation potential of social networks due to the "digital" image of this topic. Furthermore, it seems counterintuitive during this age of the digital revolution [34] to claim that there is no or very little innovation potential in social networks given the emphasis on network advantage [35] and network alliance formation [36].

Yet the goal of this research is to remain neutral and thus investigate objectively by leveraging the research based survey results. Thus could it be possible that social networks are counterproductive in the field of creating innovation? Is there a phenomenon that one could describe as the "Digital Paradox" that prevents individuals from benefitting of the innovation potential and advantages of digital communications?

The digital nature of social networks eliminates geographical and sociological boundaries: a contact, no matter how removed in space and background is potentially only one click away. However is this opportunity used to get in contact with a resource that is far removed from one's existing world? In some instances, the contrary is the case. As part of social network analysis, interesting patterns, as for instance Twitter communications [37], illustrate this discrepancy. Graphs analysis of Twitter streams show individuals talking about the exact same topic, however with a different opinion. The Twitter streams of one opinion never communicate with those of the contrary opinion, although they are talking about the same subject. This substantiates the concept of "Digital Paradox" as an interesting element to further investigate and leads to discuss the following assumptions:

#### *A. Assumption Nr. 1: There Is a "Digital Paradox" Restricting Innovation Potential of Social Networks*

As mentioned, "the Digital Paradox" prevents individuals to benefit from the ubiquitous character of digital social networks since individuals do not fully leverage the opportunity to find diverse, heterogeneous contacts.

For example viewing the "Polarized Crowd" Network within a Pew research study on Social Networks, one can observe two large and highly dense groups showing very little connections. The study shows us that these types of configurations occur when controversial issues are discussed. The topics are often highly discordant subjects such as politics, ethics etc. One can observe that there are very few links between the two groups although they are discussing the exact same topic. [38] The study of Pew Research explains: "*Polarized Crowds on Twitter are not arguing. They are ignoring one another while pointing to different web resources and using different hashtags.*"

This interesting discovery allows us to observe: although heterogeneous actors could in principle communicate, since alternate contacts are just a click away, the ease of digital does not facilitate exchanges [39] and does not create these connections, on the contrary.

Furthermore, research by Stephen, Zubcsek, and

Goldenberg [40] also points in this direction, investigating if creativity is set free within digital forums such as online platforms when generating ideas for products and services. Their study examines “interdependent ideation” as an increasingly popular discipline within marketing. The research shows that contrarily to existing belief that generating ideas in groups on-line is beneficial, the study demonstrates “*that exposure to others ideas in interdependent ideation tasks can in fact diminish individual innovative performance and that it depends on the extent to which one’s sources of inspiration or “neighbors” (i.e., other customers to whom one is connected) are themselves interconnected or clustered.*”

Applying this logic to innovation and social networks could lead to the question if interconnected digital groups have a tendency to cluster closely together [41] without benefiting from digital’s capacity to circumvent the restrictions of geographical barriers, thus ignoring that a heterogeneous discussion partner might just be a click away? Consequently one might ask if social networks [42] truly allow for productive and innovative dialogues [43] between members of heterogeneous communities or do they reinforce existing communities through dense clustering and the digital eco chamber effect?

Other assumptions were generated through the discussions of the qualitative interviews with professionals from various industries: When conducting these qualitative interviews, there was a preset canvas combining open questions with scored questions. This is how the following hypothesis were elaborated since the topic of innovation and social networks [44] is quite new and consequently less present in existing scientific literature.

*B. Assumption Nr. 2: Most Social Internal Networks Are a Failure and thus Cannot Be Instrumental in Fostering Innovation*

As social networks grow and become a fact of daily life in corporations, it is important to distinguish between enterprise/internal and public/external social networks.

Many companies see the success of public external social networks such as LinkedIn and Facebook. Consequently they believe that creating a company internal social network is an attractive alternative to e-mails and other communication channels. Initial qualitative feed-back led us to believe these internal networks are a failure. However it is very challenging to analyze the success or failure of these internal social networks since their implementations are fairly recent as well as the lack of public information.

Through over 20 interviews with innovation professionals, feed-back on topics relating to innovation and social networks from senior representatives has been gathered. In many cases employees confirmed that using public social networks was more convenient, despite security issues as they may be used as a back door to access critical data. For this reason, large organizations seek to develop internal capabilities. Still, these internal systems suffer from several setbacks in their function to locate human resources, i.e. experts:

- They do not allow people from the outside to connect with internal employees.
- Profiles on the internal network contain on average

less information on internal staff than public Social Networks.

- There is also the challenge of obtaining a critical mass of staff on the internal platform to make it useful.
- Internal networks fail to radically change behaviors in terms of main exchange media. Their use remains secondary.
- Critical mass not reached to animate discussions
- Expensive IT investments to develop more functionalities and update tools.
- Slow adoption of new practices in large organizations.
- Difficulties to extract statistics of usage to monitor and follow users’ activity.
- Different types of information that need to be structured (context, qualification).
- Resistance to change of Top management.

*C. Assumption Nr. 3: The Millennials Use Social Networks Differently, Which Might Enable Them to Innovate in A Different Way*

Digital natives also known as the millennial generation or generation Y [45] use social networks differently compared to previous generations, as is commonly suggested in various management research articles with focus on generational theory [46]. It seems that generation Y uses digital tools distinctively, especially social networks. Recent studies show that Millennials behave divergently in an enterprise environment compared to other generations in terms of communications, as suggested by recently increasing research [47] by leading management scholars. Consequently, one should

Examine if generation Y’s relationship to social networks has an impact on innovation behavior patterns.

As previously mentioned communicational behavior patterns are different according to age groups. This becomes apparent both through qualitative interviews as well as literature reviews. Generations that are older than the Millennials sometimes perceive Social Networks with suspicion as they bring a new set of social rules.

The previous generations, as they usually hold power, tend to resist to the change brought by social networks as they could fear:

- losing control
- failing in using technologically advanced platforms
- being weak in an environment with new rules

However, as the use of Social Networks is becoming mainstream, these older generations are closing the gap. This observation was confirmed as well during our interviews.

*D. Assumption Nr. 4: Can One Identify Specific Innovation Patterns Linked to Social Networks via the Survey*

As the survey included detailed questions concerning innovation types combined with user profiles it should be possible to identify specific innovation patterns linked to industry, company and individual profiles. Since the survey questions relate to specific types of innovation ranging from customer experience innovation to profit model innovation,

the initial expectation was to detect innovation patterns.

#### IV. METHODOLOGY

This statistical data points provided by the questionnaires is part of the exploratory approach integrating the feed-back from qualitative interviews to shape the hypothesis and survey questions for this present analysis. The survey results allowed redesigning yet another more focused questionnaire, to be used for identified target groups as well as C- level qualitative interviews.

This holistic approach [48] allowed to enhance the findings through an iterative process. As a result of this current interpretation, several key topics have emerged as will be outlined in the following sections. This iterative process has allowed to conduct the following surveys in parallel:

A qualitative survey based on interviews with selected professionals working in the field of innovation. In total 20 qualitative interviews were conducted as well as over 200 quantitative surveys based on Qualtrics online questionnaire were analyzed.

#### V. RESULTS

Social internal networks evaluations were highly polarized. Surprisingly all qualitative feed-back on social internal networks was highly negative. However even more surprising were the survey results. In the quantitative surveys half of the interviewees used an internal social network. Amongst those who were part of an organization with an internal social network, 50 % stated it added value versus 50% who did not use it and saw no value. The histograms relating to internal social networks were not a bell curve but distributed in a bi-polar manner for the first quantitative group. Either feed-back was highly negative, as well as very positive, contrarily to all other survey results that corresponded to a normal Gauss curve. The findings became even more surprising with the control group: 100% was negative. Confidentiality issues and the risk of losing control seem to be the only arguments used by companies to continue developing internal capabilities of social platforms. These unexpected results are very interesting and it is thus planned to further understand why these internal networks are either judged as highly useful or useless with very limited middle grounds.

Public social networks ranking in terms of innovation potential was equally surprising. The goal to identify specific social networks most inclined to create innovation, enabled the following discovery: the most used social networks are also perceived as most able to foster innovation. LinkedIn, YouTube and Facebook were chosen by the main group. The confirmation group elected the same trio with YouTube in the first position. Innovation and mainstream adoption, i.e. the bandwagon effect, seem closely related within our survey results. YouTube's rank is clearly interesting since this social network is less interactive, functioning in broadcast mode. However YouTube is seen as the network that fosters the most innovation. It is equally striking that one

of the highly successful internal social networks, i.e. AU Tube from Alstom is viewed as a great success. So, the usage of video is not perceived as passive broadcast activity, but on the contrary, an application that truly fosters innovation by diffusing knowledge. This seems relevant and worthwhile to further study since the Video function within social networks seems truly promising for innovation potential. Furthermore the success of social networks with the highest network adoption rates seem to indicate relevance of the Metcalfe network effect [49].

The statistical analysis [50] of the survey results enabled us to discover three types of clusters. These clusters reveal importance of company culture concerning social networks and innovation.

In fact our analysis of the survey data leads us to identify three profiles with different behaviors towards innovation. This would not have been apparent by simply analyzing the questionnaire results without leveraging the program SPSS.

The groups are:

##### *A. Conservative Behavior Hinders Innovation Potential of Social Networks within This Group A*

This group acts in a conservative way towards the innovation potential of digital social networks as well as these social networks in general. The members of this category are older than the other groups which does seem to indicate that usage of social networks, both from a professional as well as a private point of view is influenced by age. As less frequent users of social networks these professionals are less inclined to see the value of social networks for innovation purposes. However their job directly relates to innovation or is one of their main objectives. Thus, they see their role as innovators, but in a more conservative sense. "Their" innovation is still much linked to internal R&D and is "in house centric" [51]. It would be hasty to say that they have the "not invented here" [52] syndrome but this group is in fact closer to "homegrown" innovation projects than to collaborative, open programs. In fact, these managers are still very far from completely [53] embracing the "open innovation model" [54] as well as leveraging the full range of digital and collaborative tools. Typically these are product managers, innovation project leaders; from a gender perspective this category is male dominated. Some examples of the roles these professionals hold are: Vice President Consulting, Principle Engineer or Head of Development. In conclusion, this older age group has moderate usage of social networks both from a personal and professional perspective and thus see less related innovation potential.

##### *B. This Group B Is Characterized by Cooperative Culture and Strong Innovation Drive*

This category is dominated by innovators: this is a younger group that embraces social networks and related innovation with enthusiasm. Obviously this category is innovation driven with a positive attitude and usage towards any type of digital tools, collaborative platforms and social networks. Their digital literacy is very high. These innovators see strong potential in social networks for various purposes including innovation whilst being heavy

users both for personal as well as professional motives. Their job is either a direct role in creating innovation or related activities, such as Market Insight Manager & Innovation Catalyst, Chief Product Officer or Director of Efficiencies. This population is younger than group A and includes more women than the other categories. This is not very surprising since women are heavier social media users than men for most social networks. In conclusion, these younger professionals carry innovation projects and orchestrate information flows across their company's boundaries with a positive attitude towards social networks and their innovation potential.

### C. Group C Inhibits Innovation Potential of Social Networks due to Restrictive Company Culture

The professionals from this category are approximately the same age group as group B, however they are hampered in their use and perception of social networks. This group is restricted, cooped up, due to company environment and culture. In this context they do not use social networks very much and have a negative bias towards social media as an innovation enabler. Some of the interviewee's representative of this category are Senior Consultants, Director of Customer Experience and Senior Industrial Designer in various industries which indicates the influence of company culture. One of the next steps should consist in understanding in more detail this low social network usage, highly influenced by the organizational environment.

Finally Millennial's behaviour towards Social Networks was expected to be more positive, or at least presenting a different trend. Surprisingly, Millennials results were very similar to other generations and did not present any significant divergence when their company culture is restrictive towards social networks. This illustrates the key role of company culture as an enabler for innovation creation [55]. The Millennials seemed to only differ from the other age groups concerning their preference for Twitter as a social network.

These findings necessitate further research since Millennials might consider Social Networks as their daily routine thus not noticing the difference with former communication means. Also the panelists positive feed-back on increasing their companies' investments on social networks seems to indicate future growth and a tendency to combine innovation and marketing. There also was consensus around Customer Engagement innovation i.e. by fostering distinct interactions as the innovation type, which is most positively impacted by social networks.

## VI. CONCLUSION

To conclude, the results from both the quantitative and qualitative surveys seem surprising and somewhat counterintuitive. The data analysis uncovered trends and results that would have not been expected, as well as topics to be further investigated. In brief, the clustering has shown us the importance of organizational influence on an employee's behavior concerning innovation and social networks.

Furthermore, it seems pertinent to investigate in more detail why the innovation potential of social networks seems hampered. One could apply a similar approach as outlined in "Barriers to Information Management" [56] since the

challenges linked to information management seem quite comparable.

It would be relevant to further investigate the organizational, process and behavioral barriers that prevent leveraging social network's innovation potential.

In addition one can find parallels within articles on information savvy organizations and the 3 key barriers to information management. The explanations can equally apply to social networks and innovation since it is digital information [57] being exchanged within the company. In this case possibly the information from social networks is not being leveraged to create innovation since the company's internal barriers i.e. organizational and process, are preventing this procedure. Starting from the perspective of organizational barriers: since Social Networks are fairly new, organizations have not been set up to leverage this new form of information.

For example, it seemed very clear from the qualitative interviews, that there are organizational silos between the teams in charge of innovation versus the social network teams. This could explain some of the observed discrepancies. Social Networks might contribute to grass root marketing efforts [58] for product performance improvement but in reality there are organizational boundaries that prevent this innovation to be applied cross-functionally.

Just like "... many groups within companies continue to treat social media and social networks like traditional media, completely ignoring the interactive nature of Social

Networks"... social networks innovation potential is still mostly ignored within companies.

Since many marketers still ignore the two way communications capabilities of social media, organizations might ignore the interactive, multi-directional bridging of structural holes [59] that digital social networks can offer in the field of innovation. One could thus conclude that a "digital paradox" prevents companies to benefit from the theoretical innovation potential of these digital social networks.

## ACKNOWLEDGMENT

A special thanks to Nadim Samna, Lead Partner of Stratexis consulting firm, as an expert in strategy and innovation, who has been key in providing both his knowledge in technology and digital transformation within the enterprise landscape. His expertise and strategic vision have been considerable help for this project. Furthermore the authors express their gratitude to the Swiss National Science Foundation, as well as key team members of the MediaLab of the University of Geneva, P.J. Barlatier and E. Josserand [60]. Finally we appreciate all the time and valuable information generously provided to us by the numerous innovation and business professionals who answered the surveys.

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