

DIFFUSION OF INNOVATION THROUGH SOCIAL NETWORKS: EXAMPLE OF SOCIAL INNOVATIONS

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Abstract

In the age of informational revolution, that follows industrial revolution, rapid advances in the field of innovation and expertise are spreading easily through social networks. The current nature of cheap and highly developed information technology that is readily available to broad population is used in both technical and in social fields. Our paper focuses on the recent developments in the area of social innovations including the dispersion of innovations through social networks in communities. The paper starts off by explaining the concept of social innovations in communities. Processes by which ideas and influence spread through a social network have been studied in a number of fields. The emphasis was placed on the diffusion of technological innovations and new products. The current widespread adoption of various strategies and the effects of “word of mouth” in promotion of new goods and services rely on social networks. The use and potential abuse of information technology in some fields of our everyday life is also observed. The paper also looks at social network analysis as an important tool for studying the diffusion of innovations, looking at the main mechanisms involved in the diffusion of innovation in social network.

Key words: innovation, social networks, dispersion of innovation, open innovation

JEL Code: M12, M40, O31, O32

Introduction

This paper deals with an up to date issue. In the age of informational revolution, that follows industrial revolution, rapid advances in the field of innovation and expertise are spreading easily through social networks. The current nature of cheap and highly developed information technology that is readily available to broad population it is used in both technical and social fields. Our paper deals with the recent development in the area of social innovations including the dispersion of innovations through social networks in communities. Processes by which ideas and new products spread through social networks have been studied in a number of

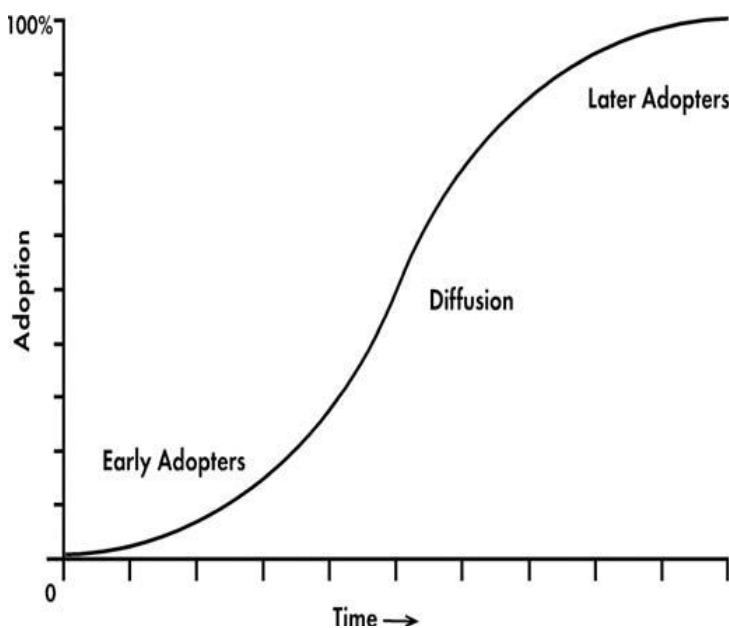
fields. Initially, the accent was placed on the diffusion of technological innovations, new products and new ideas. The current widespread adoption of various strategies and the effects of “word of mouth” in promotion of new goods and services rely on social networks. The paper also deals with explanation of the concept of social innovations in communities. Use and potential abuse of information technology in some fields of our everyday life is also observed.

The paper is structured as follows: the first part is the introduction, part 2 deals with diffusion of innovation, its roots and current progress. In part 3 we aim for the explanation of current practices on social networks, features and usability. Part 4 deals with dispersion of innovations through social networks and with the concept of open innovation. Part 5 sums up the recent development, concludes the paper and summarises future challenges.

1 Diffusion of innovation

An *innovation* is an idea, practice, or object perceived as new by an individual or other unit of adoption. The concepts of “innovation” and “new product” are synonyms used to characterize a new product category or a new brand. The product could be a consumer durable or non-durable, since there are non-durable products where social norms are important in determining consumption behaviour.¹

Fig. 1: The Diffusion S-Curve



<http://www.acrwebsite.org/volumes/display.asp?id=11309>

Source: Rogers, 1995, p. 11.

Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system (Rogers, 2003). Diffusion is basically a communication that enables the spread of messages on new product or ideas understood as innovations – new ideas. First, time the diffusion takes pace in the innovation-decision making process. The innovation decision process is the mental process through which an individual passes from first knowledge of an innovation to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision. An individual seeks information at various stages in the innovation-decision process in order to decrease uncertainty about an innovation's expected consequences.

The diffusion process typically involves both mass media and interpersonal communication channels. Today, information technologies such as the Internet and mobile phones – which combine aspects of mass media and interpersonal channels, represent the most frequently used tools of diffusion. This take-off in the rate of adoption creates the S-curve of diffusion.

According to Rogers and following authors the adoption and spread of innovations goes through the above identifies stages. The following table discusses the mode of adoption of innovations in society as well as the attitudes of other members of society to a particular group adopting innovation at particular stage of diffusion.

Tab. 1: Cluster groups of innovators and innovation adopters

The first 2.5 percent represent Innovators .
These are the individuals which adopt an innovation. Innovators look for new ideas to introduce to society. This interest in new ideas leads them out of a local circle of peer networks and into more cosmopolite social relationships. Communication patterns and friendships among a clique of innovators are common, even though the geographical distance between the innovators may be considerable. Being an innovator has several prerequisites. Control of substantial financial resources is helpful to absorb the possible loss from an unprofitable innovation. The ability to understand and apply complex technical knowledge is also needed. The innovator must be able to cope with <i>a high degree of uncertainty about an innovation at the time of adoption</i> . While an innovator may not be respected by the other

members of a social system, he or she plays an important role in the diffusion process: That of launching the new idea in the system by importing the innovation from outside of the system's boundaries. Thus, the innovator plays a gatekeeping role in the flow of new ideas into a system.

Early adopters are the next 13.5 percent members in a system to adopt an innovation.

Early adopters are a more integrated part of the local system than are innovators. Whereas innovators are cosmopolites, early adopters are localites. This adopter category, more than any other, has the greatest degree of opinion leadership in most systems. Potential adopters look to early adopters for advice and information about the innovation. This adopter category is generally sought by change agents as a local missionary for speeding the diffusion process. Because early adopters are not too far ahead of the average individual in innovativeness, they serve as a role-model for many other members of a social system. The early adopter is respected by his or her peers, and is the embodiment of successful, discrete use of new ideas. The early adopter knows that to continue to earn this esteem of colleagues and to maintain a central position in the communication networks of the system he or she must make judicious innovation-decisions. The early adopter decreases uncertainty about a new idea by adopting it, and then conveying a subjective evaluation of the innovation to near-peers through interpersonal networks.

Early majority is the next 34 percent of the individuals in a system to adopt an innovation.

The early majority adopt new ideas just before the average member of a system. The early majority interact frequently with their peers, but seldom hold positions of opinion leadership in a system. The early majority's unique position between the very early and the relatively late to adopt makes them an important link in the diffusion process. They provide interconnectedness in the system's interpersonal networks. The early majority are one of the two most numerous adopter categories, making up one third of the members of a system. The early majority may deliberate for some time before completely adopting a new idea. "Be not the first by which the new is tried, nor the last to lay the old aside," fits the thinking of the early majority. They follow with deliberate willingness in adopting innovations, but seldom lead.

Late majority is the next 34 percent of the individuals in a system to adopt an innovation.

The late majority adopt new ideas just after the average member of a system. Like the early majority, the late majority make up one-third of the members of a system. Adoption may be

the result of increasing network pressures from peers. Innovations are approached with a sceptical and cautious air, and the late majority do not adopt until most others in their system have done so. The weight of system norms must definitely favour an innovation before the late majority are convinced. The pressure of peers is necessary to motivate adoption. Their relatively scarce resources mean that most of the uncertainty about a new idea must be removed before the late majority feel that it is safe to adopt.

Laggards are the last 16 percent of the individuals in a system to adopt an innovation.

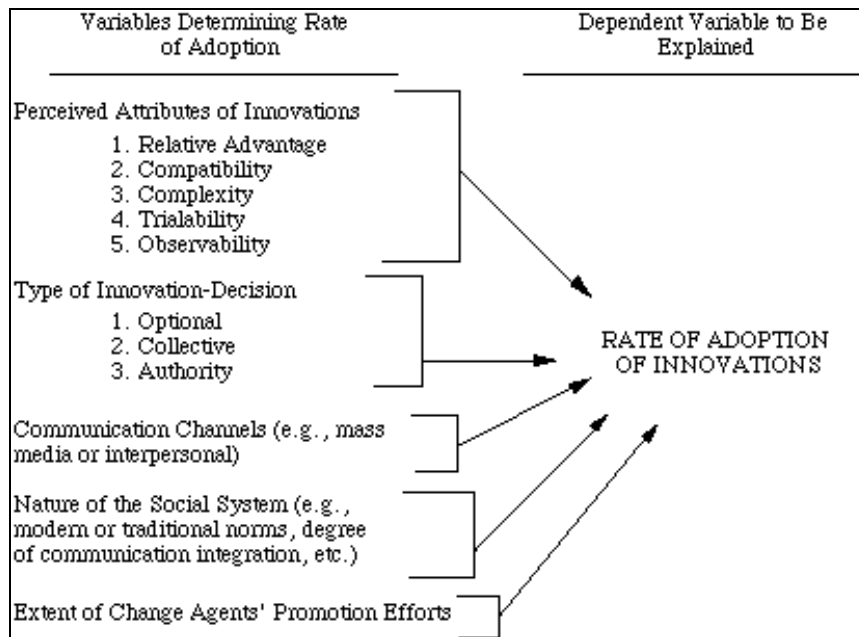
They possess almost no opinion leadership. Laggards are the most localite in their outlook of all adopter categories; many are near isolates in the social networks of their system. The point of reference for the laggard is the past. Decisions are often made in terms of what has been done previously. Laggards tend to be suspicious of innovations and change agents. Resistance to innovations on the part of laggards may be entirely rational from the laggard's viewpoint, as their resources are limited and they must be certain that a new idea will not fail before they can adopt.

Source: Adapted from Rogers, 1995, p. 11 and

http://a.parsons.edu/~limam240/thesis/documents/Diffusion_of_Innovations.pdf

As the following Figure 2 shows, there are a number of factors that influence the rate at which an innovation will be adopted. According to Rogers' model, the technological superiority of an innovation plays a relatively minor role in determining the rate of adoption. The way the innovation is perceived by potential adopters; the type of decision making processes and the social system (the values and norms) in place are among the factors identified by Rogers.

Fig. 2: The variables that influence the adoption rate of an innovation



Source: Surry and Farquhar, 1996.

We can observe that adoption of innovation is not at all a straight forward process that would be possible to be introduced by some “group leaders” or “voted government” to the whole society. We can also see that even the originators – those who introduced and developed the innovation do not have to be respected or even accepted by the society. This is a very interesting moment that seems to be in contradiction to the common conviction about the nature of “developed western civilization”. It rather seems to be merely a question of luck that some really original innovation is introduced and that some funding body decides to support it.

Now, looking at the end of our distribution – the laggards, or those who either come the last or totally reject the innovation. These are also valid members of society. Laggards are against experiments. They are conservative and they wish to preserve the system. Are the laggards those who determine the state of development of civilization or are they those who secure the stability of the system and assure that the mankind does not “fly off” and waste resources by constant quasi-innovations, changes and revolutions? Maybe, the next innovation will penetrate through to them as well.

2 Social networks: Features and usability

Since the recent developments brought by the internet era, the concept of community has less geographical limitation, as people can now gather virtually in an online community and are thus able to share common interests regardless of physical location. Prior to the internet,

virtual communities (like social or academic organizations) were far more limited by the available communication and transportation technologies constraints.

A social network perspective sets to provide a social structure that is fundamentally relational; a way to identify and measure social connectedness which indicates patterns of inclusion and exclusion; an understanding of “weak ties” and their role in improving employment opportunities; a perspective on the transmission of behaviours and attitudes as well as a visual tool to foster social reflexivity and shape pro-social attitudes.

A recent research (Rowson et al., 2010) pointed out that social network information can be used in order to identify community organizers as well as directing strategies to promote participative behaviour and volunteering. One of the main research findings showed that:

- A quarter of the respondents could not name anyone in their social network who they thought was good at bringing people together or could help them contact someone with influence, power or responsibility to change things locally.
- One in fifty of our respondents did not know anybody in their local area that supported them or helped them to make changes in any way.
- Community hubs, including pubs and sports clubs, are an important aspect of community resilience and empowerment.
- People who value neighbourliness are more likely to have large social networks.

The research also points out the limitations to defining “communities” solely in geographic terms and advocates for a fresh approach to developing communities, based on mapping local social networks in as detailed a manner as possible.

Social innovation is considered to contribute to the well-being of the society in terms of its ability to solve society-related issues or problems, especially if we are to look at the times of crises we are now facing. In this context, it is worth mentioning the recent developments in information technology such as for example the social network services (SNS). A very significant display of the importance and usability of the SNS is the Great East Japan earthquake when people had difficulties in getting in touch with family and friends to check for their safety because some mobile phones networks collapsed or were busy. That is when Twitter, mixi and Facebook came into play and people from the Tohoku region were able to inform others about their safety using such SNS sites (Tanigawa, 2012). People also use SNS sites in order to find information about volunteer activities they may take part in.

We are now speaking of a trend which supports the use of social media for knowledge exchange, information and learning purposes (Redecker et al., 2010). Studies conducted by the Institute for Prospective Technological Studies (IPTS) suggest that the high take up of social media applications outside of formal educational settings provides new opportunities for innovating and modernising Education and Training institutions and for preparing learners for the 21st century. These services provide users with online networks and communities for multi-directional communication and knowledge exchange and allow them to publish and share digital content like photos, videos and music.

There are various influencing factors with regards to the usability of social network sites. Recent research work pointed to the relative advantage of using SNS; how hard it was to use; how compatible it were with the lifestyle of the users; how much has been registered about SNS by the users; and whether social networking sites could be tested before consistent use, as influencing factors on users' attitude towards intention to use SNS (Olusegun et al., 2010).

3 Dispersion of innovations through social networks

Nowadays, policy makers have to shift their support from single firms to the innovation ecosystem that is creating and commercialising technologies (Chesbrough and Vanhaverbeke, 2011). We are talking about a shift from single large companies towards networks or ecosystems in which innovation partners jointly create new business opportunities. This shift to the network also implies that innovation public policy should seek to cultivate and strengthen small and medium sized firms.

In social organisations (charities, community groups, NGO's) new ideas often begin from a particular individual or community's problems and passions. The new model is launched in prototype in a very precarious form before securing resources and support from philanthropists or small donors (Mulgan et al., 2007).

Community Land Banks are an example of how ideas can spread successfully: they were pioneered in India, spread to the USA and are now being adopted globally. The web is also making it possible to create and spread new social organisations much more quickly, and to meet new needs in different ways. Another example is Pledgebank launched by mySociety.org (led by Young Foundation fellow Tom Steinberg) which has created a very powerful tool for bringing groups together to advance a cause.

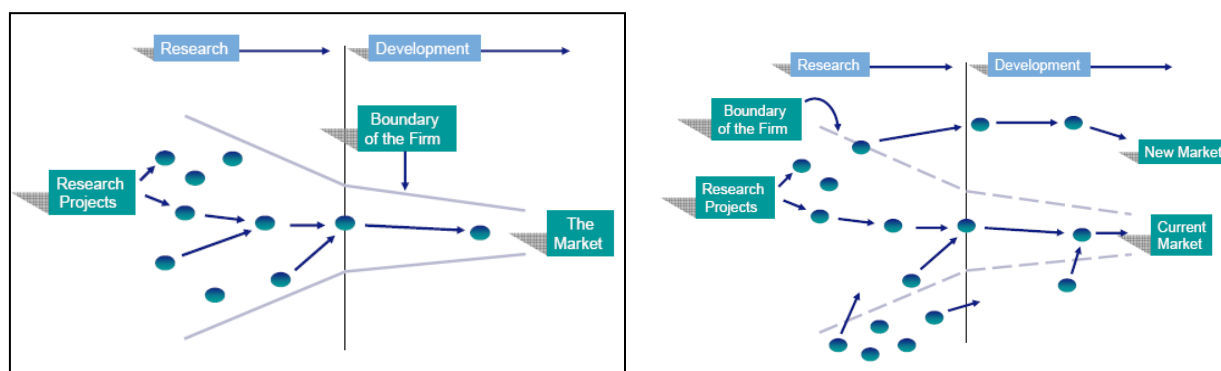
Diffusion is defined as the process by which an innovation is adopted and gains acceptance by members of a certain community. A number of factors interact to influence the diffusion of an innovation (Lee, 2004).

The four major factors that influences the diffusion process are the innovation itself, how information about the innovation is communicated, time, and the nature of the social system into which the innovation is being introduced (Rogers, 1995).

According to a recent research (Abdel-Ghany, 2008), social innovations can influence the diffusion of innovations by the personal network exposure, weak ties (people loosely connected to others in the network), as well as the degree of equality in network position.

Collaborative networks are crucial for the Open Innovation concept.

Fig. 3: Closed innovation and open innovation



Source: Cardoso et al., 2008, p. 11.

The Open Innovation model looks at the knowledge flow through the organization boundaries with an emphasis on its potential to enable the accelerated development of internal innovations. The main challenge in adopting the open innovation model is in finding the right people and in fostering the collaborative work with the aim of integrating scientific discoveries in a innovative way.

With the development of online social networks and other Social Web tools, the Web has become a platform for collaboration. The emerging open innovation platforms are trying

to leverage the Web technology, and most notably its social aspects to help innovation happen on the Web. Facebook and other social networks have become one of main ways in which people receive information nowadays (Jesic et al., 2011). Facebook has developed different ways to share the information within the social network by allowing interaction of users with the content (ex. commenting posts, re-posting, “liking”). These actions also enable greater visibility of the information in the social circle of the user.

The Web 2.0 is a term used to designate the second generation of communities and services on the Web (Cardoso et al., 2008). These communities and services integrate technologies such as blogs, wikis, RSS feeds and Ajax resources. The Web 2.0 solutions represent an huge potential for new ways of producing and multiplying intellectual capital and of sharing knowledge in the context of online communities. Web 2.0 tools include IT applications such as desktop settled videoconference applications together with instant messaging and other collaboration tools to assist collaborative work and real time communication; online publishers allow brainstorming sessions between users in different places; collaborative applications to share people’s and group’s views over products and to exchange information. Other applications include:

- Automation of communication process between people and groups, making joint projects possible (workgroups);
- Management of contacts and relationships;
- Customization of access to each member/company;
- Online training actions;
- Indexation/tagging of contents to make easier the search and its reading;
- Process automation for community communication and ongoing externalization of tacit knowledge, through collaboration tools allowing access to specialized contents.

3.1 Open Innovators

There are many companies nowadays that represent examples of open innovation as a management model. Here are just few of those companies that put their “innovative” features into action.

NineSigma: created by Procter & Gamble, connects organizations with scientific and technology problems to other firms, universities, government and private laboratories and

consulting firms in order to develop specific solutions. (<http://www.ninesigma.com/>, accessed on 23.6.2012)

InnoCentive: global network that connects companies and collaborative bright minds – currently more than 125,000. (<https://www.innocentive.com/>, accessed on 23.6.2012)

YourEncore: Created in 2003, the firm has been helping to speed up external innovation for other companies, as way to increase their growth. Through YourEncore, it is possible to hire a retired engineer with very relevant skills, for a specific short-term project. Currently, it connects about 800 scientists and engineers who are connoisseurs in several knowledge disciplines like life sciences, feeding and consumption-related sciences, materials, aerospace industries and defence. (<http://www.yourencore.com/>, accessed on 23.6.2012)

Hypios is an online problem solving R&D platform. Hypios combines intelligent crowdsourcing, competency discovery technology and human outreach to offer an optimal R&D problem solving service. Clients – called “seekers” – identify, formulate, and post their problems on hypios.com. Seekers select the deadline and the prize money awarded to the winning “solver”. To guarantee the highest possible response rate, Hypios draws from its advanced proprietary semantic technology and a database of over 800,000 experts throughout the world. (<http://www.hypios.com/>, accessed on 23.6.2012)

eYeka is a co-creation platform where creativity is put into action in order to engage in co-innovative projects. For example, Coca-Cola used eYeka’s creative platform to gather fresh interpretations of its brand promise: “energizing refreshment”. Over 2,500 pieces of content were received over a few weeks. 6 videos were eventually broadcasted to Coca-Cola’s millions of fans worldwide on their Facebook, Twitter, Google+ and YouTube pages and 2 of them were picked by Coca-Cola to enter the prestigious 2012 Cannes Lions International Festival of Creativity. Another example of success story is Unilever that used eYeka’s creative platform to create engaging video content as an online teaser to build anticipation in an unconventional way for a younger audience. Five videos were eventually used in Lux’s global online search – users get to upload their photos and select a video in which their faces would be unveiled as the New Face of Lux. (<http://en.eyeka.com/>, accessed on 23.6.2012)

Napkinlabs provides support in creating custom campaigns for brands and agencies making Facebook a collaborative, open system between brands and people. Their application “Brainstorm for Facebook” supports the process of collecting ideas collaboratively within the community. (<http://napkinlabs.com/>, accessed on 23.6.2012)

Summary and future research

Diffusion of innovations research promises to enhance our understanding of how social change occurs, a fundamental issue for all scholars of society. Therefore, at the aggregate level, innovation adoption research is primarily concerned with examining how an innovation is accepted by the total population in the adoption process, without taking into considerations behavioural and perceptual characteristics of the individual consumer. What is the role of technology in bringing about social change? One way to find out is through diffusion research. Scholarly interest in new communication technologies by communication students has given a special impulse to diffusion research in recent years. At the disaggregate level, innovations adoption studies focus on the identification of who would or would not adopt an innovation, without the support of a theoretical framework outlining how the decision to adopt is arrived at.

“Open innovation embraces a pool of different practices both technology exploration and technology exploitation practices, each of one presents its specific problems ..., but our goal is to frame and describe using the more representative tools of organizational design the more general problems of open innovation not the very specific problems associated to every single practice.” (Rodriguez and Lorenzo, 2011, p. 76)

Also, ...“diffusion of innovations practice needs to increasingly acknowledge and value the role of indigenous wisdom and solutions. Indeed innovations that are generated locally are not just more likely to be culturally-appropriate, but also more likely to be owned by the potential adopters. When adopters are externally persuaded to buy into the vision of an outside-expert, they tend to demonstrate inertia and resistance, much like the Iowa farmers who for years resisted the adoption of hybrid seed corn”. (Stacks and Salwen, in press, p. 18)

Diffusion research centers on the conditions which increase or decrease the likelihood that a new idea, product, or practice will be adopted by members of a given culture. Diffusion of innovation theory predicts that media as well as interpersonal contacts provide information and influence opinion and judgment. Studying how innovation occurs, E.M. Rogers (1995) argued that it consists of four stages: invention, diffusion (or communication) through the social system, time and consequences. The information flows through networks. The nature of networks and the roles opinion leaders play in them determine the likelihood that the innovation will be adopted. Innovation diffusion research has attempted to explain the variables that influence how and why users adopt a new information medium, such as the Internet. Opinion leaders exert influence on audience behaviour via their personal contact, but

additional intermediaries called change agents and gatekeepers are also included in the process of diffusion.²

What is interesting about diffusion is the social aspect of adopting and or not adopting the innovation. According to Rogers and his followers, the innovations are crucial, yet not all members of society welcome the change the innovation causes. We have observed that adoption of innovation is not at all a straight forward process. We can also see that even the originators – those who introduced and developed the innovation do not have to be respected or even accepted by the society. Now, looking at the laggards, placed at the end of our distribution, or those who either come last or totally reject the innovation, they can also be considered as valid members of society. Laggards possess a conservative nature, and are against experiments, looking to preserve the existing system.

There is no reason to expect that the scholarly popularity of diffusion research by communication (and other) scholars will decrease in the foreseeable future. Innovations continue to be generated and studied.

More scholarly attention needs to be paid to the consequences of technological innovations. Alternative methods of data gathering including ethnography, in-depth interviews, and participant observation should supplement the predominant quantitative methodologies of data collection and analysis (Stacks and Salwen, in press).

Acknowledgment

This study was prepared with support of VŠEM, Prague, Czech Republic and The Bucharest University of Economic Studies, Romania.

References

Abdel-Ghany, M. (2008). Social network analysis of the diffusion of innovations, *Economika ir vadyba: aktualijos ir perspektyvos* (2.11), 270–272.

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http://www.utwente.nl/cw/theorieenoverzicht/Theory%20clusters/Communication%20and%20Information%20Technology/Diffusion_of_Innovations_Theory.doc/

Cardoso, M., Carvalho, J. V. & Ramos, I. (2008). Open Innovation Communities...or should it be 'Networks'? In Miltiadis D. Lytras and Patricia Ordonez de Pablos (Eds.), *WEB 2.0: The Business Models*. New York: Springer Science and Business Media, Llc.

Chesbrough, H. & Vanhaverbeke, W. (2011). Open innovation and Public Policy in Europe. Retrieved from <http://www.sciencebusiness.net/Assets/27d0282a-3275-4f02-8a3c-b93c2815208c.pdf>

Jesic, D. et al., (2011). Web Technologies for Open Innovation. In *Proceedings of the ACM WebSci* (pp. 1–6). June 14-17 2011, Koblenz, Germany.

Lee, T. (2004). Nurses adoption of technology: Application of Rogers innovation-diffusion model, *Applied Nursing Research* (17.4), 231–238.

Mulgan, G. et al. (2007). Social innovation. What is, why it matters and how it can be accelerated. Retrieved from http://eureka.bodleian.ox.ac.uk/761/1/Social_Innovation.pdf

Olusegun, F. et al. (2010). Diffusion of Innovation in Social Networking Sites among University Students, *International Journal of Computer Science and Security (IJCSS)* (4.3), 361–372.

Redecker, C. et al. (2010). Learning 2.0 – The impact of social media on learning in Europe, European Communities. Retrieved from <http://ftp.jrc.es/EURdoc/JRC56958.pdf>

Rodríguez, J. L. & Lorenzo, A. G. (2011). Open Innovation: Organizational Challenges of a New Paradigm of Innovation Management, *European Research Studies* (XIV.1).

Rogers, E. M. (1995). *Diffusion of innovations* (4th ed.). New York: The Free Press.

Rogers, E. (2003) *Diffusion of Innovations* (5th ed.). New York: The Free Press.

Rowson, R. et al. (2010) Connected Communities. How Social Networks power and sustain the Big Society. Retrieved from http://www.thersa.org/_data/assets/pdf_file/0006/333483/ConnectedCommunities_report_150910.pdf

Stacks, D. & Salwen, M. (Eds.) (in press). *An integrated approach to communication theory and research*. New York: Routledge.

Surry, D. W. & Farquhar, J. D. (1996). Incorporating Social Factors into Instructional Design Theory. Retrieved from <http://www.hbg.psu.edu/bsed/intro/docs/social/>

Tanigawa, A. (2012). The role of IT and social innovation in a crisis situation, Japan Social Innovation Journal (2.1), 82–83.

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