Selected Papers of AoIR 2016:
The 17th Annual Conference of the
Association of Internet Researchers
Berlin, Germany / 5-8 October 2016

COLLAPSE OF AN ONLINE SOCIAL NETWORK: WHO STARTED THE AVALANCHE?

László Lőrincz
Centre for Economic and Regional Studies, Hungarian Academy of Sciences &
Corvinus University of Budapest

Anna Győr
Corvinus University of Budapest

Júlia Koltai
Centre for Social Sciences, Hungarian Academy of Sciences & Eötvös Loránd
University, Budapest

Károly Takács
Centre for Social Sciences, Hungarian Academy of Sciences

Introduction

iWiW was a forerunner among online social networks (OSN), even in international context. It was founded in 2002, and by 2008 two-third of the Hungarian internet-using population became its user. However, in the following years substitution of iWIW with Facebook increased, until 2014, when the closing down of the site was announced. These overtakes are not rare about online social networks. In 2008, the world map of the leading OSN services was quite colorful, while today almost all countries are dominated by Facebook. However, such regime changes may occur in the future, for example Boyd (2014) observes the decreasing popularity of Facebook among American teenagers.

The goal of our research is uncovering the sociological and economic mechanisms explaining such changes, using the collapse of the iWiW as an exapmle. After significant cascading mechanism were found in the abandoning of the site (Török, Janos, Ruan, Zhongyuan, and Kertész, Janos 2016), we concentrate on the specification of users, who leave the OSN first, and start these avalanches.

From the economist's perspective, OSNs can be characterized with network externalities (Katz and Shapiro 1992), as the utility of their consumption depends on the

Suggested Citation (APA): Lőrincz, L, A. Győr, J. Koltai, K. Takács. (2016, October 5-8). *Collapse of an Online Social Network: Who Started the Avalanche?* Paper presented at AoIR 2016: The 17th Annual Conference of the Association of Internet Researchers. Berlin, Germany: AoIR. Retrieved from http://spir.aoir.org.

number of customers. This creates a switching cost for the customers, and a barrier to entry for alternative providers (Economides 1996). Considering the collapse of the network, the presence of network externalities has straightforward predictions: users, who have fewer connections enjoy lower utility from this specific network, therefore they are more willing to change for an alternative one.

From a sociological perspective, the most apparent theoretical framework for the analysis is social capital. The literature agrees, that having more connection is generally useful, therefore its first prediction is in line with the network externality perspective. However, beyond this, Coleman (1990) emphasize the importance of dense and closed networks, as they are useful for sanctioning non-conforming members, thus they foster trust and cooperation. On the other hand, Burt (1992) highlights the usefulness of bridging positions, as these people can circulate different information and control projects. About this conflict Lin (1999) argues that “about preserving or maintaining resources (i.e. expressive actions), denser networks may have relative advantage”, however “for searching and obtaining resources not presently possessed, such as looking for a job or better job accessing and extending the bridges in the network should be more useful”.

For understanding the importance of social capital perspective, it is essential to go through the key functions of the OSN. One of iWiW’s key functions was that it served as a huge public address book (by default, email address of every member was visible), which could be used to contact friends of friends, or old acquaintances. Since the beginning, the toy functions of discovering one’s social network (such as visualizing it, or showing the shortest path to any member) were also attractive. It also had an extensive classified ad section, where its advantage was the knowledge of the social networks of the partner. The information aspect of social capital, when more open network structures are more useful, relate to the characteristics of these key functions, suggesting that users in more open social network positions were less likely to leave the iWiW early.

In addition to the social capital literature, diffusion of innovation research also have implications on the life cycles of OSNs. Rogers (2010) notices that attitudes and social background of early and late adopters of an innovation are typically different. What is more interesting about this, is that if someone has innovator attitude, they will be more likely to engage the subsequent service (such as Facebook) as well. Therefore, these people would also leave the old network among the first ones.

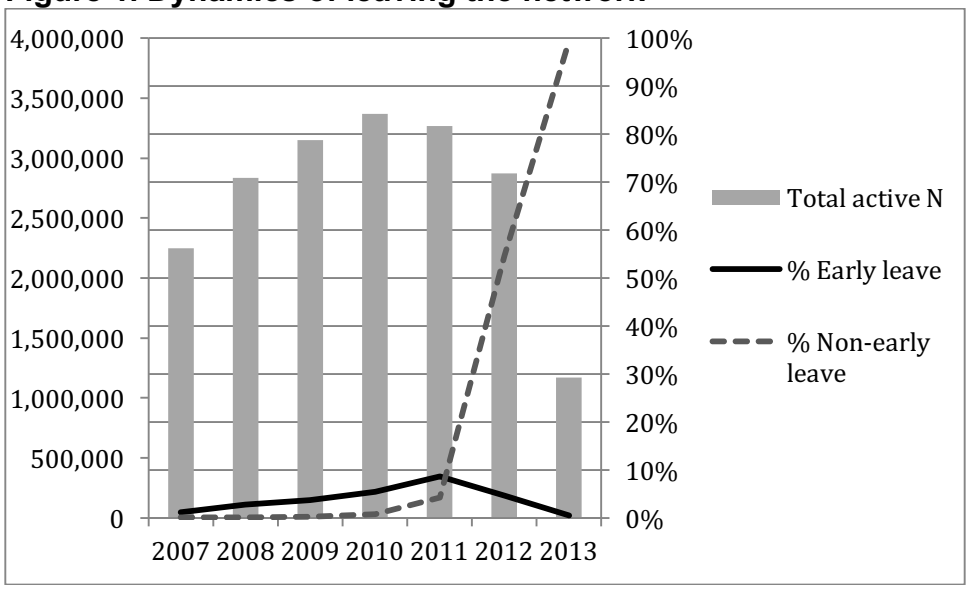
This approach suggests a completely different schedule about the collapse of the network. While the network externality perspective suggests that the collapse starts from the periphery, with less connected members, this alternative suggests that the oldest (and possibly central) members would start the avalanche.

Methods

The whole database of the iWiW network was exported in 2013. As the vast majority of users left the site without deleting her profile, the dynamics of leaving the site can be analyzed using the last login date.

Our dependent variable (if someone is the starter of the cascades) is based on the classification of the users to ‘early leavers’ (who left the site when more than 90% of their friends were active); and ‘non-early leavers’ (who left when more than 10% of their friends became inactive).

Figure 1. Dynamics of leaving the network



As independent variables we used the age of users, the share of non-reciprocated ties, and measured externality effect, closeness of one’s network, and innovativeness. To check the network externality effect, we calculated degree and log degree of users. Openness versus closeness of one’s network was quantified by the local clustering coefficient. Innovativeness was measured with the difference between the date, when one joined the network and the average date, when users of her age joined.

To analyze these effects, multivariate regression models were used. We also run the models for every year of the relevant period.

Results

Analyzing solely the yearly degree distributions of early leavers, non-early leavers and stayers, it is visible that the lower number of connections users have, the probability, that they will be early leavers, increase. This suggests that the collapse of the network can be characterized by a process that starts from the periphery, and not from central users. However, in 2009, degree distribution of the early leavers reaches the remaining users, suggesting the start of a more general churning.

However, multivariate regression models reveal a more detailed picture. The results of these models support the assumption that network externalities are present, as lower degree is associated with higher probability of leaving the network early (and it is true for the whole period). The positive effect of locally open networks is also visible: high

local clustering coefficient increases the chance of leaving iWiW early. However, the effect of innovativeness can also be observed: those, who joined earlier than a typical member of their age group, also tended to leave earlier. Additionally, the strength of these mechanisms changes over time. The effect of innovativeness is the strongest in 2008-2009, while the degree and clustering effects are the strongest in 2010.

References

Boyd, Danah. 2014. It's Complicated: The Social Lives of Networked Teens. Yale University Press.

Burt, Ronald. 1992. "Structural Holes: The Social Structure of Competition." Cambridge: Harvard.

Coleman, James S. 1990. Foundations of Social Theory. Cambridge: Belknap press.

Economides, Nicholas. 1996. "The Economics of Networks." International Journal of Industrial Organization 14 (6): 673–99. doi:10.1016/0167-7187(96)01015-6.

Katz, Michael L., and Carl Shapiro. 1992. "Product Introduction with Network Externalities." The Journal of Industrial Economics 40 (1): 55–83. doi:10.2307/2950627.

Lin, Nan. 1999. "Building a Network Theory of Social Capital." Connections 22 (1): 28–51.

Rogers, Everett M. 2010. Diffusion of Innovations. Simon and Schuster.

Török, Janos, Ruan, Zhongyuan, and Kertész, Janos. 2016. "Collapse of a Social Network Site: Cascade Behavior." presented at the NETSCI-X Conference, Wroclaw.