Network of networks: Uncovering the secrets of entrepreneurs' networks

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ENGLISH SUMMARY
Introduction

The popularity and universal use of online social network sites such as LinkedIn, Facebook and Twitter has become an important phenomenon attracting research in various disciplines. Entrepreneurs also use social networks to access and acquire resources, with online social networks also providing many opportunities for entrepreneurs to share and organize knowledge through their contacts among these networks. The role and importance of social networks for entrepreneurs has been recognized in previous studies. However, the study of online social networking by entrepreneurs is just starting. This study is intended to fill a gap in the literature concerning the structure, characteristics and use of online social networks by entrepreneurs.

We developed a novel approach to extract data on the online social networks of entrepreneurs through the use of the Application Programming Interfaces (APIs) of social network sites such as LinkedIn, Facebook and Twitter. The data concerning entrepreneurs' profiles and network connections was entered into a MySQL database for further analysis to determine the characteristics of entrepreneurs' online social networks such as size, structure, diversity and the role of these networks in the entrepreneurial process. Based on our findings concerning the structure of these networks, we also developed a simulation model to predict their contribution to entrepreneurial survival.

Structure and main findings

Following an introduction in Chapter 1, the dissertation is divided into a theoretical part (Chapter 2) and three empirical parts (Chapters 3, 4 and 5). The main findings of each chapter are presented below.

In Chapter 2, we extended the theory of a Network of Networks (NoN) to entrepreneurship and developed a novel method to collect online social network data from online social network sites.

In Chapter 3 we studied the diversity of entrepreneurs' online social networks by analysing the different industries represented in networks and their geographical locations. Our findings suggest that an entrepreneur's LinkedIn network size has a positive relationship with entrepreneurial survival. However, the size of their Facebook network is not related to their survival, while the size of their Twitter network has a negative relationship with performance. In addition, we created a visualization of the entrepreneurs' LinkedIn online social network which represents industry diversity, and reflected on the implications for future research regarding the structure of these networks.
In Chapter 4, we found that entrepreneurs’ NoNs follow an ‘exponential degree distribution’, which implies that weak ties between individual networks play an important role in forming these NoNs. Additionally, we found overlaps between an entrepreneur’s neighbours across their NoN, which suggested that entrepreneurs develop and use NoNs to support the entrepreneurial process.

Finally, in Chapter 5 we investigated the growth of the entrepreneurs’ businesses in a given network and the latter’s impact on the entrepreneurial process. We assume entrepreneurs are interested in starting up new businesses in collaboration with others in the given network. The decision regarding collaboration depends on the information and resources that can be obtained from the network. We developed a simulation model of the entrepreneurial process in terms of the growth of entrepreneurial wealth. The use of simulation supports the study of network dynamics and we used these models to identify the survival rate of entrepreneurs in the network after a certain period. Our results imply that both the extent of networks and the start-up wealth positively influence entrepreneurial growth. The simulation model can also infer the longest survival time based on a given start-up time.

**Main contributions**

This dissertation contributes to both the entrepreneurship and social network fields by studying the structure of the online social networks of entrepreneurs. First, by extending NoN theory to entrepreneurship, we found that entrepreneurs are using multiple online social networks. We suggest that NoN theory can be applied as a novel approach to the study of networks in entrepreneurship. Moreover, NoN can also be used to explain phenomena in multiple disciplines. For example, we can infer human behavioural patterns and social network structures by focusing on the entrepreneurs’ behavioural data gathered from online social networks.

Second, we find that entrepreneurs tend to build a very diverse network during the start-up period of their business. We use the data we collected to study the structure and diversity of their networks and to conduct an analysis of the impact of the network on entrepreneurial performance, measured in terms of survival. We found that the LinkedIn network size is positively correlated with performance in terms of a venture’s survival and that network diversity does not have an impact on performance.

Third, by analysing the structure of the online social networks of entrepreneurs, we found that these networks follow an exponential distribution and suggested that the networks used
by entrepreneurs formed a NoN, rather than being single networks. This entrepreneurial NoN is formed as a random network with an exponential degree distribution and features a high degree of overlap between the individual networks. We were able to identify communities of networks by removing the edges with the highest betweenness values, which normally means weak ties.

Finally, we presented a network simulation model to describe the entrepreneurial growth process as dependent on the position in the given network. The network structure we used was extracted from the LinkedIn network. This simulation model can predict entrepreneurs’ maximum survival time based on a given start-up time and the resources available. In our model, we found that entrepreneurial growth is not only related to capital investment but also to the extent of networks. While we were not able to determine the threshold for entrepreneurial survival at a given time, we could still infer the probability of survival from the amount of start-up wealth and the start-up time frame.

In conclusion, this dissertation provides a novel methodology to study entrepreneurship and online social networks. We suggest that online social network data can be used as behavioural data to study entrepreneurial processes. Furthermore, our simulation model can be used as an additional approach to predict the growth of new ventures in a fixed network structure. Using the simulation model we can also explore the dynamics and impact of online social networks on the entrepreneurial process over time. This study demonstrates that the online social network can be used to study various aspects of entrepreneurship, and it is thus worthy of further investigation in future research.