

SOCIAL CAPITAL IN THE ICT SECTOR – A NETWORK PERSPECTIVE ON EXECUTIVE TURNOVER AND STARTUP PERFORMANCE

Research-in-Progress

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Abstract

Recently, The Wall Street Journal proclaimed the “War for Internet Talent” among companies in the Information and Communication Technology (ICT) sector. At the same time, talented employees become entrepreneurial and establish their own startups. We aim to provide evidence that startup performance is not based exclusively on access to talent, in the sense of individual human capital, but is also determined by a social capital aspect resulting from their executives’ turnover history. We apply social network analysis (SNA) combined with logistical regression on a large dataset of companies and executives in the ICT sector. Our study contributes to turnover and entrepreneurship in information systems research, as well as to social capital and multilevel systems research. Furthermore, we shed a light on turnover patterns in the ICT sector, contribute to a better understanding of success factors for startups, and provide a practical measure to help identify and differentiate key employees.

Keywords: Turnover, ICT, Startups, Entrepreneurship, Social Capital, Social Network Analysis, SNA, Resource-Based View, Multilevel Networks, Human Capital, Venture Capital, Human Resource Management

Introduction and Research Motivation

Recent articles in online media suggest that competition for highly skilled knowledge workers in the Information and Communication Technology (ICT) sector has reached a new level. The Wall Street Journal even calls it the “War for Internet Talent” (Efrati and Tam 2010), building on and refining the war for talent proclaimed by Chambers et al. (1998) and Michaels et al. (2001). Web firms such as Google, Facebook, Twitter, and others are adding large numbers of staff, increasingly at the expense of their competitors. More than 10 percent of Facebook’s employees previously worked for Google (Efrati and Morrison 2010). At the same time, talented employees become entrepreneurial and establish their own startups (e.g., Kessler 2010; Mourmant et al. 2009; Taylor 2011), spurred by venture capitalists seeking lucrative investment opportunities (Mendell and Volpi 2011).

Knowledge is the most important resource in the so-called new economy (Grant 1996; Nonaka 1994). Thus, attracting and retaining employees, especially in knowledge-intensive firms (Alvesson 1995; Starbuck 1992), is an ongoing subject of interest for academic research (e.g., Hiltrop 1999; Holland et al. 2007; Kyndt et al. 2009; Mitchell et al. 2001). Turnover has been investigated broadly as part of information systems research. While in their review of 33 studies Joseph et al. (2007) identified 43 antecedents to turnover intentions of IT professionals, they conclude that there is still a major gap in understanding actual turnover behavior. In addition, despite the considerable amount of entrepreneurial activity in the ICT industry, little is known about the link between voluntary turnover and IT entrepreneurship (Mourmant et al. 2009).

Traditionally, the effect of human resources on company performance has been assessed from a human capital point of view, with a focus on knowledge, skills, and experience (e.g., Hitt et al. 2001; Kor and Leblebici 2005). Increasingly, organizational research has adopted a perspective of the firm as a social community or collective (Kogut and Zander 1996), incorporating Granovetter’s (1985) argument of embeddedness of economic action in social structures. In particular, the construct of social capital has been applied to explain organizational advantage (Leana and Van Buren 1999; Nahapiet and Ghoshal 1998). “Social capital is the contextual complement to human capital in explaining advantage. Social capital explains how people do better because they are somehow better connected with other people” (Burt 2005: 4). The value of employees with a strong network of relationships goes far beyond their base of individual knowledge and skills, especially in complex and dynamic environments (Dess and Shaw 2001). Turnover, on the one hand, reduces human and social capital of the former employer, both negatively affecting company performance (Shaw et al. 2005). On the other, departing employees can also create additional social capital and new opportunities from the formation of a new business tie between former and new employer, even over-compensating for the loss of the human resource (Somaya et al. 2008). Corredoira and Rosenkopf (2010) showed, in the context of semiconductor firms, that such turnover-induced social ties are even used for the bidirectional transfer of knowledge: “[M]obility across regions creates nonredundant network connections that seem to facilitate the flow of knowledge across firm boundaries” (Corredoira and Rosenkopf 2010: 176).

Generally, there is a growing body of research on social capital that has generated considerable insight at the interpersonal, interunit, and interorganizational levels (see for example Adler and Kwon 2002; Borgatti and Foster 2003 for overviews), and the concept has also found its way into information systems research. There is a broad body of studies analyzing the interaction between social capital and ICT, applied at the individual as well as collective levels (Yang et al. 2009). Still, there is an intriguing gap in that the majority of academics in this area have focused on single- and within-level network structures and relationships. Multilevel research is rare (Moliterno and Mahony 2011). Payne et al. (2011) identify several opportunities for future research with respect to social capital and multilevel analysis, including entrepreneurship, technology and innovation management, and the role of individual social capital compared to social capital at higher levels of investigation.

Our research is motivated by these guiding questions: Which turnover patterns/trends can be observed in the ICT industry from a macro perspective? To what extent can startup performance in this industry be explained by the social capital aggregated from the turnover history of its executives, that is, from the ties to former employers? Which executives are the key resources in terms of their individual contributions to the aggregate social capital of their current employers? We follow a multilevel approach (Moliterno and

Mahony 2011; Payne et al. 2011) in that we draw our conclusions at the company level from an underlying network of executives and their relationships that result from turnover. We answer these questions by applying social network analysis (SNA) to a very large dataset on executive turnover between companies in the ICT sector.

In the following section, we provide a more detailed theoretical background and put our research in context with related existing work. Next, we define our research goals, give an overview of our data and methods, and discuss initial research results. Finally, we look at research steps going forward and the possible implications our study might have for future research and practice.

Theoretical Background and Research Context

Company Performance and the Resource-Based View of the Firm

Beginning with the behavioral theory of the firm in the 1950s (e.g., Cyert and March 1963; March et al. 1958), the neoclassical view of the firm as a unitary, atomistic, rational actor (e.g., Coase 1937) has been increasingly criticized for neglecting other important explanatory variables. Since then, economists in the field of strategic management have developed the resource based-view (Penrose 1959; Wernerfelt 1984), which sees the firm as an aggregate of its idiosyncratic resources and capabilities, recognizing that distinct and inimitable resources provide the firm with a competitive advantage (Barney 1986; Peteraf 1993). Later research extended this view to focus on knowledge as a firm's most strategically important resource (Grant 1996; Nonaka 1994).

From the resource-based view, academics in human resources and strategic management came to understand human resources as a critical source of sustainable competitive advantage (Lado and Wilson 1994; Pfeffer 1994; Wright and McMahan 1992) and elevated human resource management at a strategic level (e.g., Lengnick-Hall and Lengnick-Hall 1988; Wright et al. 2001). Talent management and attraction and retention of key employees have become increasingly crucial to the survival and success of a firm (Hiltrop 1999; Holland et al. 2007; Iles et al. 2010; Kyndt et al. 2009; Mitchell et al. 2001). This is especially true (Horwitz et al. 2003) for knowledge-intensive firms (Starbuck 1992); in these firms, "human capital is the dominant factor" (Alvesson 1995: 6). Traditionally, most research in these areas has involved assessing the effect of human resources on company performance from a human capital point of view, focusing on workforce knowledge, skills, and experience (e.g., Hitt et al. 2001; Kor and Leblebici 2005).

Although the resource-based and knowledge-based views of the firm add much to the understanding of competitive advantage, they are still based on an atomistic view of actors. In his seminal work, the American sociologist Mark Granovetter criticized this atomized, undersocialized view: "[T]he anonymous market of neoclassical models is virtually nonexistent in economic life and ... transactions of all kinds are rife with ... social connections" (Granovetter 1985: 495). He coined the term "embeddedness," arguing that economic action is always affected by concrete personal relations and the underlying structures within networks. The argument of embeddedness of economic actions in social structures has since been expanded and complemented with respect to cognition, culture, and political institutions (Zukin and DiMaggio 1990). However, like Granovetter, most researchers focus on structural embeddedness.

More recent research in the area of the resource-based view recognizes the sociologist's argument and conceptualizes the firm as a social community or collective that specializes in the creation and transfer of knowledge (Kogut and Zander 1996). Nahapiet and Ghoshal (1998) take the next step and incorporate the concept of "social capital" to explain differences in the performance of companies. They define social capital as "the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit" (Nahapiet and Ghoshal 1998: 243). Social capital is an asset that can benefit simultaneously the organization as a whole and its individual members (Leana and Van Buren 1999). Wright et al. (2001) suggest broadening "the traditional HR [human resources] focus beyond simply people" and define the intellectual capital of a firm as human, social, and organizational capital embedded in people and systems. Chisholm and Nielsen (2009) provide their perspective on the integration of social capital in the resource-based view of the firm, concluding that while there is abundant empirical evidence of the importance of social capital for corporate performance, many problems remain in understanding the mechanisms behind this phenomenon.

Social Capital and Different Levels of Investigation

The concept of social capital has become increasingly popular and has found broad acceptance and application beyond its origins in the social sciences (see Adler and Kwon 2002 for an overview). Still, or possibly due to, this ongoing proliferation, "... the nature of social capital in economics remains confused and obscure" (Chalupnick 2010: 1230). Even Burt, one of the main researchers associated with social capital in its contemporary applications, laments: "Social capital is the Wild West of academic work" (Burt 2005: 5). These statements make it necessary to frame the concept of social capital in more detail. To begin with, we refer to an oft-quoted definition: "Social capital is the sum of the resources, actual or virtual, that accrue to an individual or group by virtue of possessing a durable network of more or less institutionalized relationships of mutual acquaintance and recognition" (Bourdieu and Wacquant 1992: 119). The main differentiator between social capital on the one hand and human capital and financial capital on the other is that social capital can be accumulated only with the help of other people (e.g., Burt 1997). Chalupnick (2010) provides a memorable example: Robinson Crusoe can make a fishing rod (financial/physical capital) and learn how to use it (human capital), but will not be able to invest in social capital until Friday enters the scene.

Borgatti and Foster (2003) proposed the following typology of studies focusing on network consequences: structural social capital, social access to resources, convergence of organizations, and contagion within communities. Structural social capital research focuses on explaining benefits (e.g., performance, evaluation, salary, etc.) for the actor as a function of the network structure within which she or he is embedded. There are two distinctive notions to structural social capital that need to be differentiated. One is that it is seen as a property of intraorganizational networks (Adler and Kwon 2002), motivated by Coleman's work on the advantage of closure and cohesiveness between members of an organization in that it facilitates the pursuit of common goals (Coleman 1988). The other is that there is social capital of brokerage, focusing on the structure of an actor's external relationships. According to Burt's (1992) foundational work, a network rich in relationships that bridge structural holes and connect non-redundant sources of information creates a competitive advantage for its owner. These two perspectives on social capital integrate very well: the highest performance can be realized when individuals in a group or company span structural holes external to the group but retain cohesiveness within the group (Burt 2001). Depending on the researcher's point of view, either effects of brokerage or cohesiveness are used as explanations. Here, we focus on social capital of brokerage, as our research subject is firms and their interdependencies.

The concept of social capital has also found broad application in the field of information systems research (see overview in Yang et al. 2009). Social capital as a dependent variable is typically used to explain the development, use, and diffusion of ICT. For instance, Stubblefield et al. (2010) investigated the role of social capital in cell phone adoption. Conversely, ICT as a dependent variable is used to explain the creation of social capital. Recently, Zheng et al. (2010) researched the role of information quality and system quality on social capital building in online communities, and Erickson (2011) found that social media such as Facebook facilitate the creation of social capital of seniors. Common to the aforementioned studies is that they see ICT as a technical artifact. Other IS researchers have investigated the role of social capital in the context of knowledge management (e.g., van Reijssen and Helms 2011) and IS project success (e.g., Han and Hovav 2011).

Research that considers multiple levels of analysis concurrently, that is, the level of individuals within the organization and the level of relationships between those organizations, is just developing (Moliterno and Mahony 2011). The different levels of investigation are generally not independent of each other. Breiger (1974) analyzed the duality of persons and groups, that is, the interpenetration between networks of intergroup ties and networks of interpersonal ties. "The centralities of groups are a function of the centralities of their members [and vice versa]" (Bonacich 1991: 155). Another piece of evidence for the interdependence of levels is the dissolution of intercompany ties as a function of executive turnover (Broschak 2004). Harary and Batell (1981) provide a theoretical foundation for the analysis of such hierarchical systems of nested networks. "If the structure of ties in the group-level network is expected theoretically to be related to organizational outcomes, then it is important to understand the cross-level effects of individual-level networks on the group-level network structure" (Moliterno and Mahony 2011: 456). This is where we are heading.

Executive Turnover, Social Capital and Startup Performance

Ton and Huckman (2008) differentiate between the negative effects incurred by turnover on direct costs (e.g., for recruiting and training the new employee) and indirect costs. The latter include loss of firm-specific human capital, demoralization of remaining employees, and loss of social capital embedded in the employees' relationships (Ton and Huckman 2008). Shaw et al. (2005) provide initial empirical evidence for the relationship between social capital loss from turnover and organizational performance. They tested their hypotheses in 38 locations of a restaurant chain. In addition, they find that the negative effect on performance is even higher when overall turnover is low. This supports Leana and Van Buren's (1999) argument that stable relationships foster the creation of organizational social capital.

In a professional services context, Somaya et al. (2008) come to a more differentiated conclusion regarding the relationship between turnover, social capital, and company performance. They analyzed the movements of patent attorneys between law firms and Fortune 500 companies. Employee turnover potentially leads to the creation of a business tie between the former and new employer, resulting in an increase of external social capital for both firms. The positive impact on performance even exceeded the loss in human capital incurred at the prior employer. In support of these findings, Corredoira and Rosenkopf (2010) showed that such turnover at semiconductor firms induced social ties that are used for the bidirectional transfer of knowledge: "[M]obility across regions creates nonredundant network connections that seem to facilitate the flow of knowledge across firm boundaries" (Corredoira and Rosenkopf 2010: 176).

Turnover has been broadly investigated in the field of information systems research. In their review of 33 studies, Joseph et al. (2007) identified 43 antecedents to the turnover intentions of IT professionals. However, they conclude that there is still a major gap in understanding actual turnover behavior. In addition, although there is a considerable amount of entrepreneurial activity in the ICT industry, little is known about the link between voluntary turnover and IT entrepreneurship (Mourmant et al. 2009).

Entrepreneurship is inherently a network activity (Dubini and Aldrich 1991), and network-based research in the field of entrepreneurship has been conducted for more than 20 years (Hoang and Antoncic 2003). In a review of this literature, Hoang and Antoncic (2003) come up with three areas of research: network content, network governance, and network structure. They further differentiate network structure into measuring the amount of resources an entrepreneur can access versus the diversity of resources. However, due to data gathering challenges, research on the latter still lags behind (Hoang and Antoncic 2003). Burt's (1992) notion of social capital of brokerage is ideally suited to aid in filling the gap. For instance, in one of the few studies on social capital and its influence on ICT startups, Vissa and Chacar (2009) show for a sample of 84 Indian software companies that "entrepreneurial teams spanning many structural holes in their external advice network are associated with high growth ventures." However, they needed to create their networks based on questionnaires, and were limited to 3 employees per startup and only 5 external contacts for each of them. Another study in this area conducted by Burton et al. (2002) showed that entrepreneurial prominence based on career histories of the founding team members has a positive effect on the probability of attracting external financing. However, their study is based on a sample of only 128 Silicon Valley companies from different industries and measures prominence of past employers by counting how many new ventures former employees of the firm have generated. These studies show that research on the effects of social capital on performance of ICT startups can be fruitful and reveal new insights into the dynamics of these companies. This motivates us to focus our research on this area and study the impact of social capital of brokerage on ICT startup performance by analyzing a very large dataset on executive turnover between companies in the ICT sector.

Network Perspective on Executive Turnover and Startup Performance

Research Goals and Hypothesis

In the course of our extensive literature review, we have identified several research gaps we want to address with this study. First, although employee turnover has been addressed in information systems research before, existing research has focused primarily on turnover intentions, leaving aside actual turnover behavior (Joseph et al. 2007). Second, while there are a few exceptions (Burton et al. 2002; Vissa and Chacar 2009), the understanding of entrepreneurship in this field has only just begun

(Mourmant et al. 2009). Third, social capital research has found broad application, yet multilevel research is still rare (Moliterno and Mahony 2011), especially in the context of entrepreneurship (Payne et al. 2011).

Prior research has shown that the construct of social capital has an effect on organizational performance (Leana and Van Buren 1999; Nahapiet and Ghoshal 1998). Social capital complements the conventional human capital constructs (Burt 2005; Shaw et al. 2005) in the tradition of both the resource-based and knowledge-based views of the firm. Social capital of individuals aggregates into the social capital of organizations (Burt 1992; Leana and Van Buren 1999). More precisely, managers who bridge structural holes within and outside of the organization benefit their firms as well (Burt 1997). This is especially true for entrepreneurs (e.g., Vissa and Chacar 2009; Witt 2004).

Turnover potentially leads to the formation of business ties between former and current employers, increasing social capital and business performance (Somaya et al. 2008) or fostering the bidirectional transfer of knowledge (Corredoira and Rosenkopf 2010). These ties must not necessarily be strong ties (e.g., based on contractual agreements). On the contrary, following Granovetter's (1973) argument, weak ties are often a better source of new information. Consequently, ties do not need to be manifested to create opportunities. Burt's (1992) concept of structural holes builds on the same arguments. A structural hole creates a competitive advantage for the person who bridges it because being in the brokerage position allows for participation and control of information diffusion (Burt 1997). "For individuals and groups, networks that span structural holes are associated with creativity and innovation, positive evaluations, early promotions, high compensation and profits" (Burt 2001: 45).

Building on aforementioned theories and research results, we hypothesize:

Social capital of brokerage from informal interorganizational ties as a result of executive turnover has a positive effect on startup performance in the ICT sector.

By focusing our analysis on executive turnover and startups in the ICT sector, we expect our results to be highly significant for two reasons. First, organizational social capital is particularly important in knowledge-based industries (Dess and Shaw 2001; Shaw et al. 2005). Second, executives provide the richest evidence regarding social capital, especially "... managers in the highest ranks of the organization, boundary managers, and, more generally, managers with few peers" (Burt 1997: 361–362).

Overview of Data and Social Network Analysis

Our analysis is based on a free public database called CrunchBase (CrunchBase 2011c), which is part of TechCrunch, a network of technology-oriented blogs and other Web properties recently bought by the Web company AOL (Arrington 2010). CrunchBase provides structured profiles on technology companies and their current and former employees, primarily executives (as our analysis shows). As of April 20, 2011, the database listed 64,211 companies and 83,466 people. The database is growing at a rapid pace: in the 4 months after April 20, 2011, 9,423 companies and 13,024 people were added. The following analyses are based on the data as of April 20, 2011; we will update our dataset for the final paper.

CrunchBase includes companies in 20 categories, including Consumer Web, Software, Entertainment, eCommerce, and so on, with a focus on startups and entrepreneurial companies (Goldenson 2011). The data are collected using a Wikipedia-like crowdsourcing approach: everyone is invited to contribute knowledge. There is a vibrant community supported by a professional team from TechCrunch. For instance, we found that 50% of all company profiles have been updated at least once within a 6-month period. Data quality is sufficiently high due to reciprocal control of the users and intensive use of external references that can be employed to validate information (Olleros 2008). With respect to data quality, Newman (2001: 16132) notes: "Data on affiliation networks tend to be more reliable than those on other social networks, since membership of a group can often be determined with a precision not available when considering friendship or other types of acquaintance." We are quite confident that the CrunchBase data hold up to what they promise, that is, rich and comprehensive information on companies and professionals in the ICT sector. However, we will maintain top-level scientific standards throughout our research. In particular, we will check continually for problems associated with potential incompleteness of and bias in our data.

CrunchBase provides access to its database by means of an Application Programming Interface (API). Data can be searched and downloaded by simple Hypertext Transfer Protocol (HTTP) requests (CrunchBase 2011b) and is available in JavaScript Object Notation (JSON) format (JSON.org 2011). We accessed the API and downloaded the complete set of people and company profiles to a local database for further processing. In the next step, we extracted the required attributes from the raw JSON data to build our network structures and the input variables for the regression model (detailed in the next section). Most of the data for our analyses are available from the CrunchBase database. However, to get a more detailed picture about the career history of employees, we are in the progress of enriching our profiles from other publicly available data sources such as professional social networks.

To calculate the social capital of brokerage inherent to each company, we apply social network analysis. SNA is a set of methods and tools developed initially in the field of modern sociology (see Freeman 2004 for the history of SNA), but today finds useful application across the social sciences, including information systems research, which began at an early date (see Letch 2003 for an overview). More recently, SNA has been applied to knowledge-related topics (van der Meer et al. 2011; van Reijssen and Helms 2009; Shumaker et al. 2011), social media analysis (Agarwal et al. 2011; Cheong and Cheong 2011; Zhu and Chau), to the IS research discipline itself (Gallivan 2010; Takeda et al.), and much more.

SNA models actors and their interrelationships in networks of nodes and ties (also referred to as edges). Actors can be individuals, groups, companies, or even more abstract items such as patents. Ties represent a certain type of relationship: they can be directed (e.g., seeks advice from) or undirected (e.g., know each other). In addition, relationships may be modeled as binary (exists or not) as opposed to signed, ordinal, or valued (e.g., the amount of trade between two countries). A network can be fully connected or decomposed into components that are connected within, but not connected to, each other. Various measures and metrics have been proposed to describe network and actor properties (Wasserman and Faust 1994). Among them are density (proportion of existing vs. potential ties), in-degree and out-degree (number of incoming and outgoing ties), and metrics for centrality. Centrality measures are linked closely to the notion of power. One very prominent representative is betweenness centrality (Freeman 1977), which measures the extent to which an actor is on the shortest path between any other pair of actors. Thus, the more connections depend on a given actor, the more power associated with that actor.

We created a network of companies based on the CrunchBase data. Ties between any two companies reflect a turnover relationship, so that each former employer of an individual is connected to the current company at which that individual works. The resulting network includes 6,140 nodes (companies) connected through 11,868 ties (turnover relationships). The reduction from the total number of companies occurs because, for some companies, CrunchBase either has no information on their employees or those employees do not yet have any career history. Furthermore, there are some small components that are islands without interconnections. This could be caused, for example, by distant geographic clusters that have yet to exchange employees. Because betweenness centrality, our measure for social capital of brokerage, is meaningful only for comparison within the same component, our final network comprises one giant component. However, we will further investigate this potential issue to prevent data bias because of the filtering.

Variables and Regression Model

Moving from the network analysis to the regression model, we need to adjust our sample and filter on startup companies only. The network included all companies for completeness of turnover histories and structural positions. We define companies in our dataset as startups if they are less than 10 years old and have fewer than 50 employees. Furthermore, to avoid bias towards already successful startups, we exclude companies that have gone public or have been acquired.

To test our hypothesis, we will be using a logistic regression model with startup performance as a dependent (explained) variable and social capital of brokerage as an independent (explanatory) variable. The effect will be controlled further by variables on the company as well as on the individual level.

Dependent variable: Measuring the performance of startup companies is not trivial. Unlike publicly traded companies, they are not required to publish company data. Furthermore, actual revenues (if any at all) do not fully represent a startup company's real value. For technology startups, and even more for Web startups, Initial Public Offerings (IPOs) or being acquired by an established company are typical exit

strategies. The success of venture capitalists (VCs) is often measured by the IPO-rate or acquisition-rate within their portfolios (Abell and Nisar 2007). VCs are the primary source of selection for startups that have not yet exited (Baum and Silverman 2004). Therefore, funding received through these investors “confirms the quality of the company and decreases the uncertainty about its potential success. ... The credibility associated with a funding event – emanating from the information available to the VC firm as well as its reputation – gives a strong signal about the quality of the startup” (Davila et al. 2003: 692). Other researchers follow the same argument for measuring potential success of a startup as a function of external funding (Baum and Silverman 2004: 412; Burton et al. 2002; Davila et al. 2003: 692). Therefore, we incorporate whether a startup has received funding as a binary dependent variable into our model.

Independent variable: Being able to identify opportunities that open up between otherwise not connected fields and combining different views and unique information to form something new is essential for innovative startups (Burton et al. 2002). Higher heterogeneity in the network surrounding an entrepreneur leads to higher diversity of information available to that entrepreneur (Hoang and Antoncic 2003). Diversity can lead to higher creativity and innovation (Burt 2001) and grants access to unique information (Burton et al. 2002), all particularly valuable for entrepreneurial companies. In a network, the degree of diversity is reflected by the amount of structural holes bridged by an actor (Burt 1992). Such structurally advantaged positions are generally associated with social capital of brokerage and can be measured by the betweenness centrality value for that actor (Burt 2001). Hence, we use the startups’ betweenness centrality values resulting from the analysis of our company network as an independent variable, which reflects the aggregated social capital of brokerage from their executives.

Control variables: We incorporate control variables to account for other factors that could explain our dependent variable (startup performance). These factors can either be situated on the company level or at the individual level. As our unit of analysis is the company, we need to aggregate individual level factors on that level as well. Drawing on prior research (e.g., Hsu 2007; Vissa and Chacar 2009), we control for company age in years, number of founders, and company size as the total number of employees. From the individual level, we deduce founding experience and managerial experience (Burton et al. 2002; Hsu 2007) by counting such positions previously held by team members. In addition, we attribute for general work experience (total, in years) and education level (number of degrees higher than bachelor’s) (Burton et al. 2002; Davidsson and Honig 2003; Hsu 2007).

Discussion of First Research Results

We now take a deeper look into our network data and illustrate our research with an example. The company Color Labs, founded in 2010 by Peter Pham and Bill Nguyen (CrunchBase 2011a), provides a new way for people to interact with each other through dynamically established social connections via mobile photo sharing (Kincaid 2011). Its pre-launch funding of \$41 million was interpreted by some (e.g., Dredge 2011; Tsotsis 2011) as an indicator of a coming new Internet bubble (for a review of the 1995-2000 Internet bubble, see (Ofek and Richardson 2003). Others speculated that the team behind Color Labs alone would be worth the money for a would-be acquirer (Ingram 2011).

We argue that part of the valuation of Color Labs is based on social capital of brokerage that stems from the relationships of its founders to their former employers. Again, we use betweenness centrality (BC) as a measure for social capital of brokerage. The BC for Color Labs is 19,494.805, well above the average BC of 8,670.493 for a company in our network. We draw an early conclusion that Color Labs is in a preferred structural network position compared to the average company and that investors may have intuitively accounted for the potential advantages stemming from this position in their investment decision.

Next, we explore an executive’s individual contribution to the aggregate social capital of a company. We define ΔBC^c_i (read delta betweenness centrality) of an individual i for company c as the difference between BC^c including the ties related to employee i and BC^c excluding those ties. If a company loses ties, its structural position will be less central afterwards. The strength of the effect depends on the ties that are dropped, for example, whether these have been unique or overlapping with other employees. As an example, we calculate the contribution of Peter Pham to Color Labs’ betweenness centrality:

$$\Delta BC^{Color\ Labs}_{Peter\ Pham} = 19,494.805 - 3,816.976 = 15,677.829$$

We can clearly see that Peter Pham contributes significantly to Color Labs' betweenness centrality and consequently to its social capital of brokerage. In comparison, the contribution of his co-founder Bill Nguyen is only 4,100.590. However, looking at board member Geoff Ralston, we find an even higher contribution of 17,134.570, although he provides the company with only one additional unique tie. His seemingly overrated ΔBC is based on the fact that the tie comes from Yahoo!, which itself is highly central and provides second-degree ties to many other companies, which increase the diversity in the network of Color Labs.

The Color Labs example allows for two observations. First, individuals contribute only by unique ties, that is, ties that do not overlap with existing ties from other employees. Second, the level of contribution is higher if the unique ties connect other companies that are themselves central in the network. Peter Pham covers many unique ties to moderately central companies compared to Geoff Ralston, who provides only one unique tie, although it is a very strong one.

In summary, we see initial indications of the role social capital of brokerage could play in differentiating companies according to their network position. In addition, there is validity to calculating an individual's contribution as delta betweenness centrality. This encourages us to go forward.

Research Outlook and Possible Implications

The initial findings based on our dataset on startups and executives in the ICT sector are very promising, and we are confident in continuing and testing our hypothesis, stated here again as a point of reference:

Social capital of brokerage from informal interorganizational ties as a result of executive turnover has a positive effect on startup performance in the ICT sector.

At present, we are in the process of finalizing the data gathering and refinement process. Next, we will begin the network analysis, which provides the necessary input for the above-mentioned logistic regression model with which we will test our hypothesis.

Our dataset yields comprehensive information on turnover patterns in general, which we will explore further by means of descriptive statistics. This will generate considerable insights regarding our first guiding question: Which turnover patterns/trends can be observed in the ICT industry from a macro perspective? The results from our analysis will then answer our second research question: To what extent can startup performance in the ICT industry be explained by the social capital aggregated from the turnover history of its executives? Furthermore, we aim to answer our third research question: Which executives are the key resources in terms of their individual contribution to the aggregate social capital of their current employer? We have proposed ΔBC as a measure of an executive's individual contribution to the aggregate social capital of the firm. Yet, further investigation is required to give the measure a profound theoretical base.

Our research contributes to different areas of ongoing academic interest: First, we add to a better understanding of executive turnover in the ICT sector in general and startups in particular. Second, by exploring turnover histories of executives, we add a complementary social capital facet and new insights into sources of organizational advantage. Third, we add empirical evidence to the still small body of research on multilevel systems in the area of social network analysis. In addition, our research will have direct practical applications. Only recently, Burt and Ronchi (2007) again confirmed the effect of social capital, based on a field experiment in teaching executives to see social capital. We increase awareness and effective use of social capital in two ways. First, we provide a way to differentiate startups in the ICT sector according to their social capital of brokerage. This can help explain and justify intuitive actions of companies and investors that seem otherwise irrational based on traditional views of human and social capital. Second, our results enhance the identification and understanding of strategic human resources, key employees rich in distinct social capital of brokerage. This is a prerequisite for effective retention management, and an additional decision criterion for selecting and hiring (or even enticing) future employees based on their relationship context.

We conclude with a statement that calls for a more differentiated view regarding the proclaimed war for talent: "Instead of the old 'war' mentality, which frames turnover as a win-or-lose scenario, companies should adopt a more holistic perspective and consider the administrative, human-capital and social-capital implications of worker mobility" (Somaya and Williamson 2008: 34).

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