Visualizing the Influence of Corporate Social Capital on IC Spin-offs

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Received 9 June 2014; revised 15 July 2015; accepted 16 October 2015

Social capital of a large parent company is a key enabler for corporate spin-offs. However, few studies have been conducted on the interactions between high-technology industries and social capital. A number of new integrated circuit (IC) spin-offs have been established worldwide over the past decade, but the success rate remains low. Hence, the purpose of this paper was to visualize the influence relationship between the dimensions of social capital, and to investigate the importance of social capital factors upon successful IC spin-offs. Data were collected on the number of Taiwanese IC design companies in which the spin-offs must have been operating for at least 5 years and analyzed using the decision-making trial and evaluation laboratory (DEMATEL) and analytic network process (ANP) methods. The results of DEMATEL analysis revealed that the “relational dimension”, as the causal dimension, strongly influences all other dimensions, including itself. Second, the results of ANP analysis indicated that the “trust” and “identity” factors within the relational dimension were the most important. This study contributes to research on visualizing influence relationship between social capital dimensions and investigating importance of social capital factors upon successful corporate spin-offs by providing a holistic analysis, and adds knowledge about how to leverage the strengths and resources of a large parent company to increase the likelihood of success of corporate spin-offs.

Keywords: Social capital, Spin-offs, IC design, DEMATEL, ANP.

Introduction

A special type of startup, called a corporate spin-off, has been popular recently among companies. These spin-offs are preferred since, if they can leverage the strengths and benefits of a large parent company while retaining the dynamic of a spin-off, the best of both will be attained¹. Even though millions of new spin-offs have been established, the success rate remains low². In high-technology industries, social capital is a key enabler for corporate spin-offs to leverage the strengths and resources of a large parent company, which can add the benefit of promoting knowledge transfer to increase the likelihood of success³. Global fabless integrated circuit (IC) design houses played a significant role in the semiconductor value chain⁴. In response to these issues, this study aimed to visualize the influence of corporate social capital on successful IC spin-offs using the decision-making trial and evaluation laboratory (DEMATEL) and analytic network process (ANP) methods. The purposes of this study are as follows: (1) visualize the influence relationship between the dimensions of social capital upon successful IC spin-offs, (2) investigate the importance of social capital factors, and (3) propose practical implementation methods based on the results.

Perspectives on social capital

Definitions of social capital

Bourdieu⁵ defined social capital as “the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintances or recognition”. In Portes’s⁶ review of contemporary definitions of social capitalism, he commented, “Social networks are not a natural given and must be constructed through investment strategies oriented to the institutionalization of group relations, usable as a reliable source of other benefits”. Several scholars have used the concept of social capital in conjunction with a company’s competitive advantages⁷,⁸.

Dimensions and factors of social capital

Several researchers divided social capital into three distinct dimensions: structural, relational, and cognitive⁹,¹⁰. Those factors under each dimension were also defined through literature reviews. Thus, a
social capital framework was constructed based on the well-defined dimensions and factors. The structural dimension is defined as who you can reach and how you reach them. Three main factors comprise the structural dimension. The first factor is the line or tie between two nodes. The second factor is the network configuration or the pattern of links. The final factor is how appropriable the organization or network is. The relational dimension represents the value and expectations regarding a particular relationship. Four major factors affect the relational dimension of social capital. The first is the trust and trustworthiness of the opposing node. Then comes the norms and sanctions that are present in the network and between the two nodes. Third are the obligations and expectations of using and giving social capital. Finally, the identity of the other nodes and how they identify each other is the final factor. The cognitive dimension presents the resources provided to both parties through shared representations, interpretations, and systems of meaning among parties. The scholars also observed its factors were in the development of intellectual capital. These factors are shared language, codes, and narratives.

Social capital in successful corporate spin-offs
Powell, Koput and Smith-Doerr showed that the number and diversity of a biotechnology firm’s network ties, and how central the company is to the network structure, positively impact firm growth. In addition, their conclusions revealed that a social network acts as a locus of innovation since timely resources and knowledge are accessible. Steier and Greenwood showed that intense, diverse, and extensive network ties were more likely to succeed whereas superficial, uniform, and few network ties were not. Another study examined how chief strategy officers leveraged their competencies in relation to the parent company. Several studies analyzed startups in different regions in terms of how well the network assisted knowledge diffusion through its members and how social capital assisted this knowledge transfer.

Methodology
Sample selection
The IC industry in Taiwan has representatives from the entire value chain within its national borders. The industry is high knowledge, tightly clustered physically, and almost all major nodes (companies and people) are socially networked to each other. In selecting the companies, there were several requirements. The first was that the spin-offs must have been operating for at least 5 years. The next issue was how many questionnaires must be collected. Since the DEMATEL method requires n=30 as the minimum, we had to find at least 30 experts in the participating companies. Finally, each expert must have been with the company for a minimum of 3 years.

Construct a model using DEMATEL and ANP
To make complex decisions concerning the development of social capital in spin-offs, the multiple criteria decision making (MCDM) method can be used to analyze and find an evaluation model. The major steps were described as follows:
Step 1- Use DEMATEL to identify the relationship between the criteria.
Step 2- Use ANP to deal with problems with dependence and feedback, and to determine the weight of the criteria.

Data analysis
DEMATEL results
After calculating the relevant influence metrics, the network relationship map (NRM) was shown in

ANP results
The initial supermatrix through pair-wise comparisons based on the NRM was shown in Table 1. Next, we can obtain the overall priority, as shown in Table 2, after deriving the weighted supermatrix. The

![Network relationship map](image)
critical factors can be accordingly determined based on the result of Table 2. For example, trust and identity are the two critical factors with weights of 0.1292 and 0.1293 within the relational dimension. The influence relationship network between any two factors would be further observed through a weighted supermatrix in order to replace a limited supermatrix. In addition, the consistency ratio for each step of the calculation was less than 0.04; several had a consistency ratio of 0.00. This signifies that the results for nearly all participating experts agree on the direction and strength of influence for each factor on another.

Conclusions
The NRM provides an overview of the flow of influence among the three dimensions of social capital. First, the relational dimension, as the causal dimension with value (14.76, 0.88), is a strong influence on all other dimensions, including itself. Second, the structural and cognitive dimensions, as the effect dimensions with values (13.93, –0.44) and (14.21, –0.43), respectively, are strongly influenced by the relational dimension and are slightly influenced by each other. Within each dimension, there are one or two critical factors. For the relational dimension, the critical factors are trust and identity, with weights of 0.1292 and 0.1293, respectively. The structural dimension has a key factor of network ties, with a weight of 0.1455, while the cognitive dimension’s key factor is shared narrative, with a weight of 0.1801. When examining the results of ANP analysis, the structural dimension has a key factor: network ties. Due to the tight-knit social structure of IC industry, it does not really matter if a particular node is central to the network or on the periphery. Just being part of the network is enough. In terms of the relational dimension, any change in identity and trust being part of the network is enough. In terms of the relational dimension, any change in identity and trust

<table>
<thead>
<tr>
<th>Cognitive dimension</th>
<th>Relational dimension</th>
<th>Structural dimension</th>
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<tr>
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<td>Identification</td>
<td>Trust</td>
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<td>organization</td>
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<td>Shared narratives</td>
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Table 1—Initial supermatrix
also use the same language since they are within the same industry. As for shared narratives, this is evident in the stories and news of different companies and their conduct. Managers of spin-off companies can use the analysis results as reference while planning to make good use of corporate social capital.

References