Does the Degree of Redundancy in Social Networks Influence the Success of Business Start-ups?

Jan Inge Jenssen (corresponding author)*
Agder University College and Agder Research,
Servicebox 422, Gimlemoen, Building H, 4604 Kristiansand, Norway.
Tel: +47 38 14 10 00.
Jan.I.Jenssen@hia.no.

Arent Greve
The Norwegian School of Economics and Business Administration
Department of Strategy and Management
Breiviksveien 40, N- 5045 Bergen, Norway
Arent.Greve@nhh.no

Abstract

Entrepreneurs use their social network to start businesses. According to Burt (1992), low redundancy in the social network promotes entrepreneurial success. In non-redundant networks the entrepreneurs' contacts do not know each other and rarely have the same information. Low network redundancy gives entrepreneurs better information and it allows entrepreneurs to combine resources from non-redundant sources. In contrast, when there is high redundancy the contacts know each other and may provide the same information. However, our study cannot confirm this hypothesis. Using data on 100 entrepreneurs in Norway we find that simple measures such as the number and strength of ties are more important for entrepreneurs than redundancy because many weak and strong ties increase the entrepreneur's access to resources. We find that much redundancy is beneficial. Entrepreneurs get information and support more easily if they have many ties with redundant relations.

KEYWORDS: Entrepreneurship, networks, redundancy, business start-ups

Introduction

Several researchers recognise that establishing new firms is embedded in social and emotional contexts, where social networks are important, as well as the market (Borch, 1994, Granovetter, 1985, Hansen, 1995, Johannisson and Mønsted, 1997, Reynolds, 1991, Reynolds and White, 1997, Starr and MacMillan, 1990). Economic environments with high establishment rates are conducive to entrepreneurship through the creation of new markets and activities (Bygrave and Minniti, 2000). In line with resource dependency theory (Barringer and Harrison, 2000, Child and Faulkner, 1998, Pfeffer and Salancik, 1978), entrepreneurs use their social relations to get the resources they need to launch a business (Cooper, et al., 1995, Hansen, 2001, Jenssen, 2001). Being in contact with a diverse set of individuals is important for entrepreneurs because it gives them access to information and other resources. However, the structure of the networks may influence the usefulness of these resources. The literature has two opposing models of entrepreneurial networks, one based on the advantage of low information redundancy in networks (Burt, 1992, 1997), and the other linking networks to resource acquisition through long- term relationships (Larson and Starr, 1993).

Social networks are beneficial to entrepreneurship (Aldrich, et al., 1986, Bolcic, 1997/ 1998, Hansen, 1995, Michell, 1969, Renzulli, et al., 2000, Staber and Aldrich, 1995). Entrepreneurs can directly reach a number of persons who are willing to support their new venture. This is their direct contacts. These may possess complementary resources and information that helps the entrepreneur establish and run their business. To achieve the required mix of resources, the entrepreneur needs a diverse set of relations (Renzulli, et al., 2000). Diversity is defined by the background of the entrepreneurs, their education, occupation, or experiences, and by their ability to provide resources or other contacts. Having a diverse set of contacts within first order reach (direct contacts), benefits the establishment and running of firms (Popielarz, 1999, Renzulli, et al., 2000). However, structural properties of networks may influence the information of first order contacts. If several of these also are in contact with each other, they may possess the same information because they talk to each other, thus creating redundancy (Burt, 1992, 1997).

The network perspective has been challenge by researchers arguing that entrepreneurs value their independence and are reluctant to engage in behaviour that may lead to dependency (Curran and Blackburn, 1994, Curran and Storey, 1993, Gray, 1995). However, Johannisson (1995) points out that networking does not create dependency but a generic dependency/independence paradox. Also, there are many studies that show a positive statistical association between networking and entrepreneurship/small business performance (see for example Bakham, et al., 1996, Bryson, 1997, Chell, 2000, Foss, 1994, Jenssen, 2001). Networks also compensate for immature markets by augmenting lacking economic institutions (Sik and Wellman, 1999).

The extensive research on entrepreneurship and network is diverse. Examples of variables that have been found to be conductive to entrepreneurship and/or small business growth are: network size, number of strong ties, frequency of contacts, multiplicity of relations, number of weak ties, range and intensity, time used to develop relationships, time used to maintain relationships, time used travelling to make contacts, number of business relationship, number of indirect ties, and number of bridges in the network (Aldrich, et al., 1986, Aldrich, et al., 1987, Greve, 1995, Greve and Foss, 1990, Greve and Salaff, 2001a, Hansen, 1995, 2001, Jenssen, 1999, Johannisson, and Johnsson, 1988, Zhao and Aram, 1995). *This study investigates how the degree of social network redundancy of entrepreneurs influences the success of business start-ups.*

Redundancy is a network property indicating the degree of overlap between entrepreneurs' contacts. People who are connected to each other tend to possess the same information and, therefore, may be redundant. In networks with high redundancy most of the contacts know each other. If few of the direct contacts of an entrepreneur know each other, network redundancy is low and the information content from each relationship is higher (Burt, 1992). The model predicts that entrepreneurs in low redundancy networks have

advantages compared to entrepreneurs with higher redundancy. They will more successfully combine resources and establish and run companies.

Alternative models suggests that entrepreneurs need densely knit networks of long-term relationships to acquire the necessary resources to establish and run a new venture (Larson and Starr, 1993). This model analyses how social networks provide resources. We study how network redundancy influences entrepreneurial success compared to a resource acquisition model. Network variables such as number of ties and their strength are assumed to provide information, financial resources, and motivational support (Granovetter, 1973, 1982, Larson and Starr, 1993). The data analysed in this study is from Norway (Jenssen, 1999, 2001).

Entrepreneurs are defined as individuals who establish, manage, and take financial responsibility and risk of a firm, and not as a corporate or intrapreneurial effort (Gartner, et al., 1994). Using a social network approach we focus on *relationships* among entrepreneurs and others rather than focusing on isolated individuals. The network configuration of these relationships is particularly important in establishing a business (Larson, 1991). Entrepreneurs need information, resources, and competence to run the business. The essence of entrepreneurship is combining resources in novel ways (Burt, 1992, Mitton, 1989). To do this they acquire support, knowledge, complementary resources, and access to distribution channels through social networks.

Theory and Hypotheses

Granovetter (1973, 1982) argued that people need a set of weak ties to gain access to information. These are acquaintances or relations to whom a focal person is loosely coupled. Using the transitivity argument Granovetter (1973) proposed that people who were weakly tied to a focal person would be less likely to know each other than if strong ties prevailed. Burt (1992) argued that the important factor was not tie strength, but whether network relations were tied to each other. Low redundancy indicates diversity. Redundancy suggests cohesion and hence conformity in social networks, not diversity. Low redundancy gives access to diverse information regardless of tie strength since low redundancy implies few connections among ego's relationships (Burt, 1992). "Contacts are redundant to the extent that they lead to the same people, and so provide the same information benefits" (Burt, 1992, p. 17).

There are three arguments behind the importance of low redundancy. First, the need for low redundancy is related to the traditional methodological argument that sources need to be independent of each other in order to be reliable. Second, non-redundant relationships

give access to more diverse information than a redundant network, because contacts among the entrepreneur's relations tend to homogenise information. Third, low redundancy makes it possible to combine resources in a novel way to develop new products or services (Burt 1992). Therefore, the degree of redundancy is negatively related to the success of business start-ups. We suggest the following hypothesis:

> *Hypothesis 1: The less redundancy in the entrepreneur's social network, the higher the likelihood of successful business start-ups.*

The redundancy hypothesis has been challenged by previous research. Studies have indicated that simple measures of social networks, for example size, are more important for entrepreneurship than sophisticated measures such as redundancy (Reese, 1993). Boissevain (1974) argues that the number of relationships, total or partial, is the most important network property. Raising the number of contacts creates an advantage in the entrepreneurial process simply because it raises the probability that a specific resource can be reached. Larson and Starr (1993) emphasise the stability of long-term relationships for entrepreneurial success. Each dyadic relationship goes through a transformation process that eventually creates resources in stable exchanges.

Following Granovetter (1973), information is most efficiently provided through weak ties, whereas Larson and Starr (1993) see networks as a provider of exchange resources through long-term relationships, which can be seen as strong ties. The strength of a relationship depends on the degree of friendship and trust, frequency of interaction, and the time that the relationship has lasted (Aldrich and Zimmer, 1986, Granovetter, 1973, Krackhardt, 1992). The Larson and Starr (1993) model and also research by Granovetter (1982, 1985) and Wellman (1981) suggest that other resources than information depend on strong ties (see also Krackhardt, 1992). Strong ties supply people with social support and motivation (Wellman, 1981), which also may be important for entrepreneurs.

These arguments suggest that simple measures as the number and strength of ties are important for entrepreneurial success, not redundancy as Burt (1992, 1997) argues. Therefore, we suggest the alternative hypothesis:

> *Hypothesis 2: The higher the number of weak and strong ties in the entrepreneur's social network, the better the access to appropriate resources, and the higher the likelihood of business start-up success.*

Methods

Subjects and design

We selected our respondents randomly from a group of entrepreneurs that had contacted a centre for entrepreneurial training (EVA-centre) in the city of Kristiansand, Norway. The respondents wanted to start a new business and sought advice from the centre. To get enough failures in our sample, we made a random selection from a group of entrepreneurs that had started a new business and a group of entrepreneurs that had failed to start their own business. The interviews were done by phone. However, the questionnaire used in the phone interviews was mailed to the respondents before the interviews were done. This made our respondents prepared to answer and it was possible to verify that they understood the questions. The questionnaire was mailed to 155 entrepreneurs. We got complete responses from 100 persons. The response rate is 64.5 percent. The response rate among the successful entrepreneurs is 67.8, in contrast to 60.3 percent in the other group.

The questions are causal because we are interested in knowing how differences in the social network affect the likelihood of entrepreneurial success (measured as total revenues). To increase the reliability of conclusions we measure possible threats by asking retrospective questions of their networks based on a classification of entrepreneurial phases. We also compare the networks of successful and non-successful entrepreneurs.

The average age of successful companies was 2 years at the time of interviewing (maximum 8 and minimum 1 year, standard deviation = 1.53). The entrepreneurs that failed to establish a company reported that they gave up their effort 1.3 years before the interviews (maximum 2 and minimum 1 year, standard deviation = 0.45).

Measures

We use revenue as the dependent variable in this study. Respondents who did not succeed in establishing a business are listed with 0 revenue. Alternatively, profits may have been used. However, few businesses are profitable in the first period after establishment, therefore, total revenues is a better measure of entrepreneurial success.

The social network variables are measured as ego-centric networks, i.e. we describe the network relations from the point of view of each entrepreneur. We use three independent network variables in this study: 1) number of weak ties, 2) number of strong ties, and 3) social network redundancy.

Following Krackhardt (1992), we have applied degree of friendship as the measure of tie strength. A tie is weak if the entrepreneur describes the contact as a loose acquaintance or acquaintance. It is regarded as strong if the entrepreneur describes the contact as a

friend or close friend. The measures of the number of weak or strong ties are simply the count of all direct ties to the respondents according to the above definition of tie strength.

The measure of social network redundancy is the relative number of the entrepreneur's direct relationships that are connected to each other. It is a comparison of the total number of ties (t) between the network relations to the total number of people (n) in the social network: Redundancy = 2t/n (Borgatti, 1997). In this study we asked the respondents to indicate relations among their network contacts. They indicated relations among all alters. Often researchers ask for relations among a limited set of contacts, usually five persons, however, we did not use a limitation. This strengthens the reliability of the redundancy measure (Burt, 1992, Hansen, 1995).

The intervening variables, the number of resources that the entrepreneur receives, are divided into three different categories: 1) Information resources (information on expertise, potential customers, suppliers, advisers, and financial sources), 2) access to financial resources through the network, and 3) affective resources giving support and motivation. The resources are counted according to how the respondents have indicated a useful resource from any network contact. It is possible to get multiple resources from each contact.

Table 1 shows the distributions of the variables, one set of distributions is from the raw data file, the other set is the distributions coded by their natural logarithm. Since most variables have skewed distributions with high values on outliers, the natural logarithm suppresses the influence of extreme data, and approximates the distributions closer to normal distributions. The ln-coded data have no outliers, and there are no collinearity in the regressions equations.

TABLE 1 Distributions

Variable	Raw data		ln-coded data		
	Mean	Std. deviation	Mean	Std. deviation	n
Revenue	782.65	2852.10	3.36	3.10	98
# weak ties	2.06	1.80	0.94	0.63	100
# strong ties	1.25	1.70	0.60	0.62	100
Redundancy	1.05	1.03	0.61	0.45	98
Information	5.61	4.99	1.40	0.83	100
Finance	0.76	1.20	0.42	0.50	100
Support	1.91	1.90	0.88	0.61	100

TABLE 2 Correlations

Variable	1.	2.	3.	4.	5.	6.	7.
1. Revenue	1.00						
2. # weak ties	0.38	1.00					
3. # strong ties	0.27	0.16	1.00				
4. Redundancy	0.17	0.27	0.12	1.00			
5. Information	0.49	0.57	0.46	0.36	1.00		
6. Finance	0.58	0.35	0.36	0.21	0.47	1.00	
7. Support	0.08	0.20	0.48	0.31	0.40	0.28	1.00

Partial Correlations

Variable	1.	2.	3.	4.	5.	6.	7.
1. Revenue	•						
2. # weak ties	0.11	•					
3. # strong ties	0.08	-0.16	•				
4. Redundancy	0.00	0.09	-0.02	•			
5. Information	0.24	0.43	0.27	0.16	•		
6. Finance	0.46	0.07	0.11	0.02	0.09	•	
7. Support	-0.23	0.02	0.35	0.19	0.18	0.15	•

Partialled with respect to all other variables
n= 96
Correlations > 0.20 are significant at 5% level.

Results

To test the first hypothesis, we estimate a regression model with redundancy as dependent variable applying all independent variables as direct effects. We analyse redundancy with the network and resource variables. Table 3 displays the results of this test.

There are only 3 significant effects in this model. They are all direct effects of resources from the social network. The strongest predictor of entrepreneurial success is access to financial resources, followed by access to information. The network variables have no direct effect on success. This is not surprising. The effects of network variables should be through their ability to provide entrepreneurs with sufficient resources to get their ventures off the ground. Network redundancy has no direct effect on start-up success. Hypothesis 1 is therefore refuted. An investigation of the correlations in table 2 indicates that even a simple bivariate test of hypothesis 1 produces an insignificant correlation. The second half of table 2, the partial correlations, reveals that the effect on the dependent variable is mostly a direct effect from the resource variables. The second half of table 3 shows the regression model only for resource variables. The main pattern is the same as we find in the first part of the table with only small changes in the parameter estimates.

TABLE 3 Revenue vs. redundancy, tie strengths, and resources

Dependent variables: entrepreneurial success measured as revenues:

Independent variables	B	Beta	B	Beta
Intercept	1.02	0.00	1.12	0.00 *
# weak ties	0.51	0.10	•	•
# strong ties	0.35	0.07	•	•
Redundancy	0.01	0.00	•	•
Information	1.03	0.27 *	1.27	0.33 **
Finance	2.75	0.45 **	2.96	0.48 **
Support	-1.08	-0.22 *	-0.93	-0.18 *
RSqr. Adj.	0.40 **		0.41 **	
F	11.62		23.85	
n	96		98	

* $p < 0.05$
** $p < 0.01$

All variables but one support our assumption that the higher the access to resources, the more successful the enterprise (hypothesis 2). However, one of the independent variables, support, has a negative relationship with the dependent variable. It looks as if the more support, or affective resources, to boost the motivation to start a firm, the less successful the enterprise. This may seem to be an odd finding. However, support alone gives no bread, and much support during the establishment may get people to start firms when they should not have done so. Their network is too supportive in an affective sense, and that does not provide the entrepreneur enough criticism to start with more realistic assumptions.

TABLE 4 Regressions of resources and social network variables

	Dependent variables: resources:					
	Information		Financial		Support	
Independent variables:	B	Beta	B	Beta	B	Beta
Intercept	0.35**	0.00	0.03	0.00	0.41**	0.00
# weak ties	0.64**	0.48	0.21**	0.26	0.06	0.06
# strong ties	0.48**	0.36	0.23**	0.29	0.41**	0.42
Redundancy	0.29*	0.15	0.09	0.08	0.28*	0.21
RSquare (adj.)	0.49**		0.19**		0.25**	
F	36.62**		8.44**		11.84**	
n	98		98		98	

Table 4 displays the regressions between each of the three resource variables against the network variables, number of weak and strong ties, and redundancy. All regressions are significant. The results reveal that both weak and strong ties provide information. However, the effect is stronger for weak ties, which supports Granovetter's (1973) weak-

ties hypothesis. The regression also reveals that strong ties provide financial resources. However, also the number of weak ties is significant, and the effect is only slightly lower than for strong ties. The table reveals that the higher the number of strong ties, the more support in the network. There is no effect of the number of weak ties. In sum these results indicate, as expected in hypothesis 2, that an increasing number of strong and weak ties is beneficial for the entrepreneur in order to get access to a variety of resources.

Table 4 also shows that more redundancy gives more information and support. The last finding is not really surprising. A highly connected and supportive network of friends does indeed provide more support, and as shown in table 3, even support in a counterproductive manner. The results regarding information resources are more surprising. The explanation may be found in the effect of connectedness. When people know each other, they are more willing to provide resources than if they are not connected to each other. A cohesion model can explain this. It takes several people to be willing to provide resources, and when one gives support, other people within the same network seem to imitate that behaviour.

To sum up, the results of this study show that success of entrepreneurs comes through their ability to access information and financial resources, which they do by contacting their social network. Some contacts provide more resources than others, but in general both weak and strong ties are important. The resources that the entrepreneurs receive from each contact are of greater importance than sophisticated aspects of the social network such as redundancy. In accordance with Boissevain (1974) and Reese (1993) these results indicate that the strength of ties are most important.

Discussion and conclusion

This study investigate how social network redundancy influences business start-ups. Burt (1992) argues that low redundancy in the network is important for entrepreneurs because it gives access to non-redundant information. Surprisingly, our analyses indicate that redundancy has no direct effect on business start-up success. Contrary to theory, it was positively related to access to information and support. This study reveals that simple network measures are influential. The numbers of both strong and weak ties have a considerable impact on start-up success. However, the effect is mediated through the ability of networks to give access to information and financial resources. Affective resources, such as support and motivation, seem to be counterproductive. This variable was negatively related to success.

Our results raise questions about Burt's (1992) assumption about the context of business start-ups. Referring to Granovetter's (1973) classic article, the strength of weak ties, Burt (1992) argues that the strength of the tie is a correlate, not a cause. Redundancy is the cause. Our results suggest that the network measures operate through their ability to pro-

vide resources, and both weak and strong ties are important for getting information. The relationship between redundancy and information was positive, which contradicts the hypothesis. This implies that redundancy is not the cause of the importance of weak ties, as Burt (1992) argues. Our results indicate that higher redundancy together with a higher number of ties affects access to information. The network contacts act in unison when giving information. Once a person is a member of a network, connectedness among actors seems to release more resources. People acting within an unconnected network, with low redundancy, get less information than people in a connected network. The connectedness of the network persons may act as a provider of trust, and therefore give access to information.

We have a similar finding for access to financial resources that are provided through both strong and weak ties, where the effect of the strong ties is slightly higher than that of the weak ties. Redundancy is unrelated to access to financial resources. This is the most important resource (of the measured variables) followed by information. However, the explained variance of the network variables' effect on financial resources was lower than the explained variance of access to information. This may be produced by the way the resources are counted. They are not weighted by the financial value, but by access in a network. This does not discriminate between smaller or larger resources.

A business start-up situation demands an active entrepreneur who is able to implement his or her ideas. Brunsson (1985) underscores the need for social support to promote action and argues that too much information gives too much remonstrance and may counteract action, which is necessary in a business start-up process. We did not find any evidence of nonlinearity of the effect of information resources. However, we did find a negative effect of support. Too supportive network seems to be counterproductive. Support was mainly given from strong ties in a network with high redundancy. Network contacts that are independent with low redundancy may be better at evaluating an enterprise than one's good old buddies.

Some entrepreneurship studies indicate that social network characteristics such as size, density, diversity, and time spent on networking, depend on the phase of entrepreneurship (Aldrich, et al., 1986, Greve, 1995, Greve and Salaff, 2001a, Johannisson and Johnsson, 1988). If so, when we do not separate between phases, as in this study, the effect of redundancy may disappear.

The notion of different segments of relationships in the social network may be another possible way to explain the unexpected results of the redundancy hypothesis (Johannisson, 1986). The entrepreneur may have both a diverse set of ties and a close knit of friends. Getting information through a diverse set of social ties may create contradictions. However, a dense network with strong ties (action formation set) can reduce uncertainty and create meaningful information (Weick, 1995). If the entrepreneur operates inside a close

network of friends, together they will have a higher capability to receive and interpret information than without the cluster of friends. Such a network can also be viewed as compensation for diversity in information by justifying choices already made by the entrepreneur (Johannisson, 1988). Most probably, both of these mechanisms operate in a real-life situation.

The idea of different segments in a social network may also be found in Burt's (1992) research. He argues that diversity of information is best provided through a low redundancy network. However, he also states that the entrepreneurs need to be free of structural holes at their own end.

We may question the necessity of low redundancy without giving up the argument that diversity is favourable to entrepreneurship. Redundancy is a problematic measure of diversity of information. Redundancy measures structural cohesion in social networks; it does not measure diversity directly. It assumes that the connected relationships of the entrepreneur necessarily share information. Unconnected sources are independent of each other and are therefore expected to provide the entrepreneur with more diverse and reliable information. However, there may be other causes of diversity than redundancy. For example Knudsen (1998) uses the concept "variety of experience". Contacts that know each other may have different types of experience, and thus provide diverse information. These relationships may provide the entrepreneur with diversity and the financial support required. Therefore, to understand how network diversity influences start-up success, we suggest applying more than redundancy as a measure of diversity when studying the relationship between social networks and business start-ups.

The final suggestion that should be subjected to further research concerns differences in the need for diversity depending upon the category of business start-ups that are considered. It is reasonable to argue that the more sophisticated the entrepreneurship is, the higher is the need for a variety of information. Our sample is drawn from a centre for entrepreneurial training. The frequency of what might be considered as high-tech companies is relatively low and it is therefore not possible to test this last suggestion.

This study have some managerial implications. First, it is important for entrepreneurs to develop many relationships in order to get access to resources that are needed for business start-ups. Second, the results showing that higher redundancy together with a higher number of ties gives access to information indicates that connectedness among the entrepreneurs contacts releases more resources. People using relationships who are not connected to each other get less information than people in a connected network. This indicate that entrepreneurs need to obtain information through contacts that know each other. When contacts know each other, their collective support is rooted in trust. Other studies indicate that entrepreneurs get access to resources when several people within the same network agree to support them.

Contacts with diverse experience probably benefit entrepreneurs. Complementary resources is one reason people interact (Greve, and Salaff, 2001b). Entrepreneurs may obtain a variety of resources through contacts that know each other, i.e. high redundancy networks.

Establishing a new business requires the ability to implement plans. Researchers have argued that much information may be confusing and may counteract action. We did not find that access to information had a negative effect on start-up success. However, we found that redundant networks provided better information, which may indicate that access to information in low redundancy networks may have information overload effects. A dense network may reduce uncertainties and establish consensus.

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