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Resource access mechanisms in networks and SME survival in Ghana

Resource
access
mechanisms

611

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Abstract

Purpose – The study aims to determine the resource access mechanism in inter-firm networks that aids SME survival in Ghana.

Design/methodology/approach – The authors collect census data on a poultry cluster in Ghana and construct a directed network. The network is used to extract direct and indirect ties both incoming and outgoing, as well as estimate the structural holes of the actors. These variables are used to estimate for survival of SMEs after a one-year period using a binary logit model.

Findings – The study finds that out-indirect ties and structural hole have a significant influence on SME survival. This works through the global influence and the vision advantage that these positions and ties offer the SMEs.

Originality/value – The study offers SMEs a choice of whom to collaborate with for information (resources) in the form of outgoing and incoming ties at both the global and local level.

Keywords Ghana, Networks, Logit regressions, Resource access, SME survival

Paper type Research paper

1. Introduction

Society is increasingly becoming networked from complex computer systems through people to organizations. The social network theory has been the main theoretical tool that has been used to explain this exponential increase in interconnectedness (Borgatti and Foster, 2003). The theory posits that interconnectedness creates several opportunities for learning, problem-solving, decision-making and personal interaction (Rainie and Wellman, 2012), but can also have a constraining effect on what complex computer systems, people and organizations can do (Lin, 1999). Social networks have been known to present significant effects on organizational antecedents and outcomes (Acheampong *et al.*, 2017; Granovetter, 2005). Some of the antecedents of inter-organizational networks include motives (Uzzi, 1999), learning (Van der Krogt, 1998), trust (Sparrowe and Liden, 2005), monitoring (Moody and Paxton, 2009) and equity (Barnir and Smith, 2002). Some of the consequences of inter-organizational networking include imitation (Demirkan *et al.*, 2012), innovation (Obstfeld, 2005), SME survival (Uzzi, 1996) and performance (Biggs and Shah, 2006).

Another dominant issue that the social network theory has been used to explain is the access of resources in the network by SMEs (Ahuja, 2000a; Burt, 2004; Uzzi and Lancaster, 2003). These studies have found conflicting results as to the effect of direct, indirect and



structural holes as resource access mechanisms on organizational outcomes leading to Rowley *et al.* (2000) suggestion that their effects may be context- or contingent-driven. However, there are still few issues that need to be critically addressed. First is the lack of actor choice. Most actors in a network decide who to collaborate with or otherwise, whereas most studies tend to use undirected data that do not capture this reality. Another challenge is the estimation of the relationships using linear models. Linear models do not capture the costs of social relationships, as found by Uzzi (1996). Finally, some studies have tend to use ordinary least squares (OLS) estimators to estimate the relationships (Acheampong *et al.*, 2017). However, OLS has been known to create some kind of bias as far as network studies are concerned due to the structural interdependence in network data (Carpenter *et al.*, 2012).

Also, from the small and medium-scale enterprises (SMEs) literature perspective, attempts to explain SME survival has focused on approaches such as the ecological view (Acheampong and Hinson, 2018; Hannan and Freeman, 1986), the institutional view (Acheampong, 2018a, 2018b; Bianchi and Mena, 2004; Yildirim, 2010), the organizational view (Analoui and Karami, 2002; Hage, 1999) and the integrativists view (Mellahi and Wilkinson, 2004). The ecological view asserts that SMEs can do little to affect their survival emphasizing the role of the environment in their failure or survival (Barnett and Carroll, 1987; Baum and Oliver, 1991; Geroski *et al.*, 2010; Hannan and Freeman, 1986). The organizational view looks at SME survival from the organizational perspective and with a focus on internal factors under the control of managers (Hage, 1999; Teece, 2007; Tsai, 2010; Vakola and Rezgui, 2000). The integrativists propose that all approaches be used in tandem to understand SME survival because one approach cannot do a good job (Mellahi and Wilkinson, 2004). The literature has found little space for SME survival from a social network theory perspective. However, as SMEs operate in social systems, it will, therefore, be critical to consider enterprise failure or survival from a stakeholder relations perspective.

In this study, we propose a research design and theoretical approach to help address some of the shortfalls in the current stream of research on resource access in inter-firm networks focusing on SME survival. First, we collect inter-firm network data on SMEs in Ghana. The SMEs are asked to nominate from a list of other SMEs that they have either business and/or family relations with. This allowed us to provide the SMEs with a choice that is critical in inter-firm networks because it is possible for an SME to nominate another that does not reciprocate the nomination. Second, SMEs gain access to resources in a network through direct ties, indirect ties or structural holes. The direct and indirect ties can be either incoming (in which case the SME has prestige) or outgoing (in which case the SME has influence) (Buskens, 1998). However, there are costs associated with accessing resources from a network. Hence, we expect the relationship between the resource access mechanism and the survival of the SME to be U-shaped. That is, initially, the costs will outweigh the benefits, but with time, the social influence or prestige of the SME will set-in and offset the costs so that the positive effects can be felt.

We find that the quadratic model better explains the variance in dependent variable (survival) than the linear model by about some 13 per cent. Controlling for SME age, size, manager experience and education, we find that three variables – in-direct ties, out-indirect ties and structural holes – are significant and influence SME survival from a resource access perspective. To properly identify the true cause of SME survival, we developed a random model based on the Erdos–Renyi Model and compared with our main model. We find that in-direct ties estimates in the main model are not significantly different from the estimate in the random model, and hence drop it as a true cause of survival. We conclude that the true causes of SME survival in Ghana are out-indirect ties and structural holes. We also conduct

some size-based cluster analysis and find that there are differences in effects of resource access mechanisms on SMEs across SME size.

This paper is structured as follows. Section 1 is devoted to introduction. Section 2 presents the theory and hypothesis. Then, in Section 3, we present the research methods focusing on study setting, network survey, measures and model specification. Section 4 presents the results of the analysis, while Sections 5 and 6 present the discussion of the results and conclusions, respectively.

2. Literature review

2.1 Resource access via networks

The network-forming concept has gained attention among numerous academics (Acheampong and Hinson, 2018; Acheampong *et al.*, 2017; Quaye *et al.*, 2018; Dana, 2007; Dana, Etemad, and Wright, 2008) because of greater potentials in enhancing resource accessibility, control and power and its ability to bring a paradigm shift or change in entrepreneurship strategy (Wright and Dana, 2003).

According to Coviello and Cox (2006) and Wright and Dana (2003), firms can access resources through network relationships principally in two ways: by acquiring resources through market transaction or by mobilizing resources. Acquiring entails the transfer of resource ownership and risk attached thereto, while mobilizing allows the use of resource without ownership transfer. The current literature indicates that the access strategy may depend on the nature of resources (Chi, 1994; Håkansson and Snehota, 1995; van de Vrande *et al.*, 2006). Clearly, specified and transferable resources may simply be acquired in arm's-length relationships that require only limited interaction (Lefaix-Durand *et al.*, 2009).

Scholars have argued that mobilization is the primary method of accessing resources when innovating in a network (Håkansson and Snehota, 1995; Oerlemans *et al.*, 1998). According to Mouzas and Naudé (2007, p. 62), mobilization refers to “utilizing a company’s relationships to move other actors such as customers, suppliers, partners and even competitors to work within the plans of the mobilizing company”. Mobilization, therefore, is a process of utilizing relationships to other actors to connect resources (Chou and Zolkiewski, 2012). Resources can be accessed only temporarily through mobilization, however, as ownership of the resource does not transfer (Glover *et al.*, 2005). Thus, the relationships have to be sustained as long as the firm wishes to continue to access the resources.

To access resources through mobilization, actors first need to activate or reactivate ongoing or dormant relationships, or initiate new relationships (Chou and Zolkiewski, 2012), and then commit the actors to resource mobilization (Hadjikhani, 1992). Seeking resources from new counterparts is considered more difficult than mobilizing resources within existing relationships where some investments have already been made and the costs and benefits of collaboration are more apparent (Håkansson and Ford, 2002). Established relationships that are characterized by trust and commitment between the actors facilitate resource mobilization (Eisingerich *et al.*, 2009; Håkansson *et al.*, 2009, p. 18). In sum, the IMP literature suggests that, by activating or initiating relationships with other actors, their resources eventually become available to the mobilizer.

2.2 Theory and hypotheses

Theoretically, this study is founded on the social network theory, which originated in the field of social psychology. It has experienced an exponential increase in attention during the last two decades (Borgatti and Foster, 2003), also among operations and production management scholars (Hearnshaw and Wilson, 2013). A social network is defined as “a

finite set or sets of actors and the relation or relations defined on them” (Wasserman and Faust, 1994, p. 20). The actors (nodes) in social network analysis can represent different levels of any kind of social unit such as individuals, firms, organizations (Contractor *et al.*, 2006; Borgatti and Li, 2009). Central to the social network perspective is the notion that social networks are “conduits of valuable information” (Gulati, 1995, p. 623), which otherwise would not have been available to an individual (Lin, 1999). In an effort to acquire information, firms bond together in formal and/or informal networks (Granovetter, 1983). Through relational networking mechanisms, information can be exchanged between participants, effectively bridging what Burt (2017) termed “structural holes” in social networks. The basic notion of the social network theory is that people tend to think and behave alike because they are connected. This connectedness creates several opportunities for learning, problem-solving, decision-making and personal interaction (Rainie and Wellman, 2012).

Integral to the social network theory is the concept of “embeddedness”, which can be traced back to Polanyi and MacIver (1944). Within this view, economic decision-making behavior is embedded, and thus informed and shaped by social relations, and value is derived via the embedded and interconnected nature of an entity within the network (1983). Central to the social network theory is also knowledge creation in what has been termed “communities of practice” (Brown and Duguid, 2000). As such, the interaction of individuals sharing common goals enables the creation of more sophisticated knowledge and insight via the communication of topic-specific information and experiences (Nonaka, 1994; Borgatti and Foster, 2003).

Interestingly, literature has proposed four main assumptions why social network provides opportunities for actors embedded in them: relations between actors, embeddedness, structural patterning and social utility of network connections (Jeffrey, 2012). Many of these consequences of networks have been used to explain many outcomes in organizations, both large and small. As has been argued above, one of the dominant issues that the social network theory has been used to explain is the access of resources in the network by SMEs (Ahuja, 2000a; Burt, 2004; Uzzi and Lancaster, 2003). The studies have found conflicting results as to the effect of direct, indirect and structural holes as resource access mechanisms on organizational outcomes leading Rowley *et al.* (2000) to suggest that their effects may be context- or contingent-driven. However, there are still a few issues that need addressing. First is the lack of actor choice. Most actors in a network decide who to collaborate with, or otherwise but most studies tend to use undirected data that do not capture this reality. Another challenge is the estimation of the relationships using linear models. Linear models do not capture the costs of social relationships as found by Uzzi (1996). In the following paragraphs, we develop hypotheses to help address these issues.

2.3 In-direct ties, out-direct ties and SME survival

The number of direct ties a SME maintains has been known to positively influence organizational outcomes (George *et al.*, 2001). Their influence is in the form of knowledge sharing, complementarity and scale (Ahuja, 2000b). SMEs in clusters can share knowledge on what is best practice and can lead to higher levels of performance for their sustained growth. They also achieve complementarity by bringing different skillsets to perform a task. Especially, when it comes to meeting the orders of larger corporate clients where one SME’s capabilities may not be enough to achieve the required output. This is related to the scale factor. Increasingly, SMEs especially, agricultural ones must meet the raw material requirements of institutional buyers and collaboration enables them to access support from their immediate environment to meet these large-scale project demands.

This suggestion does not, however, take into consideration how knowledge sharing, complementarity and scaling works. Some studies have suggested how direct ties can achieve the above three. Strong ties (Granovetter, 1973), exploitative behavior (Rowley *et al.*, 2000) and embedding (Uzzi and Lancaster, 2003) can be used to explain how direct ties affect this influence. Direct ties can be seen as strong ties with which an SME has a relationship. SMEs with direct, strong or intense relationship can easily access resources from each other whether it is knowledge, complementary skills or scaling opportunities. The same can be said for exploitation and embeddedness where SMEs can exploit or utilize their immediate contacts to gain access to knowledge, complementary skills and scaling opportunities. Taken together, resource access from direct ties represents local (an actor's immediate neighborhood) search behavior (Zaheer *et al.*, 2010).

This literature also does not take into account the mode by which the SMEs access the resources. Most of the studies (Ahuja, 2000b; Gilsing *et al.*, 2008; McEvily and Zaheer, 1999) have used undirected ties as the basis of their analysis. However, SMEs have a choice as to which other SMEs they collaborate with or otherwise, where they seek for help and whom they give help. Within an SME's local neighborhood of direct ties, it can decide to go in search of knowledge sharing, complementarity or scaling opportunities. It can also decide which of such opportunities it will accept. Outgoing direct ties go in search of such opportunities in the SMEs local neighborhood, while the incoming ties need to be accepted. Outgoing ties give influence, while incoming ties are a sign of prestige (Buskens, 1998). SMEs that have ties going to others can use such ties to influence them to access resources for their survival. An SME that receives a lot of incoming ties is prestigious because it may possess certain expertise that is needed in the network. Such SMEs can have a higher bargaining position to access other resources it lacks from the network for their survival. The ties these SMEs have can also serve as prisms of organizational quality that can be used to signal other SMEs outside the network if these ties are to resource-rich hubs (Benjamin and Podolny, 1999).

These resource access mechanisms are not cost-free. SMEs incur costs either monetary, social or learning (Burt, 2004; Uzzi and Lancaster, 2003) to benefit from the resources embedded in their local neighborhood. Rowley *et al.* (2000) focus on the opportunity cost of attempting to exploit direct ties by specifically stating that the utilization of direct ties takes resources away from other (SME) functions that could add value to the SME. For effective resources, access to direct relationships, trust and cooperation are critical (Coleman, 1988). These attributes takes time to develop, and hence, the returns to resource access attempts in networks will be negative, but continuous participation will then bring positive returns. In the empirical literature, a quadratic relationship has been found between embeddedness and survival of SMEs (Uzzi, 1996). Consequently, we hypothesize that:

H1a. At lower values of in-direct ties, SMEs experience negative returns, but at higher values, experience positive returns as a result of their local prestige.

H1b. At lower values of out-direct ties, SMEs experience negative returns, but at higher values, experience positive returns as a result of their local influence.

2.4 In-indirect ties, out-indirect ties and SME survival

Indirect ties refer to the ties an actor has outside his/her local neighborhood as a result of ties of connections held by its direct ties to other ties it has no direct tie to. In sociology, it is also popularly referred to as the "friend-of-friend" phenomenon (Steven *et al.*, 2009;

[Acheampong et al., 2017](#)). Indirect ties can be a resource gathering and/or processing/screening mechanism ([Ahuja, 2000b](#)). In SME networks, SMEs can reach other SMEs beyond their immediate catchment area to access information and resources that can be critical for their functioning and existence. Indirect ties can also be used to screen information received from direct ties as well. For example, if information received from a direct tie is different from what the tie sent to its other direct ties, then the trustworthiness of such information should be doubted. Closer indirect ties can also be used to screen information flowing to the SME from much more distant indirect ties.

Indirect ties can also be thought of as weak ties ([Granovetter, 1973](#)), an explorative mechanism ([Rowley et al., 2000](#)) and/or arm’s-length relations ([Uzzi and Lancaster, 2003](#)). The weak ties explanation suggests that SMEs with many indirect ties will be able to access resources from other SMEs that are not in their immediate environment. This lends itself to the flow of resources between groups rather than within groups. Linked to this idea is the explorative mechanism of indirect ties. If SMEs move from their immediate groups in search of resources that can be thought of as explorative as compared to exploiting the local resources direct ties offer. Exploration offers SMEs the chance to gain resources that are not in their immediate catchment area. Arm’s-length part of the argument suggests that indirect relations are cool, impersonal and atomistic, and therefore require less investment in these relations. Like “books-on-shelf”, SMEs can activate them as and when resources are needed. This helps them largely avoid the constraining effects of over-embeddedness. Taken together, indirect ties represent a global access to resources by an SME embedded in a network. This is because of any mechanism used to explain the access of resources in the network; the fact is that it is beyond the SMEs immediate ties.

As mentioned earlier, with direct ties, SMEs have a choice as to which indirect ties they go to for resources and collaboration, and vice versa. These represent the incoming indirect ties and outgoing indirect ties. The outgoing ties represent the influence the SME has, and the incoming ties represent the prestige it has in the network ([Buskens, 1998](#)). As indirect ties are a global behavior in the network, SMEs can access resources through either their global influence or global prestige. Global influence allows the SME to use the high level of acceptance it has among indirect ties to go global in search of resources and collaborations. Global prestige allows SMEs to gain from the resources sets of indirect ties as a result of some expertise they have and can use as a bargaining chip ([Burt, 1992](#)). For example, if an indirect SME comes to the SME under analysis, it will decide to trade its expertise for those specializations that the incoming SME has. Resource access in the global network environment is also not cost-free as in the case of the local network environment. SMEs will incur learning, social and monetary costs ([Burt, 2004](#); [Uzzi and Lancaster, 2003](#)). An example can be found with global prestige where the SME uses its prestige as bargaining power to access other resources from incoming indirect ties. Consequently, we hypothesize that ([Table I](#)):

Table I.

Resource access
mechanism matrix

		Direct tie	Indirect tie
In-coming tie		Local prestige	Global prestige
Out-going tie		Local influence	Global influence

H2a. At lower values of in-direct ties, SMEs experience negative returns, but at higher values, experience positive returns as a result of their global prestige.

H2b. At lower values of out-direct ties, SMEs experience negative returns, but at higher values, experience positive returns as a result of their global influence.

2.5 Structural holes and SME survival

Structural holes occur when there are no redundancies in an actor's local neighborhood. The actor appropriate benefits as a result of connecting two clusters of actors who are in themselves not connected (Burt, 1992). The key benefits that accrue to such an actor is the vision advantage that connecting different clusters offers (Burt, 2004), offering the actor the opportunity to be creative by bringing different perspectives to bear on a problem. This is possible because connecting different aspects of the network helps the SME engage in arbitrage (information mainly). SMEs that are embedded in structural holes arbitrage by synthesizing information across the various sub-groups, creating analogies, suggesting global best practices and creating general awareness (Burt, 2004).

The empirical evidence supporting the usefulness of structural holes as a resource access mechanism has been mixed. While some find positive effects of structural holes, some find negative effects, while some further argue that it is contingent on several factors-like context. Ahuja (2000) found that structural holes have a negative effect on innovation of biotechnology SMEs in collaborative networks. Structural holes have been linked with the general capability formation and moderation (Zaheer and Bell, 2005), as well as more specifically, competitive scanning and pollution prevention capabilities of SMEs (McEvily and Zaheer, 1999) which ultimately leads to SME performance. This seems to suggest that the effects of structural holes are contingent. However, network characteristics have been seen to have a quadratic effect on organizational outcomes (Uzzi, 1996). It is, therefore, possible that the differences in the directionality of structural holes may depend on the extent (or the stage) of bridging.

Structural holes will initially lead to negative consequences because connecting multiple clusters in a network to achieve the arbitrage that Burt discusses requires trust, that is, altered interests will be served (Ingram and Roberts, 2000). Actors that are embedded in these holes will need to invest social and learning resources to achieve this end before the benefits of bridging structural holes will trickle in. Also, access, timing and referrals have been discussed as critical to benefitting from structural holes (Burt, 2000). However, for small SMEs managing issues of access, timing and referrals can become daunting, leading to coordination problems and been overwhelmed with information (Ahuja, 2000b). This can lead to negative effects of structural holes, but continued engagement can lead to perfection, thereby reversing these negative effects to attain the benefits that the theory posits. Consequently, we hypothesize that:

H3. At lower levels, SMEs bridging structural holes appropriate negative returns, but at higher levels, the negative returns are reversed in favor of positive ones.

3. Methods

3.1 The research setting

The research setting of this paper is centered on the poultry sector in Ghana. The government of Ghana in the 1960s identified poultry production as having the utmost potential for addressing the critical shortfall in the supply of animal protein and job creation in Ghana (FAO, 2014). According to Flake and Ashitey (2008), the poultry industry in Ghana

grew rapidly between the 1980s and 1990s, developing into a vibrant agricultural sector and supplying about 95 per cent of chicken meat and eggs in the country. [Atuahene et al. \(2012\)](#) asserted that the poultry industry had been, and continues to be, a very important contributing section in agriculture, which continues to lead the Ghanaian economy with a 34.5 per cent share of the total gross domestic product (GDP). [Landes and Persaud \(2004\)](#) reported that poultry meat is the fastest growing component of global meat production, consumption and trade, with developing and transitional economies playing a leading role in the expansion. The industry creates jobs and serves as a source of income to farmers.

Despite the tremendous contributions and benefits provided by this sector, the poultry sector in Ghana is one of the few sectors that have faced the harsh realities of trade liberalization. This has led to the collapse and below-capacity operation of many of the poultry clusters in the country before the mid-1980s to early 1990s ([FAO, 2014](#)). Compared to cocoa, maize or rice, the poultry sector does not feature prominently in economic planning or agricultural policy and program documents. Where it is referred to, the proposed measures appear to lack either purpose, focus or consistency, and it is difficult to discern a specific policy approach or strategy toward the poultry sector ([Sumberg et al., 2013](#)). Also, the sector faces various challenges, including poultry diseases, unreliable markets, inadequate inputs and lack of relevant and timely extension information, lack of access to adequate finance, diseases and absence of electricity for operations in most farms. [Acheampong \(2017\)](#) and [Adei and Asante \(2012\)](#) opine that, with the presence of feed-processing mills, poultry input shops, disease-preventing measures, organized markets and slaughter and processing technologies, operations and growth of the poultry industry in Ghana can be enhanced.

This study researches the poultry sector in three districts of the Brong Ahafo region: Dormaa Central (Dormaa Ahenkro), Dormaa West (Nkrankwanta) and Dormaa East (Wamfie). This cluster is popularly known in the agriculture literature as the Sunyani/Dormaa Cluster ([Mensah-bonsu and Rich, 2010](#)). At the moment, the poultry industry, specifically table egg production, is operating at a large-scale levels. Poultry production in this cluster is one of the largest in the region and nationwide. Some of the major challenges encountered by the poultry farmers included financing, diseases and absence of electricity for operations in most farms, while the presence of feed-processing mills, poultry input shops and availability of organized markets served as prospects that could be harnessed to boost the growth of the poultry industry in the district ([Adei and Asante, 2012](#)). The area seems to have formed strong collaborative partnerships with Foani Farms in La Cote D'Ivoire to avoid competition that was leading to collapse of some farms. Anecdotal evidence suggests (the researcher observed this) some farms that collapse are helped back to their feet by Foani Farms so long as there is a social or familial linkage. The owner of Foani farms is a family relation of the broader Unity Farms in Ghana, one of the big players in the Ghana poultry industry. The cluster in recent times is one of the sectors receiving support from the Ghana government as part of the broader National Poultry Support Project (NPSP) announced by the Ministry of Trade and Industry[1] and the Ghana Broiler Revitalization Project (GHABROP) through the Ministry of Food and Agriculture (MOFA) in a 10-year collaboration with the Ghana National Association of Poultry Farmers[2]. The sample characteristics are presented in [Table II](#) below. We see a lot of new farms and owners with limited experience because most of the farms have been started by returnees from Europe or remittances from migrants to Europe who are seeking to return back to Ghana.

3.2 Network survey and sociogram

The study used the networks survey approach to sample and collect data (Boutillier, 2009). Network analysis requires high rates of responsiveness (Sparrowe *et al.*, 2001); therefore, a census approach was used to survey the poultry farmers. To do this, a composite list of all poultry farms operating in the three districts as in January 2013 were compiled from the industry association, IRS, Municipal Assemblies, Assemblymen and women in each unit area of the district and office of the paramount traditional chief (*Omanhene*) (Acheampong *et al.*, 2017). When the whole list was compiled and recurring farms taken care of, we had a total of 163 farms. We contacted all the farmers to interview them, and 155 farmers participated. It is important to note that not all the farmers in the cluster area were included in the compiled list because some of the farmers were hobbies and not established for the purpose of making profit. Such farms were excluded from the data set. The average interview took between 35 and 45 min, and the respondents were asked to provide their business and personal relations they used in their business activities. Multiple name generators was used to generate the name of relations to other farmers at the business and personal (or family) level (Lin, 1999). The respondents were asked to list seven of these relations (Rooks *et al.*, 2012). After every interview, we assessed the face the validity of the responses of the respondents; if they understood the questions or answered truthfully and the support they brought to back some of these claims. Six (6) questionnaires were rejected leaving us with a total of 151 for the analysis stage. The survey was conducted in 2014 and 2015.

3.3 Measures and operationalization

3.3.1 Dependent variable: SME survival. SME survival and failure are two different sides of the same coin. An SME that has failed has not survived, and an SME that has survived has not failed. For the purposes of this paper, the focus will be on defining failure with the reverse being true for survival (Acheampong, forthcoming). This study defines enterprise failure as when an enterprise can no longer meet the utility of its stakeholders (Barnett and Carroll, 1987). To operationalize this, a composite list of all poultry farms operating in the three districts as in December 2014 was compiled from the industry association, IRS, Municipal Assemblies, Assemblymen and women in each unit area of the district and office of the paramount chief (*Omanhene*). A follow-up was made on the same list in June 2015. Those SMEs that had gone out of business by this time were deemed to have failed in this respect. SMEs that survived were coded as 1, and those that failed were coded as 0. At the end of the treatment period, 62 SMEs had failed, while 92 survived out of the 155 SMEs that participated in the study.

	Mean	SD	1	2	3	4	5	6	7	8	9	10
SME age	7.47	5.99	1									
SME size	6.87	11.48	0.44	1								
Manager education	3.73	0.89	0.06	0.12	1							
Manager experience	7.81	6.63	0.77	0.36	-0.16	1						
Out-direct ties	1.27	1.00	0.18	0.36	0.05	0.02	1					
In-direct ties	1.27	2.76	0.17	0.65	0.05	0.14	0.44	1				
Out-indirect ties	0.26	0.15	0.03	0.03	0.07	0.03	0.46	0.06	1			
In-indirect ties	0.26	0.35	-0.05	0.19	0.28	-0.20	0.21	0.38	0.08	1		
Structural holes	0.92	0.15	-0.12	-0.17	-0.07	-0.06	-0.36	-0.06	-0.12	-0.05	1	
SME survival	-	-	0.01	0.12	-0.48	0.30	-0.27	-0.02	-0.25	-0.47	-0.03	1

Table II.
Means, SDs and
correlations

3.3.2 Independent variables

3.3.2.1 Direct ties. Degree centrality is used to measure the direct ties between the SMEs in the data set. Degree refers to the local connectedness to the actor in the network at distance one (Borgatti, 2005). The degree centrality of a given farm is given by Freeman (1979) as:

$$D(i) = \sum_j A : i \leftrightarrow j$$

Where: i is the node of interest and j is any other node in an adjacency matrix A . $i \leftrightarrow j$ is the direct tie between i and j . As our independent variables of interests are out-directed ties and in-direct ties; we define them as follows:

Out-direct ties (i) = $i \Rightarrow j$ and In-direct ties (i) = $i \Leftarrow j$.

3.3.2.2 In-direct ties. To measure indirect ties, we computed the sum of geodesic distances between an SME and all other SMEs less the sum of their degree centrality. We represent the graph theoretic distances between all pairs of nodes as a matrix A in which d_{ij} gives the length of the shortest path from node i to node j . This is represented as (Borgatti and Everett, 2006):

$$GD(i) = \sum_j A : d_{ij}$$

However, as we are interested in indirect ties, $d_{ij} > 1$. Again, for out-directed ties and in-direct ties; we define them as follows:

Out-indirect ties (i) = $i \Rightarrow j$ and In-indirect ties (i) = $i \Leftarrow j$.

3.3.3 Structural holes. We measured structural holes as the efficiency index in the network of ties among farms. We used (Burt, 1992) measure of efficiency, which counts the ratio of non-redundant ties to total ties for a focal SME as:

$$SH(i) = \left[\sum_j (1 - \sum_q p_{iq} m_{jq}) \right] / c_j$$

All the network measures were computed using UCINET (Borgatti *et al.*, 2002).

3.3.4 Control variables. The study controlled for the organizational ecology (*SME age and size*) and managerial effects (*manager educational background and experience*) on survival of SMEs. SME age is operationalized as how long it has been in business, while size is operationalized as the number of employees it has. Manager educational background is operationalized as the highest educational attainment of the owner/manager, while experience is the cumulative number of years owner/manager has been working in the industry.

3.4 Model specification and estimation

The dependent variable, survival, as represented is a binary outcome that takes on two values of 0 and 1. It will be impractical to use the linear regression technique because it allows the dependent variable to take values below 0 and above 1. Because the binary outcome assumption is violated in binary outcomes, a logistic regression is more appropriate (Wooldridge, 2010). We specify the logit model of general form as:

$$G(z) = \Lambda(z) = \exp(z) / [1 + \exp(z)]$$

Where $G(z)$ is the probability that an SME survives, given unobserved continuous variables of z . The model also assumes a linear relationship between z and explanatory variables of the form:

$$Z = b_0 + b_1x_1 + b_2x_2 + \dots + b_nx_n$$

where x_1 to x_n are the explanatory variables. The model enables the inclusion of standard functional forms such as quadratics. In the case of a quadratic, the turning point will then be:

$$\left| b_1/2b_2 \right|,$$

Where b_1 is the coefficient of linear term and b_2 the quadratic term.

The model is then estimated using maximum likelihood with robust standard errors (MLR). This estimator is useful in estimating data that are non-normal and have issues with non-independence of the sample set (Yuan and Bentler, 2000).

3.5 Post hoc analysis

To truly identify the variables that lead to the survival or failure of an SME, we develop a random network and estimate the variables and run logit regression like in the main model. The assumption here is that, if SMEs form networks strategically for their survival, then such connections should not be random. If variables in the main model are found not to significantly differ from those of the random model, then it may not be a true cause of survival or failure of an SME from a networking perspective. To do this, we use the Erdős–Rényi (ER) $G(n,p)$ random graph model in UCINET (Borgatti *et al.*, 2002; Jackson, 2010). We also estimated size-based analysis of the sample (micro and small) and compared to the main model to ascertain whether the variables that predict survival hold in the sub-samples.

3.6 Dealing with some analytical problems in network research

Some prominent problems in analyzing network data are endogeneity, sample selection bias and structural autocorrelation (Carpenter *et al.*, 2012). Endogeneity occurs when the predictors are correlated with the error term. This can arise mainly as a result of measurement problems and/or simultaneity. Measurement error arises when the true nature of the network is not captured. Simultaneity occurs when there are feedback loops between the predictors and explanatory variable. Sample selection bias can also result as a result of not capturing the true network, especially when the snowball sampling method is used, in which case, only connected actors appear in the network. Finally, structural autocorrelation leads to the non-independence of actor scores in network research, and this can significantly bias the results of any regression analysis. To deal with the problems of measurement error resulting from not capturing the true network and sample selection problems, a census approach was adopted. This helped capture significantly the true network, as we had a response rate of 96.3 per cent which above the 80 per cent threshold suggested by Ingram and Roberts (2000). In the case of simultaneity, we think it impractical that there will be a significant feedback loop between the social network variables and survival of an SME. Lastly, to deal with the problem of structural autocorrelation, we used the maximum likelihood with robust standard errors (MLR), as this estimator is useful in estimating data that are non-normal and have issues with non-independence of the sample set (Yuan and Bentler, 2000).

4. Results

Table II provides the descriptive statistics and correlations for all the variables in the 155 observations in the sample. The sample represents the census of all the SMEs in the cluster; there is considerable variance about the means on variables such as age, size and managerial experience, while structural holes and out-indirect ties had very low variances about their means. The highest correlations were 0.77 and 0.65 which were below the threshold points suggested by Hair *et al.* (2010) of 0.8. This suggests that there are likely not to be problems with multi-collinearity or overestimation of the model. Again, these high correlations are also not with the variables of interest.

Table III reports the logistic regression results using the MLR in MPlus. Model I is the control model where we introduce the control variables (age, size, manager education and experience). These control variables come from the organizational ecology and upper echelon theory. All the control variables are seen to have a statistically significant relationship with SME survival. SME age and manager education are, however, seen to have a negative relationship with SME survival. The model has a pseudo- R^2 of 0.200. Model II is the linear model where we model for the linear relationship between our variables of interest (out-direct ties, in-direct ties, out indirect ties and in-indirect ties) and SME survival, while control for the variables in Model I. We find that all the variables (out-direct ties, in-direct ties, out indirect ties, in-indirect ties and structural holes) are statistically significant, with the exception of structural holes. Out-direct ties, out indirect ties and in-indirect ties have a negative relationship with SME survival, while in-direct ties have a positive relationship. The model has a pseudo- R^2 of 0.582 with a ΔR^2 of 0.382. The control variables are seen to have a statistically significant relationship with SME survival. SME age and manager education are, however, seen to have a negative relationship with SME survival. In Model III, we added the quadratic terms of the main variables in Model II. In Model III, the quadratic three terms (in-direct ties, out indirect ties and structural holes) have a positive and significant relationship with SME survival. The linear term these same variables have a negative and significant relationship with survival. The control variables are still seen to have a statistically significant relationship with SME survival. The model has a pseudo- R^2 of 0.712 with a ΔR^2 of 0.130. Due to the higher model fit exhibited by Model III, we select it as the model with best fit to data. We then use it as the basis of the *post hoc* analysis and discussion. (Tables IV and V).

Variable	Control model (I)	Linear model (II)
SME age	-0.727*** (0.108)	-0.671*** (0.095)
SME size	0.729*** (0.074)	0.707*** (0.069)
Manager education	-0.288*** (0.089)	-0.324*** (0.074)
Manager experience	0.792*** (0.114)	0.591*** (0.092)
Out-direct ties (OD)		-0.238*** (0.055)
In-direct ties (ID)		0.148** (0.068)
Out-indirect ties (OI)		-0.179*** (0.058)
In-indirect ties (II)		-0.214*** (0.055)
Structural holes (SH)		-0.104 (0.072)
R^2	0.200	0.582
ΔR^2		0.382

Table III.
Logit models of survival

Notes: Model estimated with maximum likelihood with robust standard errors (MLR); Robust standard errors are reported in parentheses; * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$

Variable	Quadratic model (III)	Random model (IV)	Difference test (III-IV) ^a
SME age	-0.343 ^{***} (0.096)	-0.738 ^{***} (0.097)	-
SME size	0.405 ^{***} (0.056)	0.758 ^{***} (0.059)	-
Manager education	-0.229 ^{***} (0.116)	-0.212 ^{***} (0.046)	-
Manager experience	0.197 ^{**} (0.087)	0.879 ^{***} (0.085)	-
Out-direct ties (OD)	-0.050 (0.267)	-0.206 ^{**} (0.108)	0.230*
In-direct ties (ID)	-1.172 ^{***} (0.431)	0.299 ^{**} (0.148)	0.230
Out-indirect ties (OI)	-3.941 ^{**} (1.607)	0.234 (0.355)	3.152 ^{***}
In-indirect ties (II)	3.452 (9.918)	-0.667 ^{***} (0.206)	2.929 ^{***}
Structural holes (SH)	-1.832 ^{**} (0.816)	0.638 (0.493)	0.067 ^{***}
OD2	0.058 (0.253)	0.138 (0.093)	1.308 ^{**}
ID2	1.436 ^{***} (0.484)	-0.210 (0.115)	5.176 ^{***}
OI2	3.689 ^{**} (1.715)	-0.042 (0.377)	18.940 ^{***}
II2	-3.421 (9.829)	0.544 ^{***} (0.198)	16.966 ^{***}
SH2	1.663 ^{**} (0.754)	-0.528 (0.533)	0.057 ^{**}
R ²	0.712	0.511	

Notes: Model estimated with maximum likelihood with robust standard errors (MLR); Robust standard errors are reported in parentheses; * $p < 0.10$; ** $p < 0.05$ and *** $p < 0.01$; ^aThe absolute mean difference in estimate values is reported

Table IV.
Comparison with a
random model

Variable	Quadratic model (III)	Micro enterprises (V)	Small enterprises (VI)
SME age	-0.343 ^{***} (0.096)	-0.562 ^{**} (0.291)	-0.333 ^{**} (0.134)
SME size	0.405 ^{***} (0.056)	Fixed	Fixed
Manager education	-0.229 ^{***} (0.116)	-0.115 (0.091)	-0.271* (140)
Manager experience	0.197 ^{**} (0.087)	0.693 ^{***} (0.349)	0.155 ^{**} (0.067)
Out-direct ties (OD)	-0.050 (0.267)	-0.513 ^{***} (0.194)	-0.473 (0.264)
In-direct ties (ID)	-1.172 ^{***} (0.431)	-0.635 (0.423)	-1.038 ^{**} (0.430)
Out-indirect ties (OI)	-3.941 ^{**} (1.607)	-0.002 (0.842)	-0.978 (0.557)
In-indirect ties (II)	3.452 (9.918)	-0.004 (10.507)	-1.490 (2.439)
Structural holes (SH)	-1.832 ^{**} (0.816)	0.030 (2.021)	-1.122 ^{**} (0.500)
OD2	0.058 (0.253)	0.392 (0.366)	0.342 (0.197)
ID2	1.436 ^{***} (0.484)	1.229 ^{**} (0.549)	1.658 ^{***} (0.152)
OI2	3.689 ^{**} (1.715)	-0.001 (0.776)	0.798 (0.476)
II2	-3.421 (9.829)	-0.069 (10.449)	1.379 (2.390)
SH2	1.663 ^{**} (0.754)	-0.048 (2.110)	0.953 ^{**} (0.420)

Notes: Model estimated with maximum likelihood with robust standard errors (MLR); Robust standard errors are reported in parentheses; * $p < 0.10$; ** $p < 0.05$ and *** $p < 0.01$; Fixed means the parameter is fixed to 1

Table V.
Size-based cluster
analysis

We conducted a two *post hoc* analysis. In the first, we compared the main model (Model III) with a random model (Model IV) and conducted a difference test (III-IV) using the independent sample *t*-test approach. We find that all the network variables in the main model are significantly different from those in the random model, with the exception of indirect ties. This suggests that the indirect effects observed in the main model may be due to randomness, rather than strategic reasons. In the second *post hoc* analysis, we conducted a size-based analysis of the sample. The sample was split into micro and small SMEs. In the micro SME sample, we find that out-direct ties have a negative influence, while indirect ties

(at higher degrees) influenced survival, and such influence was positive. In the small SME sample, we find that only in-direct ties and structural holes influenced survival. At lower levels of these variables, the effect on survival is negative, but at higher levels, the effect becomes positive, indicating a quadratic effect.

5. Discussion of findings

The study set out to determine the resource access mechanism in inter-firm networks that aids SME survival in Ghana. We test five main mechanisms: in-direct ties (local prestige) (*H1a*), out-direct ties (local influence) (*H1b*), in-indirect ties (global prestige) (*H2a*), out-indirect (global influence) (*H2b*) and structural holes (the vision advantage) (*H3*) that can influence the survival of an SME while controlling for the organizational ecology theory factors (age and size of SME) and upper echelon theory factors (manager education and experience). We find that three of the mechanisms in-direct ties (local prestige), out-indirect (global influence) and structural holes (the vision advantage) significantly influence the survival of SMEs (the poultry cluster included in the study). This confirms the proposition of [Buskens \(1998\)](#), [Granovetter, 1973](#) and [Rowley et al. \(2000\)](#). However, we find that the influence of in-direct ties (local prestige) may be due to random factors rather than strategic reason. We also found that the influence of the variables on survival is quadratic with a U-shaped pattern. This indicates that, at initial or low levels of the mechanism, the odds of survival of the poultry cluster included in the study are negative, but at higher levels, the odds are positive. This result was in tandem with the findings of [Uzzi, 1996](#). The authors also analyzed the data along micro SMEs (less than five employees) and small SMEs (between 6 and 80 employees). Among small SMEs, we find that the quadratic effect still holds with in-direct ties and structural holes the significant mechanisms. However, we have already determined that in-direct ties may be due to random factors, and hence, structural holes that offer the vision advantage is the main mechanism influencing small SMEs' odd of survival. Among micro SMEs, we do not find the quadratic effect, but linear effects. The analysis revealed that out-direct ties at lower degrees influence the odds of survival, but not at higher degrees, while in-direct ties, at higher degrees, influence odds of survival, but not at lower degrees. Again, we have already determined that in-direct ties may be due to random factors, and hence, out-direct ties that offer local influence is the main mechanism influencing micro SMEs' odd of survival.

6. Research implication

6.1 Implication for theory

We position the findings of the study in the academic literature in two ways:

- (1) the resource access mechanisms in inter-firm networks; and
- (2) the SME survival literature.

First, we find that the network resource access mechanism has influence on SME survival, and it consistent with earlier studies that found that social network factor influences the survival of SMEs, and such shape is quadratic ([Uzzi, 1996](#)). The quadratic nature of the relationship is able to bring some convergence on some earlier findings that had found contradictory results. [Ahuja \(2000a\)](#) had found a negative relationship between structural holes and organizational outcomes, while [Zaheer and Bell \(2005\)](#) had found a positive relationship. The findings in this study are able to establish that structural holes can take both forms depending on the degree of intensity that SMEs in the sample are locating in structural holes in the network. Our findings support the claim that the effects may be

contextual (Rowley *et al.*, 2000), but only to the extent of degree of gain in structural hole advantages. An important aspect of the findings is that this study gives actors in a network the choice to accept collaborations or go in search of one either within their immediate environment or broader network environment. This can be viewed from multiple perspectives such as strong and weak ties (Granovetter, 1973), explorative and exploitative behavior (Rowley *et al.*, 2000) and embedding and arm's-length relations (Uzzi and Lancaster, 2003). This is possible when we operationalize indirect ties as weak ties, explorative behavior and arm's-length relations, while direct ties can be seen as strong ties, exploitative behavior and embedding.

The findings of the study find support for indirect ties as weak ties, explorative behavior and arm's-length relations has having a significant influence on organizational outcomes. However, because we give SMEs the choice in the study, we believe that it is when SMEs go in search of resources in the inter-firm network (global influence) that affects their odds of survival because we did not find any support for indirect ties that comes to the SME for collaborations. Secondly, we relate our findings to the SME literature. We find that SME survival is influenced by social network factors, and in this particular study, the mechanisms for accessing resources in the inter-firm networks. Much more specifically, we find that out-going indirect ties that give the SME a global influence and structural holes that provide SMEs with vision advantage are critical. This is in line with Scott and Carrington (2011) who found that relational systems of SMEs connecting and interacting has a huge influence on their performance and survival (Allen *et al.*, 2008). The size of the SME is also critical as the effects of the resource access mechanism in networks influence the SMEs' odds of survival can differ based on the size of the SME.

6.2 Practical implication

We also discuss the implications of our findings to practice in two ways. First, we suggests to managers to attempt to build ties beyond their immediate ties to forms arm's-length relations that require little investment in networking. This will offer managers the advantage of gaining global influence in the network that can aid their access to critical resources, and from the perspective of this study, which is mainly informational. The global influence can help them also fill possible structural holes in the network as they may end up serving as brokers, and hence gain the vision advantage associated with structural holes as well. Secondly, we will want to bring to the attention of managers that the influences of the resource access mechanism are also size-dependent. It is, therefore, imperative that they consider the size of their SME in implementing social networking programs. Managers of micro SMEs should focus on managing out-direct ties, as they have a negative influence on their survival, while managers of small SMEs should focus on gaining brokerage positions offered by filling structural holes.

7. Future research

The results from this current study are largely in accord with theoretical expectations. However, as with any scientific research, there are a number of study limitations and future directions which need to be pointed out. This research primarily used a specific sector, thus, the poultry sector. This forms a certain limitation, as it may not yet be enough to derive conclusions for different sectors. However, this does form a basis for further research, in which other sectors, can be assessed, offering data for cross-comparisons within the services sector. Additionally, this paper focused on Ghana, however, the poultry sector in other countries can be included in further studies.

8. Conclusions

The study set out to determine the resource access mechanism in inter-firm networks that aid SME survival in Ghana. The study concludes indirect ties as weak ties, explorative behavior and arm's-length relations have a significant influence on SME survival. SMEs that go in search of resources beyond their immediate ties and fill structural holes in the inter-firm network in the long run increase their odds of survival as a result of the global influence and vision advantage. We also conclude that the size of the SME also moderates the influence of the network resource access mechanism on the odds of survival of an SME.

Notes

1. Available at: <http://graphic.com.gh/news/general-news/22412-government-support-to-poultry-industry-increasing.html>.
2. Available at: <http://www.thepoultrysite.com/poultrynews/32740ghanas-broiler-sector-to-get-legup-from-revitalization-project>.

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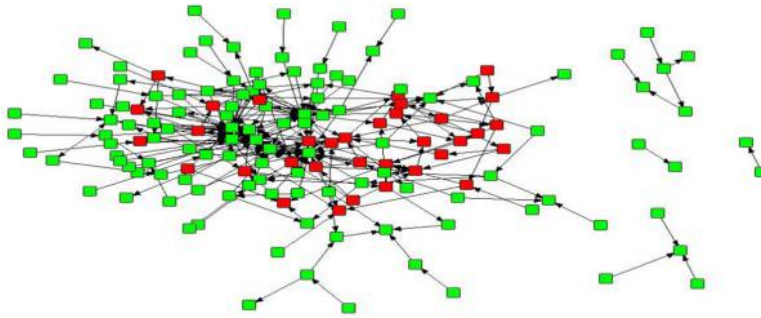
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Notes: Green = survived; red = failed

Figure A1.
SME network

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