A neural network analysis of the influence of strategic and relational motivation on acquisition of inter-organisational network ties in the Ghanaian automobile cluster

4 authors, including:

Michael Addai
ACCRA TECHNICAL UNIVERSITY
12 PUBLICATIONS **47** CITATIONS

Bertha Ada Danso
Takoradi Technical University
14 PUBLICATIONS **37** CITATIONS

Elikem Chosniel Ocloo
Accra Technical University
14 PUBLICATIONS **168** CITATIONS

Some of the authors of this publication are also working on these related projects:

Project   SMEs Development View project

A neural network analysis of the influence of strategic and relational motivation on acquisition of inter-organisational network ties in the Ghanaian automobile cluster

Hu Xuhua

Jiangsu University,
301 Xuefu Rd., Zhenjiang, 202013, China
Email: xhhu@ujs.edu.cn

Michael Addai*

Accra Technical University,
P.O. Box 561, Accra, Ghana, West Africa
Email: maddae@apoly.edu.gh
Email: maddai@hotmail.co.uk
*Corresponding author

Bertha Ada Danso

Jiangsu University,
301 Xuefu Rd., Zhenjiang, 202013, China
Email: Bertha.danso@tpoly.edu.gh

Chosniel Elikem Ocloo

Accra Technical University,
P.O. Box 561, Accra, Ghana, West Africa
Email: elikem75@yahoo.co.uk

Abstract: The acquisition of inter-organisational network ties remains a functional pre-requisite in the survival of a business venture. We sought in this study, to explore the extent to which strategy-driven motivational factors and relational motivational factors significantly influence acquisition of inter-organisational network ties. Our data was procured from a sample of 150 managers and owners of small scale automobile firms recruited from an automobile cluster in Ghana. We adapted but modified a feed-forward neural network model where data propagate along the connections in the direction from the network inputs to the network outputs from the extant literature. Our results showed a complementary relationship between the effects of interactions that precede the development of cooperation among organisations and strategic forces which involve the deployment of a firm's core competencies. We proposed the need for automobile SMEs in Ghana to harness potential sources of competitive strength such as previous experience of working together with others.

Biographical notes: Hu Xuhua is the Executive Dean of the School of Finance and Economics at Jiangsu University, China. He is also the Director of Division of Open Economy and Industry Development. He teaches industrial economics and has a lot of experience in industrial research.

Michael Addai is a final year PhD candidate at the Jiangsu University, China. He is also a Lecturer at the Accra Technical University in Ghana where he teaches marketing management and business management. His research area for his PhD dissertation is the effects of inter-organisational ties on resource transfer.

Bertha Ada Danso is a second year PhD candidate at the Jiangsu University, China. She is also a Lecturer at the Takoradi Technical University in Ghana. She teaches food and beverage and hotel management and possesses a lot of experience in research.

Chosniel Elikem Ocloo is a second year PhD candidate at the Jiangsu University, China. He is also a Lecturer at the Accra Technical University in Ghana where he teaches marketing and behavioural management. His research area is e-commerce adoption in B2B marketing.

1   Introduction

The economy of Ghana operates largely on the prevalence of many small and medium scale enterprises scattered across the length and breadth of the country. As a nation whose economy is largely directed by both the public and private players, the history of SME development is littered with corpses of several hitherto vibrant entities that have succumbed to the difficult challenges of operating in a highly difficult economic context. Currently, the main economic sectors where SMEs abound in Ghana include agriculture, services and industry respectively (Odoom and Odoom, 2016). As observed by Odoom and Odoom (2016) SMEs in Ghana perform very well in terms of total factor productivity which tends to be highest especially in the medium-sized segment with 50–100 workers. Also with regards to innovation, research by various studies indicates that SMEs in Ghana have contributed their fair share in the development of the economy (Appiah Fening et al., 2008). When the government of Ghana declared 2001 as the beginning of the era of 'golden age of business', the need for a vibrant private sector to act as the catalyst of growth gained more momentum; many SMEs repositioned their business development strategies with many constituting themselves into clusters and business associations to benefit from state funded support (Asante et al., 2018). However, the expectations that such initiatives could propel them to the pinnacle of business success became elusive overtime (Odoom et al., 2017). It is therefore not surprising that

in recent years, the contribution of Ghana's SME sector has fallen short of its potential not only because of their inability to access capital as well as lack of modern technology but due to the lack of a well-defined inter-organisational linkage, collaboration, cooperation and alliances among the various firms that find themselves in the few clusters in the country (Appiah Fening et al., 2008). In the midst of these challenging business conditions, individual firm motivation (relational and strategic), and environmental factors (intrinsic and extrinsic conditions) have propelled a number of SMEs to organise themselves into proper clusters in order to take advantage of inter-organisational linkages, collaborations, relationships and alliances to enhance their innovation performance and to be competitive on the global market as well as taking advantage of potential synergies including financial and technological synergies (Connell et al., 2014).

Various studies across the globe have proved that inter-organisational network ties obtained through the firm's own motivations are far superior in resource acquisition (technology, knowledge/skills, capital, etc.), increase their innovation performances and capacities as well as enhance their global competitiveness (Autio et al., 2014). As a result, most SMEs in Sub-Saharan Africa cannot compete with these industrial clusters on the global market (Taura and Watkins, 2014). In spite of the difficult challenges that SMEs operating in Ghana face due to their inability to engage in innovative activities especially adopting the inter-organisational network tie approach within a cluster system, most researchers on SMEs in the country have only focused on the management, financial and performance issues of the sector (Taura and Watkins, 2014). It is extremely difficult for one to even find real empirical studies conducted on the inter-organisational network model of SMEs in Ghana (Darbi and Knott, 2016) and even the few empirical studies that have been undertaken have also been uneven making comparative assessments difficult (Taura and Watkins, 2014). Most studies on innovation have mainly focused on process and technological innovation (Raymond et al., 2016). Also, few other studies have looked at organisational network innovation among SMEs such as Salavou et al (2004) and cited by Sok et al. (2013) who looked at organisational innovation in SMEs from the context of strategic orientation and competitive structure in Greek SMEs. Moreover, several network models have also been developed regarding the spread and adoption of inter-organisational network innovation (Raymond et al., 2016). Again, few studies have focused on a qualitative approach to inter-organisational network innovative success (Brečić and Simintiras, 2016) with most studies focusing on quantitative approaches in studying the phenomenon (Raymond et al., 2016). Despite the uniqueness of the contributions of these studies to network tie development and application in business, they are bereft of industry-specific and firm motivation exigencies needed to wholly explore the challenges facing such SMEs in their attempt to acquire business network ties and appropriate it for their own development (Dooley and O'Sullivan, 2016). This renders cluster-based inter-organisational ties of SME research in Ghana as an incomplete picture of findings (Obeng et al., 2014) and accordingly require further investigation into inter-organisational ties, resource transfer, etc. In the multiplicity of these issues that remain outstanding, the case of firm motivation influencing organisational ties formation and resource acquisition in the automobile cluster which remains one of the most successful clusters in Ghana is worth exploring.

Situated on the south west coast of Accra, the agglomeration of small producers and traders in the auto industry in Accra locally known as 'Abossey Okai' began in the early

1970s. Its growth was partly due to the unavailability of imported materials and spare parts which resulted in an increasing necessity to repair and recycle in particular, cars, lorries and small buses (Akple et al., 2014). These local workshops found every new way of prolonging the life of vehicles and producers and traders were highly specialised in particular operations or products whiles some small engineering workshops emerged that produced new or reconditioned old parts. A European engineer might have considered their machines as rudimentary and thought of the whole Abossey Okai project as a hopeless scrap heap. Indeed, none of these workshops could have existed on its own but together they achieved an impressive collective efficiency which helped to save the Ghanaian transport system from collapse in the late 1970s (Akple et al., 2014). The Abossey Okai auto project provided a lot of employment at the time and gave earning opportunities to around 40,000 people. Specialisation within the cluster has since deepened further with a particular interest on how the cluster could cope with the electronic challenge with the new generation of vehicles (Acheampong et al., 2016). Did this leave the local workshops stranded? The answer is no. They responded equally to the challenge. The deepening of the skills base of the cluster has since led to the emergence of few firms such as The Kantanka Automobile Group and the Mahindra and Mahindra group that are now producing their own brands of vehicles and export them from Ghana to other African countries. Currently, about 220,000 people work in this industrial cluster and spread over 13,500 SME businesses within the cluster. While this is a rough estimate, it is clear that the cluster has grown considerably. Unavailability of spare parts is less of a driver now but the need to grow the cluster into a world class car manufacturing hub in the West African sub region has been the driving force of the managers of the cluster.

Today, lorries and cars are reassembled with reconditioned parts or where required with new parts such as piston rings, gaskets or plugs. A cluster which appears insurmountable initially has now become a monumental industrial auto hub not only for Ghana but in the West African sub-region (Akayeti, 2015; Akple et al., 2014). In the midst of the often isolated and dishonoured hub of great entrepreneurs, this research seeks to explore the extent to which strategy-driven motivation factors (resource complementarity/similarity, financial resources, research and development (R&D) capabilities, information, knowledge access, entry to new markets (new clients), status and legitimacy) and relational motivational factors such as previous experience of working together (familiarity), success of previous collaborations, common third parties, personal relationships and background of boundary spanners. After reviewing current knowledge in the area of firm motivation, network ties and resource acquisition, we outline and ensemble an artificial neural network (ANN) analytical procedure to determine the influence of the respective factors and their identifiable cause.

2   Strategic motivation for acquiring inter-organisational network ties

Strategic motivation explains the main reason why individual organisations strategically develop ties with other organisations; these reasons are however set at the organisational level, i.e., different organisations have different strategic motivations. According to the resource dependence theory, organisations intentionally look for resources across inter-organisational ties. It must be stated that, the benefits derived from inter-organisational ties and alliances usually go beyond financial motives and rather

driven by more of strategic reasoning (Zineldin and Dodourova, 2005), which include creating new market opportunities, achieving economies of scale and sustaining long-term competitive advantage. Different factors account for a firm's strategic motives for establishing an inter-organisational tie relationship. Some of these strategic motivational factors are; complementarity, similarity, R&D capabilities, financial resources, information, entry into new market, legitimacy and status.

- *Complementarity:* Thus, an organisation's search for resources is usually targeted at complementing its own resources with new ideas that are accessible from other organisations. In a study by Ozcan and Santos (2015) citing Ozcan and Eisenhardt (2009), they established that complementarity of resources inspires tie arrangements in the wireless gaming industry, where complementarity is claimed to have contributed to high innovation performance. Complementarity in this regard refers to the establishment of an inter-organisational tie relationship where firms can transfer complementary resources from these ties in aid of innovation performance (Todeva and Knoke, 2005). According to Huang et al. (2015), most firms do not generate enough internal resources to undertake meaningful innovation regularly and that are motivated to form inter-organisational strategic alliances with firms that have complementary resources in order to transfer such resources to enhance their innovation capabilities. In the view of Zineldin and Dodourova (2005), there is an increase in the number of industrial manufacturers that are establishing several forms of alliances in an attempt to improve their market competitiveness. In view of this, for the past recent decade, strategic alliances have almost doubled in number which is even likely to increase in the future (Zineldin and Dodourova, 2005).

- *Similarity:* Another logic also proposes that organisations start cooperation with other organisations that possess comparable resources; that is, similarity encourages cooperation (Tsai, 2002). A study conducted by Albers et al. (2016) and Masiello et al. (2015) indicate that organisations establish ties especially in the case of inter-organisational relationship with firms that possess similar resources. Similar resources in this context can be of several different kinds, for example, financial, R&D capabilities, information, access to new market, legitimacy and status. Financial resources for instance greatly drive cooperation across organisational boundaries. In a typical example, Ozmel et al. (2013) in studying about the effects of inter-firm ties on performance in financial markets observed that firms develop many ties among their already-existing network to obtain financial assistance. Moreover, Ozmel et al. (2013) in their study on how venture capital and alliance networks affect inter-organisational networks also established that, a new venture's affiliations with venture capitalists (VCs) that have prominent positions in syndicate networks and a new venture's prominent position in alliance networks resulting from previous alliances offer numerous strategic benefits. Furthermore, Galaskiewicz et al. (2006) as cited by Mano (2014) also established that non-profit organisations that rely mostly on peoples' benevolence and volunteers develop at a quicker rate in the event that they have more ties with urban elites; nonetheless, in the case of non-profit organisations that rely heavily on fees and in some instances sales, develop quicker when they have fewer ties. It is thus clearly seen that firms are motivated strategically to form inter-organisational ties with firms that they can acquire similar resources to facilitate innovation performance.

R&D capabilities are likewise a major strategic motivational factor for the formation of inter-organisational ties especially as observed in most technology-driven ventures. A study by Berchicci (2013) found out that tie development among organisations is greatly motivated by the main objective of accessing new knowledge for the purpose of improving on innovation performance. Three decades after the initial work by Pfeffer and Salancik (1978), researchers continue to argue about the consequences of diversity which mirrors the argument on complementarity versus similarity. In 2011, The Academy of Management Journal called for papers on 'relational pluralism of individuals, teams, and organisations', which they invited scholars such as Ranjay Gulati, Martin Kilduff, Stan Li, Andrew Shipilov and Wenpin Tsai to be the guest editors. This initiative therefore goes further to show that there is a great interest in the community of researchers on the advancement of the topic of strategic motivation from its current state. Previous studies actually give convincing evidence on the development of new products as a trigger of strategic cooperation across organisational frontiers. Expanding on this debate, different researchers have accentuated that organisations are motivated to look for a wider array of R&D capabilities as this has been an observable phenomenon in the biotechnology industry (Greve et al., 2013; Noyes et al., 2014). The contention here is that, organisations that have vigorous R&D capabilities facilitate the formation of various ties with different organisations (Love et al., 2014). It is again argued that, R&D capabilities serve as 'admission ticket' driving strategic inter-organisational ties in light of information shared among organisations (Love et al., 2014). Thus, cooperation among retailers and suppliers provide for quick reactions to market developments because of information sharing among partners.

Information is a fundamental resource for strategic cooperation across organisational boundaries (Chen et al., 2014; Isaksson et al., 2016). One major significant type of strategic information is referrals. Referrals are the commendations given about organisations to work with, on the premise of either past experience of cooperating or based on their reputation in the industry or market place (Shipilov et al., 2014). People likewise enjoy considerable advantages through referrals. Burt (1992) as cited by Stam et al. (2014) went on further to even submit that financial experts who receive frequent referrals from other people enjoy regular monetary related incomes since being referred in various places creates a lot of opportunities such as working with different organisations. It must be noted however that, the source of such referrals is quite significant. Other scholars have investigated into the role of information on an organisation's history in making a decision to form a strategic alliance with it (Loebbecke et al., 2016; Rowlinson et al., 2014). Organisations usually look for background information about the capacities and the conduct of future network ties (Viswanathan et al., 2014). Such information is critical in making decision on the administrative mechanisms to resolve issues with respect to the misuse of resources. Information carries knowledge that facilitates organisations to transact business in the market place, and is particularly essential in complex environments (Chen et al., 2014). The most important aspect of organisation is its capacity to access and process information since it influences its ability to identify and exploit information (Cohen and Levinthal, 1990) as cited by (West and Bogers, 2014). It is quite tedious and costly for organisations to design a strategy to acquire the essential information (Un and Asakawa, 2015), hence, organisations are motivated to establish a strategic and coordinated effort with external organisations in pursuit of information that is already available from these external partners (Casillas et al., 2015).

Entry into new markets or an industry: Entry into new markets or an industry serves as a great strategic motivation for organisations which more often than not requires legitimacy in the marketplace/industry; i.e., being seen as aligning one's self with the existing standards and principles of the industry (Francis, 2016; Tasselli et al., 2015). In the event of enormous amount of FDI inflows happening around the globe, deciding on the mode of entry remains a key research question (Zineldin, 2007). According to Zineldin (2007) it is noteworthy to state that multinational enterprises (MNEs) usually adopt two paths that lead to three types of entry modes for firms entering into foreign markets; these entry modes are

a   equity investments

b   establishing exclusively owned subsidiaries (this can be achieved either through the establishment of an organic venture and/or by an acquisition)

c   by engaging in a joint venture with a local partner.

The choice of entry mode is a very important strategic decision for MNEs competing globally. In as much as entry into new markets or industry is strategically a motivating factor for organisations, it is always difficult for new entrants to be successful without getting the necessary information about the market (Kim et al., 2015; Zineldin, 2007).

Gaining legitimacy in the market is critical for success especially in the event where organisations do not have prior experience on market operations. Obtaining legitimacy on the market place by organisations is usually considered as a strategic motivation to establish inter-organisational ties. In a study of cooperation among hospitals, Schermerhorn and Shirland (1981) as cited by Marín-Idárraga and Losada Campos (2015) stated that cooperation among hospital directors increases when they become anxious about hospital independence and status in their inter-organisational relationships.

Status likewise serves as a strategic motivation for firms to develop inter-organisational ties (Hartmann and Herb, 2014; Leal-Millán et al., 2016; Shipilov et al., 2014; Sorenson, 2014). Citing an example from the auditing industry, Meier et al. (2016) stated that organisations look for status when deciding to start cooperation or when they want to switch organisational ties. Scholars usually conceptualise status into two main dimensions: i.e., an organisation's previous performance and its network relationships (Bidwell et al., 2015; Sorenson, 2014). The first issue is that, an organisation's status is connected to that of its counterparts. This means that, the lower status of an organisation's affiliates also implies that its own status is lower and vice versa. In view of this, organisations often decide to develop strategicties with firms of a comparative status or standing which is usually referred to as status equilibrium or symmetry (Manzo and Baldassarri, 2015; Shipilov et al., 2014). Giving another viewpoint, studies have operationalised status with regards to inter-organisational network position, i.e., network centrality as used by Shipilov et al. (2014) as a measure of status. This view complements other researches that concentrate on organisation's prior performance (Hallen and Pahnke, 2016). Thus, organisations that found themselves in central positions of a tie network more often than not are motivated to choose cooperative partners who are equally central in the network (Shipilov et al., 2014). For example, Zineldin (2004) indicated that future strategic planners in organisations must take into consideration the possible benefits of collaborating, co-operating and co-ordinating with

firms that operate in the same markets, instead of embarking on the traditional form of competition. Zineldin (2004) further observed that the competitive psychology represents oneself as being better than others and stresses the winning of more resources at their expense.

In summary, strategic motivations refer to the situation where organisations look for resources that induce cooperation. Relational aspects also prompt cooperation as we discussed in the next paragraph.

3   Relational motivation for acquiring inter-organisational network ties

Relational perspectives of motivation are referred to as the interactions that precede the development of cooperation among organisations. It is therefore our contention in this paper that relational motivation comprises the following; past knowledge of partnership (familiarity), achievement of past projects, personal relationships and common third parties. There is the assumption that firms enter into relationships in order to improve some aspects of performance (Zineldin and Dodourova, 2005) which serves as a motivation for the establishment of inter-organisational relationships among firms.

Organisations that have past experience of cooperating, i.e., familiarity, usually establish stronger inter-organisational ties. It has been reported by Short and Jarvis (2000) and Stępień and Sulimowska-Formowicz (2015) that repetitive ties are a solid indicator and motivator for future cooperation arrangements since organisations create trust-based cooperation systems. The familiarity proposal avers that predicting behaviour in view of past knowledge foresees the organisation's readiness to undertake independent activities across organisational frontiers. Familiarity therefore motivates inter-organisational tie formation since it limits the dangers of resource misuse and instability and that the certainty in partners conduct is informed by previous knowledge. Familiarity may allude to both prior and present cooperation as found in various projects. Organisations that have history of relational ties are usually motivated to create more ties. Organisations with good standings and presence in the industry, established through partnerships, create new avenues for future alliances (Loebbecke et al., 2016; Ozmel et al., 2013). Moreover, previous ties are critical when there is industry uncertainty. Previous knowledge of a partner as well as the success of past activities, generate an attractive proposition for an organisational tie relationship since it reduces an organisation's cost of looking for new partners. A study by Castellucci and Podolny (2017) revealed that investment bankers have the tendency to associate with those people or firms that they have associated with previously. Advocates of the familiarity concept (Castro et al., 2014) have recently issued a warning about the part played by past knowledge in light of the fact that organisations are usually motivated to establish ties with partners that they have together achieved some success. In view of this, organisations decide to establish ties with former partners whether from prior or current partnerships because of behavioural certainty; however not the least important because of the achievement of previous endeavour (Gudzheva, 2016). Nonetheless, organisations should encourage cooperation with new partners who they might have no previous or current cooperation experience. In a relationship where the partners eventually consider as a successful co-operation that create new value together, rather than mere exchange (Zineldin, 2004)actually motivates the formation of inter-organisational ties.

The presence of common third parties can also motivate cooperation among organisations (Hodge and Greve, 2017; Shipilov and Li, 2014). Present ties give referrals with respect to possible future ties which leads to increasing of partners' behavioural certainty (Kleis et al., 2014). Likewise, personal relationships also facilitate the formation of new inter-organisational cooperation. Studies on interlocks propose that ties among organisational directors influences potential tie formation (Lamb et al., 2016; Martin et al., 2015). Directors in interlocks facilitate the flow of information about both organisations and industry norms (Mazzola et al., 2016; Davis, 1991). Board directors of different organisations tend to be influential in the development stage of cooperation among organisations that were not previously connected. A study by Lamb et al. (2016) revealed that interlocks encourage partnership formation in instances where a single director functions as an officer in one of the firms.

Table 1 Summary of motivation for inter-organisational tie relationships

Type of motivation	Theoretical reasoning	Examples
1 Strategic motivations • Resource complementarity/similarity • Financial resources • R&D capabilities • Information • Knowledge access • Entry to new markets (new clients) • Status • Legitimacy	Organisations engage in cooperation across organisational boundaries to access complementary or because of similar resources. Financial resources, R&D capabilities, information, knowledge, entry to new markets, legitimacy and status are antecedents of the coordination of inter-organisational tie relationships	• Entrepreneurs who seek financial resources from established organisations • Manufacturing firms that form alliances with other organisations with R&D capabilities • Entry into new markets via joint ventures; organisations as source of legitimacy and status for their operations.
2 Relational aspects • Previous experience of working together (familiarity) • Success of previous collaborations • Common third parties • Personal relationships • Background of boundary spanners	Previous experience of working together (specifically, in successful ventures) promotes coordination among organisations; embedded personal relations and background elements are also, essential.	• Organisations that have worked together tend to form future alliances; • Organisations in an alliance are likely to initiate coordination in the presence of common third parties; • Formation of ties among Indian entrepreneurs from the same social caste; organisations in interlocks tend to form ties.

The foundation of boundary spanners as well encourages the establishment of collaboration among organisations. Qualities like nationality, ethnicity and personal affinity supplement the relational motivations discussed above. Current studies that relate matching theory to organisational studies lay emphasise on the significance of ethnicity

in matching possibilities (Montelisciani et al., 2014; Mitsuhashi and Greve, 2009). Vissa (2011) also found out that social similarity, notably, social class clarifies the establishment of ties among Indian organisations. In a survey of the Museum of Modern Art (Shinew et al., 1995) demonstrated that individual affinity turns out to be more of a determinant factor in upper class social settings.

In summary, relational aspects as a motivational factor in acquiring inter-organisational ties is concerned with previous ties among organisations, referrals and individual ties among directors (i.e., boundary spanners) and their backgrounds. These relational perspectives lead scholars to conclude on the basis that composition of ties among organisations is important for cooperation. Table 1 presents a summary of motivation for inter-organisational tie relationships.

4 Materials and methods

Our study investigated and analysed the effect of relational and strategic motivation on acquisition of network ties using the automobile cluster in Ghana as a case study. We selected the automobile cluster because the sector employs a sizable number of young people and provides a sizeable share of economic contribution to the economy of Ghana. Currently, it is growing at an average annual growth rate of 9% for the past six years and contributes about 1.9% of the country's annual GDP. The cluster is made up of manufacturing and assembling of cars, vehicle repairs, metal works, manufacturing of engineering materials and accessories, manufacturing of automobile spare parts, new and used vehicle sale market, local and international exporters and other auxiliary service providers. We employed a mixed method approach to collect the data using both a live interview survey and the administration of questionnaire.

5 Cluster sampling procedure

Cluster-based firms usually have flexible structures. In view of this, the study employed a cluster sampling method in selecting a sample size of 250 firms in the cluster. This sampling technique is used when natural but relatively heterogeneous groupings are evident in a statistical population. That is, in using this technique, the total population of the cluster was divided into sub-cluster groupings of five based on the major sectors of the cluster. These sectors are; car manufacturing and assembling, vehicle maintenance and repairs, metal works and body building, manufacturers of engineering materials and accessories and manufacturers of automobile spare parts. After the groupings, a simple random sampling technique was used in selecting the elements in each group sampled. That is, a two-staged cluster design which allows elements in a sampled group in a cluster to be selected was adopted for the purpose of this study. A common motivation for this method was to reduce the total number of questionnaire and costs whiles still arriving at a desired accuracy. SMEs in the sampled sectors with more than 5 but less than 200 employees were selected based on the selection criterion of the American Small Business Administration (ASBA). It must be emphasised that although the measure of defining SMEs vary among various authors in terms of firm size, number of employees, annual revenue, etc. scholars writing about SMEs in Ghana often use the ASBA definition. Table 2 shows the selected sample from each sector of the cluster.

Table 2 Selected sample

Sector	Total
Car assembling and manufacturing	6
Vehicle repairs and maintenance	88
Metal works	90
Manufacturing of engineering materials and accessories	50
Manufacturing of automobile spare parts	16
Total	*250*

6 Questionnaire design

Questionnaire for the study was designed mostly using both close-ended questionnaire method and the Likert scale method. The close-ended questionnaire helped in predetermining the standard responses that were deemed appropriate for the study and also helped to guide and made it relatively easy for the respondents in choosing particular answers. Again, the close-ended questionnaire gave the respondents the opportunity to provide straightforward answers which saved time and also encouraged a large number of respondents to participate in the study (Fung et al., 2015). It must however be stated that questions that demanded some probable answers such as agree and disagree, the study employed a Likert scale of five points (5–1) in designing the appropriate questions to facilitate in soliciting for the necessary data suitable for the study (i.e., 5 = highly agree whiles 1 = highly disagree). The questionnaire was carefully designed to cover and evaluate all the variables of the study. It is necessary to reiterate that questions on the variables were deduced from the extant literature based on the views of Hallen et al. (2014), Kauppila et al. (2018) and Obstfeld et al. (2014). These variables were however reworded to suit the exigencies of this current research. The main advantage of using questionnaire was to allow the respondents some form of flexibility and independence of answering the questions devoid of the biases usually exhibited in the presence of the researcher.

Over a period of three weeks, 32 firm owners and managers were randomly selected and interviewed about the motivation influencing their choice of inter-organisational network ties. These people occupy key strategic positions in their firms with regards to the firms' innovation activities hence understood the specific challenges facing the sector and the potential effect of motivation on network tie acquisition. The outcome of the interview was used in developing the final questionnaires. We strictly pre-tested and refined the wordings of the questionnaire in line with best research practices. In addition to selected demographic variables, that were tested, we composed questions to test the extent to which the following strategic motivation (resource complementarity/similarity, financial resources, R&D capabilities, information, knowledge access, entry to new markets (new clients), status and legitimacy) motivate or predict the acquisition of interorganisational network ties. Next, five questions were asked to evaluate the extent to which relational motivation factors such as previous experience of working together (familiarity), success of previous collaborations, common third parties, personal relationships and background of boundary spanners serve as motivation or predict the

acquisition of inter-organisational network ties. The entire questionnaire was made up of 40 questions. The researcher used eight weeks in collecting all the necessary data. Other relevant evidence was gathered by way of field notes using the daily dairy approach. To ensure the validity and also elaborate on the measurement instrument, the researchers undertook the following steps:

1   A comprehensive review of the definition of inter-organisational ties relationship.

2   A thorough elaboration of the research instrument.

3   The questionnaire was reviewed with the assistance of doctoral students at the Institute of Open Economy and Industry Development in School of Finance and Economics at Jiangsu University.

4   To verify the reliability and the validity of the instrument, a pilot test was conducted.

5   The questions were written in the English language.

7   Data collection

This study made use of both primary and secondary data sources. Thus, primary data sources for this study came from empirical information gathered through intensive fieldwork in the cluster using questionnaire survey protocol whiles secondary data was sourced from the Ghana Statistical Service (GSS) and the Ministry of Trade (MOT). In the process of the questionnaire administration, we sought for the assistance of colleague lecturers at the Accra Technical University to help facilitate the collection of the data. It must be noted that these colleague lecturers were strictly monitored during the questionnaire administration. Prior to the data collection, we organised a training workshop for all facilitators to understand the nature and the object of the topic as well as the different variables. In the process of collecting the data each one of the facilitators was strictly monitored by the researcher and also asked respondents to contact the researcher directly to resolve any part of the questionnaire they did not understand. However, for a group of firms numbering about seventy who were largely semi-illiterates and illiterates, the questionnaires were self-administered to them by the researcher. After this process, the researcher gathered the entire responses and eliminated those questionnaires that were not well answered and collated those with valid responses. Out of the 250 questionnaires which were administered only 150 were properly answered representing 60% percent of successful response rate that was used for the final analysis.

8   Analytical procedure

Our analytical procedure was conducted at a two-staged level. We first conducted data integrity checks using an ensemble of prescribed analytical techniques (Tennant and Pallant, 2006). The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO-MSA) and Bartlett's test of sphericity were used to determine the appropriateness of the data for factor analysis and the values were within acceptable range. Table 3 shows the KMO-MSA and Bartlett's test of sphericity.

Table 3   KMO and Bartlett's test

Kaiser-Meyer-Olkin measure of sampling adequacy		0.861
Bartlett's test of sphericity	Approx. chi-square	256.424
	Df	35
	Sig.	0.000

Subsequently, a factor analysis to investigate the components of relational motivation and strategic motivation preceded the construction of a radial basis function neural network model to examine the effect of strategic and relational motivation on the acquisition of inter-organisational network ties. Prior to this, we checked the basic assumptions such as the constant variance and normality so as not to influence the outcome. The varimax rotation and principal components analysis were performed for factor analysis. We set and ensured that all measure of sampling adequacy exceeded the Cronbach's alpha reliability value threshold level of 0.80. This is presented in Table 4.

Table 4   Principal component analysis for strategic and relational motivation

Factor and items	Factor loadings	Eigen val.	Percentage variance	Cronbach's alpha
Strategic motivation		4.395	41.50	0.85
Resource comp	0.850			
Legitimacy	0.854			
Financial resource	0.838			
Knowledge access	0.887			
Status	0.751			
Relational motivation		3.213	10.34	0.73
Previous col.	0.724			
Common third party	0.755			
Personal relationship	0.667			

All items of R&D, information and entry to new market were deleted from the strategic motivation due to multicolinearity with others or lower factor loading. Similarly, familiarity and background of boundary spanners were equally removed from the relational factors. The final model consisted of five relational and three strategic motivational factors on inter-organisational network ties acquisition which were then analysed using Muñoz and Ramos' (2007) sigmoid basis function neural network configuration. According to Muñoz and Ramos (2007), it is possible for neural networks to have many different layers, units per layer, network inputs, and network outputs. Our final model contained 14 input layers, three hidden layers and two output layers (inter-organisational ties). Each network-input-to-unit and unit-to-unit connection is modified by a weight. In addition, each unit has an extra input that is assumed to have a constant value of one. The weight that modifies this extra input is called the bias. All data propagate along the connections in the direction from the network inputs to the network outputs, hence the term feed-forward. When the network is ran, each hidden layer unit performs the calculation on its inputs and transfers the result (O_c) to the next layer of

units. The activation function of our model ANN can be expressed mathematically as follows:

$$O_c = h_{Hidden}\left(\sum_{p=1}^{p} i_{c,p} w_{c,p}\right)$$
(1)

where $h_{Hidden}(x)$

where O_c represents 'acquisition of network ties' which is the output of the current hidden layer unit c, P is either the number of units (resource complementarity, financial resources, knowledge access, status, legitimacy, previous collaboration, common third party and personal relationship) being the number of network inputs, $i_{c,p}$ is a computer generated input to unit c from either the previous hidden layer unit p or network input p, $w_{c,p}$ is the computer generated weight modifying the connection from either unit p to unit c or from input p to unit c, and bc is the bias. In equation (1), $h_{Hidden}(x)$ is the sigmoid activation function of the unit and is charted in Figure 1. There exist different activation functions but the sigmoid was implemented for this research. To avoid saturating the activation function, which makes training the network difficult, the training data was scaled appropriately. Similarly, before training, the weights and biases are initialised to appropriately scaled values.

Figure 1 Sigmoid activation function
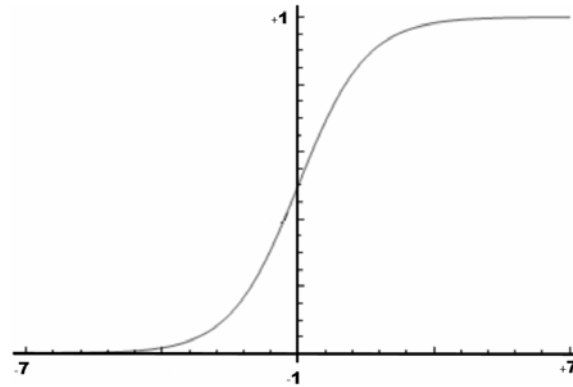

Note: Chart limits are x = ±7 and y = –0.1, 1.1.

Each output layer unit performs the calculation on its inputs and transfers the result (O_c) to a network output.

$$O_c = h_{Output}\left(\sum_{p=1}^{P} i_{c,p} w_{c,p} + b_c\right) \text{ where } h_{Output}(x) = x$$
(2)

where O_c represents 'acquisition of inter-organisational network ties' which is the output of the current hidden layer unit c, P is either the number of units (resource complementarity, financial resources, knowledge access, status, legitimacy, previous collaboration, common third party and personal relationship) being the number of network inputs, $i_{c,p}$ is a computer generated input to unit c from either the previous hidden layer unit p or network input p, $w_{c,p}$ is the computer generated weight modifying the connection from either unit p to unit c or from input p to unit c, and bc is the bias. For

this research, $h_{Output}(x)$ is a linear activation function. For each specific dimension, we created a composited score by summing up all the scores for the set of questions under the dimension for each respondent. The composite scores were then used as variables. Figure 2 shows the sigmoid activation function output model.

Figure 2 Sigmoid activation function input-output model (see online version for colours)
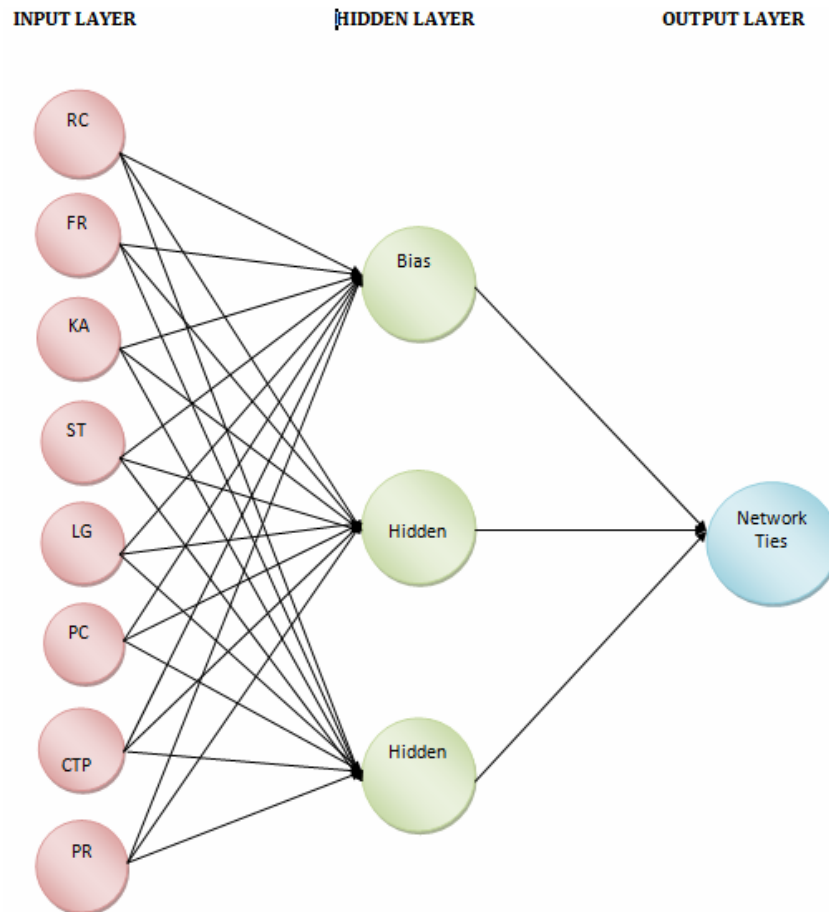
The result in Table 5 shows the prediction inaccuracy of independent factors that influence the acquisition of inter-organisational network ties. Firstly, the table indicates an overall prediction inaccuracy of 13.8% of both strategic and relational motivation variables (prediction accuracy 86.2%). That is, there is 86.2% of accurate prediction that indicates that the independent strategic and relational motivational variables influence the acquisition of inter-organisational network ties in the model. The individual prediction inaccuracies of strategic motivation again provide ample evidence of the influence of strategic motivation on the acquisition of network ties. For example, prediction inaccuracy of resource complementarityis15.4% (prediction accuracy = 84.6%); financial resources prediction in accuracy rateis17.1% (prediction accuracy = 82.9%), knowledge access has prediction inaccuracy of17.8% (prediction accuracy = 82.2%), status has prediction inaccuracy of 20.3% (prediction accuracy = 79.7%); and previous

collaboration shows prediction inaccuracy rate of 14.7% (prediction accuracy = 83.3%) all recording high accurate prediction or lower inaccurate prediction rate in each case. This gives an overall prediction accuracy of 82.3% (prediction inaccuracy of 17.7%). These low prediction inaccuracies and high prediction accuracies of the independent strategic motivation variables clearly show that strategic motivational factors greatly influence the acquisition of inter-organisational network ties since their prediction accuracy rates are high as shown in the model. This further goes to show that, firms can predict at an accuracy rate of 82.3% that strategic motivational factors can influence the acquisition of inter-organisational network ties. This result is thus supported in the extant literature. For example, Zineldin and Dodourova (2005) stated that, the benefits derived from inter-organisational ties and alliances usually goes beyond financial motives and rather driven by more of strategic reasoning. Again, this result confirms the study by Berchicci (2013) which found out that tie development among organisations is greatly motivated by the strategic objective of accessing new knowledge for the purpose of improving on innovation performance. Furthermore, the result supports the argument in the literature as espoused by Love et al. (2014) that, R&D capabilities serve as 'admission ticket' driving strategic inter-organisational ties in light of information shared among organisations.

On the other hand, the prediction accuracies of the relational motivation factors out perform each of the strategic motivational parameters as far as contribution or influence on the acquisition of inter-organisational network ties is concerned. For example, the prediction accuracy of the effect of success of previous collaboration on acquisition of inter-organisational network ties is nearly 90% (prediction inaccuracy is 9.6%). In the same regard, the effect of common third parties on acquisition of inter-organisational network ties is nearly 91% (prediction inaccuracy is 8.1%) while the effect of personal relationship on acquisition of inter-organisational network ties is 93% (prediction error is 7.2%). These high prediction accuracies of relational motivational factors clearly suggest that relational motivational factors have about 86% chance of influencing the acquisition of inter-organisational network ties. This means that, the high rate of prediction accuracies of relational motivational factors in the model indicate that these variables highly influence the acquisition of inter-organisational ties. Thus, firms can rely on the high accuracy of the relational motivational factors to predict the success of the acquisition of inter-organisational network ties. Again, this result supports the existing literature. For instance, Hennelly and Wong (2016) indicated in their studies that previous knowledge of a partner as well as the success of past activities; generate an attractive proposition for a relational tie relationship among firms since it reduces an organisation's cost of looking for new partners. Again, Todeva and Knoke (2005) was of the view that familiarity motivates inter-organisational tie formation since it limits the dangers of resource misuse and instability and that the certainty in partners conduct is informed by previous knowledge. Finally, the result supports the extant literature in the sense that according to Hodge and Greve (2017) and Shipilov and Li (2014), the presence of common third parties can motivate cooperation among organisations. It is noted from the result that the inflation adjusted testing model follows similar patterns. Overall, the training values returned a prediction accuracy in terms of the influence of relational motivation on inter-organisational ties to be 86% (prediction error of 13.8%) which is far higher than using only the strategic motivation variables to predict acquisition of inter-organisational network ties.

Table 5   Model summary

Cross entropy error		21.048
Average percent incorrect predictions		13.8%
Percent incorrect predictions for categorical dependents training	Resource complementarity	15.4%
	Financial resources	17.1%
	Knowledge access	17.8%
	Status	20.3%
	Legitimacy	14.7%
	Previous collaboration	9.6%
	Common third party	8.3%
	Personal relationship	7.2%
Stopping rule used		1 consecutive step(s) with no decrease in error[a]
Training time		0:00:00.39
Cross entropy error		23.374
Average percent incorrect predictions		14.6%
Percent incorrect predictions for categorical dependents testing	Resource complementarity	17.5%
	Financial resources	18.2%
	Knowledge access	19.8%
	Status	23.2%
	Legitimacy	10.8%
	Previous collaboration	9.5%
	Common third party	8.9%
	Personal relationship	21.2%

Note: [a]Error computations are based on the testing sample.

9   Conclusions

To survive and prosper in a constantly changing business environment, firms must design their operational structures, systems, strategies and super ordinate goals to organically adjust the possible changes to their operational environment most of which come unannounced. The acquisition of inter-organisational network ties remains a functional pre-requisite in this adventure. We sought in this study, to explore the extent to which strategy-driven motivation factors (resource complementarity/similarity, financial resources, R&D capabilities, information, knowledge access, entry to new markets (new clients), status and legitimacy) and relational motivational factors such as previous experience of working together (familiarity), success of previous collaborations, common third parties, personal relationships, background of boundary spanners significantly influence the acquisition of network ties. Our results show a complementary relationship between the effect of interactions that precede the development of cooperation among organisational relational and strategic factors which involves the deployment of firms' core competencies to define direction and purpose to achieve competitive advantage. It

was particularly observed that the prediction accuracy of the relational motivation factors outperforms each of the strategic motivation parameters as far as contribution or influence of acquisition of network ties is concerned. Impliedly, the analysis reveals that while automobile cluster-based organisations may have clearly delineated resource deployment and action plan, it may not necessary lead to gaining competitive space. We note that complementarity/similarity, financial resources, R&D capabilities, information, knowledge access, entry to new markets (new clients), status and legitimacy are not sufficient precondition to attainment of a good inter-organisational network ties unless it is backed with strong relational capabilities. In the context of automobile cluster in Ghana, the analysis proves that there is the need to harness potential sources of competitive strength such as previous experience of working together (familiarity), success of previous collaborations, common third parties and personal relationships as the key driving force to attainment of competitive advantage over and above other factors so identified in the research.

References

Acheampong, F., Akenten, J.W., Imoro, R., Agbesie, H.R. and Abaye, D. (2016) 'Evaluation of heavy metal pollution in the Suame industrial area, Kumasi, Ghana', *Journal of Health and Pollution*, Vol. 6, No. 10, pp.56–63.

Akayeti, A. (2015) 'Assessment of the state of development of automobile design and manufacturing in Ghana'.

Akple, M.S., Turkson, R.F., Ezugwu, C.I., Biscoff, R.K. and Bosrotsi, C.K. (2014) 'An empirical investigation into the relationship between workshop operations and accidents in local automobile garages in Ghana', *Journal of Advances in Environmental Health Research*, Vol. 2, No. 3, pp.142–150.

Albers, S., Wohlgezogen, F. and Zajac, E.J. (2016) 'Strategic alliance structures: an organization design perspective', *Journal of Management*, Vol. 42, No. 3, pp.582–614.

Appiah Fening, F., Pesakovic, G. and Amaria, P. (2008) 'Relationship between quality management practices and the performance of small and medium size enterprises (SMEs) in Ghana', *International Journal of Quality & Reliability Management*, Vol. 25, No. 7, pp.694–708.

Asante, J., Kissi, E. and Badu, E. (2018) 'Factorial analysis of capacity-building needs of small-and medium-scale building contractors in developing countries: Ghana as a case study', *Benchmarking: An International Journal*, Vol. 25, No. 1, pp.357–372.

Autio, E., Kenney, M., Mustar, P., Siegel, D. and Wright, M. (2014) 'Entrepreneurial innovation: the importance of context', *Research Policy*, Vol. 43, No. 7, pp.1097–1108.

Berchicci, L. (2013) 'Towards an open R&D system: internal R&D investment, external knowledge acquisition and innovative performance', *Research Policy*, Vol. 42, No. 1, pp.117–127.

Bidwell, M., Won, S., Barbulescu, R. and Mollick, E. (2015) 'I used to work at Goldman Sachs! How firms benefit from organizational status in the market for human capital', *Strategic Management Journal*, Vol. 36, No. 8, pp.1164–1173.

Brečić, R. and Simintiras, A. (2016) 'The moderating effect of perceived effectiveness of SMEs' marketing function on the network ties – strategic adaptiveness relationship', *Journal of Small Business Management*, Vol. 54, No. 4, pp.1080–1098.

Casillas, J.C., Barbero, J.L. and Sapienza, H.J. (2015) 'Knowledge acquisition, learning, and the initial pace of internationalization', *International Business Review*, Vol. 24, No. 1, pp.102–114.

Castellucci, F. and Podolny, J.M. (2017) 'The dynamics of position, capability, and market competition', *Industrial and Corporate Change*, Vol. 26, No. 1, pp.21–39.

Castro, I., Casanueva, C. and Galán, J.L. (2014) 'Dynamic evolution of alliance portfolios', *European Management Journal*, Vol. 32, No. 3, pp.423–433.

Chen, Y-H., Lin, T-P. and Yen, D.C. (2014) 'How to facilitate inter-organizational knowledge sharing: the impact of trust', *Information & Management*, Vol. 51, No. 5, pp.568–578.

Connell, J., Kriz, A. and Thorpe, M. (2014) 'Industry clusters: an antidote for knowledge sharing and collaborative innovation?', *Journal of Knowledge Management*, Vol. 18, No. 1, pp.137–151.

Darbi, W.P.K. and Knott, P. (2016) 'Strategising practices in an informal economy setting: a case of strategic networking', *European Management Journal*, Vol. 34, No. 4, pp.400–413.

Dooley, L. and O'Sullivan, D. (2016) 'Inter-organisational innovation: collaborative breadth and depth within the low-technology SME sector', Paper presented at the *ISPIM Conference Proceedings.*

Francis, P.A. (2016) *Factors that led to Entrepreneurial Success: An Exploratory Qualitative Study*, Capella University.

Fung, C.H., Martin, J.L., Hays, R.D., Rodriguez, J.C., Igodan, U., Jouldjian, S. and Alessi, C. (2015) 'Development of the usability of sleep apnea equipment-positive airway pressure (USE-PAP) questionnaire', *Sleep Medicine*, Vol. 16, No. 5, pp.645–651.

Greve, H.R, Mitsuhashi, H. and Baum, J.A.C. (2013) 'Greener pastures: outside options and strategic alliance withdrawal', *Organization Science*, Vol. 24, No. 1, pp.79–98.

Gudzheva, I. (2016) *How do Companies Choose their Partners for Cross-Industry Innovations (Collaborations)?*, UHasselt.

Hallen, B.L. and Pahnke, E.C. (2016) 'When do entrepreneurs accurately evaluate venture capital firms' track records? A bounded rationality perspective', *Academy of Management Journal*, Vol. 59, No. 5, pp.1535–1560.

Hallen, B.L., Katila, R. and Rosenberger, J.D. (2014) 'How do social defenses work? A resource-dependence lens on technology ventures, venture capital investors, and corporate relationships', *Academy of Management Journal*, Vol. 57, No. 4, pp.1078–1101.

Hartmann, E. and Herb, S. (2014) 'Opportunism risk in service triads – a social capital perspective', *International Journal of Physical Distribution & Logistics Management*, Vol. 44, No. 3, pp.242–256.

Hennelly, P. and Wong, C.Y. (2016) 'The formation of new inter-firm relationships: a UK offshore wind sector analysis', *International Journal of Energy Sector Management*, Vol. 10, No. 2, pp.172–190.

Hodge, G.A. and Greve, C. (2017) 'On public-private partnership performance: a contemporary review', *Public Works Management & Policy*, Vol. 22, No. 1, pp.55–78.

Huang, F., Rice, J. and Martin, N. (2015) 'Does open innovation apply to China? Exploring the contingent role of external knowledge sources and internal absorptive capacity in Chinese large firms and SMEs', *Journal of Management & Organization*, Vol. 21, No. 5, pp.594–613.

Isaksson, O.H.D., Simeth, M. and Seifert, R.W. (2016) 'Knowledge spillovers in the supply chain: evidence from the high tech sectors', *Research Policy*, Vol. 45, No. 3, pp.699–706.

Kauppila, O-P., Bizzi, L. and Obstfeld, D. (2018) 'Connecting and creating: tertius iungens, individual creativity, and strategic decision processes', *Strategic Management Journal*, Vol. 39, No. 3, pp.697–719.

Kim, N., Min, S. and Chaiy, S. (2015) 'Why do firms enter a new product market? A two-dimensional framework for market entry motivation and behavior', *Journal of Product Innovation Management*, Vol. 32, No. 2, pp.263–278.

Kleis, L., Nault, B.R. and Dexter, A.S. (2014) 'Producing synergy: innovation, IT, and productivity', *Decision Sciences*, Vol. 45, No. 5, pp.939–969.

Lamb, N.H., Lamb, N.H., Roundy, P. and Roundy, P. (2016) 'The 'ties that bind' board interlocks research: a systematic review', *Management Research Review*, Vol. 39, No. 11, pp.1516–1542.

Leal-Millán, A., Roldán, J.L., Leal-Rodríguez, A.L. and Ortega-Gutiérrez, J. (2016) 'IT and relationship learning in networks as drivers of green innovation and customer capital: evidence from the automobile sector', *Journal of Knowledge Management*, Vol. 20, No. 3, pp.444–464.

Loebbecke, C., van Fenema, P.C. and Powell, P. (2016) 'Managing inter-organizational knowledge sharing', *The Journal of Strategic Information Systems*, Vol. 25, No. 1, pp.4–14.

Love, J.H., Roper, S. and Vahter, P. (2014) 'Learning from openness: the dynamics of breadth in external innovation linkages', *Strategic Management Journal*, Vol. 35, No. 11, pp.1703–1716.

Mano, R.S. (2014) 'Networking modes and performance in Israel's nonprofit organizations', *Nonprofit Management and Leadership*, Vol. 24, No. 4, pp.429–444.

Manzo, G. and Baldassarri, D. (2015) 'Heuristics, interactions, and status hierarchies: an agent-based model of deference exchange', *Sociological Methods & Research*, Vol. 44, No. 2, pp.329–387.

Marín-Idárraga, D.A. and Losada Campos, L.Á. (2015) 'Organizational structure and inter-organizational relations: analysis in health care public institutions in Colombia', *Estudios Gerenciales*, Vol. 31, No. 134, pp.88–99.

Martin, G., Gözübüyük, R. and Becerra, M. (2015) 'Interlocks and firm performance: the role of uncertainty in the directorate interlock-performance relationship', *Strategic Management Journal*, Vol. 36, No. 2, pp.235–253.

Masiello, B., Izzo, F. and Canoro, C. (2015) 'The structural, relational and cognitive configuration of innovation networks between SMEs and public research organisations', *International Small Business Journal*, Vol. 33, No. 2, pp.169–193.

Mazzola, E., Perrone, G. and Kamuriwo, D.S. (2016) 'The interaction between inter-firm and interlocking directorate networks on firm's new product development outcomes', *Journal of Business Research*, Vol. 69, No. 2, pp.672–682.

Meier, M., Lütkewitte, M., Mellewigt, T. and Decker, C. (2016) 'How managers can build trust in strategic alliances: a meta-analysis on the central trust-building mechanisms', *Journal of Business Economics*, Vol. 86, No. 3, pp.229–257.

Mitsuhashi, H. and Greve, H.R. (2009) 'A matching theory of alliance formation and organizational success: complementarity and compatibility', *Academy of Management Journal*, Vol. 52, No. 5, pp.975–995.

Montelisciani, G., Gabelloni, D., Tazzini, G. and Fantoni, G. (2014) 'Skills and wills: the keys to identify the right team in collaborative innovation platforms', *Technology Analysis & Strategic Management*, Vol. 26, No. 6, pp.687–702.

Muñoz, L.A.B. and Ramos, J.J.V. (2007) 'Similarity-based heterogeneous neural networks', *Engineering Letters*, Vol. 14, No. 2, pp.103–116.

Noyes, E., Brush, C., Hatten, K. and Smith-Doerr, L. (2014) 'Firm network position and corporate venture capital investment', *Journal of Small Business Management*, Vol. 52, No. 4, pp.713–731.

Obeng, B.A., Robson, P. and Haugh, H. (2014) 'Strategic entrepreneurship and small firm growth in Ghana', *International Small Business Journal*, Vol. 32, No. 5, pp.501–524.

Obstfeld, D., Borgatti, S.P. and Davis, J. (2014) *Brokerage as a Process: Decoupling Third Party Action from Social Network Structure Contemporary Perspectives on Organizational Social Networks*, pp.135–159, Emerald Group Publishing Limited.

Odoom, R. and Odoom, R. (2016) 'Brand-building efforts in high and low performing small and medium-sized enterprises (SMEs)', *Journal of Small Business and Enterprise Development*, Vol. 23, No. 4, pp.1229–1246.

Odoom, R., Narteh, B. and Boateng, R. (2017) 'Branding in small-and medium-sized enterprises (SMEs) current issues and research avenues', *Qualitative Market Research: An International Journal*, Vol. 20, No. 1, pp.68–89.

Ozcan, P. and Santos, F.M. (2015) 'The market that never was: turf wars and failed alliances in mobile payments', *Strategic Management Journal*, Vol. 36, No. 10, pp.1486–1512.

Ozmel, U., Reuer, J.J. and Gulati, R. (2013) 'Signals across multiple networks: how venture capital and alliance networks affect interorganizational collaboration', *Academy of management Journal*, Vol. 56, No. 3, pp.852–866.

Raymond, L., Bergeron, F., Croteau, A-M. and St-Pierre, J. (2016) 'IT-enabled knowledge management for the competitive performance of manufacturing SMEs: an absorptive capacity-based view', *Knowledge and Process Management*, Vol. 23, No. 2, pp.110–123.

Rowlinson, M., Hassard, J. and Decker, S. (2014) 'Research strategies for organizational history: a dialogue between historical theory and organization theory', *Academy of Management Review*, Vol. 39, No. 3, pp.250–274.

Shinew, K.J., Floyd, M.F., McGuire, F.A. and Noe, F.P. (1995) 'Gender, race, and subjective social class and their association with leisure preferences', *Leisure Sciences*, Vol. 17, No. 2, pp.75–89.

Shipilov, A. and Li, S. (2014) 'Toward a strategic multiplexity perspective on interfirm networks contemporary perspectives on organizational social networks', *Academy of Management Journal*, Vol. 57, No. 2, pp.449–459, Emerald Group Publishing Limited.

Shipilov, A., Gulati, R., Kilduff, M., Li, S. and Tsai, W. (2014) 'Relational pluralism within and between organizations', *Academy of Management Journal*, Vol. 57, No. 2, pp.449–459.

Short, D.C. and Jarvis, P. (2000) 'Developing workplace leaders through their emotional reactions: creating committed change agents to build a learning organization', in *Conference Proceedings, Academy of Human Resource Development*, Vol. 2, pp.293–300.

Sok, P., O'Cass, A. and Sok, K.M. (2013) 'Achieving superior SME performance: overarching role of marketing, innovation, and learning capabilities', *Australasian Marketing Journal (AMJ)*, Vol. 21, No. 3, pp.161–167.

Sorenson, O. (2014) 'Status and reputation: synonyms or separate concepts?', *Strategic Organization*, Vol. 12, No. 1, pp.62–69.

Stam, W., Arzlanian, S. and Elfring, T. (2014) 'Social capital of entrepreneurs and small firm performance: a meta-analysis of contextual and methodological moderators', *Journal of Business Venturing*, Vol. 29, No. 1, pp.152–173.

Stępień, B. and Sulimowska-Formowicz, M. (2015) 'Do relational capabilities equally matter in successful cooperation? – Empirical evidence from polish enterprises', *Journal of Applied Management and Investments*, Vol. 4, No. 4, pp.252–259.

Tasselli, S., Kilduff, M. and Menges, J.I. (2015) 'The microfoundations of organizational social networks: a review and an agenda for future research', *Journal of Management*, Vol. 41, No. 5, pp.1361–1387.

Taura, N.D. and Watkins, D. (2014) 'Counteracting innovative constraints: insights from four case studies of African knowledge-intensive metalworking and automotive clusters – 'the Akimacs', *Entrepreneurship & Regional Development*, Vol. 26, Nos. 3–4, pp.313–336.

Tennant, A. and Pallant, J.F. (2006) 'Unidimensionality matters', *Rasch Measurement Transactions*, Vol. 20, No. 1, pp.1048–1051.

Todeva, E. and Knoke, D. (2005) 'Strategic alliances and models of collaboration', *Management Decision*, Vol. 43, No. 1, pp.123–148.

Tsai, W. (2002) 'Social structure of 'coopetition' within a multiunit organization: coordination, competition, and intraorganizational knowledge sharing', *Organization Science*, Vol. 13, No. 2, pp.179–190.

Un, C.A. and Asakawa, K. (2015) 'Types of R&D collaborations and process innovation: the benefit of collaborating upstream in the knowledge chain', *Journal of Product Innovation Management*, Vol. 32, No. 1, pp.138–153.

Vissa, B. (2011) 'A matching theory of entrepreneurs' tie formation intentions and initiation of economic exchange', *Academy of Management Journal*, Vol. 54, No. 1, pp.137–158.

Viswanathan, M., Echambadi, R., Venugopal, S. and Sridharan, S. (2014) 'Subsistence entrepreneurship, value creation, and community exchange systems: a social capital explanation', *Journal of Macromarketing*, Vol. 34, No. 2, pp.213–226.

West, J. and Bogers, M. (2014) 'Leveraging external sources of innovation: a review of research on open innovation', *Journal of Product Innovation Management*, Vol. 31, No. 4, pp.814–831.

Zineldin, M. (2004) 'Co-opetition: the organisation of the future', *Marketing Intelligence & Planning*, Vol. 22, No. 7, pp.780–790.

Zineldin, M. (2007) 'International business relationship and entry modes: a case of Swedish automotive industry Scania and Volvo in Mexico', *Cross Cultural Management: An International Journal*, Vol. 14, No. 4, pp.365–386.

Zineldin, M. and Dodourova, M. (2005) 'Motivation, achievements and failure of strategic alliances: the case of Swedish auto-manufacturers in Russia', *European Business Review*, Vol. 17, No. 5, pp.460–470.