

The SME Co-operation Framework: a Multi-method Secondary Research Approach to SME Collaboration

Francesc Estanyol Casals
Business School
University of Edinburgh
Edinburgh, Scotland, UK
francesc.casals@ed.ac.uk

Abstract—This work presents the SME co-operation framework, a model created to analyse the field of SME collaboration and to understand how small businesses co-operate. The constructs of this study are based on previous research on interfirm co-operation, which permits to cross-validate results from different studies, combine their findings and to create the framework to obtain a global idea of SME co-operation. The SME cooperation framework combines in a unique model the three main dimensions involved in SME cooperation (strategic, management and social) with the internal and external factors influencing business collaboration. Using the developed framework, the author summarizes why SMEs should co-operate, the problems SMEs face adopting collaborative approaches and the factors influencing interfirm collaboration effectiveness. The findings of this work provide some important implications for managers concerned with adopting collaborative approaches. From a managerial perspective, it shows that co-operation between SMEs is a valid approach for improving their performance as long as the success factors are considered, which in turn, reduces the risk of alliance failure.

Keywords—SME; collaboration; co-operation, framework; advantages, strategic, problems and barriers, effectiveness

I. INTRODUCTION

Traditionally, SMEs have had to face challenges for their survival with their limited resources and with little support from governments. This unfavourable scenario gets worse in uncertain economic periods like the current crisis because they do not have access to capital markets and their sources of external financing are much more limited than those of large corporations (LC) [1]. In addition to these difficulties, globalization of the markets and increasing international competition force SMEs to search for new, innovative, flexible and imaginative ways to survive [2,3,4].

One popular alternative for small firms is the adoption of co-operative approaches with other organizations. From the 90s onwards, a considerable number of businesses in different industries began entering into a variety of co-operative interfirm relationships to perform their business activities [5]. This new method of business was accompanied by a significant amount of research. Terms such as networking, co-operation or alliances have been widely used in literature [6,7,8,9] but, in spite of the results of some studies like [10] indicating that SMEs prefer to collaborate with other SMEs, there is a considerable lack of studies

focusing on collaboration between SMEs, and most of them are focused on LC-SME interactions [11,12], leaving the interesting field of SME-SME collaborations with little evidence and without a clear consensus [11].

Some authors have applied the same theories to both large and small firms but this is an incorrect approach because it fails to consider the special characteristics of SMEs and tends to produce outcomes and conclusions that are not applicable to real firms [13,14]. Moreover, the results of several studies demonstrating the advantages of collaboration for SMEs have not been translated into a massive adoption of these approaches. There are two main problems in previous research concerning relationships between SMEs: *the lack of longitudinal studies* [15,16] and the abuse of *cross-sectional studies* assuming that interfirm collaboration can be measured at any time and applying the results from one sector to another, without considering possible biases [11].

To overcome these problems and to obtain a holistic view of the topic it is necessary a secondary analysis including studies of SMEs from different regions, sectors, contexts and periods of time. Therefore, the main objectives of this study are: a) *to perform a deep literature review of SMEs collaboration* in order to b) *create a framework for a better analysis of the field* that must permit to c) present clear and useful information about the *reasons SMEs should adopt collaborative approaches*, the most *common problems and barriers* they face and the *factors influencing interfirm collaboration effectiveness*.

For this purpose, firstly it is necessary to understand the particular context of SMEs and the current theories about interfirm co-operation.

II. LITERATURE REVIEW

A. The context of SMEs

Define a SME is not an easy task. Its definition varies among countries and has changed during time [17]. In this study, the author adopts the European Commission (EC) one, the most widely used in European literature and similar to the American Small Business Administration (SBA) definition. EC defines a SME as a private company with fewer than 250 employees, with an annual turnover inferior to €50 million and with an annual balance sheet total less than €43 million [18].

In the EU, SMEs represent 99 percent of non-financial businesses and, in addition to their presence, play a key role *creating employment*: about two-thirds of total employment in the private sector; *economic growth*: contributing to more than half of the total value-added created by businesses in the EU [19], *innovation* and *social integration*. This influence is not exclusive to the European context. Works like [17] or [20] present similar figures for developing countries like China, Hong Kong or Taiwan and [21] for the United States. However, the turnover figures of the last EIM Annual Report on SMEs show that small firms have lower profitability, employee compensation, and labour productivity than large enterprises [19].

Governments worldwide, aware of these problems, have initiated a set of specific programs, frameworks and policies to promote the collaboration of SMEs with other SMEs and research organizations (ROs) [22]. These efforts for fostering co-operation and innovation are similar to initiatives from other countries described in works like [23], [24] or [25] and are aligned with the results of several studies underlining the crucial role played by the interaction of different organizations in the innovation process [26,27]. Small firms are not an exception and, as identified in [28] and [29], their performance and innovation is improved when they collaborate [30]. But, several studies demonstrated that, even if there is evidence of mutual benefits, most participants are reluctant to co-operate. This fact, together with the conclusions of [8] and [31] suggesting that co-operation leads to co-operation, encourage to study the reasons why SMEs are not adopting these approaches, the advantages and disadvantages of SME collaboration and the factors influencing its effectiveness.

B. Threedimensional analysis of interfirm cooperation

The literature about interfirm cooperation is plenty of different, and sometimes contradictory, theories. This work, taking as a starting point the results from studies such as [11], [32] and [27], follows a theoretical triangulation approach to analyse it.

In the past, two main theories were referenced about firms and interfirm collaboration depending on whether the companies were considered in terms of cost minimization or explained as bundles of resources: the *transaction-cost theory* [33] and the *resource-based theory* [34]. In the first, the unit of analysis is the transaction, a transfer of goods or services, and it is focused on analysing companies and collaborations in terms of minimizing the transaction costs. Consequently, this theory explains aspects such as the governance structure, the strategic position or the type of interfirm cooperation. Overall, it is focused on the external efficiency of the firm and relies on formal agreements the responsibility to ensure good practices between partners, leaving trust as a secondary factor. Power, control and the importance of imperfect information are the other aspects

TABLE I. CONSTRUCTS AND MEASURES

Constructs	Items	Authors
Reasons for SME collaboration	External/Internal reasons. Learning, innovation, internationalisation, reputation, risk-sharing, complementarities and economies of scale, saving costs, increase sales, lobbying power, product quality and increase flexibility.	J. Hagedoorn, 2002; Volery, 1995; A. Berry, 1997; Masurel and Janszen, 1998; Hoffmann and Schlosser, 2001; Archibugi and Iammarino, 2000; Diez, 2002; Fischer and Varga, 2002; Chung and Kim, 2003; Chesbrough, 2003; Bullinger et al., 2004; Yasuda, 2005; Oregan et al., 2006; Fukugawa, 2006;
Problems and barriers to SME collaboration	External/Internal barriers to collaborate. Partners search and selection, scarcity of resources, no planning or strategy, lack of skills personnel, investment required, lack of mechanisms to evaluate the process, huge competence of big corporations, trust, individual behaviour and fear.	Haagedorn and J. Schakenraad, 1994; Thomson, 2001; Hoffmann and Schlosser, 2001; Narula, 2004; Marti, 2009; Zeng et al., 2010; Narula, 2004; Mancinelli and Mazzanti, 2009; Aragon-Sanchez and Sánchez-Marín, 2005; ; Mancinelli and Mazzanti, 2009; Marti, 2009
Factors influencing the effectiveness of interfirm collaboration	Five phases of alliance evolution and success factors of strategic alliances in SMEs. Factors that have been classified in strategic, management and social categories.	Volery, 1995; Humphrey and Schmitz, 1996; Masurel and Janszen, 1998; Archibugi and Iammarino, 2000; Hoffmann and Schlosser, 2001; Diez, 2002; Fischer and Varga, 2002; Chung and Kim, 2003; Chesbrough, 2003; Bullinger et al., 2004; Yasuda, 2005; Oregan et al., 2006; Fukugawa, 2006; Muscio, 2007;

covered by this theory. Similarly to the transaction-cost theory, the strategic management theory focuses on profit maximization, establishing measurable inputs and outputs to firms/networks objectives.

On the other hand, the resource-based theory focuses on the internal resources of the firm and understands enterprises as heterogeneous, both with respect to their resources and to their capabilities. The position of the SME depends on its amount of these items, and as introduced in *Porterian value chain theory*, the complementarity of resources should also be considered for this evaluation.

More recently, the *knowledge-based theory* adds the concept of knowledge as an asset or resource of firms and it is under this concept that interfirm collaboration becomes key because by co-operating with other entities, firms are able to share and acquire new knowledge.

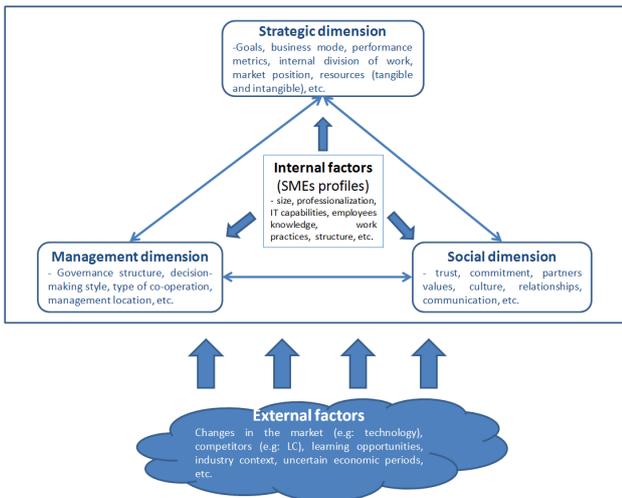


Figure 1 SME co-operation framework

In addition to power, control, uncertainty and trust factors considered in previous theories, it adds concepts like personal relationships and friendships as a key to ensure success in co-operation.

In the same way *Johannisson's social network theory* [35] emphasizes the role of personal relationships in these collaborations. According to this theory, the important factors are trust, friendship, commitment, shared values or beliefs. It argues that, in social networks, formal contracts are substituted by trust and commitment between participants.

III. RESEARCH METHODOLOGY

Individual theories like the ones presented in previous section are helpful to understand different perspectives of interfirm collaboration, but it is by combing them that is possible to have a holistic view of this topic, and therefore, to be able to carry out a complete analysis of this type of relationship. In order to analyse the literature, compare different studies and put together conclusions of different authors systematically, the author developed the SMEs co-operation framework (see Figure 1) which has been used to extract relevant conclusions of different aspects of SME collaboration and to deploy an exploratory and qualitative approach of previous studies to cross-validate their results and combine their findings. The application of the framework on constructs and measures of previous studies presented in Table 1 helped to identify important aspects of SME collaboration and to group results, conclusions and contributions from several studies in a unique work (see Tables II, III and IV).

A. The SMEs co-operation framework

The SMEs co-operation framework is the result of combining the above-mentioned theories in a single model. Therefore, it complements their findings, supplements their weaknesses and groups similar approaches into the following three dimensions that should be considered when analysing collaboration:

- **The strategic dimension:** Includes variables such as network goals, business models, and metrics to monitor performance, internal division of work, partners' interests, market position and strategy for competition.
- **The management dimension:** Includes the definition of the governance structure and the decision making style, the type of co-operation, the management location, systems to ensure business autonomy and independence and mechanisms to overcome internal problems.
- **The social dimension:** Refers to communication between partners, motivation, trust, culture, personal relationships, organization values and partners' commitment. This dimension includes mechanisms to fight against the individual behaviour and the traditional fear to collaborate of most SMEs as well as measures to avoid disinterest during the relationships.

The framework also includes the factors influencing business collaboration:

- **Internal factors:** This category includes variables related with the profile of the SME. Variables like the size (number of employees), age, sector, languages, business activity, location, management style or profile of the employees are just some internal factors that should be considered when analysing SME collaboration because they have an important influence when interacting with other partners.
- **External factors:** This group includes factors external to the SME. Basically are characteristics of the market and the environment that could affect the collaboration process in some moment. Size and trend of the market, number of competitors, type of industry, governmental regulations and the presence of private/public funding organizations.

The combination of these three dimensions with the internal and external factors influencing business collaboration resulted in the model presented in Figure 1. During the following section the author presents the results of applying this framework in order to analyse why SMEs should co-operate, the problems SMEs face adopting collaborative approaches and the factors influencing its effectiveness.

IV. RESULTS

A. Advantages of SME collaboration and how it can lead to improved performance and increased productivity

The advantages of collaborative approaches have been widely covered in the literature. For example, in 1994 Kanter argued that a good way to achieve competitive advantage was developing collaborative relationships based on open systems and sharing of information [36]. Some authors have followed this initial concept, emphasizing the relationship between co-operation and innovation [30,37,38]. In the case of SMEs, this becomes more relevant due to their need to complement their internal knowledge with external sources

[17,39,40] and their difficulties in establishing successful partnerships. Reinforcing these ideas, some researchers affirm that success of SMEs against larger competitors may be determined by their ability to utilize external networks efficiently and create useful alliances [41,42] or that competitiveness may, in fact, be determined more by its external network than its size [9,43, 44].

These studies show the importance of co-operation for SMEs and its relationship with innovation and success and help to understand why for decades governments and public organizations have been creating mechanisms to promote it.

Although the relationship between innovation and co-operation is an important reason, it is not the only one. There are plenty of examples in the literature of studies analysing the reasons and benefits of small firms adopting co-operative approaches [6,15,46,47]. Each study comes to different results, but some common conclusions can be easily identified.

Assuming and understanding co-operation as a strategic option for SMEs to complement or change their businesses models, the author suggests that those should be grouped into: *external* (industry environment) and *internal* (the firm). The first group includes reasons related to position in the market, response to external threats, internationalization and relationship with competitors, customers or suppliers, while the second group embodies elements related to the internal mechanism of the firm: goals, values, resources and capabilities, structure, etc.

Bearing in mind that the main goal of any private company is to survive and, in most cases, to grow, Table II presents the relevant reasons why SMEs should consider adopting collaborative approaches.

B. Problems and barriers to SME collaboration

The research performed in this work also permitted to identify a set of problems and barriers that SMEs face in order to collaborate. Although some authors refer to these factors as disadvantages of collaboration, the author suggests that they arise from inappropriate type of behaviour and/or incorrect formalization of the collaborative initiative, rather than the concept itself. For example, it has been argued that co-operating with firms with shared interests and know-how increases the risks of opportunistic behaviour and overlapping [48]. For the author, more than a disadvantage, this is consequence of a bad partner selection, one of the main problems they face in collaboration, and encourages keeping studying why, in spite of the advantages described in previous sections; collaboration is not common among SMEs.

Similarly to the previous analysis of the advantages of SMEs collaboration, it is also possible to group the barriers into internal and external (Table III). Within the first group, the most important factor is lack of resources, for example time, employees or capital. This forces SMEs to focus on their daily activities, affecting other aspects like finding appropriate partners, devising new business opportunities or Internal and external reasons for SME collaboration investing in co-operation formation and maintenance.

TABLE II. REASONS FOR SME COLLABORATION

Internal reasons for SME collaboration
Learning and sharing experience. There is a strong relationship between SMEs' innovation and the collaboration-learning-collaboration cycle.
Innovation. Firms increasingly rely on external sources of innovation by emphasizing the sharing of ideas, knowledge, resources and individuals.
Find complementarities. Sometimes related to economies of scale, collaboration permits SMEs to complement their resources, including R&D, production, marketing or management capabilities. Some studies conclude that collaborations with complementary partners achieve better results in terms of performance and innovation.
Saving costs by sharing resources (e.g: space, transport, etc). Sharing of resources results in a reduction of individual costs.
Increase sales. Some types of collaboration permit to achieve a better selling position and/or enter to new markets, which results in more sales for its participants.
Gain buying power. If some firms act together, normally they increase the buying power to its suppliers, permitting them to obtain better deals.
External communication. Working with alliances leads to improved branding and communication power.
Improve investments. Being part of an alliance increases the investment capacity of an individual firm.
Access to big projects and funding. Collaborating with other organisations, it is possible to access to bigger projects and to obtain funding from the large number of research funding programmes which exists.
Lobbying power. Acting together, companies can increase their negotiating and political power and influence governments and their decisions.
Increase product quality. Collaborating with partners with better know-how of some phase of product development can influence positively on the quality.
Increase flexibility. Outsourcing and collaboration with other firms permit SMEs to reduce investments in internal tasks and be more flexible to market demands. In addition, if one partnership does not work properly, it is easier to change it for another one.
Improve competitiveness. SMEs can improve their competitiveness by providing access to external resources.
Performance. Collaboration represents a vital source of knowledge for most SMEs which affects the quality of their human capital and the firm's performance.
Keep business autonomy. Co-operation is a promising strategic option for SMEs, which traditionally want to keep their business autonomy.
External reasons for SME collaboration
Internationalisation Strategic alliances permit SMEs to access to international markets, selecting partners in terms of quality of services/products provided, independently of their location.
Overcome uncertain economic periods. As a response to insecurity to develop/adapt new technologies networks represent an alternative to complement their own capacity, reducing the barriers to develop or adapt new technologies and and/or technological changes.
New businesses opportunities. From a strategic perspective, collaboration opens up the possibility of creating new business models or joining developments in collaboration with other partners whihc would otherwise have been impossible.
Reputation.
Better position to face the fast-changing and increasingly competitive global market.
Risk sharing. Non-internal activities are an easily reversible form of investment. Sharing the risks of activities that are beyond the scope or capabilities of a single firm is a smart approach to explore new ideas and markets.

As external factors, the poor efficiency of previous cases and the lack of objective mechanisms to evaluate their performance decrease their confidence in collaboration. Coordination mechanisms and power conflicts are other barriers to collaboration, closely related to the difficulties resulting from personal relationships and trust.

In addition to the barriers of collaboration, it is also necessary to identify the factors SMEs should consider in order to ensure its success. The next section identifies some of these factors and demonstrates how a good knowledge of them can improve the effectiveness of interfirm co-operation.

C. Factors influencing the effectiveness of interfirm co-operation

Despite the amount of research about SME collaboration, there is no comprehensive theory of factors influencing co-operation success. Several reasons hinder this task. Firstly, each type of collaboration is different and it is therefore necessary to study each case specifically. Secondly, the intrinsic characteristics of the partners have a direct impact on the process and finally, as identified in [7], collaboration between SMEs follows different phases and each phase is influenced by different factors depending on specific conditions of the environment or time.

Following the same approach used before, the three-dimensional framework has been used to determine the factors influencing the effectiveness of interfirm co-operation. Analysing the strategic, management and social dimensions separately permits to identify the factors, summarized in Table IV more easily.

Although the number of factors identified in the social dimension is lower than the other two dimensions, it is necessary to remark that its influence on the others and on the whole co-operation process is very important. Usually an appropriate social capital increases the efficiency of information diffusion between partners and trust substitutes the cost of monitoring, decreasing transaction costs and increasing the efficiency of the collaboration [27].

Finally, external factors such as the technological or market conditions of the industry have an influence on the co-operation process and partners should be aware of them before and during the process.

V. CONCLUSIONS

By using the SME co-operation framework, and on the basis of the findings from the extensive literature review, the author explored the advantages, disadvantages and barriers to co-operation that SMEs face and the factors influencing its effectiveness.

Although no primary research has been performed during this work, some contributions to the study of SME collaboration have been achieved. First, the developed framework groups the essential aspects and factors identified in the literature to be considered when analysing the topic and it provides a useful tool for future researchers studying the topic. Second, the use of the framework permitted to extract relevant information from previous studies, discard

TABLE III. PROBLEMS AND BARRIERS OF SME COLLABORATION

Internal problems and barriers
Partners search and selection. Lack of time for partner search and problems to find appropriate partners.
Lack of strategic diagnosis. Acquiring a collaborative approach should be part of the cultural and strategic domains of the company and normally SMEs do not investigate alternative businesses due their lack of time.
Scarcity of resources. Traditionally SMEs have little to offer.
Bad co-operation planning. Most SMEs' decisions are made by the owners, without a clear strategic plan. It is important to have a clear idea about the co-operation objectives and the type of co-operation before the beginning.
Individual behaviour and fear. SMEs' propensity to co-operate is significantly less than that of large companies because they are more reluctant to share internal know-how.
Disinterest in co-operation. The lack of knowledge about specific success factors of alliances is one of the main reasons why SMEs do not develop co-operative approaches.
Lack of skilled personnel. The lack of skilled personnel (IT, managers, etc) hinder the implementation of collaborative approaches.
Inability to devise new business opportunities. Due to lack of time and know-how, a lot of SMEs lose the opportunity to create new business, enter new markets or create new products in collaboration with other SMEs.
Investment. SMEs with limited resources are not willing to invest in co-operation projects with unclear outcomes and benefits.
External problems and barriers
Poor efficiency. Some studies show poor results of co-operation and a failure rate of around 50 percent.
Lack of efficient mechanisms to evaluate co-operation. There is no consensus about how to evaluate the performance of a co-operation.
Competence of big corporations. Normally larger firms have more to offer and therefore have more possibilities to form alliances than SMEs.
Organisation difficulties. Alliances are difficult and costly to manage, as it is necessary to invest in specific monitoring and management resources.
Trust, commitment and compromise. Lack of mechanisms to overcome trust, credibility and compromise problems related with win-win co-operation.

useless conclusions and summarize in a unique work important findings from previous studies about SME collaboration. It has been useful to analyse the interfirm collaboration field from different perspectives as it provides a holistic view of the topic and complements the few studies which exists on SME-SME collaboration. The multi-method approach adopted to cross validate the findings from several studies permitted to understand the characteristics of SME collaboration and save time not re-inventing the wheel. Finally, the results of this work, presenting in a clear and practical way the advantages of SME collaboration, the barriers SME face in adopting collaborative approaches and the factors influencing its efficiency, represent a complete approach to the topic and provide a guide for managers thinking in adopting collaborative approaches. The results of the work show that co-operation between SMEs present a large number of advantages for the participants as long as the success factors are considered and included in a planned strategy. Having a clear prior idea about what is expected reduces the risk of failure and facilitates its governance.

As mentioned before, the author believes that most of the problems SME face during collaboration are consequence of

bad habits and decisions in the design and maintenance of it but that an accurate understanding of the process can minimize them. In that sense, classifying the reasons and barriers to collaborate into external and internal categories facilitates its understanding and permits to address specific actions depending on the context. Similarly, the classification of the factors influencing the effectiveness of interfirm co-operation into strategic, management and social categories permits to design measures to ensure its implementation across the different management structures of an alliance.

In addition, and in keeping with the findings of [10] or [27], this study revealed that social factors are crucial to ensure collaboration success and part of the strategy of SMEs. It is necessary for the participants to have a clear understanding of why they want to co-operate and which results they expect before starting collaboration. This process requires a favourable attitude and an analysis of the individual characteristics of the participants in order to find complementarities and synergies while avoiding conflicts.

Moreover, the nature of the partners and people involved is an important social factor. It is well-known that complementarity of resources and skills facilitates success but having compatible and similar cultures is also important.

Despite the results included in this work were extracted from studies performing surveys to real SMEs, the author is currently working on an empirical survey to SMEs to add primary research, corroborate the findings and give continuity of this work. In the meanwhile, future studies on SME collaboration can take advantage of the framework developed and improve their research on this topic. Many variables influence interfirm cooperation and specific analysis tools are necessary in order to understand it. The developed framework is one of these tools because facilitates systematic study of the topic, analysing different dimensions and factors involved separately.

TABLE IV. FACTORS INFLUENCING SME COLLABORATION EFFECTIVENESS

Strategic factors
Complementarity. Co-operation should contribute individual strengths and look for complementary resources. It is also important that partners have compatible business strategies in order to avoid power conflicts.
Business strategy and co-operation skills. Co-operation has to be a part of the SME business strategy. Partners with experience in co-operation projects tend to be more successful than those without.
Realistic goals. Need to define realistic and achievable goals.
Geographical closeness. In general SMEs prefer face-to-face contact, therefore, collaboration involving partners in close proximity tend to be easier to develop and achieve faster and better results.
Technological capability. Look for partners with similar IT systems and routines in order to avoid incompatibility.
Management factors
Prior knowledge of the partners and trust. Co-operation on established trust-based relationships reduces the initial agreements. It is necessary to specify the rights, duties and expected contributions for each partner.
Equality. It is necessary that partners make equal contributions depending on their potential, unequal power structures lead to conflicts. It is necessary to specify partners' duties in initial agreements in order to avoid problems.
Protect core competences. Co-operation management has to ensure that

individual core competences are protected and that only the desired expertise and know-how is transferred between members.
ICT management tools. Use of ICT tools in order to manage co-operation and share information among participants.
Planning. In order to achieve goals, it is necessary to create a plan specifying tasks and milestones. Establish easy tasks in the beginning helps to achieve them fast and convince sceptics.
Continuous monitoring. It is necessary to implement systems and mechanisms to continuously monitor cooperation, otherwise partners can be distracted and perform below their capabilities.
Social factors
Culture. Having a common organisational culture and a shared "view of the world" facilitates co-operation success.
Integrative spirit. Promoting the integrative spirit among the co-operation members, emphasising the potential benefits of working together.
Access to external support. Support from external experts is beneficial to most of SMEs.
Learning capacity. Include participants with a desire to learn and exchange knowledge.

REFERENCES

- [1] G. F. Udell. How will a credit crunch affect small business finance? FRBSF Economic Letter, 09, March 2009.
- [2] O. Williamson. The economic institutions of capitalism. New York: The Free Press, 1985.
- [3] S. Sjöstrand. On the rationale behind "irrational" institutions. Journal of Economic Issues, 26:1007–1040, 1992.
- [4] C. Holland and A. Lockett. Mixed mode network structures: the strategic use of electronic communication by organisations. Organization Science, 8:475–488, 1997.
- [5] J. Hagedoorn. Inter-firm R&D partnerships – an overview of patterns and trends since 1960. Research Policy, 31 (4):477–492, 2002.
- [6] A. Berry. Sme competitiveness: The power of networking and subcontracting, January 1997.
- [7] W. H. Hoffmann and R. Schlosser. Success factors of strategic alliances in small and medium-sized enterprises an empirical survey. Long Range Planning, 34:357–381, 2001.
- [8] E. Varamaki and J. Vesalainen. Modelling different types of multilateral co-operation between smes. Entrepreneurship & Regional Development, 15:2747, 2003.
- [9] R. Narula. R&D collaboration by smes: new opportunities and limitations in the face of globalisation. Technovation, 24:153161, 2004.
- [10] J. Marti. Radar study. Report, June-July 2009. Study of SMEs co-operation in Catalonia.
- [11] E. Varamaki. The development process of interfirm cooperation of smes. Frontiers of Entrepreneurship Research, 1996.
- [12] G. Lorenzoni and A. Lipparini. The leveraging of inter-firm relationships as a distinctive organizational capability: a longitudinal study. Strategic Management Journal, 20:317–338, 1999.
- [13] D. Fletcher. Strategic alliances and value adding networks - a critical review. In Bes paper presented at RENT VII, Budapest, Hungary, 25-26 November 1993.
- [14] R. Volery. Critical success factors in interfirm cooperation: The case of swiss small and medium-sized enterprises. Sidney, Australia, 18-21 June 1995.
- [15] C. Bronder and R. Pritzl. Developing strategic alliances: a conceptual framework for successful cooperation. International Marketing Strategy: Contemporary Readings, page 205, 1997.
- [16] O. Borch and M. Arthur. Strategic networks among small firms: Implications for strategy research methodology. Journal of Management Studies, 32(4):419–441, 2007.

- [17] S. Zeng, X. Xie, and C. Tam. Relationship between cooperation networks and innovation performance of smes. *Technovation*, 30(3):181 – 194, 2010. ISSN 0166-4972.
- [18] EU. On the implementation of commission recommendation of 6 may 2003 concerning the definition of micro, small and medium-sized enterprises. Commission Staff Document, October 2009.
- [19] D. Audretsch, R. van der Horst, T. Kwaak, and R. Thurik. First section of the annual report on eu small and medium-sized enterprises, January 2009.
- [20] W. Siu. An institutional analysis of marketing practices of small and medium-sized enterprises (smes) in China, Hong Kong and Taiwan. *Entrepreneurship and Regional Development*, 17(1):6588, 2005.
- [21] OECD. Globalization and small and medium sized enterprises (smes). Organization for Economic Cooperation and Development, Paris, 1997.
- [22] EU. Seventh framework programme (fp7). Website, March 2010. URL http://cordis.europa.eu/fp7/home_en.html. Accessed date: 13/03/2010.
- [23] D. Audretsch. Standing on the shoulders of midgets: The us small business innovation research program (sbir). *Small Business Economics*, 20(2):129–135, 2003.
- [24] S. Mani. Government, innovation and technology policy: an international comparative analysis. *International Journal of Technology and Globalisation*, 1(1):29–44, 2004.
- [25] D. Doloreux. Regional networks of small and medium sized enterprises: evidence from the metropolitan area of ottawa in canada. *European Planning Studies*, 12 (2):173189, 2004.
- [26] R. Rothwell and M. Dogson. Innovation and size of firm. *Handbook of Industrial Innovation*, 1994.
- [27] E. Von Hippel. *The Sources of Innovation*. Oxford University Press, T. Vuorinen, E. Varamaki, and J. Vesalainen. Explaining inter-organizational cooperative behavior—the rationale of three different theories in the finnish metal industry. 2006.
- [28] A. Jafee. Real effects of academic research. *American Economic Review*, 79/5:957–970, 1989.
- [29] C. Freeman. Networks of innovators: A synthesis of research issues. *Research Policy*, 20:499–514, 1991.
- [30] R. Coombs, A. Richards, P. Saviotti, and V. Walsh. *Technological Collaboration: The dynamics of cooperation in industrial innovation*. Edward Elgar, 1996.
- [31] A. Muscio. The impact of absorptive capacity on smes collaboration, 2007.
- [32] E. Varamaki and T. Pihkala. A hotel of small firms—an oddity of sme networking. pages 21–24, 1997.
- [33] O. E. Williamson. The economics of organization: The transaction cost approach. *The American Journal of Sociology*, 87(3):548–577, 1981. ISSN 00029602. URL <http://www.jstor.org/stable/2778934>.
- [34] J. Pfeffer and G. Salancik. *The external control of organization. A resource dependence perspective*. Harper and Row Publishers, 1978.
- [35] B. Johannisson. Beyond process and structure: social exchange networks. *International studies of management and organization*, 17:34–38, 1987.
- [36] R. Kanter. Collaborative advantage: the art of alliances. *Harvard Business Review*, 72:96–96, 1994.
- [37] H. Bullinger, K. Auernhammer, and A. Gomeringer. Managing innovation networks in the knowledge-driven economy. *International Journal of Production Research*, 42(17):3337–3353, 2004.
- [38] I. Liefner, S. Hennemann, and L. Xin. Cooperation in the innovation process in developing countries: empirical evidence from zhongguancun, beijing. *Environment and Planning A*, 38(1):111–130, 2006.
- [39] E. Malecki. *Technology and Economic Development: The Dynamics of Local |Regional and National Change*. Longman, 1991.
- [40] K. Sorama, A. Katajamaki, and E. Varamaki. Cooperation between smes: social capital and learning perspective. 2004.
- [41] B. Nooteboom. Innovation and diffusion in small firms: theory and evidence. *Small Business Economics*, 6:327–347, 1994.
- [42] B. Van Dijk, R. den Hertog, B. Menkveld, and R. Thurk. Some new evidence on the determinants of large-and small-firm innovation. *Small Business Economics*, 9:335–343, 1997.
- [43] L. Mytelka. *Crisis, technological change and the strategic alliance*. Pinter., London, 1991.
- [44] H. Chesbrough. *Open innovation: the new imperative for creating and profiting from technology*. Harvard Business Press, 2003.
- [45] S. A. Rosenfeld. Does cooperation enhance competitiveness? assessing the impacts of inter-firm collaboration. *Research Policy*, 25:247–263, 1996.
- [46] E. Masurel and R. Janszen. The relationship between sme cooperation and market concentration: Evidence from small retailers in the netherlands. *Journal of Small Business Management*, 1998.
- [47] J. G. Combs and J. David J. Ketchen. Explaining interfirm cooperation and performance: Toward a reconciliation of predictions from the resource-based view and organisational economics. *Strategic Management Journal*, 20:867–888, 1999.
- [48] S. Larsson and A. Malmberg. Innovations, competitiveness and local embeddedness. *Geografiska Annaler SeriesB: Human Geography*, 81(1):118, 1999.

REFERENCES OF THE CONSTRUCTS AND MEASURES (TABLE 1)

- [49] D. Archibugi and S. Iammarino. *Innovation and globalisation: evidence and implications*. Routledge, 2000.
- [50] J. Diez. Metropolitan innovation systems: a comparison between barcelona, stockholm, and vienna. *International regional science review*, 25(1):63, 2002.
- [51] M. Fischer and A. Varga. Technological innovation and interfirm cooperation: an exploratory analysis using survey data from manufacturing firms in the metropolitan region of vienna. *International Journal of Technology Management*, 24(7):724–742, 2002.
- [52] S. Chung and G. Kim. Performance effects of partnership between manufacturers and suppliers for new product development: the supplier’s standpoint. *Research Policy*, 32(4):587–603, 2003.
- [53] H. Yasuda. Strategic alliances for smes. *CACCI Journal*, 1:1–12, 2005.
- [54] A. Aragon-Sanchez and G. Sánchez-Marín. Strategic orientation, management characteristics, and performance: A study of spanish smes. *Journal of Small Business Management*, 43(3):287–309, 2005.
- [55] N. Oregon, A. Ghobadian, and M. Sims. Fast tracking innovation in manufacturing smes. *Technovation*, 26(2):252–261, 2006.
- [56] N. Fukugawa. Determining factors in innovation of small firm networks: a case of cross industry groups in japan. *Small Business Economics*, 27 (2-3):181–193, 2006.
- [57] S. Mancinelli and M. Mazzanti. Innovation, networking and complementarity: evidence on sme performances for a local economic system in north-eastern italy. *The Annals of Regional Science*, 43(3):567–597, 2009.
- [58] J. Haagedorn and J. Schakenraad. The effect of strategic technology alliances on company performance. *Strategic Management Journal*, 15:291–309, 1994.