

## Complementors and Innovation

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### ***The theoretical setting: Innovation and collaboration***

A lot of innovations arise not from any single individual or single organization but instead of collaborative efforts of multiple individuals or organizations. This often faces difficult decisions and might result in losing (partly) control over core processes, the lost of know-how, and shared rewards. At the other hand collaboration creates opportunities that enable learning, more scale, faster development times and shared risks (Gulati, 1998; Gulati, Nohria, & Zaheer, 2000; Powell, Koput, & Smith-Doerr, 1996). The increasing amount of research in business relationships is able to emphasize the contribution to innovation and is argued in several themes: For instance, Network configuration (Burt, 1995; Granovetter, 1973; Håkansson & Snehota, 1995), or network management (DeSanctis, Glass, & Ensing, 2002; Riccaboni & Pammolli, 2003; Ritter & Gemunden, 2003; Von Raesfeld Meijer, 1998). Although recent studies have explored the impact of network position on the performance of a firm to innovate (Ahuja, 2000; Coles, Harris, & Dickson, 2003; Nooteboom, 2000), empirical studies still find ambiguous results:

### **Need for more entrepreneurship and general network research**

Network research in general has been performed for many years and brought about by significant insights into today's body of research. In relation to innovation performance and entrepreneurship, research opportunities remain:

It is argued that all network structures have some benefits (Uzzi, 1996, 1997). To make use of these benefits, entrepreneurial decision making is crucial in directing the firm into the a (good) network position (Burt, 1995; Dhanaraj & Parkhe, 2006). An understanding of the networks dynamics that influence the formation of new alliances can provide insights for managers on path-dependent processes that may lock them into certain courses of action as a result from their current ties (Gulati, 1998). Network-based research in entrepreneurship is still in conflict about the effects of strong ties vs. weak ties, and the benefits of embedded networks vs non embedded networks (Hoang & Antoncic, 2003).

A recently conducted overview of 12 years of entrepreneurship research (Van Praag & Versloot, 2007) concludes similar trends: A scattered picture for the state of research and its results are at large. A lot of variety in definitions of the entrepreneur (and its counterpart), variety in the innovation indicators, and a low sample sizes, are partly responsible for the cause.

The bulk of empirical evidence available is often based on (strategy) research, conducted at large multinational organizations that use patents to protect their mainly technological innovations. Strategy research does include SME's only recently, and non technological innovations are very seldom included. This in contrast to what NPD theory builders argue. They say that making a distinction on the novelty of markets and novelty of technology is important for a thorough understanding on innovation management (Garcia & Calantone, 2002). So far, there has not been made a clear distinction in this context variable market vs. technology. Subsequently, a bias occurs in the measurement of the real innovation performance of companies. Further, in the empirical world, SME's are the major bulk of firms and have entrepreneurs as leading entities. So entrepreneurial research, conducted with clear control groups (Hoang & Antoncic, 2003; Van Praag & Versloot, 2007) (difference between managers and entrepreneurs), is of great value here (Hagedoorn, 2006).

## **The need for complementor research (as part of the above)**

At first, a lot of research has been done to enhance (vertical) collaboration, along the supply chain including customers, see for an extensive overview Pittaway et al., (2004). The role of involving customers in the innovation process is proven to be evident and beneficial (Ritter & Gemunden, 2003). Relationships with suppliers are one of the most important networking arrangements that affects innovation performance and productivity positively (Lamming et al., 2002). Although much of evidence points towards the role of suppliers and customers, it is the praxis that recognizes other parties for innovation. Regarding, parties that provide complementary products (complementors<sup>1</sup>(Yoffie & Kwak, 2006)) that lead to innovation.

Current empirical research fails to distinguish clearly between supplier/customer networks and complementor-customer networks. The network literature falls short in highlighting the vast heterogeneity of actors and their consecutive different roles for innovation (Dhanaraj & Parkhe, 2006). Strategic alliances make distinction on how the alliances are formed and how partners are chosen (Borgatti & Foster, 2003), but overlook the implications caused by complementarities. The marketing literature recognizes similar concepts like, supplementary services (Anderson & Narus, 1995), bundling, partnering, co-development co-maker ship co-branding (brand alliances) etc. Of course there exists a risk of making oversimplifications but in general these marketing theories show two fundamental restrictions: At first, classic marketing focuses too much on static economic models and thinks that transactions economics are leading. However, for this research, the following argument is of more importance. Market exchange is truly seen as rational economic based actions in which actors are independent and price is leading (Håkansson, Harrison, & Waluszewski, 2004; Håkansson & Snehota, 1995). This in contrast to one of Granovetter's (1985) most fundamental and proven propositions is that economic action is very strongly affected by networks of social relationships. So, at last, the above fields may benefit clearly from empirical based complementor research.

## ***The empirical setting: the Dutch printing industry***

For centuries, the printing industry has served civilization. Distributing and conserving knowledge, news or other data have been there main tasks and are indirectly accountable for the wealth of modern society. They are also responsible for a significant portion of economic activity to national markets. Currently, regarded to jobs and turnover, the Netherlands recognizes almost 50.000 jobs that generate an annual turnover of almost € 7.4 billion (www.kvgo.nl, 2006). From the total amount of 2.996 enterprises, small and medium sized enterprises (SME's) are accountable for the biggest share; 96% of the companies have fewer than 50 employees and only 63 companies have more than 100 employees. The printing industry is a dynamic business characterized by technological- and market change (Boczkowski & Ferris, 2005; Cox & Mowatt, 2003; Hardstone, 2004; Nijhof & Streumer, 1998). Although the paper less office ("The Office of the Future", 1975) didn't prove to be truth, the printing sector is an industry in which computer based technology has already made enormous impacts. This extensive digitizing of products and processes, created many threats, as well as opportunities(Matthyssens, Vandenbempt, & Berghman, 2004). Nowadays (even for higher volumes) traditional offset printing, accountable for the bulk of printing, is more and more replaced by digital printing. Recent industry related developments (Vachon & Klassen, 2006) show that some printing companies have encountered in an early stage that they are dealing with a technological mature industry in which is mainly competed on price (Tidd, Bessant, & Pavitt, 2005) and profit margins are squeezed. For western companies and especially SME's, price competition is in most cases a harsh business and indicates the necessity for innovation.

Enhancing innovation in this technological mature industry is hard to achieve for a single company, for a SME even harder (Hanna & Walsh, 2002). The printing SME's do not have a lot of

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<sup>1</sup> "Complementors are companies that independently provide complementary products or services directly to mutual customers".

(e.g. R&D or financial) resources to develop new technologies, what would result normally in a better competitive position. By the way, this is not the issue here. The printing technology is assumed to be more than sufficient. The sector already recognizes some very large high-tech providers (f.i. Xerox, Heidelberg, & Kodak) who manufacture effective machines. Those expensive machines, including stagnation of the demand, have currently caused overcapacity and a large shake out is stirring (Matthyssens, Vandenbempt, & Berghman, 2004). Nevertheless, another issue concerns that most of the printing companies serve low-tech mass markets, in which only little added value can be generated. This underlines that nowadays, business opportunities in the printing industry lay rarely within technological improvements, however printing companies have to search for or expand their network with potential parties that could add value to their product. Alliances and collaboration agreements with non printing parties (complementors) such as IT companies or Logistics partners are becoming very popular to achieve successful innovations.

## Research question

Keeping the constraints and opportunities in mind of the printing industry as well as the current state of research and especially the role complementors may play in innovation; the following research question can be derived:

*How does collaboration with complementor contribute to the innovation performance of a firm.*

This leads to the following set of subquestions:

1. In general, what are complementors and how can they be distinguished from suppliers? Are there different types of complementors, do they fulfill different roles at different times (Empirical & Theoretical)?
2. For a deeper understanding, what are the preconditions if a company wants to collaborate with a complementor to improve the innovation performance? These pre-conditions should include explicitly the characteristics of management in this (Theoretical & Empirical)?
3. How are managers able to proactively design their own networks for a higher innovation performance by means of collaborating with complementors?

## Approach

Documented in 4 consecutive papers that will enclose the dissertation, I want to achieve this purpose as follows:

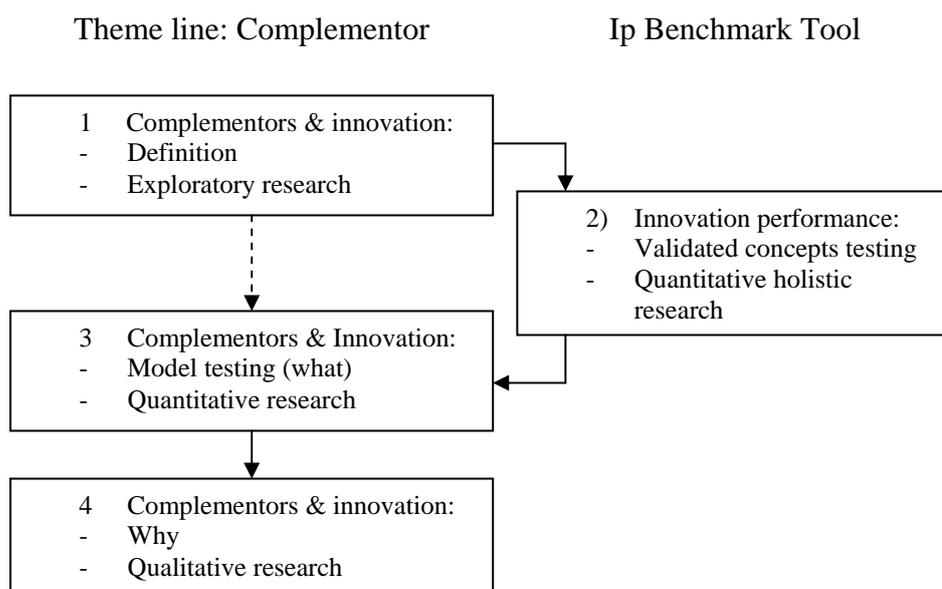


Fig 1. Overview dissertations and its parts / papers

**Paper 1:**

The primary purpose of this paper is to argue the importance that complementors play in innovation and how the configuration of a business network may affect this. Firstly I will explore the literature for the expected role of complementors, how they are embedded in the value net and how they affect innovation performance. Then, drawing on empirical evidence of the Dutch printing industry we conclude that, complementor collaborations play a key role for market innovation. Interests are frequently misaligned compared to supply chain collaborations subsequently, complementor collaborations are subject to a more complex interplay of strategies, technologies, and market needs. Future research demands for indicating success factors of network configuration and complementor roles.

**Paper 2:**

The purpose of this paper is twofold: At first I want to replicate past findings by testing “proven” and relevant concepts. This step should bring more insights *in*, but in particular construct a solid base *with* factors that determine innovation performance. Second purpose concerns a more practical purpose. It is given that the printing companies -who are being interviewed- need to receive immediate advice. This will be done with the Innovation Performance Benchmark (IPB) toolbox. The interview is being carried out by consultants that possess a lot of industry knowledge and are able to translate theory into practice. Doing this with validated and well researched scales, shall improve the quality of the advice significantly. Remark: This paper is not the backbone of my “complementor” dissertation, this will be realized by the three-stage rocket paper 1, 3 & 4. However, paper 2 remains a very important step to acquire a valid data set to test complementor hypotheses.

To achieve the above purposes the following approach will be taken: The tool will be constructed with a model that tries to capture the innovation performance in a holistic way. An Entrepreneurship in Networks (EiN) model (Groen, 2005; Kirwan, Van der Sijde, & Groen, 2006) will serve as framework and is operationalized with proven concepts and validated scales.

The entrepreneurship in networks model conceptualizes that during the entrepreneurial process four kinds of capital in four different domains are accumulated to create value:

- Economic capital: the financial resources in cash and kinds a venture has available and access to. This capital is operationalized with variables like: turnover growth, EBITA percentage to turnover, added value per employee and other known measures from finance & accounting.
- Strategic capital: the way a venture positions itself in the market and attains and uses power. This capital is operationalized by using the Entrepreneurial Orientation (Lumpkin & Dess, 1996) and the market orientation (Narver & Slater, 1990).
- Cultural capital: the knowledge, technology, know-how, experience, and values a venture puts into practice as well as how it organizes this. In this capital we measure the education level of the employees and its consecutive work experience. There is also looked if the company commits resources to training.
- Social capital: the relations of an entrepreneur and his venture with his environment, and the position of the venture within the network. The network for innovation will be analyzed with strong ties and weak ties (Granovetter, 1973), structural holes (Burt, 1995), on a micro (portfolio) level and use an adjusted version of McEvily and Zaheer’s (1999) research operationalization.. Further is looked at the content of the relationships and the role every relationship plays. The network analysis will put a solid base for paper three and is. Paper two is a forthcoming of complementor propositions derived from paper 1.

**Paper three:**

In paper 2 a holistic model was used to assess the innovation performance of a firm in general. In paper 3 a more precise model is constructed by using network theory. The purpose of this paper is to test in depth success factors that affect the innovation performance of a firm when collaborating with a complementor or not. Collaborating with a complementor is not on an ad hoc base. Management should feel a need to collaborate to innovate. However, collaborating with partner’s outside your industry is a bigger challenge and concerns more risks. Also a higher degree of pro-activeness is desired to recognize opportunities, and especially take the value out of it. Subsequently, logical

reasoning says that some entrepreneurial orientation probably has a mediating effect and is to be included. The model will be quantitatively assessed by the gathered data from paper 2. Directions for further research will put a basis for paper four.

**Paper four:**

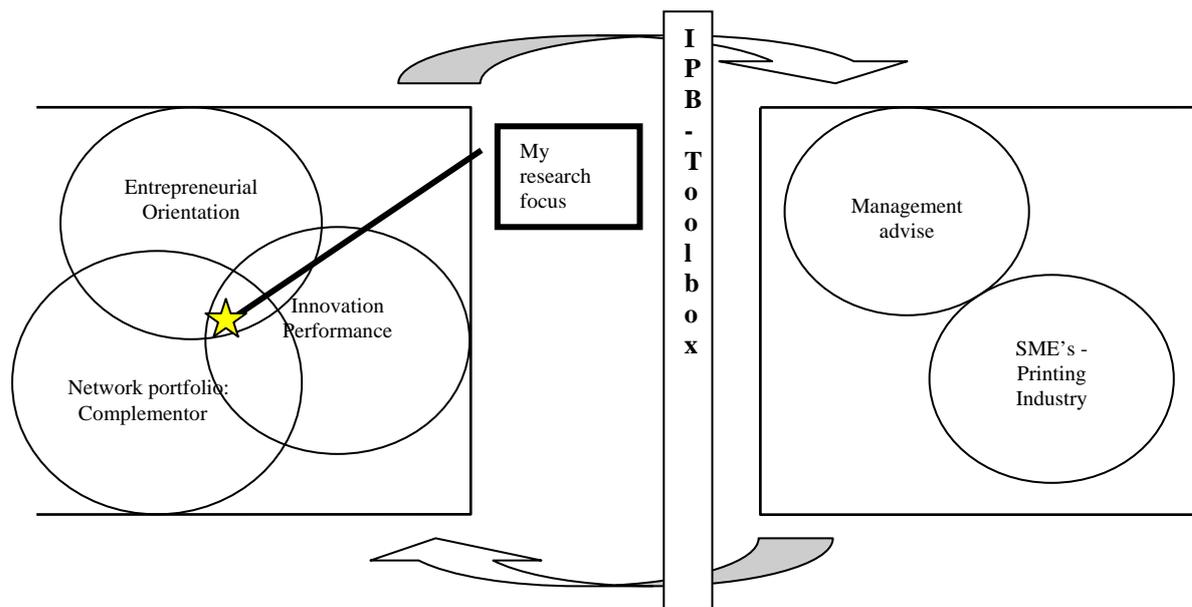
As paper 2 and 3 explores the contribution of the success factors, in the last paper will be tried to understand *why* these factors cause the success. Here I will use a qualitative approach to find in depth explanations for findings in paper 1, (2,) and 3. Two companies, a complementor and a supplier company are being planned to interview and will serve as case study.

A small introduction about the two companies:

Company “C” fullfils a prominent role as a complementor. “C” is a software company that offers printing companies, as well as end users print on demand (PoD) software. The unique selling points of PoD software is that end-users can make better use of the flexibility of a digital printing machine (f.i. shorter production runs, lower stock / employee costs or the opportunity to variable data printing). Their network approach to collaboration and orientation towards the markets make it a best practice example to qualitatively assess the role of being a complementor.

“OL” is a manufacturer of variable data printer software that can be integrated into the workflow software of the printing OEM’s. “OL” sees itself as a true technology provider to optimize variable data printing issues. “OL” collaborates extensively with the big OEM’s, via these relationships they are trying to market their product. So whereas “C” is looking to make the pie bigger, “OL” is given users tools to take a bigger piece of the pie.

**Empirical Cycle & Research domain:**



**Fig 2.**

**Renewing insights of research**

In this research will be looked to the role of complementors, this is (becoming) a common practical business term but lacks a clear scientific foundation. Definition problems and related (scientific) empiric evidence play a major role in that.

**Theoretical and practical relevance**

An important direction for the mainstream strategy research lies in incorporating a deeper understanding of adopting a relational or network perspective (Gulati, Nohria, & Zaheer, 2000). The challenge of my research lies not only in studying networks and alliances but to translate theory into practice and give managers feasible recommendations.

**Applicability potential and economical perspective**

Innovation and network research are very important for the industry for sustainable competitive advantage, although enough questions are not answered yet. More significant empirical results should contribute to the body of knowledge. The economical perspective is to consult firms with the developed IPB tool and help them creating sustainable competitive advantage.

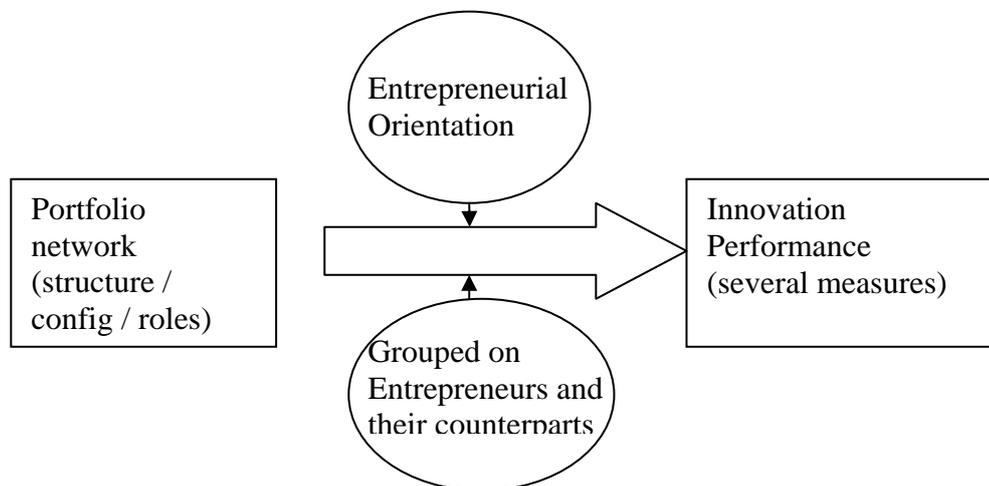


Fig 3. Overview Research Model 1:

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