Technology acquisitions:

a study of the three parties involved

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Summary

Over the past decades an increasing number of companies has used technology acquisitions to gain access to new technologies and technical capabilities. Technology acquisitions are defined as the acquisition of young technology-based firms made by large established firms to graft the acquired technological capabilities onto their own resource bases (Puranam et al., 2006). The advantages of taking over such young technology-based firms are clear from the perspective of the acquirer. First, they provide fast access to valuable assets such as technologies and innovative capabilities (Ahuja & Katila, 2001; Ranft & Lord, 2002). Second, young technology-based firms have organizational advantages in terms of innovation and exploration, which explains their attractiveness for incumbents (Brown & Eisenhardt, 1997). Moreover, technology acquisitions offer fast access to new markets, while internal development is a more risky strategy to enter new markets. Technology acquisitions are not only an important strategic objective from the perspective of the acquirer, also for the young technology-based firm it might be interesting to pursue an acquisition strategy as it offers them access to the complementary assets necessary to bring their products to the market (Gans & Stern, 2003). Besides, technology acquisitions constitute an essential exit route for the venture capitalist investing in the firm. Nowadays, the majority of the financial returns realized by venture capitalists are generated by acquisitions (i.e. the so-called trade sales). The objective of this doctoral study is to investigate how the three parties mentioned above can contribute to the success of the acquisition, taking in account that the definition of success might differ depending on the party under study. While the acquirer is primarily interested in performance after acquisition, the young technology-based firm and the venture capitalist are rather interested the acquisition as such and the return generated by this event. This dissertation consists of three studies, each zooming in on one of those parties involved.

The first paper of this dissertation studies the acquisition from the perspective of the acquirer. More specifically, it investigates how certain strategic decision taken by the acquirer influence acquisition performance. Using a case study design, this study unravels how the strategic decisions and actions undertaken by the acquirer in the pre- and postacquisition stage are interrelated and how they affect acquisition performance.

The empirical findings clearly demonstrate how preacquisition and postacquisition are closely correlated and influence one another. The interviews further revealed that both search and selection are crucial in preparing the implementation of the acquisition, as they moderate some of the typical selection problems (such as information asymmetry) and implementation problems (such as resistance of the personnel). With respect to search, our findings confirm that it is crucial to develop effective search strategies which allow the acquirer to identify interesting acquisition target. The search for suitable acquisition targets usually occurs by means of engaging in collaboration agreements, corporate venture capital, licensing agreements etc. They allow the acquirer to gain in-depth knowledge about the potential acquisition target before the actual acquisition. This knowledge helps the acquirer to better manage both the selection stage and the postacquisition implementation stage. Regarding selection, we explored how decisions taken during the selection and due diligence process influence the subsequent stages of the acquisition. The empirical data indicate that involvement of the client department is a crucial success factor in the acquisition process for the following reasons. First, the client department is best suited to check a number of assumptions with respect to the expected synergies. Second, the involvement of client department during the pre-acquisition stages also secures buy-in and commitment from this department to acquisition, thereby reducing the resistance of the employees to the acquisition and facilitating implementation. Finally, we discovered that the interrelatedness of these process components has implications for the team that is managing the acquisition. In particular, the interviews revealed that acquisitions might benefit from project management, where one dedicated team is responsible for the management of the file.

In a second paper, attention shifted from the acquirer to the young technology-based firm. This study aims to investigate how the strategic actions of the young technology-based firm contribute to the chance of being acquired and the acquisition return. Building on resource-based theory, a number of hypotheses were developed to predict the impact of technical, human and social resources on acquisition likelihood on the one hand and the impact of revenue generating capabilities on acquisition return on the other. Based upon an analysis of 285 young technology-based firms, it appears that hiring managers with experience in the sector and patenting both have a positive influence on the likelihood of being acquired. Regarding acquisition return, both revenues and commercial and research partnerships have a positive impact on

acquisition return. Conversely, hiring experienced top manager and patents seem to negatively affect acquisition return.

The third study finally, intends to examine to what extend the experience of the venture capital firm investing in the young technology-based company influences the likelihood of realizing an acquisition. For the development of the hypotheses, organizational learning theory was used. This theory distinguishes between three types of learning: learning from own experiences, learning from the experiences of others and congenital experience (i.e. experience which already accrued in the industry before foundation of an organization). The analysis of 206 British young technology-based firms reveals that both experiential learning from own trade sale experience and vicarious learning from the trade sale experiences of the syndicate partners have a significant positive impact on the likelihood of realizing a trade sale. Congenital experience on the other hand has no significant impact.

These three studies make a number of significant contributions to the literature. The first paper primarily contributes to the literature on technology acquisitions. This papers is one of the first to investigate how the preacquisition stage and postacquisition are related to one another. Further, this paper illustrates the importance of proper knowledge management, not only between target and acquirer but also between the various teams within the acquirer. The second and third paper primarily contribute to the exit literature by explicitly considering trade sales an exit option. Furthermore, the second paper also adds to the entrepreneurship literature on commercialization strategy by focusing on acquisitions as a route to market. In addition to the literature contributions, this doctoral thesis also provides some interesting insights for acquirers, young technology-based firms and venture capitalists looking to realize a successful acquisition.

Samenvatting

De voorbije decennia namen steeds meer ondernemingen hun toevlucht tot technologieacquisities voor het verwerven van nieuwe technologieën en capaciteiten. Technologieacquisities worden gedefinieerd als de overname van jonge hoogtechnologische bedrijven met het oog op het verwerven van technologische capaciteiten (Puranam et al., 2006). De motieven voor overname zijn duidelijk vanuit het standpunt van de overnemer: dit type van overnames bezorgt hen immers snelle toegang tot waardevolle activa zoals technologieën en innovatiecapaciteiten (Ahuja & Katila, 2001; Ranft & Lord, 2002). Kleine hoogtechnologische bedrijven beschikken typisch over een organisatorisch voordeel op vlak van innovatie en exploratie, wat hen zo aantrekkelijk maakt in de ogen van de grote bedrijven (Brown & Eisenhardt, 1997). Bovendien laat een overname een snellere betreding van de markt toe dan wanneer de overnemer voor het risicovolle traject van interne onderzoek en ontwikkeling zou kiezen (Hitt et al., 1991). Dergelijke overnames zijn niet alleen interessant vanuit het oogpunt van de overnemer, ook voor de hoogtechnologische bedrijfjes zelf is dit een belangrijk strategisch doel. Een overname biedt hen immers de toegang tot de complementaire middelen (zoals productie, marketing & distributie) nodig om hun product naar de markt te brengen (Gans & Stern, 2003). Bovendien is een overname vaak een belangrijke exit voor de risicokapitaalverschaffers die in het bedrijf geïnvesteerd hebben. De meerderheid van de financiële returns gerealiseerd door venture capitalists komt immers voort uit de verkoop van hun portfoliobedrijven aan grotere bedrijven. Doel van dit doctoraat is om na te gaan hoe de drie bovengenoemde partijen kunnen bijdragen tot het succes van de overname. Dit doctoraat bestaat dan ook uit drie afzonderlijke studies die elk inzoomen op één van de bovengenoemde partijen en nagaan in welke mate de strategische acties en karakteristieken van deze drie partijen bijdragen tot het succes van de overname. Hierbij wordt rekening gehouden met feit dat elke partij succes en performantie anders zal gaan definiëren. Daar waar de overnemer voornamelijk geïnteresseerd zal zijn in performantie na de overname (i.e. in welke mate worden de verwachte synergiën gecreëerd), zijn de overlater en venture capitalist eerder geïnteresseerd in de financiële gevolgen van de deal zelf. Voornaamste

doelstellingen voor deze partijen zijn enerzijds het realiseren van een overname tout court en anderzijds de prijs waarvoor men verkoopt.

De eerste studie die deel uitmaakt van dit doctoraat bestudeert de overname vanuit het perspectief van de overnemer. Deze studie gaat na hoe bepaalde acties ondernomen door de overnemer bijdragen tot beter overnamesucces. Door middel van een case studie werd onderzocht in hoeverre de beslissingen en acties ondernomen door de ondernemer in preacquisitie overnamefase een invloed hebben op postacquisitie implementatie. De resultaten van deze studie tonen aan dat het voor de overnemer belangrijk is om preacquisitie en postacquisitie te zien als twee gecorreleerde processen die in hoge mate door elkaar beïnvloed worden in plaats van twee duidelijk gescheiden processen. Uit de case studie komen twee belangrijke bevindingen naar voren. Enerzijds blijkt dat het voor de overnemer cruciaal is om effectieve zoekstrategieën te ontwikkelen die hem in staat stellen interessante overnamekandidaten te detecteren. Deze zoektocht naar geschikte overnamedoelen kan gebeuren door middel van het aangaan van samenwerkingsverbanden, corporate venture capital, het sluiten van licentieovereenkomsten etc. Deze zoekstrategieën laten de ondernemer toe een goede kennis op te bouwen van het overnamedoel alvorens over te gaan tot effectieve overname. Deze kennis zal ook nuttig zijn in de postacquisitiefase en bijdragen tot een vlottere implementatie. Anderzijds blijkt uit de resultaten dat het aan te raden is om het departement dat verantwoordelijk zal zijn voor de implementatie reeds te betrekken van in de selectiefase. Op die manier kan de kennis van dit departement aangewend worden voor het juister inschatten van de verwachte synergiën. Tevens draagt dit bij tot een groter gevoel van commitment en buy-in aan de zijde van het implementatiedepartement. De grote mate van interactie tussen de preacquisitie en postacquisitie fase heeft verder voor gevolg dat voldoende aandacht besteed moet worden aan de uitwisseling van informatie en kennis tussen de partijen betrokken in pre- en postacquisitie.

In een tweede studie verschoof de aandacht van de overnemer naar de overlater. Deze studie heeft als doel na te gaan in welke mate de strategische acties ondernomen door het jonge hoogtechnologische bedrijf bijdragen tot de kans om overgenomen te worden en de return gerealiseerd met de overname. Hierbij werd verder gebouwd op de

"resource-based theory" om een aantal hypotheses te ontwikkelen omtrent de invloed van deze middelen op de kans een overname te realiseren en de return van de overname. Uit de analyses blijkt dat het aanwerven van managers met ervaring in de sector en het verkrijgen van patenten beide bijdragen tot een hogere overnamekans. Voor wat betreft de return bij overname, stellen we vast dat zowel de omzet als het aangaan van commerciële en onderzoekssamenwerkingsverbanden leiden tot hogere overnamereturns, terwijl patenten en ervaren topmanagers een negatieve invloed hebben op overnamepremie.

De derde studie tot slot heeft als doel om te onderzoeken in welke mate de ervaring van de venture capitalist die investeerde in de hoogtechnologische starter een invloed heeft op de kans een overname te realiseren. Voor het ontwikkelen van de hypotheses werd vertrokken van de "organizational learning theory". Deze theorie maakt het onderscheid tussen drie vormen van leren: leren uit eigen ervaringen, leren uit de ervaringen van anderen en aangeboren ervaring (i.e. ervaring die reeds was opgebouwd in de industrie voor de opstart van de organisatie). Uit het onderzoek van 206 Britse hoogtechnologische starters en hun venture capitalists blijkt dat voornamelijk het leren uit eigen ervaringen en het leren uit de ervaringen van andere venture capitalists een positieve impact had op de kans dat het portfolio bedrijf een overname kon realiseren. De aangeboren ervaring had geen significante impact.

Deze drie studies maken een aantal contributies tot de bestaande literatuur rond dit onderwerp. De eerste studie draagt bij tot de literatuur rond technologieacquisities door de onderlinge afhankelijkheid van preacquisitie en postacquisitiefase aan te tonen. Verder illustreert deze studie het belang van kennismanagement, niet alleen tussen overnemer en overlater maar ook tussen de verschillende partijen werkzaam bij de overnemer. De tweede en derde studie dragen voornamelijk bij tot de exit literatuur. Daar waar deze literatuur voornamelijk focuste op IPOs, gaan deze twee studies dieper in op het belang van overnames. Verder draagt de tweede studie ook bij tot de ondernemerschapsliteratuur. Hoewel in deze literatuur veel aandacht besteed wordt aan commercialisering van de technologie op de technologiemarkt, focust deze

literatuur zich voornamelijk op samenwerkingsverbanden als een manier om de technologie te commercialiseren. De optie van een overname wordt hier vaak genegeerd. Tot slot genereerde deze doctoraatsstudie een aantal nuttige inzichten voor de praktijk. Zowel de overnemer als de overlater en venture capitalists verkrijgen via deze studie een duidelijker inzicht in de factoren die bijdragen tot een succesvolle overname.

List of publications and conference presentations based on this doctoral research

Articles

Clarysse, B., Bobelyn, A., & Del Palacio Aguirre, I. (2012). Learning from own and others' previous experience: the contribution of the venture capital firm to the likelihood of a portfolio company's trade sale. Small Business Economics (forthcoming)

Conference Proceedings

Bobelyn, A., & Clarysse, B. (2010). The importance of legitimacy building when preparting for a trade sale. Academy of Management Best Paper Proceedings.

Book Chapters

Bobelyn, A., Lambrecht, I., & Clarysse, B. (2009), "Groei door acquisities: de rol van innovatiegemotiveerde overnames in de groeistrategie van Telco en BASF", in Clarysse, B. (Ed.). Groeizaam Vlaanderen: een beleidsondersteunend wetenschappelijk perspectief, Roularta.

Bobelyn, A. & Clarysse, B. (2011), "Overnemen en overlaten van jonge ondernemingen", in Clarysse, B. (Ed). Ondernemen tussen wetenschap en beleid in Vlaanderen – Inzichten van vijf jaar Steunpunt Ondernemen en Internationaal Ondernemen, STOIO.

Working Papers

Bobelyn, A., & Clarysse, B. Technology acquisitions: a process perspective on search, selection and implementation.

Bobelyn, A., Clarysse, B., & Wright, M. Young high tech firms, academic spin-offs, resources and trade sales.

Conference Presentations

Bobelyn, A., Clarysse, B. & Lambrecht, I. (2008). How to manage absorptive capacity: the case of technology acquisitions. ISPIM conference, Tours, France, June 2008

Bobelyn, A., & Clarysse, B. (2009). Technology acquisitions: a process of search, selection and implementation. UK IRC Conference, London, UK, June 2009

Bobelyn, A., Clarysse, B., & Wright, M. (2010). Dressing up for a big wedding: the importance of legitimacy building when realizing an exit by trade sale. Babson College Entrepreneurship Research Conference, Lausanne, Switzerland, June 2010.

Bobelyn, A., & Clarysse, B. (2010). The importance of legitimacy building when preparing for a trade sale. Academy of Management Conference, Montreal, Canada, August 2010

Clarysse, B., Bobelyn, A., & Del Palacio Aguirre, I. (2011). Learning from own and others' previous experience: the contribution of the venture capital firm to the likelihood of a portfolio company's trade sale. Academy of Management Conference, San Antonio, US, August 2011

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1. Introduction

Over the past decades, our economy has evolved to a knowledge economy. Although knowledge has always characterised our economic systems, what distinguishes today's knowledge economy from ancient economies is the increasing role of knowledge as a commonly traded good (Arora, Fosfuri & Gambardella, 2002). This resulted in the emergence of so-called markets for technology. According to Arora et al. (2002) a market for technology refers to transactions for the use, diffusion, and creation of technology. This includes transactions involving full technology packages and patenting licensing as well as transactions involving knowledge that is not patentable or not patented. The existence of markets for technology has importance implications for the corporate strategy of the firm. This doctoral dissertation explores one modus to operate on the market for technology, namely technology acquisitions. Technology acquisitions are defined as "the acquisition of young-technology-based firms made by large established firms to graft the acquired technological capabilities onto their own resource bases". Technology acquisitions not only have become increasingly important for incumbents, but also for high-tech start-ups as a commercialization strategy providing access to the complementary assets necessary to bring their products to the market. This study aims to investigate the implications for strategy when pursuing technology acquisitions.

1.1. Importance of technology acquisitions

The increasing importance of technology acquisitions implies that incumbents become more and more dependent on accessing the exploration capabilities of high-tech start-ups to foster innovations. There are various motives that incite incumbents to acquire technology ventures. First, the knowledge and technologies gained through external mechanisms will be less path-dependent and may therefore lead to a greater variance of resource combinations and better innovation performance (Fleming, 2001; Levinthal & March, 1993; Nelson & Winter, 1982). Second, the acquisition of profound expertise and technical skills constitutes a central motive to acquire new technology-based firms (Graebner, 2004; Ranft & Lord, 2002). Third, in today's economy, characterized by rapid innovation, shortening product cycles, increasing technological complexity and reliance

on highly specialized skills and expertise, it has become practically impossible to develop all technologies needed to maintain competitiveness within the boundaries of the firm itself (Puranam et al., 2006; Ranft & Lord, 2002). Under these circumstances, technology acquisitions offer a quick access to new technologies and capabilities. Fourth, small technology-based firms are attractive acquisition targets because of the organizational advantages at exploration (Brown & Eisenhardt, 1997; Doz, 1988). By linking these capabilities to the complementary assets of the acquirer in manufacturing, marketing and distribution, acquirers seek to leverage the exploration capabilities of the target (Puranam et al., 2006; Teece, 1986).

Also young technology-based firms are influenced by the growing popularity of technology acquisitions. First, there is a growing body of evidence that the pioneer advantage may no longer apply (Golder & Tellis, 1993 & 2002; Gao, Ritter & Zhu, 2011). Several studies have shown that pioneers have long-lived market share advantages and are likely to be market leaders in their product categories (e.g. Lambkin, 1988). However, the results of Golder and Tellis (1993, 2002), seriously question the existence of the pioneer advantage by showing that almost half of market pioneers fail and their mean market share is much lower than that found in other studies. On the contrary, they found that it are often the late entrants, that become the market leaders. Furthermore, early market leaders have much greater long-term success and enter on average 13 years after the pioneers to the market. Small entrepreneurial firms typically have the skills and mind sets to create innovations, while established firms typically dispose of the capabilities to transform the idea from a niche market to a mass market (Markides & Gerosky, 2005). Thus, while high-tech start-ups primarily may initiate radical innovation, it are often the established firms that conquer and scale up these new markets created by start-ups. This has consequences for the way in which young technology-based firms can reap the benefits of their inventions. Young technology-based firms are often dependent upon the complementary assets of incumbents to commercialize their products in the mainstream market. Being acquired by an incumbent offers the young technology-based firm access to complementary assets such as production, marketing and distribution capabilities (Gans & Stern, 2003). In summary, both high-tech start-ups and incumbents benefit from the growing

importance of technology acquisitions. Although being acquired implies that technology venture foregoes the independent commercialization of the technology and hand over the control over the organization to the incumbent, technology acquisitions also entail an important advantage: obtaining access to costly-to-build complementary assets that are crucial for the successful commercialization of the technology (Gans & Stern, 2003).

In addition, the growing popularity of technology acquisitions implies that acquisitions have become an important exit strategy for the financiers that invested in high-tech start-ups. Empirical evidence indeed confirms that acquisitions have become increasingly important and account for the majority of the financial returns realized by venture capitalists (Gompers, 1995; Black and Gilson; 1998; Gao, Ritter & Zhu, 2011). A recent study of Gao et al. (2011) confirms this trend. Moreover, they argue that this trends confirms a structural shift as selling to a larger firm, which can help the company with speeding product to market and scaling up, offers more advantages relative to remaining as an independent firm.

The following two figures confirm that trade sales have become more important than IPOs as exit mechanism, both in terms of numbers and value. Figure 1 provides an overview of the number of IPOs and trade sales realized in each year in the period 2000 to 2008, comparing Europe with the UK. These numbers clearly demonstrate the importance of trade sales as exit route for VC investors. With exception of the dotcom bubble of 2000, IPOs are only a fraction of trade sales. A similar trend can be noted when considering the deal value of IPOs versus trade sales, as the total amount of money raised with trade sales is consistently larger than for IPOs, again with exception of the year 2000.

Figure 1: Annual evolution of trade sales and IPOs in Europe and the UK: number of companies[1]

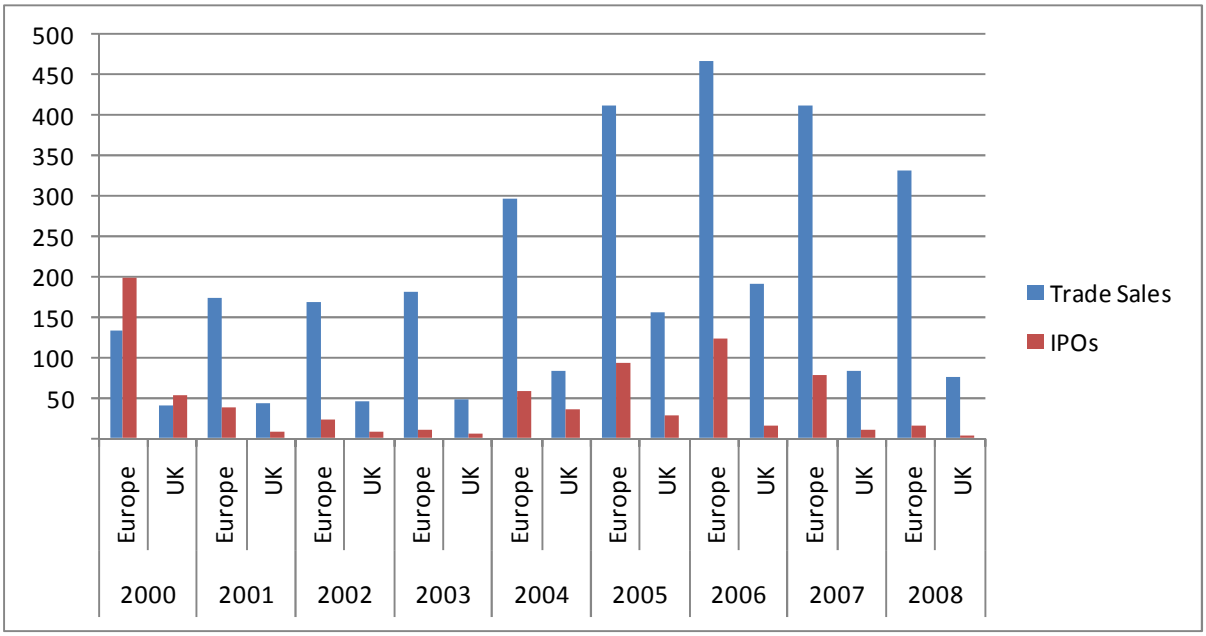
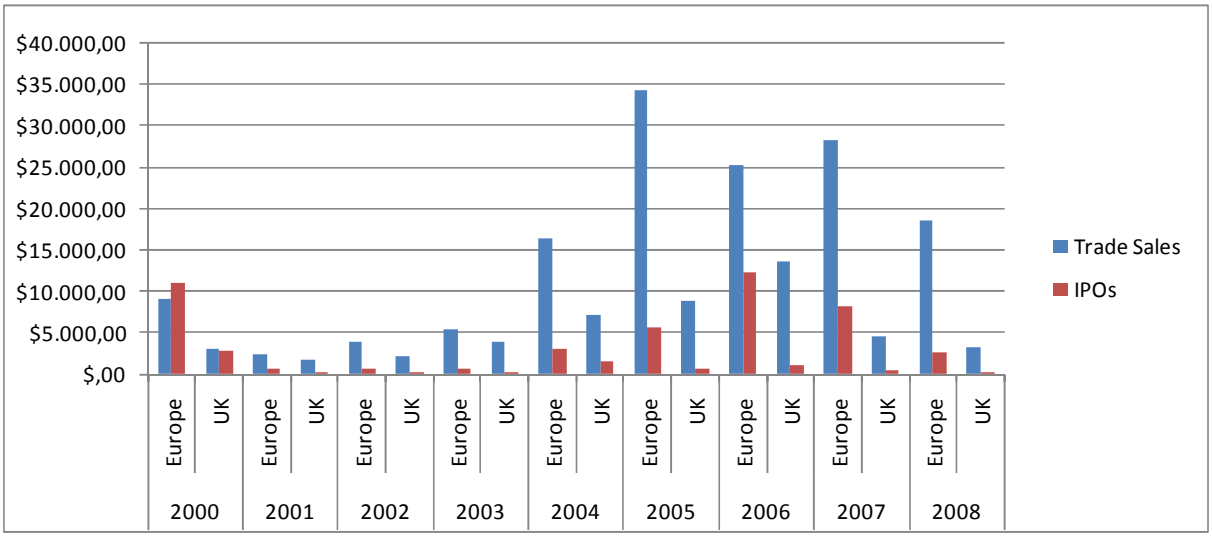


Figure 2: Annual evolution of trade sales and IPOs in Europe and the UK: Total amount of money raised (million $)[1]



1.2. Research Questions

The aim of this doctoral dissertation is to explore some of the antecedents of a successful technology acquisition. Attention is given to all three parties involved in the acquisition

[1] Figures obtained from VentureSource (www.venturesource.com)

process of a young technology-based firm, namely the acquirer, the young technology-based firm itself and the VC investor, as each paper being part of this doctoral dissertation deals with one party involved. The first paper addresses how the acquirer can contribute to acquisition success, while the second and third paper explore the roles of the young technology-based firm and the venture capitalist in the process of realizing a trade sale. The following three paragraphs illustrate the research gaps that were addressed by each paper.

1.2.1. Acquirer

The topic of technology acquisitions has received a considerable amount of attention in both academic and business literature. Pioneering research mainly focuses on the level of strategic fit between target and acquirer (Rappaport, 1979; Salter & Weinhold, 1981). Later on, the focus shifted towards organizational fit and post-acquisition integration (e.g. Jemison & Sitkin, 1986; Datta, 1991; Schweizer, 2005) and on explaining the variance in acquisition performance (e.g. Hemmert, 2004; Ahuja & Katila, 2001). Potential causes for poor acquisition performance are sought in bad selection behaviour, high acquisition premiums and in long and costly integration processes (Gilson & Black, 1995; Haspeslagh & Jemison, 1991; Porrini, 2004). Based upon these root causes, two divergent literature streams emerged, one focusing on explaining preacquisition issues such bad selection behaviour and high premium, the other focusing on postacquisition integration problems. But notwithstanding this abundant literature, relatively little is known about the acquisition process itself and how this process impacts acquisition failure or success. A few papers have used a process perspective as point of departure, but these studies focus at one component of the acquisition process, for instance the pre-acquisition selection stage or the post-acquisition implementation stage. However these studies neglected to question how the preacquisition and postacquisition stage interact to influence acquisition performance. To address this gap in research, we look at the acquisition process as a whole, carefully scrutinizing each process component for its influence on the subsequent acquisition stages and performance. Using a case study design, we unravel the process of technology acquisitions and look into the various mechanisms through which each process component affects the subsequent stages. The findings indicate that the decisions and managerial actions taken in the search and

selection phase have an important impact on the success of implementation. We identify search and involvement of the client department as crucial mechanisms in the acquisition process. Furthermore, we discover that the interrelatedness of the different process components has important implications for the structure and composition of the team that manages the acquisition.

1.2.2. Young technology-based firm

In a second paper, the focus shifted from the acquirer to the young technology-based firm looking to be acquired. As explained above, young technology-based firms pursuing the strategy of being acquired operate in the market for technology. Literature on the market for technology thus served as a starting point to unravel the strategic actions contributing the realizing an acquisition. However, this stream of literature focuses largely on explaining licensing and neglects to consider technology acquisitions as an option for generating revenues in the market for technology. The entrepreneurship literature which focuses on commercialization strategies on the other hand, mainly explores how environmental factors drive the choice of commercialisation strategy leaving no room for managerial agency. This paper tries to address this research gap by investigating what factors contribute to a successful exit through trade sale. More specifically, this research analyses to what extent managerial actions undertaken by these firms impact its likelihood of being acquired and its eventual acquisition return. We build on insights from resource-based theory to develop hypotheses on the impact of resources on acquisition likelihood and return. In a sample of 285 UK YTBFs, we find that patents and the hiring of experienced top managers result in a higher acquisition likelihood, while revenues and commercial and research partnerships contribute to acquisition return.

1.2.3. Venture Capitalist

The objective of this paper finally, is to examine to what extent venture capital firms contribute to the likelihood that the portfolio company in which they invested will realize a trade sale. As venture capitalists are considered to be hands-on investors, one

can expect that they employ their experience to engage in value-adding activities and foster the performance of their portfolio companies. Various studies have tried to link the value-adding activities of VC firms to portfolio company success (e.g. Sapienza & Timmons, 1989; Sapienza, 1992; Schefczyk, 2001). These studies have typically looked at revenues (Schefczyk, 2001), growth in revenues and/or employment (Bottazzi and Da Rin, 2002; Davila et al., 2003) or a combination of financial and technical performance shortly after investment decisions (Baum and Silverman, 2004). Surprisingly, they have neglected to investigate how the VC firm contributes to the chances of their portfolio companies to realize a trade sale. Building on arguments from learning theory, this paper developed a number of hypotheses on the relation between vicarious, experiential and congenital learning of the venture capital (VC) firm and the trade sale hazard of its portfolio companies. Based on our analysis of 206 VC-backed UK start-ups, we find that both experiential learning from own trade sale experience and vicarious learning from syndicate partners with trade sale experience significantly increase the trade sale hazard. The routines and procedures learned from experienced syndicate partners complement experience accumulated through trial and error. Congenital trade sale experience of the investment managers on the contrary has no significant influence on the acquisition hazard.

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2. Technology Acquisitions: A Process Perspective on Search, Selection and Implementation

ABSTRACT

Technology acquisitions have become an important external source of innovation. But despite the popularity of technology acquisitions, there are still a lot of acquisitions that fail. Much of the research on technology acquisitions focuses on questionable motives, problems regarding valuation and selection and difficulties in the post-acquisition integration to explain acquisition performance. But notwithstanding this abundant literature, relatively little is known about the acquisition process itself and how this process impacts acquisition failure or success. A few papers have used a process perspective as point of departure, but these studies focus at one component of the acquisition process, for instance the pre-acquisition selection stage or the post-acquisition implementation stage. However these studies neglected to question how these different process components interact to influence acquisition performance. To address this gap in research, we look at the acquisition process as a whole, carefully scrutinizing each process component for its influence on the subsequent acquisition stages and performance. Using a case study design, we unravel the process of technology acquisitions and look into the various mechanisms through which each process component affects the subsequent stages. The findings indicate that the decisions and managerial actions taken in the search and selection phase have an important impact on the success of implementation. We identify search and involvement of the client department as crucial mechanisms in the acquisition process. Furthermore, we discover that the interrelatedness of the different process components has important implications for the structure and composition of the team that manages the acquisition.

2.1. Introduction

In order to gain and maintain competitive advantage, firms constantly seek to innovate (Rosenkopf & Nerkar, 2001; Teece et al., 1997). Historically, the innovation literature has focused on the role of internal research and development as the primary source of innovation and growth. However, more recently it has become clear that internal R&D only plays a partial role in explaining a firm's innovation success. Organizations are argued to become more dependent on their ability to exploit external knowledge to sustain their competitive advantage (Cohen & Levinthal, 1990). As a consequence, a company's competitiveness does no longer merely depend on its ability to create and exploit knowledge internally, but also depends on its ability to access and take advantage of knowledge residing outside the firm. In this context, the acquisition of technology and more specifically the acquisition of pioneering ventures has become an increasingly important means to obtain access to innovative technologies (Hitt et al., 1991; Chakrabarti et al., 1994, Vanhaverbeke et al., 2002). Small technology-based firms are attractive targets to acquirers as sources of technological input and innovation capabilities in settings of rapid technological change (Arora et al., 2001). The knowledge and technologies gained through external mechanisms will be less path-dependent and may therefore lead to a greater variance of resource combinations and better innovation performance (Fleming, 2001; Levinthal & March, 1993; Nelson & Winter, 1982) When searching for new opportunities, managers tend to search close-in before moving into uncharted terrains (Cyert & March, 1963). In a world where innovation opportunities are limited, internal innovation opportunities will soon become exhausted. In order to find new opportunities firms will need to search further from their existing operations. Technology acquisitions may offer such an opportunity. Certainly, technology acquisitions have become an important external source of innovation, what's more, their importance is still increasing over time (Tellis & Golder, 2002; Markides & Geroski, 2005). Figures from PriceWaterHouseCoopers reveal that the M&A activity in the technology sector has recovered from the burst of the dotcom bubble, by showing a sharp increase in both the number of transactions and transactions value for the period 2003-2007. 2007 proved an increase of 24% in number of deals and 44% increase of deal value (Morgan & Ryan, 2008). But despite their growing popularity, there are still

many acquisitions that have failed to achieve their objectives (e.g. Ranft & Lord, 2002; Graebner, 2004).

Many researchers have tried to explain acquisition performance. Within the literature that focuses on technology acquisitions, two streams of research can be distinguished: one focuses on problems during the preacquisition stage to explain acquisition success, while the other stream looks into postacquisition issues to explain acquisition performance. Pre-acquisition misjudgements are usually explained by information asymmetries between the target and the future acquirer. Various researchers have investigated what mechanisms can be used to reduce this information asymmetry (e.g. Benson & Ziedonis, 2009; Reuer & Ragozinno, 2008; Porrini, 2004; Kohers & Kohers, 2001; Coff, 1999). The second stream on the other hand, has focused predominantly on organizational problems that arising during the postacquisition implementation state. Part of this literature looks at the optimal organizational structure to realize synergies, with the dilemma of integration versus autonomy at the forefront ((e.g., Puranam et al., 2006; Puranam & Srikanth, 2007; Schweizer, 2005). Others have focused on mechanisms and strategies that foster coordination and knowledge transfer (Kapoor & Lim, 2007; Kiessling & Harvey, 2006; Graebner, 2004; Ranft & Lord, 2002). While both streams of research provides some very useful insights for acquirers to improve post acquisitions results, a link between those two research streams is missing. By focusing on one stage of the acquisition process, i.e. the preacquisition stage or the postacquisition, both streams of research have neglected to investigated how preacquisition affects postacquisition implementation. This is surprising as ever since the publication of the work of Jemison and Sitkin (1986), it is widely accepted that the acquisition process itself is an important determinant of acquisition success. Therefore, the objective of this paper is to integrate both literature views by investigating how the preacquisition stage affects postacquisition implementation. For this purpose a process study will be used. In essence, the process perspective concentrates on explaining how managerial actions and decisions taken during the acquisition process affect the acquisition success, i.e. the extent to which synergies are realized (Birkinshaw et al., 2000). In fact, researchers have long understood that the value creation following an acquisition must be studied by examining the actions that lead up to the acquisition

decision along with the integration and management activities that follow the decision (Jemison & Sitkin, 1986). However, in reality the number of process studies that capture the whole acquisition process from search and selection through implementation is relatively limited. This paper tries to fill this gap by scrutinizing the complete acquisition process from defining the acquisition strategy to the acquisition outcome. More specifically, this paper explores how decisions taken during the preacquisition stages affect postacquisition implementation. Our empirical fieldwork reveals that every process component has an impact on the eventual acquisition outcome. Each process component not only affects the acquisition outcome but also has an impact on the subsequent process stages. The contribution of this paper is twofold. First, we add to the literature on technology acquisitions that predominantly has been focusing on the integration dilemma by complementing this organizational view with the economics on information view. This paper makes the connection between preacquisition literature and postacquisition literature by looking at the whole acquisition process. Our framework illustrates how implementation problems may be caused by mistakes made in the preceding stages of search, selection and due diligence and how this affects team management. Furthermore, we extend the literature by providing evidence that acquirers not only learn from their previous acquisitions, but learning also plays an important role within the acquisition process. Effective search allows the acquirer to learn from the target before the actual action and smoothens both the selection and implementation process. Furthermore, the results indicate that in each stage valuable knowledge is gathered and that it is important to share this knowledge with all employees involved in both the acquisition process: employees involved in the postacquisition stage should learn from the knowledge gathered by the employees involved in the preacquisition stage. A second contribution of the paper is empirical. This paper addresses the call for more case studies in the field of technological acquisitions. The case study provides a deeper insight in the process of technology acquisitions and identifies a number of mechanisms that are crucial in the search and selection phase as they influence the implementation and eventually the acquisition outcome.

The remainder of this paper unfolds along the following lines. First, we elaborate on the concept of technology acquisitions, we provide a short literature review on this phenomenon. Second, we describe the research design and the research setting. Third, we draw on the empirical fieldwork to build a theoretical framework that extends our knowledge on the process of managing technology acquisitions. Although the data gathered guided our theory building, the different literature streams relevant for this study are taken into account, thereby addressing one of the most common misconceptions about grounded theory (Suddeby, 2006). Finally, we recapitulate the main conclusions and discuss the limitations and implications.

2.2. Literature review

During the past decades, incumbents increasingly rely on technology acquisitions to gain the new technologies and capabilities needed to sustain or enhance their competitiveness. The acquisition of small technology-based firms has become an important means to obtain valuable resources such as technologies and innovation capabilities (Ahuja & Katila, 2001; Ranft & Lord, 2002). Following Huber (1991) and Puranam (2001), we define technology acquisitions as "acquisitions of small, technology-based firms by large, established firms made so that the larger firm can graft acquired technological capabilities onto their own resource bases".

Various motives incite incumbents to the acquisition of small technology-based firms. First of all, in today's environment characterized by rapid innovation, shortening product cycles, technological complexity and reliance on highly specialized skills and expertise, it has become very difficult, if not impossible, to develop all the technologies and capabilities needed to maintain competitiveness within the firm itself (Puranam et al., 2006; Ranft & Lord, 2002). Organizations therefore rely on technology acquisition as a prompt gateway to new technologies and capabilities. Second, the resources gained through external sourcing are less path-dependent, thereby offering new opportunities for resource combinations to foster innovative output (Fleming, 2001, Levinthal & March, 1993; Nelson & Winter, 1982). Internal development on the other hand may be perceived as more risky than acquisitions that provide faster access to the marketplace

(Hitt et al., 1990). Furthermore, small technology-based firms are attractive acquisition targets because of their organizational advantages at exploration (Brown & Eisenhardt, 1997; Doz, 1988). By linking these capabilities to the complementary assets of the acquirer in manufacturing, marketing and distribution, acquirers seek to leverage the exploration capabilities of the target (Puranam et al. 2006; Teece, 1986) Finally, in knowledge-intensive and innovation-driven industries, also the acquisition of profound expertise and technical skills constitutes a central motive to acquire new technology-based firms (Graebner, 2004; Ranft & Lord, 2002).

Despite the aforementioned clear economic advantages technology acquisitions encompass, there are also some disadvantages. There are still many technology acquisitions that fail to achieve their objectives and result in poor performance (Schweizer, 2005; Graebner, 2004; Ranft & Lord, 2002). Two root causes of poor performance can be distinguished. First, potential causes for poor acquisition performance are attributed to bad selection behaviour and paying high acquisition premiums (Gilson & Black, 1995; Haspeslagh & Jemison, 1991; Porrini, 2004). Second, the reasons for failure are also attributed to long and costly integration processes of these acquired firms. Capturing value from acquisitions depends on the effective management of the post-deal implementation (Schweizer, 2005; Graebner, 2004, Haspeslagh & Jemison, 1991). Within this line of research, the focus has primarily been on managing the organisational dilemma of coordination versus autonomy. To what extent and under which circumstances do these acquired technology ventures have to be integrated in the main structure of the company versus remaining autonomous, independent ventures?

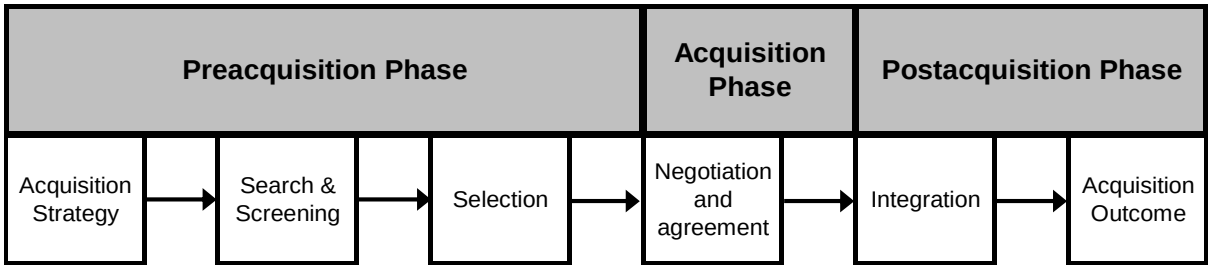
To summarize, we can conclude that literature distinguishes between two stages: the preacquisition stage and the postacquisition stage. Whereas preacquisition misjudgements are usually explained by economics of information, postacquisition integration issues are explained by organisational theory. In the following paragraphs, we first throw a light on the acquisition process, discussing the different steps in the pre- and postacquisition stage. Second, a literature review is provided on pre-acquisition

problems caused by information asymmetry. Finally, we elaborate on the organisational causes of acquisition failure, elaborating both on the problems and suggested solution in the post-acquisition implementation phase.

2.2.1. The acquisition process

Roughly, the acquisition process can be broken down in two stages, the preacquisition stage and postacquisition stage, with in between the actual acquisition, i.e. the consummating of the deal. The preacquisition stage in turn consists of three successive stages: Formulation of acquisition strategy, search for and screening of potential targets, and the final selection of the acquisition target. Each acquisition starts with the formulation of an acquisition strategy. This strategy presents a clear set of objectives that serve as a foundation for the following stage: the search and screening stage. In this stage potential acquisition targets are identified and prioritized. This stage not only entails the search for potential targets but also covers an important learning aspect as will be illustrated below. Subsequently, in the selection stage, the potential targets are evaluated and one target is selected for acquisition. In the acquisition stage, the acquirer enters into negotiations with the target until an agreement is reached. Next to the price and method of payment, also the retention of key personnel and physical integration constitute an important part of the negotiations. Once the deal is consummated, one enters the postacquisition or implementation stage. In this stage, the business potential created in the previous stages is now realized by transferring and combining resources and capabilities to create competitive advantage. The following figure gives an overview of the acquisition process (Adapted from Haspeslagh & Jemison, 1991):

Figure 3: the acquisition process



2.2.2. The economics of information view

Acquisitions in general and technology acquisition in particular allow organizations to obtain access to knowledge that is of high strategic importance but of low familiarity (Leonard-Barton, 1995). However the quality of this knowledge is hard to assess, leading to information asymmetry between acquirer and target and adverse selection (Coff, 1999). As a result of this information asymmetry, acquirers may struggle with assessing the true synergy potential of acquisition candidates. Several M&A studies have noted that information asymmetry may have a significant impact on the likelihood and performance implications of acquisitions (Eckbo et al., 1990). In this line of research, information asymmetry models assume that one party to a transaction disposes of more or better information than the other party to the transaction (Akerlof, 1970). In essence, there are two major forms of information asymmetry: hidden information and hidden action. Hidden information occurs when one party to a transaction knows relevant information that is not known to the other party. In a market where buyers cannot accurately assess the quality of the products, prices will reflect average quality which causes parties of good quality to leave the market, resulting in a market dominated by parties of inferior quality and adverse selection (Akerlof, 1970; Leland & Pyle, 1977 en Chan & Leland, 1982). Hidden action on the other hand, occurs when one party cannot observe relevant actions taken by the other party.

Two responses are offered so solve the problem of adverse selection: signalling and screening. The natural market response to adverse selection is signalling (Spence, 1973). Signalling defines the process of informing potential investors on the quality of the venture in a credible, trustworthy manner (Campbell & Kracaw, 1980; Spence, 1973). Acquirers have to make their investment decision under a high degree of uncertainty, resulting in high levels of information asymmetry and therefore seek signals of target quality. Screening serves as another potential solution of the adverse selection problem. In this case the uninformed party of buyer offers a contract that causes informed parties to self-select (Rothschild & Stiglitz, 1976). Screening may offer a more appropriate technique as it allows one economic agent to extract otherwise private information from another (Spence, 1973). Therefore, in the context of technology acquisitions screening

can also be described as the due diligence process in which the investment opportunities are carefully scrutinized.

Acquirers of small technology-based firms are confronted with high levels of information asymmetry for a number of reasons. First of all, the assets of these firms mainly comprise intangible assets which are hard to assess as financial statements only mention tangible assets (Cooper et al., 1988). Second, buyers have difficulties assessing what will be transferred and what not due to employee turnover and knowledge tacitness. Much of the value of technology ventures depends on the human capital. If key personnel leave after acquisition, the value of the human capital decreases (Graebner, 2004). Third, there is uncertainty on the synergies that can be created as the combined capabilities cannot be observed a priori; synergies with human capital and knowledge intensive firms, such as technology ventures, require effective knowledge transfer in order to materialize on the synergy potential (Coff, 1999). However, it may be difficult to assess how much knowledge will be transferred. Fourth, small technology-based firms are typically confronted with high levels of market and technical uncertainty (Chaudhuri et al., 2005). And finally, the target is usually a company with limited maturity and a restricted track record. Little historical and codified information is available on these new technology ventures (Hannan & Freeman, 1989). All these factors provoke high levels of information asymmetry which hinder the acquirer to adequately select, value and integrate the target.

In the literature on technology acquisitions, a number of factors have been analysed which enable the acquirer to reduce information asymmetry. Coff (1999) for example demonstrates that buyers cope with this information asymmetry and related uncertainty by (1) offering lower bid premiums; (2) using contingent payment such as earn outs and stock payment and (3) increasing information both through lengthy negotiations and by avoiding tender offers. These coping strategies however, become less important when the acquirer has no intention of integrating the target.

Moreover, also acquisition experience and previous alliances may help moderate information asymmetry. Empirical evidence indeed shows that firms with previous acquisition experiences perform better than firms without previous acquisitions performance as this experience allow acquirers to develop some routines which help them selecting, valuing and integrating acquisition targets (Haleblian & Finkelstein, 1999; Bruton et al., 1994; Fowler and Schmidt, 1989). Haleblian and Finkelstein (1999) their findings indicate the presence of a curvilinear relationship between acquisition experience and acquisition performance. Besides, the more the targets resembles previous targets, the better acquisition performance. Porrini (2004) on the other hand investigated the impact of previous alliances on acquisition performance. Her results point out that previous alliances have indeed a positive impact on acquisition performance. These effects are even stronger when it concerns R&D, technology transfer, manufacturing and marketing alliances in comparison to licensing alliances. Also Reuer & Ragozinno (2008) confirm that interfirm alliances between target and acquirer may be helpful to reduce information asymmetry, as this alliance serves as a signal of quality.

2.2.3. The organizational view

The organizational view focuses on the problems that arise during the implementation phase. One of the most prevalent problems during implementation is the autonomy versus coordination paradox. Post-acquisition integration both hinders and facilitates the efforts of the acquirer to leverage the knowledge and technology of the target and realize the expected synergies (Birkinshaw et al.; 1999, Chaudhuri et al., 2005); Puranam & Srikanth, 2007). Puranam et al. (2006) argue that the key to resolving the coordination-autonomy dilemma is considering the development stages of the target's innovation trajectory. Their findings confirm that structural integration leads to better innovation outcomes when the target has already launched products. However, when no products are launched yet by the target, structural separation seems to be the preferred post acquisition structural forms. In other words, when the knowledge and capabilities of the target have not been codified in the form of a product, structural separation is recommended. Not only because this structural form preserves the innovation capabilities and routines of the target, but also because the high levels of information

asymmetry hamper the decision abilities of the acquirer. Therefore, the target is in better place to manage its innovation activities. On the other hand, when the knowledge and capabilities of the target are codified in the form of a product, information asymmetry decreases which allows the acquirer to manage the activities of the target. What's more, effective coordination between target and acquirer becomes more important to manage the manufacturing, marketing and distribution activities. In this case, structural integration is recommended. Similar conclusions are found in a follow-up paper of Puranam and Srikanth in 2007. This study demonstrates that integration helps acquirers to leverage the knowledge-base of the target but hinders the leveraging of the innovation capabilities of the target. Schweizer (2005) on the other hand, distinguishes between R&D-related and non-R&D-related activities to resolve the integration dilemma. He proposes a hybrid integration approach: R&D related activities or the activities with the highest degree of information asymmetry should retain a high degree of autonomy, while the non-R&D-activities should be integrated. Other authors focus not on the choice of integration itself but on mechanisms and strategies that foster coordination and knowledge transfer and thereby help resolving the integration paradox. Graebner (2004) for instance argues that the leaders of the acquired firm play a crucial role in bridging the information gap that exists between acquirer and target. By engaging in mobilizing and mitigating actions, they contribute to the creation of both expected and serendipitous value. Ranft and Lord (2002) stress the importance of rich communication between acquirer and target for a number of reasons. First, rich communication facilitates the preservation of the technologies and capabilities of the target. But more importantly, rich communication also smoothens the process of knowledge transfer. Furthermore, they underline the importance of speed of integration: slower acquisition implementation allows for a learning period during which the acquirer and the target begin to cooperate and transfer knowledge. Finally, also retention of key personnel (Kiessling & Harvey, 2006; Graeber, 2004) is crucial as they are the most critical assets. The target's technological capabilities depend upon the skills and expertise of these people. Kapoor & Lim (2007) underline the importance of similar routines and skills to smoothen coordination, however too much overlap in routines and skills may limit the cross-fertilization of ideas.

The literature described in the previous paragraphs gives an overview of the determinants of failure and success in technology acquisitions. Part of the literature has looked at the pre-acquisition knowledge and activities and a more recent stream of research has focused on the post-acquisition integration aspect. Despite this abundant literature, relatively little is known about the acquisition process itself and its impact on failure and success. Where previous process studies mainly focus on the implementation phase, this paper looks at the acquisition process as a whole, carefully scrutinizing each process component and its impact on the acquisition outcome. In specific, we investigate how decisions and managerial actions implemented during the preacquisition stage have an impact on postacquisition implementation and performance.

2.3. Methods and data

2.3.1. Description of the methodology

As we are interested in explaining *how* decisions taken during the search and selection stage affect postacquisition implementation and performance, a case study approach is most appropriate. More specifically, a process study approach was used. The process perspective frames acquisitions as a series of decision-making steps each of which has an impact on the final outcome of the full acquisition process (Jemison & Sitkin, 1986). A case methodology is particularly useful in studying the process of M&A's, as it enables the researcher to explore the processes through which synergies are identified and actualized (Larsson, 1993). In spite of Larsson's advocacy, a case study methodology has only been used in a limited number of M&A research studies (Pablo & Javindan, 2004). Therefore, to address the research question, we will combine a case study design and inductive empirical investigation. This is the most appropriate research design, as the main goal of this paper is to further extent the existing theory on technology acquisitions. The first step consisted of selecting an appropriate case. When selecting an appropriate case, the following criteria were taken in account. First, we used to definition put forward by Puranam et al. (2006) to define the research population. Puranam et al. (2006) define technology acquisition as acquisitions of small technology-based firms made by large established firms to graft the acquired technological

capabilities onto their own resource bases. Second, as we are extending theory on managing technology acquisitions based case studies, it makes sense to select an extreme case (Eisenhardt, 1989). We thus selected a case that was considered to be a failure. Finally, we also willingness to cooperate and to provide us with extensive backing documents was included as a selection criterion. Together, these criteria led to the selection of an acquisition done by a leading telecom operator in Belgium, we call Belganet. We studied the acquisition of Mobile Everywhere by Belganet.

Once the case is selected, also the interviewees must be selected. To select the interviewees we use the snowball technique. The sampling should begin with top managers as they are critical players in perceptions about change in organizations and are therefore identified as key informants (Kumar et al., 1993). Hence, top managers that were involved in the acquisition process were interviewed. After each interview we asked the interviewee who else was involved in the process and could provide us with relevant and important information on the topic. We continued this procedure until no new names came to the surface. In total we conducted nine interviews. We interviewed both managers and lower-level employees.

The interviews were conducted by two interviewers and took on average between one and two hours. All interviewees were recorded and the tapes were transcribed verbatim to increase to reliability of the results. Furthermore, we asked each of the participants if they could provide us with documentation on the process. We were given access to more than 300 pages of internal PowerPoint presentations. These presentations contain the presentation used to defend the acquisition for the board of directors, presentations on the implementation and task segmentation, communications of Belganet to Mobile Everywhere, etc. We had also access to financial information, more specifically to the financial sheets that were used to calculate the stand-alone and synergy value of the target company. Furthermore, we used annual reports and press releases to back up the story. Altogether, these documents provide over 500 pages of secondary data sources and are useful for the following reasons. First, they make it possible to construct a quantitative picture of the process under study (Burgelman, 1994). Second, they allow

checking for potential systemic bias due to retrospective thinking (Golden, 1992). Afterwards, each interview was discussed by the two interviewees and a third independent person in order to increase the validity of the data. We used content analysis to analyse the data. The interview transcripts serve as main source of data and basis for analysis, however observation and documentation data were included as triangulation and supplementary data sources (Miles & Huberman, 1994). Each interview report was coded independently by the two interviewers. Afterwards, the coding was put together and compared. Whenever the coding differed, a discussion followed until agreement was reached.

Table 1 Overview of interviewees

Source		Interviews		Internal Documents	
		Number	Function	Number	Pages
Stage	Preacquisition	3	Director Business Development Lead Manager Strategy and Business Development Segment Leader Alliances	4	125
	Acquisition	2	Director Business Development Lead Manager Strategy and Business Development	1	9
	Postacquisition	7	Director Business Development Segment Leader Alliances Partnership Development Manager VP Business Development Responsible Sales SME market Responsible Sales Large market Responsible Sales Corporate market	8	189

2.3.2. Research Setting: Belganet – Mobile Everywhere[2]

The Belganet group is a Belgian telecom operator and is active in three main fields: fixed-line services, mobile communication services and international services. In 1994 Belganet launched the Mobinet cellular network. All mobile communications services are provided by this venture. It is Mobinet who initiated the acquisition of Mobile Everywhere in 2006. At that time, Mobinet was market leader in the mobile market. However, competition was becoming fiercer and margins were dropping. In addition, the core business of Mobinet, connectivity, has become a commodity. Consequently, Mobinet decided to move up the value chain, integrate vertically and enter the business of mobile applications. It is in this context that the acquisition of Mobile Everywhere should be situated. In 2006, the year of acquisition, Belganet had total revenues of 6.1 billion Euros, an EBITDA of 2.4 billion Euros and employed about 18000 people. Mobile Everywhere was founded in March 2002. The company specialized in the development of mobile solutions on the PDA (Personal Digital Assistant) and synchronization of data between the PDA and the traditional ICT-system of the company, like e.g. ERP and CRM. The start-up Mobile Everywhere was not a case of solo-entrepreneurship. The founding team consisted of three men in their early thirties who realize they operate in a business which is still in its infants. After running through all potential applications of this new technology, they realized that the PDA offered a wide range of opportunities. Affordable mobile solutions were in great demand in all industries. Still only a handful of companies were specialized in this business. Because of their joint experience with PDA's and data control, they decided to found Mobile Everywhere. In 2006, Mobile Everywhere was acquired by Belganet/Mobinet. At the moment of acquisition, Mobile Everywhere had more than 40 clients. The company mainly focused its activities on mobile sales people in two well-defined industries, Fast Moving Consumer Goods – Food and Non-Food (distribution, hotel & catering industry) – and Pharma (medical sales, OTC). At that time, Mobile Everywhere had 26 employees and a turnover of about 1.5 million Euro.

[2] The names of the companies involved in the case study are kept anonymous for confidentiality reasons.

2.4. Findings

Using a case study design we investigate how the acquisition process affects the acquisition outcome. Each phase of the acquisition outcome not only has an impact on the eventual outcome of the acquisition but also affects the next stage in the process. As a consequence all these stages are interrelated and jointly shape the acquisition outcome. In the next paragraphs, we examine through which mechanisms each stage has an impact on the subsequent stage and the acquisition success or failure. More specifically, we study the extent to which search and selection practices in pre-acquisition process affect the subsequent stages of acquisition process. For each phase, one or several mechanisms are discovered that affect the subsequent stages and the eventual outcome of the acquisition.

2.4.1. Empirical findings

In 1994 Belganet launched the Mobinet cellular network. The main activity of this venture was to provide mobile communication services. Mobinet became market leader and by 2002 the first mobile operator in Belgium to offer all customers internet access via GPRS. However by 2005, Mobinet experienced that margins were dropping as connectivity became more and more a commodity. As a response to this threat, a new strategy was launched by the Strategy and Business Development department in order to materialize the opportunities offered by mobile IT. In order to materialize the opportunities offered by mobile IT, Mobinet decided it needed to move up the value chain and integrate vertically. In the future, Mobinet wanted to become a prime contractor of mobile solutions. Since Mobinet has no real internal R&D activities, it opted to look outside its boundaries for potential mobile applications. In the past, Mobinet had set up a wide range of partnerships with the players in this field. However, Mobinet decided to acquire a company instead of relying on partnerships, as this allowed them to move up the value chain much faster and capture more value in comparison to partnerships. The Strategy and Business Development department was responsible for the first four phases in the acquisition process, namely the definition of the acquisition strategy, the search process of identifying and valuing potential targets, the selection process and the negotiations. The main objective of the Strategy and

Business Development (S&BD) department is to monitor the environment to detect opportunities and partner with those small markets that have the opportunities to become big. To accomplish this objective and spot opportunities, the department attends conferences, uses trend watching tools and calls on external consultants. Since it was clear that the future of Belganet/Mobinet is in the business of mobile ICT, it was the job of S&BD to select those opportunities with the highest potential. After scanning the market of mobile IT, the S&BD decided that mobile sales & field force, email and personal information management are those IT-applications which were likely to be mobilized first. However, the mobile applications email and personal information management were considered to add low value. Mobile sales and field auditing on the other hand, were the markets with the highest growth potential. In summary, the acquisition strategy of Belganet to materialize the opportunities offered by mobile IT consisted of acquiring a young company that had the technology to offer mobile sales and field auditing services and that targeted the mid-company size market. Belganet decided to target the mid-market because market research indicated that Belganet has a high credibility in this segment, in addition Belganet's customers are to a large extend SMEs which implies synergies are to be created in this segment.

Once the acquisition strategy was defined, all small players in this market were identified and contacted to discuss future collaboration. In this step, the alliance team was involved as well. They already had a good understanding of the players in the market, since they were responsible for creating partnerships that allow selling the own products. As each player in the value chain has its competences, co-selling agreements allow increasing sales. Consequently, the alliance team knew the ICT market very well and was able to identify all relevant players in the market of mobile sales and field auditing. A due diligence of all these players was carried out and the following selection criteria were taken in account: technical competences, business competences and track record and organizational fit. Based on these analyses, two targets were identified, one of which is acquired: Mobile Everywhere. After nine long months of negotiations, both parties reached an agreement: Mobile Everywhere was sold to Mobinet for 5.3 million Euros: 4.1 million fixed payment and 1.2 million earn-out. This valuation was based on the stand-alone business case. Taken in account the expected synergies, the value was three times as high. With the acquisition, Mobinet hoped to realize some cost synergies like common marketing and IT. However, the emphasis was on the creation of revenue

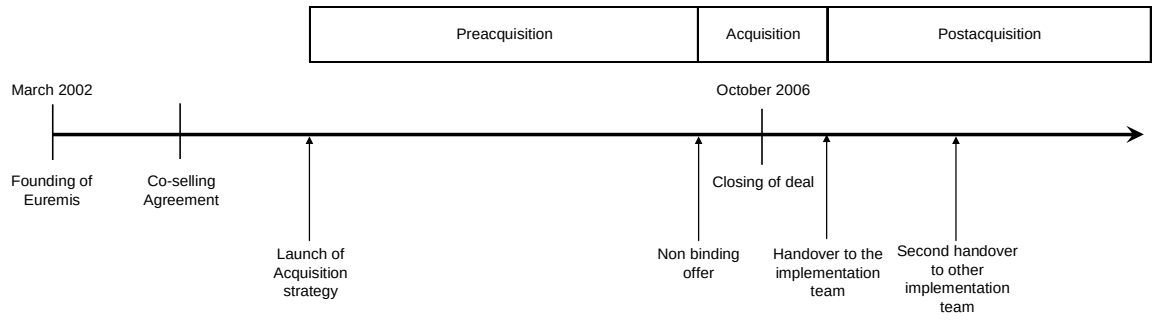
synergies. Mobinet expected that they were able to increase the sales to 150 % of the sales generated by Mobile Everywhere, by linking the Mobinet brand and customer base to the Mobile Everywhere products.

However, during the interviews it became clear that the acquisition was not an unqualified success and the expected synergies were not realized. Belganet was not able to realize the expected synergies for a number of reasons. Although the strategy behind the acquisition is clear and everyone agrees that mobile ICT applications were indeed the future of Belganet, the acquisition could not realize its full potential. Based upon the interviews, we ascertained a number of reasons why the acquisition did fall short on expectations. First, the market of for the product of Mobile Everywhere was not as developed as expected. All the representatives of the sales department (i.e. someone from the SME market, someone in charge of the large market and someone in charge of the corporate market) confirmed that the market "*is still in its early adopter phase"*. Especially the market of small and medium companies is not ready to adopt the technology. The sales representative of the SME market admitted "*My experience for SME is negative, but that doesn't mean that there is no potential. I do think there is a potential market, but the product should first be sold to Corporate and Large. And later on, SME will follow*". It appeared that Belganet was a bit too optimistic with respect to the expected synergies. Belganet thought that synergies could be realized by simply linking the customer base and brand of Belganet to the Mobile Everywhere product. Reality however, was more complicated.

Second, moving up the value chain was more difficult than expected. The sales cycles of the two companies were totally different. The sales process for a Belganet product was rather reactive and sales cycles are short. The sales process for Mobile Everywhere' product on the other hand was pro-active; it was about knowing the company and addressing its needs. As a consequence the sales cycle was longer. Selling Mobile Everywhere' product required a different mindset, different contacts, and different sales talks. In order for the Belganet people to be able to sell the product, effective knowledge transfer from Mobile Everywhere to Belganet was required in the course of which

Belganet people are trained to develop the necessary skills. Finally, there were some problems relating to the team that managed the acquisition. In the whole process, several teams succeeded each other in the management of the acquisition. Obviously, the hand-over of the acquisition file from one team to another implies the loss of a lot of information. Overall, the acquisition could have benefited from a better preparation of the implementation phase. The following time line summarizes the important events in the acquisition process:

Figure 5: Timeline of Mobile Everywhere acquisition



In the following paragraphs, we dilate upon the root causes of these problems and try to unravel how they could have been averted. We investigate how each process component has an impact on the subsequent processes and the overall success or failure of the acquisition. In particular we investigate how managerial actions and decisions taken in the search and selection phases of the process interact to influence the realization of the expected synergies and the acquisition outcome.

2.4.1.1. The impact of Search

Once the acquisition strategy is defined the search for potential acquisition candidates can begin. In business literature this search process is defined as the identification process of potential acquisition targets that fit the acquisition profile (Depamphilis, 2001). However, if we examine academic literature, we could conclude that search is seen an important learning activity. Search processes include the search for new product

ideas, new forms of organization and/or solutions to existing problems (Stuart & Podolny, 1996; Katila 2002; Katila & Ahuja, 2002). These search processes can be seen as a dynamic capability that enlarges the knowledge base of a firm and therefore allows firms to sustain their competitive advantage over time. Accordingly, search in organizations is an important part of the organizational learning process through which firms attempt to solve problems (Huber, 1991). Due to path dependency, most firms that seek to enlarge their knowledge base restrict their search process to familiar and proximate areas (Rosenkopf & Almeida, 2003). This local search process is especially beneficial to create incremental innovation, as firms become more expert in their current domain (Rosenkopf & Nerkar, 2001). Recent literature, however, emphasises that sustainable competitive advantage relies more heavily on the firm's dynamic capabilities to move beyond local search and reconfigure its knowledge base. The work of Stuart and Podolny (1996) for example illustrates that Matsushita was able to reposition itself by moving away from local search and by committing itself to a series of alliances with other firms that gave them access to different technologies. Also the results of Rosenkopf & Nerkar (2001) indicate that organizations that want to move beyond their current industry should engage in radical exploration. Similar results can also be found in the study of Katila (2002). Her results point out that old intra industry-knowledge hampers innovation, while old extra-industry knowledge stimulates innovation.

These findings imply that organizations looking for technology acquisitions need search mechanisms that enable them to learn from the knowledge residing outside the firm.. EIRMA (2004) distinguished the following modes for accessing external information: purchase of technology, joint venturing and alliances, joint development, contract R&D, licensing, collaborations with universities, equity in university spin-offs and equity in venture capital investment funds. All these mechanisms may serve as search strategies as they allow building up knowledge on a certain technology. Therefore, we define search strategies in the context of technology acquisitions as mechanisms to access external knowledge and information. However not all mechanisms are suited as search strategies for technology acquisitions as some of these mechanisms already hold with them the ownership of, or at least the right to exploit the technology. For that reason, we

define alliances, corporate venture capital, university-industry links and joint ventures as open search strategies.

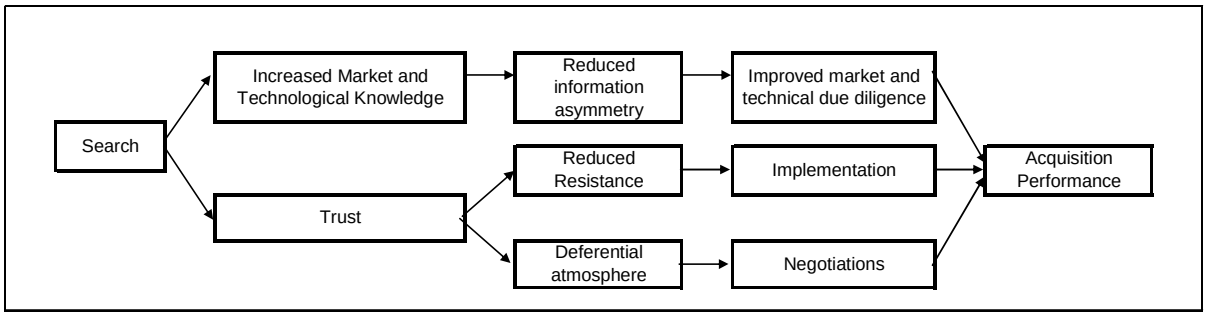
Searching for and valuing entrepreneurial targets is often problematic because entrepreneurial firms are difficult to locate as exchange partners (Deeds et al., 1999). While at the same time, entrepreneurial firms tend to find it more difficult to signal their business prospects to investors (McConnell & Pettit, 1984). Moreover, private companies tend to involve higher transaction costs in the presence of search and valuation problems than their public counterparts (Pablo & Javindan, 2004).

When investigating the case, we discovered that search is indeed more than identifying and valuing potential targets. This phase may also comprise an important learning aspect as the acquirer tries to access external knowledge on potential targets. The case study revealed that existing partnerships were a very important source of information. These partnerships not only smoothen the process of identifying potential targets, the knowledge gathered through these partnerships also serves as a valuable input in the selection phase and in the subsequent acquisition phases. Belganet was able to identify all relevant players that fitted the acquisition profile thanks to the co-selling agreements it had with most of the relevant players in the market of mobile sales and field auditing. When entering new businesses, Belganet "*always first tries to work with partners to develop this new business, these collaborations serve as a window on new technologies and the herewith related opportunities*". The interviews revealed that the search activities in the form of co-selling agreements affected the acquisition outcome through two separate mechanisms. First, the search stage increased the market and technological knowledge on mobiles sales and auditing. The information gathered during the search phase was a crucial input in the selection phase and in the negotiations as it allowed the acquirer to assess the combination potential of the opportunity. The target-specific information gathered during the collaboration reduces the information asymmetry. This reduced information asymmetry in turn smoothens the progress of the selection and due diligence and contributes to the overall acquisition performance. This mechanism is also illustrated in figure 3. Several M&A studies have pointed out that information

asymmetry may indeed have a negative impact on acquisition performance (Eckbo et al., 1990). Thanks to these partnerships, Belganet was able to scan the market of technologies and choose those technical solutions with the highest potential, as confirmed by one of the interviewees: "*The advantage of having an alliance team is that it enabled us to get in touch with the mobile ICT market… We of the alliance team knew that we were given the space to set up these partnerships because sooner or later Belganet would acquirer one of these partners*". Also Porrini (2004) her findings confirm that alliances allow to build up target-specific information and experience, benefiting selection, valuation and integration of acquisitions. Search is not only a facilitator of the acquisition process because of its knowledge generating impact, it has also an impact on the quality of the relationship between acquirer and target, i.e. the second mechanism through which search affect acquisition performance. During the search phase, Belganet contacted all its partners in the mobile sales and field auditing business and asked in all openness "*how can we collaborate better in the future?*". This approach created a climate of trust and stimulated a friendly environment in which the negotiations took place. "*The negotiations were very intense, but always civil. I had a lot of respect for them and they had a lot of respect for me*" It also decreased the resistance of the employees of the target to the acquisition. In fact, most of the employees were happy to become part of Belganet, since they worked so well together in the past: "*The moment the acquisition was completed, the CEO of Mobile Everywhere started communicating this to his employees; at that point in time they were very happy to become part of Belganet*". The fruitful collaboration before the acquisition created a climate of trust that had a positive impact on the negotiations and implementation phase. Several studies confirm that high levels of trust between partners stimulate people to engage in social exchange and by doing so share more knowledge and information (Ring & Van de Ven, 1992). Since effective knowledge transfer is crucial for the success of technology acquisitions, trust contributes to a considerable extent to the performance of the acquisitions. Trust increases the willingness of partners to share knowledge and information (Inkpen & Tsang, 2005), because it alleviates the fear for opportunistic behaviour from the other partner(s) in the collaboration (Bradach & Eccles, 1989). Moreover, trust facilitates the process of exchange tacit and difficult to codify information, which is by definition hard to communicate and to trade by markets (Kogut & Zander, 1992). The following figure

summarizes the mechanisms through which search affects the acquisition process and acquisition outcome:

Figure 6: How search affects the subsequent phases of the acquisition process and the acquisition outcome.



2.4.1.2. The impact of selection

The search phase is followed by a selection phase, which comprises the selection of one acquisition target and a technical and a market or business due diligence. The technical due diligence was done properly: Belganet did have a good understanding of the technology beforehand. They knew what the technology was about and what the application could do. The business or market analysis on the other hand, aims at assessing the business potential of the acquisition. Since technology acquisitions seek to create synergies by leveraging the technological knowledge of entrepreneurial ventures by linking them to the complementary assets of large companies in manufacturing and distribution (Puranam et al., 2006), the acquirer creates value by conquering and scaling up the market created by start-up companies. This implies the expected synergies are by nature revenue synergies. It was expected that synergies could be realized by coupling the customer base of Belganet (which consists mainly of small and medium enterprises) and the product of Mobile Everywhere. However, during implementation it became clear that this was not as easy as expected. One of the most important reasons why the acquisition failed to realize the expected synergies was a misjudgement of these expected revenue synergies. During the interviews it became clear that the market potential of the technology of Mobile Everywhere was somewhat misjudged. Hence, the expected synergies were not realised. There are a number of other reasons why sales didn't increase as predicted. First, selling the product of Mobile Everywhere is

completely different from selling traditional Belganet products. These differences in sales cycle limited the organizational fit between the two companies, which consecutively impedes the effective realization of the expected synergies (Jemison & Sitkin, 1986): *"We were box movers. Mobile Everywhere is not a box mover. It's a real application. This means that the sales cycle is longer than expected. We thought it would take about one month, but in fact it takes on average six months… This also means that we don't have discussions with the persons we are used to discuss with. Up to here we always communicated with the CIO or the Chief Telecom Officer and now all of a sudden we have to talk to sales people… Our people don't even have to sell the application. They just have to generate leads and the Mobile Everywhere sales people will do the rest. But our sales people are not at ease with this…"* Another interviewee adds: *"Selling a regular Belganet product is rather reactive. The customer needs something and we give them what they need. Since Mobile Everywhere focuses on sales people in Fast Moving Consumer Goods (FMCG) and Pharma, you need to know the world of FMCG and Pharma to determine their needs. The sales people at Mobile Everywhere actually come from FMCG and Pharma. They need to ask themselves: 'How can my applications facilitate their processes?' The process is more proactive."* Several interviews with managers from sales confirm this: *"Our sales people can learn about the technicalities of this product but it's far more important to know the business. You need to know what these sales people in FMCG and Pharma do day in day out in order to know how you can be of service for them. Maybe it would be a good idea to merge Mobile Everywhere and Belganet people so that they can learn this from each other.".* Second, the current market potential of the product was overrated. Apparently, the adoption of the Mobile Everywhere product is still in its early adopters phase. Also the interviews confirm that the market for the Mobile Everywhere product is in its early phase: "*There are about 600.000 small and medium enterprises in Belgium. Some of them might be interested in the product, but for this type of applications, the small and medium enterprises are followers. They follow what happens in the corporate market. There may be some early adopters in that market segment but it's very hard to find them."* Someone else confirms: "*The acquisition took place too soon. The SME market is not ready. If you look at the references within Mobile Everywhere, you notice that most of them are large companies. There are a number of small companies, but they are active in the same market as the big companies*". The main reason why these misjudgements occurred is because the client department, that is the sales and marketing department, was not

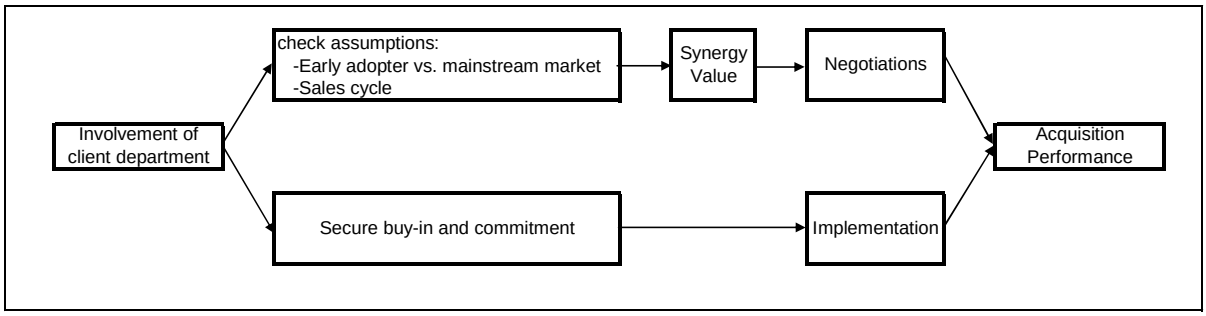
involved in this stage: "*The business case calculated during the due diligence phase does not correspond with reality. During the valuation of the opportunities, sales targets were set but they were never challenged with sales. What I mean is that they never checked whether sales could sell this product? Do we need coaching or real tools to sell this product? Is this part of our targets and are these targets realistic? We should have been involved in the previous phase to prepare for the hand-over and implementation"*. The sales and marketing department interacts on a daily basis with the customer and has of course a deep understanding of the dynamics, needs and preferences in that market. Based on this market knowledge, involvement of the sales and marketing department would have led to more accurate estimations of the expected synergies. This would in turn have affected the negotiations, since the stand-alone value of the target and the synergy value determine the lower and upper margin for negotiation the acquisition prices.

The involvement of the client department (i.e. the department that is responsible for the implementation, in this case the sales and marketing department) in the due diligence phase is also essential for another reason. After the deal was completed, the acquisition file was handed over the sales and marketing department, who now became responsible for the realization of the synergies. However, it soon became clear that there was a lack of commitment and buy-in to implement the synergies effectively. The persons, who were responsible for the implementation of the deal, were not involved in the preparation of the file. As a result, the marketing and sales team was only involved after the closing of the deal. This implies that when the deal was closed the sales & marketing targets were not part of the marketing and sales roadmap of that year. One of the interviewees puts it as following: "*We expected that when Belganet would sell the product of Mobile Everywhere, sales would increase a lot. But this didn't happen the first year because it (the product) was not included in the sales targets of the sales guys. These things should have been prepared before the hand-over, before signing the deal. And the same applies for the marketing roadmap. After the deal was signed, I just received the file and they said: go and implement it! So the first thing I did was to check the contract we signed and what our commitment was. We checked with all the persons in charge how we could put into operation these targets. This went really slow. This really was a change of mind-*

sets… The problem is buy-in. First you need buy-in from the management. This was very hard to obtain. The implementation should be a top-down buy-in process. However, after the hand-over we did a lot of work to get the targets operational. This really was a top-down process that took a lot of time, because both the marketing roadmap and sales targets were already set, it's very time-consuming to change this." The responsible for the market of small and medium enterprises confirms: "*There was a lot of resistance to implement the case. This is not only the case for the small and medium sized market but also for the other market segments. If we include the product of Mobile Everywhere in our targets because it is of strategic importance, the people from strategy and business development will sure be happy, but they only have an advising role. They have no hierarchical power to say: go and implement it!*". These findings imply that if the client department was involved sooner in the pre-acquisition phase, the implementation would have went off more smoothly. The sales and marketing department would have had the time to translate the synergies into sales targets and a marketing roadmap which naturally increases the commitment of the sales and marketing department to the project. One of the managers of the Strategy and Business Department realizes that it was indeed important to effect the commitment of the client department: "*The problem is that we are not in charge of sales and marketing. It is hard for us to say: guys, you do it! We really need to try to involve those people in the file and motivate them to participate*".

To summarize, the client department should have been involved in the selection and due diligence phase for two reasons. First, the client department, which is the sales and marketing department, is best placed to check the assumptions made in the evaluation of the acquisition file, as this is the department where the market knowledge resides. Second, involvement of the client department during selection and due diligence secures the buy-in of this department and allows them to prepare for implementation. Large organizations are typically confronted with heavy processes. Involvement in the earlier phases allows them to translate in time the expected synergies in sales targets and marketing roadmaps.

Figure 7: How selection affects the subsequent phases of the acquisition process and the acquisition outcome

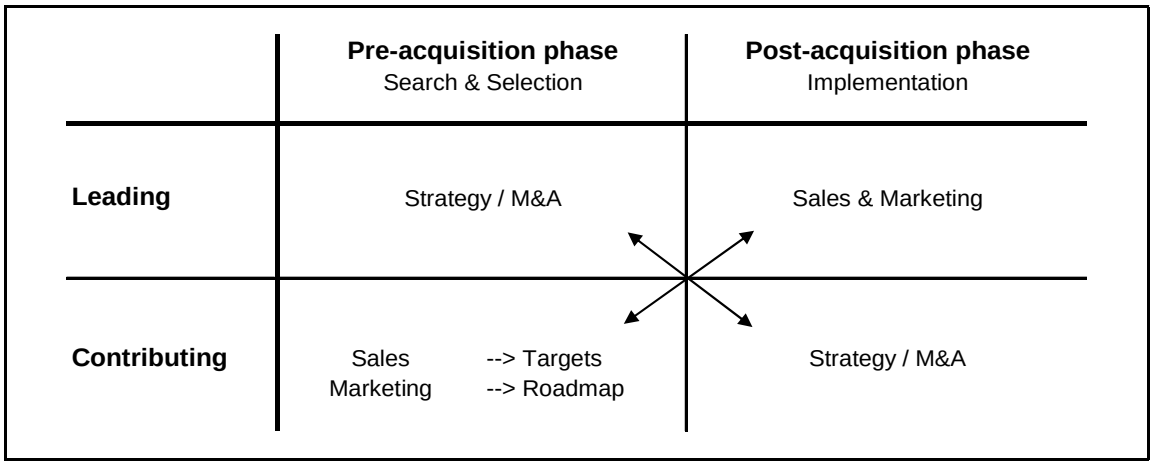


2.4.1.3. Managing the process as a whole

The fact that the different components of the acquisition process are interrelated has also an impact on the management of the process, more specifically on the team in charge. The acquisition process comprises conceptually and operationally different analyses done by different people (Jemison & Sitkin, 1986). Analysing the different aspects of the acquisition process require different competences, consequently the knowledge on the acquisition file is divided among several individuals. However, the knowledge on the acquisition file is mainly tacit by nature. Knowledge literature defines tacit knowledge, as opposed to codified knowledge, by its dissociation from practice, experience and know-how, it is deeply rooted in action, commitment and involvement in a specific context (Nonaka, 1994). Research further indicates that the proportion of an organization's knowledge resources that reside in the minds of people is probably somewhere between 80 and 99% - the overwhelming majority of an organization's knowledge thus resides in the heads and hands of their staff. Tacit knowledge is incommunicable and difficult to transfer, as opposed to explicit knowledge which is easily codified and translated (Nonaka & Takeuchi, 1995). This lack of explicit knowledge in the acquisition process hinders the transfer of knowledge and plays a part in the team composition and management. As it is difficult to transfer the knowledge of the acquisition file, it becomes critically important to manage the whole acquisition file by the same acquisition team. In the case we studied however, there were frequent changes in the team responsible for the implementation as is proven by the following quotations: "*there has been an evolution in the file. ABC, DEF and I are no longer involved. I think, nowadays, it is mainly XYZ who manages the file*". Another interviewee confirms

"*The first matter that didn't go well, was the handover of the file. We only received the file once it was signed. Other than that: nothing!! We should have been involved earlier, during the preparation of the file, to prepare the hand over*". Also the person in charge of the selection and negotiations acknowledges that many problems arose from the handover of the file: "*The implementation, there it all went wrong. I had the drive, but from the moment the cheque was handed over, I was no longer in charge. I am not saying that I should have done better. But we should see to it that the person, who was in charge of the acquisition itself, is also responsible for the implementation and the creation of synergies*". Further in the interview he repeats: "*The mistakes mainly occurred after the acquisition. Then the file was handed over from Business Development to the other team. Moving the file from one team to another means losing the dynamics. Just the fact that all the knowledge on the file needs to be transferred takes months!*". The situation was even deteriorating after the reorganisation of Belganet. Numerous interviewees confirm: "*Several people that were involved in the acquisition file, were assigned to another function*". These findings lead us to believe that team longevity is an important driver of acquisition success. Therefore, ideally the acquisition should be managed as a project, where one manager has direct access to and responsibility for the work of all those people involved and the core group of people are dedicated and physically co-located with the leader. These types of teams are called heavyweight teams (Clark & Wheelwright, 1992). However, due the specific nature of the acquisition, the roles of the different peoples will change. The strategy or M&A department will have leading role during the pre-acquisition phase as it is their responsibility to search for and appraise potential acquisition targets, however input from the client department is desired for the reasons elucidated in the preceding part; their role should be contributing. Once the deal is closed and the acquisition reaches its implementation phase, the roles should be switched around as the client department becomes responsible for the operational management of the acquisition. Nevertheless, the strategy or M&A department should still fulfil a contributing role because of the thorough knowledge they have built up during the pre-acquisition phase. This model is presented in the figure below.

Figure 8: Managing the process as a whole



2.5. Discussion

By studying how the decisions taken and actions executed during the search and selection stage affect the implementation of the acquisition and the extent to which the expected synergies were realized, we demonstrate that issues of information asymmetry are not limited to the preacquisition stage and neither are coordination matters only of interest during postacquisition implementation. Further, our study indicates that measures taken to alleviate information asymmetry can also foster coordination. Similarly, actions undertaken to smoothen the implementation also reduce information asymmetry.

Building on the literature on search, we define search in the context of technology acquisitions as the use of joint ventures, alliances, joint development, contract R&D, licensing, etc to access new knowledge and information. They serve as learning mechanisms allowing the firm to learn and enlarge its knowledge base. Our findings illustrate that the use of these mechanisms help to reduce information asymmetry between the acquirer and potential acquisition targets, decreasing the chances of preacquisition misjudgment. However, these mechanisms also foster coordination as the knowledge and the trust that were built during preacquisition collaboration also help when implementing the acquisition and realizing the expected synergies.

Second, we discovered that coordination of the activities of target and acquirer is not something that only becomes relevant after the closing of the deal when the

postacquisition phase begins. We demonstrate that coordination issues should already be considered during the preacquisition stage. For this purpose, involvement of the client department during preacquisition is recommended. This not only allows to check whether the expected synergies to be created during the postacquisition stage are realistic, it also secures the commitment of the client department to the implementation of the acquisition. Another advantage of this approach is that it reduces information asymmetry between the various parties involved in the acquisition process on the side of the acquirer. Our empirical evidence indicates that information asymmetry problems do not only occur between acquirer and target but also between the various parties involved in the acquisition on the side of the acquirer. Involvement of the client department during the selection stage may prevent that the knowledge gathered during preacquisition activities gets lost when the file is handed over to the team responsible for implementation.

2.6. Conclusion

Organizations depend more and more upon their ability to access and exploit external knowledge to build up and sustain competitive advantage (Cohen & Levinthal, 1990). Technology acquisitions are just one mode of accessing and exploiting this external knowledge, however both business practice and literature indicate that technology acquisitions have become an important means to obtain access to innovative technologies (Vanhaverbeke et al., 2002; Puranam et al., 2006). But despite the abundant literature on technology acquisitions, we still lack a deeper insight in the entire process of managing acquisitions, from strategy definition to implementation and performance. There are a few papers that studied the phenomenon from a process perspective (such as Jemison & Sitkin, 1986, Birkinshaw et al., 2000; Ranft & Lord, 2002), yet their focus is mainly limited to the integration process. This paper addressed this gap in literature by looking at the entire acquisition process and examined how this process affects acquisition performance. More specifically, we investigated how the different process components are interrelated and how decisions and managerial actions made during the search and selection phase affect the implementation and the acquisition outcome. We used an in-depth case analysis to gain a deeper understanding of the acquisition process and its impact. The interviews revealed that both search and

selection are crucial in preparing the implementation of the acquisition, as they moderate some of the typical selection problems (such as information asymmetry) and implementation problems (such as resistance of the personnel). First, we investigated the impact of search on the subsequent stages of the acquisition process. We defined search as accessing external information and knowledge on new technologies by means of alliances, corporate venture capital, and joint ventures. We found that search contributes to acquisition performance through two mechanisms: increased market and technological knowledge and trust. On the one hand, the market and technical information gathered during the search activities lowers the level of information asymmetry and leads to better selection decisions, which in turns contributes to acquisition performance. On the other hand, these search activities allow building up a relationship with the potential target. The trust established during this cooperation leads to decreased resistance with the employees of the target firm and also facilitates the process of negotiating the deal, which again contributes to acquisition performance. Second, we explored how decisions taken during the selection and due diligence process influence the subsequent stages of the acquisition. We identified involvement of the client department as a crucial success factor in the acquisition process for the following reasons. First, the client department is best suited to check a number of assumptions, especially the assumptions related to the market, such as the adoption of the technology in the market and the sales cycle, for this knowledge is an important input factor in the calculation of the synergy value of the deal and therefore affects the negotiations and acquisition performance. Second, the involvement of client department during the pre-acquisition stages also secures buy-in and the commitment of this department to acquisition, thereby reducing the resistance of the employees to the acquisition and facilitating implementation. Finally, we discovered that the interrelatedness of these process components has implications for the team that is managing the acquisition. In particular, the interviews revealed that acquisitions might benefit from project management, where one dedicated team is responsible for the management of the file. Together, these findings raise a number of issues that up until now, received limited attention in the research of technology acquisitions.

This paper makes a number of contributions, both on a conceptual and an empirical level. First, we add to the literature on technology acquisitions. By jointly studying the preacquisition and postacquisition stage, we integrate insights of the economics of

information view with the organizational view to provide a more complete picture of the acquisition process. The conceptual frameworks developed in this paper demonstrate that information asymmetry issues are at play both in the pre- and postacquisition stage. Further, these information asymmetries not only exist between acquirer and target but also occur between the various teams of acquiring company. Correspondingly, coordination problems are not limited to the postacquisition stage but should also be considered during the preacquisition stages. To manages these problems related to information asymmetry and coordination, our paper makes proposes two mechanisms taking in account the flow of the acquisition process. Doing so we illustrate that acquisitions are a path-dependent process as preacquisition decisions affect postacquisition implementation and vice versa. Second, this paper illustrates the importance of proper knowledge management during the acquisition process. Much of the knowledge gathered during the acquisition process is tacit by nature. Consequently managing the knowledge transfer between the various teams responsible for the management of the acquisition within the acquirer is equally important as managing knowledge transfer between acquirer and target. In addition to these conceptual contributions, this study makes a practical contribution. The insights developed in this study could help both the acquirer and the target to optimize their acquisition strategy and performance.

As any study, also this one is characterized by a number of shortcomings. First, as we study only one acquisition in great depth, the external validity of our findings is questionable. Additional research is required to explore the proposed mechanisms in other contexts and sectors. In a first stage, more case studies are recommendable. Later on this should be followed by statistical testing to ensure external validity. Further research is also required to gain a deeper insight in the proposed mechanisms and to verify the discovered relationships. Another shortcoming of this study is that we were not able to study the process real-time. Though we took some measure to reduce potential bias due to retrospective thinking, real-time studies would yield even more fine-grained grained results.

2.6. References

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3. Young High Tech Firms, Resources and Trade Sales

ABSTRACT

The most likely exit for a VC investing in a YTBF is a trade sale. An increasing number of scholars have investigated the determinants of a successful acquisition. However, most studies analyse acquisitions from the perspective of the acquirer and focus on managerial actions before and after acquisition that are likely to increase acquisition success. We adopt the perspective of the YTBF and analyze to what extent managerial actions undertaken by these firms impact its likelihood of being acquired and its eventual acquisition return. We build on insights from resource-based theory to develop hypotheses on the impact of resources on acquisition likelihood and return. In a sample of 285 UK YTBFs, we find that patents and the hiring of experienced top managers result in a higher acquisition likelihood, while revenues and partnerships contribute to acquisition return.

3.1. Introduction

The commercialization strategy of a young technology-based firm (YTBF) is a crucial determinant of its success (Rothaermel & Deeds, 2004; Kasch & Dowling, 2008). Gans and Stern (2003) extended Teece's (1986) framework and showed that the commercialization strategy of a YTBF will depend on the appropriability regime of the technology on which the firm is based and the distribution of complementary assets in the product market it wants to target. In many cases these complementary assets are tightly held by a few incumbents and it is almost impossible for the YTBF to enter that market. In such circumstances, a well-functioning "market for technology", characterized by a tight appropriability regime, can enable the YTBF to commercialize its technology through selling licenses, performing contract research, or by collaborating with a large company which owns the complementary assets to turn the technology into a product (Hsu, 2006).

Although the markets for technology are important to generate revenues, their functioning is dependent on the appropriability regime. Even in tight appropriability regimes, these markets are unlikely to generate the revenues and growth prospects a typical VC is interested in (Clarysse et al., 2009). Instead, it is typically the potential trade sale of the YTBF to an incumbent which attracts the attention of the venture capitalist (Ritter, Gao & Zhu, 2011). Gans, Hsu and Stern (2002) consider "cooperation with and acquisition by large incumbents" as a potential outcome when the appropriability regime is tight and a necessary outcome if the complementary assets are tightly held. However, they combine cooperation and acquisition as one construct and only focus on the impact of environmental factors on the probability of cooperation and acquisition, without making any distinction between different YTBFs operating in similar environments. Understanding the managerial actions which lead to a successful trade sale (i.e. acquisition of the YTBF by an incumbent) is thus an important step in analyzing the strategic choices that a YTBF has to commercialize its products in complex environments (Clarysse et al., 2009).

To analyze management's strategic actions that optimize both the likelihood the YTBF will be acquired and the acquisition return, we build on insights from the resource-

based view of the firm (Barney, Ketchen & Wright, 2011; Hoopes, Madsen & Walker, 2003). Resource-based theory focuses on explaining the characteristics of resources and capabilities that contribute to a firm's competitive advantage (Hoskisson, Hitt, Wan & Yiu, 1999), thereby providing guidance to managers seeking to build and exploit a competitive resource base. YTBFs in possession of a portfolio of valuable, rare, imperfectly imitable and substitutable resources not only create a competitive advantage for themselves, but also become attractive acquisition targets in the eyes of the incumbents in the industry. More specifically, we investigate to what extent social, human and technical resources contribute to a YTBF's attractiveness as an acquisition target, the likelihood of acquisition and to what extent revenue generating capabilities contribute to the acquisition return. While technical resources and capabilities are the main assets to be sold in case of an acquisition of a YTBF (Puranam, Singh & Zollo, 2006), we argue that human and social resources are also required to become an attractive acquisition target. Much of the value of technology ventures resides in the human capital of the company as the knowledge of YTBFs, which is typically tacit and socially complex, is embodied in the founders and key personnel of the firm (Graebner, 2004). The experience of the hired top managers helps the YTBF to develop and grow and attract the interest of potential investors. Social capital also contributes to the attractiveness of YTBFs as acquisition targets as it allows them to overcome resource constraints and acquire knowledge and resources that would otherwise be unavailable (Colombo, Grilli & Piva, 2006). Thus, in addition to technical resources, human and social resources are needed to bring the YTBF to a maturity level which attracts the attention of potential acquirers. Furthermore, we argue that the price paid for a YTBF will reflect the revenue generating capabilities of the YTBF. YTBFs typically encounter difficulties when transforming their rent potential into profits (Durand, Bruyaka& Mangematin, 2008). However, when they are able to demonstrate their rent appropriation by generating revenues and entering into commercial partnerships this is likely to make them more attractive acquisition targets resulting in higher acquisition returns.

Empirically, we examine the hazard of being acquired and the acquisition return, defined as the difference between acquisition price and amount of venture capital received, divided by age at exit, in a sample of 285 British young technology-based firms. Our results show that acquisition likelihood is affected by the number of experienced

top managers and the patent stock a YTBF has, while acquisition return is influenced by revenues, number of commercial and research partners and patent stock.

Our analysis makes a number of contributions. First, by focusing on technology acquisitions, we extend the literature on cooperative commercialization strategies which predominantly focuses on alliances with companies owning the complementary assets as a route to market (e.g. Colombo, Grilli & Piva, 2006; Rothaermel & Deeds, 2004). We analyze the strategic actions which make the strategic choice of a trade sale more likely and which create value to increase the success of a trade sale. In doing so, we go beyond the literature that analyzes acquisitions from the perspective of the acquirer to consider the perspective of the YTBF being acquired. Second, our study is one of the first distinguishing between the factors influencing acquisition likelihood and those driving acquisition return. Conceptually, our results seem to indicate the existence of various types of technology acquisitions depending on the strength of the appropriability regime. When YTBFs can protect their technology with a strong patent portfolio, having commercial partnerships to demonstrate their commercial potential is not necessary as it has a negative impact on acquisition return. Conversely, YTBFs with no patents do benefit from having commercial partnerships as they contribute to the acquisition return. This seems to suggest that a company lacking in patents to protect its technology should take its venture one step further along the company development cycle and prove commercial viability by establishing commercial partnerships. Third, our analyses serve to extend the limited literature on exits from YTBFs by shifting the focus to trade sales, which are a more frequent exit option than IPOs. Ritter et al. (2011) argue that this is a structural shift which is likely to remain for the following reason. As innovation speed has increased to the benefit of large firms, a small firm is worth more as part of a larger organization than as an independent firm. By being part of a larger organization, small firms can benefit from economies of scope and bring new technology to market faster. Finally, our findings are relevant for managers seeking to optimize their chances of a successful trade sale by highlighting those strategic actions that contribute to acquisition likelihood and acquisition return.

This paper unfolds as follows. In the next section, we first provide a review of previous research on commercialization strategies in general and technology acquisitions specifically. We then build a theoretical framework and hypotheses drawing on

resource-based theory. We argue that acquisition likelihood is determined by the presence of technical, social and human resources, while acquisition return depends on the capabilities of the YTBF to generate revenues. Third, we describe the unique sample we collected and propose the methodology used to operationalize the constructs. Fourth, we test the effect of various resources and capabilities on the acquisition return, controlling for the likelihood of being acquired and discuss the results. Finally, we discuss the contribution of the paper and further avenues for research.

3.2. Literature review

Arora, Fosfuri and Gambardella (2002) define markets for technology as "transactions for the use, diffusion and creation of technology. This includes transactions involving full technology packages and patent licensing as well as transactions involving knowledge that is not patentable. These transactions can take different forms, from pure licensing to complicated collaborative agreements." The literature on markets for technology has primarily focused on the circumstances under which firms will engage in licensing (Arora, Fosfuri and Gambardella, 2001; Fosfuri, 2006). Increases in the effectiveness of patent protection lead to increased licensing propensity, but only when the firm lacks specialized complementary assets required to commercialize new technologies (Arora and Ceccagnoli, 2006).

Firm size has also been found to be an important determining factor in explaining patent licensing (Gambardella, Giuri and Luzzi, 2007). However, even in well-functioning markets for technology, the revenues which YTBFs generate through licensing and contract research may not be sufficient to support profitable growth (Clarysse, et al., 2009). This literature has ignored trade sales as a potential commercialization strategy for YTBFs in the market for technology. By selling to an incumbent in the industry, the YTBF gains access to the complementary assets necessary to speed their product to the market and/or increase market share. This generates returns for the owners of the YTBF, either in the shape of earn-outs (linked to the performance of the acquisition target), shares or cash.

A parallel stream of research has focused on the commercialization strategies of innovative start-ups firms, building on the seminal work of Teece (1986). This research has shown that the appropriability regime in the form of strong intellectual property rights, the presence of intermediaries such as venture capitalists and high levels of sunk costs of market entry increase the chance that the start-up will cooperate with holders of complementary assets (Gans and Stern, 2003, Gans et al., 2002). Cooperation includes both acquisition by the incumbent firm and collaboration with the incumbent. Gans and Stern (2003) build on these results to develop a framework that guides the innovative start-up in choosing the appropriate commercialization strategy. Only in the scenario of weak appropriability regimes and unimportant complementary assets that are widely spread among incumbents is a commercialization strategy which targets acquisition (and cooperation) an unlikely scenario. As a result of these findings, Aggarwal and Hsu (2009) and Kasch and Dowling (2008) have further explored the antecedents of cooperative strategies. However, these studies either do not explicitly distinguish acquisitions from strategic alliances or other forms of collaboration or they specifically exclude acquisitions from the study (eg. Hsu, 2006; Kasch & Dowling, 2008).

In addition to the unclear role which acquisitions play, prior studies have also predominantly focused on how environmental factors impact the most likely commercialization strategy, thereby overlooking the differences which might exist between companies that operate in a similar environmental space. As a result, these studies leave no room for managerial agency and neglect to investigate which managerial actions help in realizing the selected commercialization strategy. This is a major shortcoming in the literature which focuses on value creation strategies. To compensate, we combine insights from the literature on commercialization strategies of YTBFS with insights from the resource-based view of the firm. The resource-based view of the firm states that the competitive advantage and thus success of a firm critically depends upon the bundle of resources at the firm's disposal (Wernerfelt, 1984). These resources only create above average value if the following conditions are met: the resources are valuable, rare, imperfectly imitable and not substitutable (Barney, 1991). Applying these principles in the context of trade sales, implies that the acquisition success of YTBFs critically depends upon the resources the firm has acquired. The more

valuable, rare, imperfectly imitable and substitutable the resources of the YTBF, the higher are the chances that the firm will be able to realize a trade sale on favorable terms (i.e. a higher return). In the next section, we develop five hypotheses on how the YTBF's resources and capabilities contribute to the chances of a YTBF realizing a successful trade sale.

3.3. Hypothesis development

While the literature on markets for technology and commercialization strategies of young technology-based firms has largely focused on environmental factors influencing the chosen commercialization strategy, the resource-based view (RBV) offers a framework which allows us to evaluate how YTBFs should behave in order to be successful in their chosen commercialization strategy. Central to the RBV is the argument that differences in performance between companies can be explained by differences in acquired resources. YTBFs seeking to be acquired should optimize their resource base so that it becomes valuable for the future acquirer. A resource can be defined as an asset or input to production both tangible and intangible that an organization owns, controls, or has access to on a semi-permanent basis (Helfat & Peteraf, 2003). In the late nineties, resource-based theory was extended to dynamic markets and includes capabilities besides resources as a source of competitive advantages (Eisenhardt & Martin, 2000). Organizational capabilities can be defined as "the ability of an organization to perform a coordinated set of tasks, utilizing organizational resources for the purpose of achieving a particular result" (Helfat & Peteraf, 2003, p 999). This implies resources are only valuable when the organization has the capabilities to deploy those resources.

3.3.1. Technical resources

Technological resources constitute the core of a firm's competitive advantage. They comprise an organization's patents, technological knowledge and production skills that are valuable and difficult to imitate by competing firms (Lee, Lee & Pennings, 2001). These technical resources and capabilities are even more imperative for YTBFs (Shrader & Simon, 1997). Consequently, patenting is an important way for YTBFs to establish themselves in the technological domain in which they operate. Patenting allows the YTBF to disclose information about its most important asset without the risk of losing the returns on its inventions. The ability to stake technological claims is a critically important for a young venture's future potential (Baum & Silverman, 2004). In R&D intensive and innovative environments, patents are an important indicator of the appropriability of future returns of innovation (Teece, 1986). Not patenting may be seen as forgoing the economic returns of one's invention and inappropriate behavior. Intellectual property protected by patents confers value creation by allowing the YTBF to solely commercialize its technological inventions, seize market opportunities and differentiate themselves from incumbents (Lee, Lee & Pennings, 2001). Venture capitalists view patenting as desirable behavior (Haeussler, Harhoff and Mueller, 2009), because it provides evidence that the firm is at a certain stage of development and has defined a certain market niche (Lemley, 2001). Independent evaluation by patent offices may lend credibility to the patent itself and to the company in possession of the focal patent. It indicates that the YTBF properly manages its technology; it serves as a sign that the firm has matured efficiently to consider various commercialization options and that the firm is willing to invest in the protection of its technology (Haeussler et al., 2009). As such, patents may provide YTBFS with an important competitive advantages as it excludes other companies from commercializing their technology. Patents indicate that the firm has technology that may be valuable to potential buyers, thus increasing the likelihood of being acquired and the acquisition return.

Hypothesis 1a: The more patents a YTBF has, the higher the likelihood that it will be acquired.

Hypothesis 1b: The more patents a YTBF has, the higher the acquisition return.

3.3.2. Human resources

Human resources include the training, experience, judgment, intelligence, relationships and insights of the individual managers and employees in the firm. Within the entrepreneurship literature it is widely accepted that qualified founders and top managers play a crucial role in the success of the venture (Colombo & Grilli, 2005; Cooper et al., 1994). For YTBFs the entrepreneur is the most critical source of human capital within the firm. Welbourne and Andrews (1996) indicate that firm-specific human capital in new firms is embodied in the management know-how and experience of the founding team. The knowledge about the sector and management embodied in the entrepreneur permits the YTBF to assess various commercialization strategies and the appropriateness of actions to pursue those strategies (Cohen & Levinthal, 1990). Entrepreneurs lacking such knowledge can hire experienced people to complement the management team. Hellman and Puri (2000; 2002) highlight the importance of obtaining sufficient executive turnover in order to increase professionalization within new ventures and to enhance growth. Consequently, the hiring of top managers with extensive experience in the field reflects the firm's effort to set up a qualified team with the skills and capabilities necessary to turn the venture into a success, resulting in a higher likelihood of being acquired and higher acquisition return.

Hypothesis 2a: The more top managers the YTBF has been able to hire, the higher the likelihood of being acquired.

Hypothesis 2a:Given the acquisition likelihood, the more top managers the YTBF has been able to hire, the higher the likelihood of being acquired.

3.3.3. Social capital

Various researchers in the social capital literature have demonstrated the importance of networks and partnerships for firm performance (Gabbay & Leenders, 1999). As firms typically represent only a fraction of the value chain, they depend upon other parties in the value chain to acquire resources (Pfeffer & Salancik, 1979). Consequently, organizations should develop strategies that allow them to build and exploit external relationships (Lee et al., 2001). In addition, social capital resources provide important

access to knowledge acquisition and opportunities to learn from partners and contacts, which in turn allows the firm to mobilize additional resources that would otherwise be beyond reach. Alliances are particularly critical for the success of YTBFs as in their early stages YTBFs are unlikely to dispose of all the resources and capabilities necessary to compete with incumbents (Colombo & Piva, 2008). Alliances or partnerships allow the YTBF to complement its resource base (Pisano, 1991; Eisenhardt & Schoonhoven, 1996) by providing access to the alliance partner's technological competences, knowledge of relevant markets and complementary assets needed for the successful commercialization of their technology (Colombo, Grilli & Murtinu, 2009). Partnerships thus contribute to a firm's competitive advantage thereby increasing its attractiveness as acquisition target. Therefore, we hypothesize:

Hypothesis 3a: The more partners YTBFs have, the higher the likelihood of being acquired.

Hypothesis 3b: Given acquisition likelihood, the more partners YTBFs have, the higher the acquisition return.

3.3.4. Revenue generating capabilities

While the above three types of resources help the YTBF to create visibility among future acquirers and increase acquisition likelihood, these resources are not sufficient to result in a high acquisition return. When determining the price to be paid for the acquisition of a YTBF, the acquirer will consider two things. First, the acquirer will consider the extent to which this acquisition will contribute to its revenues. Secondly, the acquirer considers the level of uncertainty associated with these revenues. In the process of technology commercialization and generating return, YTBFs face two challenges, namely rent generation and rent appropriation. YTBFs typically encounter difficulties when transforming their rent potential into profits (Durand, Bruyaka & Mangematin, 2008). Rent generation thus does not necessarily result in rent appropriation. A YTBF with the capabilities to generate revenues thus reflects the ability to transform its rent potential into rent appropriations, which in turn will be reflected in the acquisition return. Therefore, we argue, the higher the revenues generated by the YTBF, the higher the acquisition return.

Yet, not all YTBF are able to generate revenues. Technology commercialization is a complex process, entailing various steps such as acquiring ideas, augmenting them with complementary knowledge, developing and manufacturing saleable goods and selling those goods in the market (Mitchel & Singh, 1996: p 170). This process is characterized by high levels of uncertainty. Exploitation or commercial alliances tend to bridge the gap between rent generation and rent appropriation as they provide the YTBF with access to the complementary assets needed to bring its product to the market (Durand, Bruyaka & Mangematin, 2008). Hence, the more commercial partners a YTBF has, the more channels to market it has, and the higher the acquisition return. In addition, these commercial partnerships might indicate that the technology of the YTBF is closer to market, thereby decreasing the level of market uncertainty that still exists and contributing to the acquisition return. Hence:

Hypothesis 4: Given acquisition likelihood, the more revenues YTBFs have, the higher the acquisition return.

Hypothesis 5: Given acquisition likelihood, the more commercial partners YTBFs have, the higher the acquisition return.

3.4. Method

3.4.1. Sample and data collection

We define technology acquisitions as "the acquisition of YTBFs made by large established firms to graft the acquired technological capabilities onto their own resource bases" (Puranam et al., 2006: 263). For purposes of this study, YTBFs are defined as companies founded between 1991 and 2004 which develop and commercialize new products or services based upon proprietary technology or skills (Heirman & Clarysse, 2007). We take 2004 as our end point in order to allow sufficient time for exit by trade sale to take place. We begin the identification process of technology acquisitions from a sample of YTBFs instead of using a conventional acquisition database since these are less likely to pick up smaller private acquisitions. The VentureSource database from Dow Jones provides such a database. Our sample frame includes YTBFs located in the UK that received venture capital. We decided to

focus on VC-backed companies as these companies have to specific objective of realizing an exit. We identified a sample of 334 companies from this database. We were able to confirm valuation figures for 162 companies. Since we test for the likelihood of being acquired, a control sample was added to this original sample. Following Megginson and Weiss (1991) a matched pair methodology was used to construct a similar sample of non-acquired companies. Each acquired company was matched with a similar non-acquired company on the basis of the following criteria: year of founding and sector classification. To match the companies as closely as possible, we used the three-digit sector classification. If no companies matched that profile, sector classification was extended to match the two-digit classification. The matched companies were selected at random from a list of all companies that met the required characteristics. All companies in the matched sample were still active in the year of data collection, bankruptcies and IPOs were excluded from the analysis. This implies all companies are at risk of being acquired.

3.4.2. Dependent Variables

We operationalize two dependent variables. Only a fraction of investments succeed in realizing an exit through trade sale.. Therefore, a first step in realizing a successful exit is being acquired. We use the likelihood of being acquired as our first measure of exit success. The main goal of possibly realizing an exit is to generate a return. It is well known that VC firms and investors of technology ventures reap most of their benefits by exit either through IPO or trade sale (Cumming & MacIntosh, 2003). Consequently, we use acquisition return as our second measure of exit success. The two dependent variables are defined as follows:

Acquisition likelihood: this is a dummy variable indicating whether the young technology-based venture has been acquired (=1) or not (=0).

Acquisition return: We calculated the annual return to construct the depend variable. For this purpose we subtracted the total amount of venture capital financing received from the price paid for acquisition. The result was divided by the age of the firm in year of acquisition to generate acquisition return numbers.

3.4.3. Independent variables

3.4.3.1. Human, social and technical resources

To identify the extent of resources in YTBFs the following sources were consulted. First, the company profiles provided by VentureSource contained some information about the partnerships of the company. However, these data seemed incomplete, therefore we used two additional resources to measure the amounts in each of those resource categories. First, we checked the company website for information on the presence of partnerships, hired top managers and patents. In order to make sure that we only included those social and human capital resources that were present within the company before acquisition, we used an archived version of the company's website[3]. Second, we screened the press releases of the ventures to identify partnerships and hired guns. For this purpose, the database provided by Factiva was used. Detailed information about patents granted to the YTBFs was collected from Delphion.

Human capital (Hired Top Managers): this measure reflects the number of 'hired guns' of the company. It measures the number of top managers with more than 10 years of experience in the focal sector that were hired by the YTBF (Heirman & Clarysse, 2005). We counted the total number of experienced top managers that were hired by the YTBF from start-up until year of acquisition.

Social Capital: social capital is measured as the total number of partnerships communicated by the YTBF up until the year of acquisition. We consider three types of partners: affiliations with other companies (Number of Commercial Partners), affiliations with universities and research institutes (Number of Research Partners), affiliations with venture capitalists.

Technical resources (Patent Stock): this is measured by the patent stock of the YTBF. Patent stock is defined as the total number of applications filed by a focal firm that eventually resulted in a successful award of a patent (Hsu & Ziedonis, 2011; Haeussler et al., 2009; Heeley et al.). The Delphion database was used to perform the patent search. Of course only those patents that were assigned to the company were taken in account. Because the distribution of this variable was skewed, a log transformation was performed.

[3] www.archive.org provides a tool that allows accessing older versions of a company website.

3.4.3.2. Control variables

In the equation predicting acquisition likelihood the following control variables were included. First, we controlled for the experience of the lead VC who invested in the company with trade sales (VC Trade Sale Success). Clarysse et al. (2011) find that trade sale experience of the lead VC increases the chances of a company being acquired. We also controlled for size (Number of Employees) and age of the company (Age). In addition, the number of financing rounds (Number of Financing Rounds) and amount of VC financing (VC Amount) were included as controls, as both variables are a potential indicator of the quality of the venture and thus the likelihood of being acquired (Nahata, 2008). Regarding the acquisition return equation, we again include the number of financing rounds and amount of VC financing as they might reflect the underlying quality of the venture and subsequently acquisition return. Second, we included a number of sector dummies (Biotech dummy, physical science dummy and ICT dummy), as industries differ regarding effectiveness of appropriability regimes, market size, entry cost and average performance influencing the price an young venture is likely to receive at acquisition.

3.4.4. Heckman selection model

To test our hypotheses, we first analyze the acquisition propensity of a YTBF (i.e. a categorical variable indicating whether the YTBF was able to realize a trade sale or not). Second, for those companies that have been acquired, we investigate which factors influence acquisition return. To predict the acquisition return, we need to correct our sample for those ventures that have not been acquired because for these ventures, obviously, no acquisition price is available (Cochrane, 2005). The Heckman correction allows us to control for such a selection bias. Furthermore, the Heckman procedure allows us to estimate both equations – the one estimating acquisition likelihood and the one estimating acquisition return – simultaneously. However, this procedure requires different variables for each equation. More precisely, we need at least one variable in the selection equation which does not predict acquisition return. The selection of this variable should be driven by theory. Following Clarysse et al. (2011) our model includes the trade sale experience of the lead VC for this purpose.

3.5. Results

Table 2 presents the descriptive statistics for the entire sample summarizing the characteristics of the companies in year of acquisition. It also provides a correlation matrix. Although some of the independent variables show significant correlations, the absence of high levels of correlation between the independent variables implies that multicollinearity is probably not an issue in this analysis. This is confirmed by calculation of the variance inflation factors. The low level of correlation between VC Trade Sale Success on one hand and acquisition return on the other indicates that this measure meets the requirement of exogeneity and thus can be used to create the selection correction lambda.

Table 3 presents the descriptive statistics distinguishing between the acquired and the non-acquired firms. Most notable are the differences in terms of VC financing. The lead VC of the acquired firms has on average 24% trade sales in his portfolio, while the lead VC of the non-acquired firms has about 19% trade sales in his portfolio. Furthermore, the acquired firms receive on average more VC financing, 13.3 million Euros for the acquired firms versus 10.5 million Euros for acquired firms, in fewer financing rounds, 2.50 versus 2.98. Finally, the acquired firms generate on average almost twice as much revenues as the non-acquired firms. The acquired firms realize a mean turnover of 12.7 million Euros while the non-acquired firms realize merely 6.4 million Euros. In the next section, we investigate whether these differences explain the likelihood of being acquired.

Table 2: Summary statistics

Variables	Mean	Std. Dev	Correlation (* Significant at 0.05 level)													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Acquisition Return	4.47	16.49	1.00													
2. Acquisition Dummy	0.55	0.50	.*	1.00												
3. VC Trade Sale Success	0.22	0.13	0.01	0.18*	1.00											
4. Age	8.10	4.58	-0.21*	-0.02	0.07	1.00										
5. Number of Employees	102.69	368.10	0.03	0.08	0.02	0.25*	1.00									
6. Number of Financing Rounds	2.72	1.67	-0.07	-0.14*	0.06	0.04	-0.04	1.00								
7. VC Amount	12.00	18.05	-0.02	0.08	0.17*	0.08	0.16*	0.32*	1.00							
8. ASO dummy	0.11	0.31	-0.07	0.09	0.11	-0.07	-0.06	0.17*	0.16*	1.00						
9. Patent Stock	0.34	0.74	-0.05	0.05	0.03	0.07	-0.02	0.36*	0.36*	0.27*	1.00					
10. Hired Top Managers	0.83	1.38	-0.04	0.11	0.09	0.05	-0.01	0.20*	0.12*	0.15*	0.05	1.00				
11. Number of Commerial Partners	4.95	6.97	0.46*	-0.02	0.12*	0.09	0.16*	0.22*	0.13*	0.02	0.05	0.37*	1.00			
12. Number of Research Partners	0.25	0.76	0.15	0.04	-0.02	-0.04	-0.04	0.18*	0.10	0.19*	0.32*	0.00	0.01	1.00		
13. Number of Syndicate Partners	3.20	2.68	0.00	-0.01	0.19*	-0.04	-0.06	0.53*	0.50*	0.32*	0.40*	0.27*	0.20*	0.19*	1.00	
14. Revenues	9.87	25.65	0.12	0.12*	0.04	0.07	0.29*	-0.15*	0.15*	-0.06	-0.04	-0.04	-0.02	-0.06	-0.06	1.00

Table 3: comparison of acquired and not acquired firms

	Acquired Companies		Non Acquired Companies	
	Mean	Std. Dev.	Mean	Std. Dev.
1. Acquisition Return	4.47	16.49	n.a.	n.a.
2. Acquisition Dummy	1.00	0.00	0.00	0.00
3. VC Trade Sale Success	0.24	0.13	0.19	0.13
4. Age	8.01	4.52	8.20	4.66
5. Number of Employees	130.88	484.26	68.36	116.65
6. Number of Financing Rounds	2.50	1.47	2.98	1.86
7. VC Amount	13.26	20.52	10.46	14.41
8. ASO dummy	0.13	0.34	0.08	0.26
9. Patent Stock	0.37	0.74	0.30	0.73
10. Hired Top Managers	0.97	1.50	0.66	1.21
11. Number of Commerial Partners	4.85	7.81	5.08	5.82
12. Number of Research Partners	0.27	0.73	0.22	0.80
13. Number of Syndicate Partners	3.17	2.60	3.24	2.78
14. Revenues	12.70	32.50	6.42	12.44

Table 4 presents the results of the two stage Heckman selection model to predict the likelihood of being acquired and the acquisition return. Model 1 in table 4 gives on overview of the results for the base model, while model 2 presents the results of the hypothesis. Overall, this model is strongly significant (Wald chi-square = 94.97, $p < 0.0001$).

3.5.1. Likelihood of being acquired

First we explore the results for the dependent variable "likelihood of being acquired". The selection equations of Table 3 provides a deeper insight into the drivers of being acquired. The table confirms that the experience of the VC in trade sales ($p < 0.01$) is a crucial driver of the likelihood of being acquired. As this variable is not significantly related to acquisition return, it also meets the exogeneity requirements for use in the selection correction. Among the control variables, only the Number of Financing rounds have a significant impact, which is negative ($p < 0.01$). Concerning technical resources, measured as the number of patents granted to the YTBF, as hypothesized a positive impact on acquisition likelihood is noted. This impact is significant at the 0.05 level, thereby supporting hypothesis 1a. Regarding the number of Hired Top Managers, we

find a significant positive effect on acquisition likelihood ($p < 0.05$), supporting hypothesis 2a. Finally, we tested the relationship between various types of partnerships and the likelihood of being acquired. While commercial and syndicate partners have a negative sign and research partners have a positive sign, the coefficients are however not significant, and therefore we do not find support for hypothesis 3a.

Table 4: Heckman Selection Model

Heckman two step	Model 1				Model 2			
	Selection		Regression		Selection		Regression	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
VC Trade Sale Success	1.578 **	0.616			1.795 ***	0.631		
Biotech dummy			-2.154 *	4.685			-1.049	4.213
Physical Science dummy			-0.364	4.390			2.291	3.797
ICT dummy			2.348	3.402			0.499	2.868
Age			-0.976 ***	0.297			-0.756 ***	0.245
Number of Employees	0.000	0.000	0.003	0.003	0.000	0.000	-0.002	0.003
Number of Financing Rounds	-0.142 ***	0.051	0.655	1.385	-0.162 ***	0.060	-0.875	1.187
VC Amount	0.012 *	0.007	-0.048	0.099	0.010	0.007	-0.028	0.072
ASO dummy	0.623 **	0.293	-6.111	6.186	0.513	0.315	-5.364	4.533
Revenues							0.068 **	0.034
Number of Commercial Partners					-0.015	0.012	1.254 ***	0.168
Number of Research Partners					0.085	0.118	4.681 ***	1.636
Number of Syndicate Partners					-0.037	0.044	0.618	0.595
Patent Stock					0.288 **	0.146	-3.545368 *	2.096
Hired Top Managers					0.142 **	0.066	2.777283 **	1.004
Constant	-0.007	0.193	17.523 *	8.219	0.006	0.196	9.905	6.168
Mills Lambda	-10.025				-4.024156			
Observations	285				285			
Censored observations	123				123			
Uncensored observations	162				162			
Wald Chi2	12.95				94.97			

3.5.2. Acquisition Return

The regression models in table 3 present the results for the hypotheses on acquisition return. Among the control variables, only Age ($p < 0.01$) has a significant and negative effect on acquisition return. Although patents had a positive impact on acquisition likelihood, the impact on acquisition return is negative, but weakly significant ($p<0.10$), thus we find no support for hypothesis 1b. In contrast to hypothesis 2b, Hired Top Manager have a significant but negative impact on acquisition return ($p < 0.01$). Regarding revenues we find the expected positive effect, significant at the 0.05 level, thereby supporting hypothesis 4. Further, it appears that regarding acquisition return, the firm's partnerships become more important. All three types of partners have a

positive impact on acquisition return. Most importantly, the number of commercial partnerships positively affects acquisition return with a p-value below 0.01, thereby supporting hypothesis 5.

3.6. Discussion

We argued that acquisitions of YTBFs have become increasingly important. Despite this importance, the literature does not give much guidance about the factors that determine the likelihood of acquisition or the acquisition return. The entrepreneurship literature has looked at cooperation-based commercialization strategies including acquisitions, but focuses predominantly on environmental factors influencing commercialization choice, neglecting to discuss the impact of managerial agency and differences in resource base. We try to fill this gap by exploring the drivers of the success of acquisitions from the perspective of the YTBF. We used the resource-based view to explain how managerial actions to build resources increase the likelihood of acquisition and its return, using a sample of 285 innovative, British ventures. Regarding acquisition likelihood, our results indicate that both hiring experienced top managers and patenting contributes to the likelihood of a firm realizing a trade sale. Partnerships on the other hand have no significant effect on acquisition likelihood. Possibly, because all companies in our sample are VC-backed, they already have gained sufficient visibility with potential acquirers. Additional partnerships do not help to signal quality to create visibility and enhance likelihood of being acquired. Regarding acquisition return, we predicted a positive impact of revenues and commercial partnerships on acquisition return. Both hypotheses were supported. In addition, we find that also research partners contribute to acquisition return. Although they do not signal the ability to generate revenues, they do contribute to acquisition return. Perhaps these research partnerships indicate a more focused, closer to market technology (Clarysse et al., 2011) reducing risk and uncertainty. Surprisingly, the impact of Hired Top Managers on acquisition return is negative. Possibly, the acquirers prefers to pay YTBFs with experienced top managers in the shape of earn-outs instead of high acquisition prices in order to retain those managers, resulting in a lower acquisition return.

3.6.1. Conceptual implications

The conceptual implications of this paper are threefold. First, we contribute both empirically and conceptually to the literature on commercialization strategies. While previous research in this area predominantly focused on alliances as the most important mode of cooperative commercialization strategies, this study is one of the first to investigate the drivers of technology acquisitions as commercialization strategy. Moreover, by analyzing the strategic actions that contribute to acquisition success, we go beyond studies which have focused on commercialization strategy being shaped by environmental factors. Additionally, we distinguish between factors influencing acquisition likelihood and those influencing acquisition returns. Our results indicate that the resources and capabilities which contribute to acquisition likelihood are different from those contributing to acquisition returns. These results suggest that the resources needed to increase acquisition likelihood are the resources which allow the firm to develop to a certain level and reach a certain level of maturity. However, some of those resources might become redundant once the YTBF becomes part of a larger organization. As a result they have no effect on acquisition return. The growth process of YTBFs typically involves the following four stages: innovation assessment, offering development, commercialization and rapid growth, each of which requires different resources and capabilities (Partanen et al., 2008). In order to be considered as a potential acquisition target, the YTBF may need to reach at least the second stage (offering development) in order to be 'investor ready'. Reaching the offering development stage implies that the YTBF has proof-of-concept and incorporates the development of an initial business model (Morris et al., 2005). At this point the technical uncertainty has decreased to a level which attracts the interest of the acquirer, thereby contributing to acquisition likelihood. As a YTBF moves to the next stages of growth, namely commercialization and rapid growth, it develops its own marketing and distribution networks. Consequently, the YTBF becomes less dependent on the complementary assets of the acquirer, resulting in a higher bargaining power and higher acquisition returns. Hence, YTBFs with the capabilities to generate revenues and commercial partnerships have clearly reached the commercialization stage of growth, implying a higher bargaining power towards potential acquirers and acquisition return. Conceptually, this implies the existence of various types of technology acquisitions depending on the stage of development in the company life cycle. We expect that this is

driven by the strength of the appropriability regime, whereby companies lacking in patents to protect their technology should take their venture one step further along the company development cycle and prove commercial viability by establishing commercial partnerships and revenues. To test this, we conducted post hoc analyses (table 5) including the interaction effect between patents and commercial capabilities. These results confirm that companies lacking in patents to protect their innovations benefit even more from establishing commercial partnerships. For the interaction with revenues on the other hand, we find the opposite effect, however this is not significant.

Table 5: Interaction between patents and revenue generating capabilities

Heckman two step	Model 1						Model 2					
	Selection			Regression			Selection			Regression		
	Coef.		Std. Err.	Coef.		Std. Err.	Coef.		Std. Err.	Coef.		Std. Err.
VC Trade Sale Success	1.794674	***	0.631229				1.795	***	0.631			
Biotech dummy				-2.416		4.288				-2.177		4.297
Physical Science dummy				0.226		3.863				0.704		3.846
ICT dummy				-0.044		2.907				0.316		2.890
Age				-0.730	***	0.245				-0.740	***	0.245
Number of Employees	0.000		0.000	-0.001		0.003	0.000		0.000	-0.001		0.003
Number of Financing Rounds	-0.162	***	0.060	-1.046		1.172	-0.162	***	0.060	-1.300		1.164
VC Amount	0.010		0.007	-0.020		0.071	0.010		0.007	-0.016		0.073
ASO dummy	0.513		0.315	-4.070		4.362	0.513		0.315	-1.871		4.411
Revenues				0.070	**	0.034				0.067	**	0.035
Number of Commercial Partners	-0.015		0.012	1.266	***	0.167	-0.015		0.012	1.160	***	0.161
Number of Research Partners	0.085		0.118	4.263	***	1.598	0.085		0.118	4.640	***	1.640
Number of Syndicate Partners	-0.037		0.044	0.429		0.589	-0.037		0.044	0.605		0.606
Patent Dummy	0.288	**	0.146	2.971		4.085	0.288	**	0.146	-6.014		4.620
Hired Top Managers	0.142	**	0.066	-2.386	**	0.946	0.142	**	0.066	-2.321	**	0.958
Patent Dummy x Revenues										0.000		0.000
Patent Dummy x Commercial Partners				-0.932	*	0.512						
Constant	0.006		0.196	7.513		5.897	0.006		0.196	4.937		5.904
Mills Lambda	-0.048						3.76634					
Observations	285						285					
Censored observations	123						123					
Uncensored observations	162						162					
Wald Chi2	98.35						94.46					

Second, our insights enrich studies of the impact of VCs on YTBFs, which largely either focuses solely on IPOs or studies VC performance at portfolio level (considering jointly the number of IPOs and trade sales). Conversely, our study emphasizes trade sales as exit route. This focus is justified given the increasing importance of trade sales as exit route (Ritter, Gao & Zhu, 2011). Finally, we provide insights into the delicate trade-off between resources that contribute to acquisition likelihood and those that contribute to acquisition return.

3.6.2. Policy and practice implications

Besides these theoretical implications, this study also serves the interest of policymakers and practitioners. First, our results provide valuable insight for VCs as it helps them to advise portfolio companies to focus their resource building activities on those resources which are most likely to contribute to trade sale success. Similarly, YTBFs seeking to optimize their chances of a successful trade sale benefit from these insights. Our findings indicate that both patents and experienced top managers contribute to acquisition likelihood. However, YTBFs should take into account that these experienced top managers might become redundant once part of a larger organization. Our results reveal that depending on the strength of patent protection, different strategic actions are needed to increase acquisition return. Both revenues and commercial partnerships are important predictors of acquisition return, however commercial partnerships become even more important when YTBF cannot protect their technology with patents.

3.6.3. Limitations

As any study, ours has limitations. First, we were not able to collect data on environmental factors such as the appropriability regime of the technology nor on the way complementary assets are distributed in the markets which these companies target. This is an area for future research and controlling for these environmental contingencies might explain the contradictory results for the drivers of acquisition likelihood and acquisition price. Second, although we incorporate a longitudinal aspect in that we identify whether firms have exited, this study does not involve a panel dataset. Panel data would allow time lags between developing resources and capabilities and realizing a trade sale to be taken into account. Third, additional research is needed to unravel the impact of partnerships. Considering both the nature of the partner and the nature of the partnership could provide some more detailed insights. Fourth, the measures we use to capture human resources and VC experience are approximations. Taking into account the nature of the expertise of both parties could yield more fine-grained results. Finally, our study does not consider the differences that might exist between various industries. The biotech industry for example, has a very clear path to commercialization, while

capturing value from software is less straight-forward. We conducted preliminary post-hoc analyses that revealed that for each sector, experience of the lead VC with trade sales remains a stable predictor of acquisition return. In addition, we explored whether biotech firms and companies with a technology based on physical sciences differ from ICT companies. For the first group, patents are still positive and significant, while hiring experienced top managers has no significant effect. For companies in the ICT sector the contrary is true. Experienced top managers have a positive effect on acquisition likelihood, while patents become insignificant. Furthermore, the amount of revenues seems to contribute to the acquisition likelihood, while both commercial and research partners have a positive effect on acquisition return. These results seem to suggest that for companies in the biotech sector and in physical science the market for technology is a viable option as patents are the most important predictor of being acquired. In the ICT sector on the other hand, companies selling technology is sell straight-forward. Generating revenues and proving market acceptance by engaging in commercial partnerships seem to be more important in the pursuit of a successful trade sale. However, some caution is required when interpreting these results as the sample size for each sector is small. Further research is thus needed to explore the antecedents of a successful trade sale in each sector/industry.

3.6.4. Conclusion

Technology acquisitions have become increasingly important for YTBFs, both as a commercialization strategy providing access to the complementary assets necessary to bring their products to the market and as an exit route. However, received literature provides little guidance regarding the strategic actions which contribute to the realization of such a commercialization strategy. Our study is one of the first to analyze the strategic actions driving acquisition likelihood and return. Our results show that acquisition likelihood is affected by the number of experienced top managers and the patent stock a YTBF has, while acquisition return is influenced by revenues, number of commercial, research and syndicate partners and patent stock.

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4. Learning from Own and Others' Previous Experience: The Contribution of the Venture Capital Firm to the Likelihood of a Portfolio Company's Trade Sale

ABSTRACT

The objective of this paper is to examine to what extent different venture capital firms contribute to the likelihood that the portfolio company in which they invested will realize a trade sale. We use arguments from learning theory to hypothesize the relation between vicarious, experiential and congenital learning of the venture capital (VC) firm and the trade sale hazard of its portfolio companies. Based on our analysis of 206 VC-backed UK start-ups, we find that both trade sale experience of the VC and learning from syndicate partners with trade sale experience significantly increase the trade sale hazard. The routines and procedures learned from experienced syndicate partners complement experience accumulated through trial and error. Congenital trade sale experience of the investment managers on the contrary has no significant influence on the acquisition hazard.

4.1. Introduction

Trade sales have been recognized as the most likely exit route for venture capital (VC) backed start-ups (Cumming and MacIntosh, 2003). An exit by trade sale or acquisition happens if the entire firm is sold to a third party, often a strategic acquirer (Cumming and MacIntosh, 2003). Despite the fact that trade sales are such an important exit route, there is little theory about the factors influencing trade sale likelihood. The entrepreneurship literature has identified a number of contextual level factors which have a positive impact on the likelihood of a trade sale. Gans et al. (2002) highlight the environment in which companies start up, and more specifically the appropriability regime, as an important element of a likely trade sale. Start-ups in tight appropriability regimes can protect their technology more easily and hence are more likely to realize a trade sale. Others have focused on the strategic choices made by the VC-backed company to explain potential trade sale success. Porrini (2004) shows that cooperation with potential acquirers increases the likelihood of a trade sale for the VC-backed firm. The main reason why previous alliances increase trade sale likelihood is that they reduce information asymmetry between acquirer and target (Porrini, 2004; Reuer and Ragozzino, 2008).

One important actor for trade sale success, which - so far - has been understudied is the venture capitalist (VC). This is in contrast to the amount of studies of IPOs as an exit. Furthermore, within the private equity literature, there is extant literature suggesting that VCs monitor and add value to the companies in which they invest (Sapienza et al., 1996; Knockaert et al., 2006). In other words, they are assumed to add value beyond the money they provide. Various studies have tried to link the value adding activities VC firms bring to portfolio companies. Sapienza (1992) and Sapienza and Timmons (1989) for instance detected positive correlations between VCs' management support intensities and portfolio company performance. Schefczyk (2001) found that VCs who take an active role in their portfolio companies significantly increase the success rate of these companies. These studies have typically looked at revenues (Schefczyk,

2001), growth in revenues and/or employment (Bottazzi and Da Rin, 2002; Davila et al., 2003) or a combination of financial and technical performance shortly after investment decisions (Baum and Silverman, 2004). However, despite the importance of trade sales as potential indicators for success of VC-backed companies, the possible contribution of particular VC firms to the likelihood of a trade sale of their portfolio firm is an area which so far has been largely neglected in the received literature.

To fill this gap, this paper uses learning theory to evaluate the role played by the VC firm and its investment managers in their portfolio companies. Increasingly, researchers have argued that learning from previous own experiences or vicarious learning from others' experiences is an important way to acquire knowledge (Kim and Miner, 2007). We would therefore expect that the experience a VC firm has with previous trade sales will have a positive impact on the likelihood of a subsequent trade sale of its portfolio companies. The learning literature distinguishes between three types of learning. Experiential learning includes the knowledge which is acquired from own past successes or failures (Ingram and Baum, 1997). Vicarious learning is defined as learning from the trade sale experience of other VC firms (Kim and Miner, 2007). Finally, congenital learning or congenital experience refers to the experience which has already accrued in the industry before the particular VC firm is founded (Meyer and Rowan, 1977). This kind of experience or learning is induced into the VC firm by recruiting for instance experienced investment managers.

This research is based on the analysis of a sample of 206 VC backed UK start-ups. In addition, we conducted a qualitative investigation in which we interviewed eight VCs[4] with diverse levels of experience in liquidation events. In presenting our hypotheses, the quotes and insights obtained from these interviews are used to illustrate and clarify the learning processes taking place in the VC firm. They

[4] We interviewed one investment managers from each of the following VC firms: Imperial Innovations, Index Ventures, Amadeus Capital, Debaeque Venture Capital, Alta Partners, Allegis Capital, VentureScout and Aster Capital

are not meant to generate strong empirical findings to build theory upon, but rather to illustrate that the theory we used to develop our hypotheses accurately reflects our empirical findings.

This paper starts with a literature review in which we review the extant literature on the value-adding role of VCs. In addition to the value-adding role of VCs, we also briefly discuss the entrepreneurship literature on trade sales. In the following section, we outline in more detail the role played by the VC firm in increasing the likelihood of a trade sale. We suggest that the previous experience embedded in the VC firms, the experience of the investment managers setting up and/or joining the firm and the experience gained through the syndicate partners will play a significant role in determining the trade sale likelihood of the portfolio companies. Subsequently, we measure the effects of the different learning and experience variables, controlling for certain portfolio company and VC firm level characteristics. We conclude with a discussion of our findings and suggestions for future research.

4.2. Literature Review

Researchers have devoted much attention to the influences of VCs on the formation of start-ups (Barry et al., 1990) and further on the multiple ways in which VCs might enhance a start-up's performance (Baum and Silverman, 2004). In a recent literature review on the value added of VCs to their portfolio companies, Large and Muegge (2008) conclude that the different value-adding inputs of VCs can be classified as internally or externally oriented. Externally oriented roles are usually linked to the image or legitimacy, and to some extent to the credibility, of the portfolio company towards external stakeholders (Fried and Hisrich, 1995). Internal contributions in the portfolio companies include recruitment (Murray, 1996), controlling (Ehrlich et al., 1994), strategic consulting (Timmons and Bygrave, 1986) and entrepreneurial mentorship (Busenitz et al., 2004). Although informative, this type of research remains

mainly atheoretical, leaving the question *why* VCs can better play this role than entrepreneurs unanswered.

A second stream has adopted a more theoretical approach to why and how VCs add value to their portfolio companies beyond the capital invested. For instance, Dimov and Shepherd (2005) have taken a human capital perspective to explain the potential value added by VCs and demonstrate that general human capital contributes to the portion of IPOs realized by the VC firm. Knockaert et al. (2006) further extend the human capital perspective by arguing that VC investment managers who have previous entrepreneurial experience will be more engaged in value-adding activities than investment managers who lack that experience. Baum and Silverman (2004) not only include human capital as a potential determinant, but also highlight the importance of other forms of capital such as intellectual and social capital in explaining the coaching role of VCs in their portfolio companies. In summary, this literature has mainly used a resource-based perspective to explain differences in the behavior of VCs.

In parallel, a stream of VC literature with roots in the finance literature has looked at the performance of VCs at the portfolio company level, mainly focusing on IPOs of the portfolio companies. In this literature stream, measures of VC firm experience such as age, accumulative aggregate investment and number of investment rounds have been analyzed for their impact on IPO success or aggregate portfolio performance (Lerner, 1994; Gompers, 1996). More recently, indirect experience variables such as the network position of the VC firm (Hochberg et al., 2007), connectedness of the VC firm (Sorensen, 2007) or a composite measure of both experience and connectedness (Nahata, 2008) were added to explain the performance of VCs and their portfolio companies in terms of IPOs. In this empirically driven literature stream, there seems to be a clear consensus that the experience of the VC firm and its position within the networked community of VCs have a positive impact on the performance of the VC, measured by the IPO success of its portfolio companies.

Despite the fact that many papers have investigated the contribution of the value-adding role of the VC to performance at VC firm level or portfolio company level, the impact of these value-adding inputs on outcomes has been inconclusive so far (Large and Muegge, 2008). Much of this confusion has been attributed to the lack of consensus for measuring the outcome of those value-adding roles. Some studies have investigated performance at portfolio company level and studied the impact on outcomes such as company growth (e.g., Davila et al., 2003; Bottazzi and Da Rin, 2002) or time to exit (Giot and Schwienbacher, 2007), while other studies have considered performance at the VC firm level (e.g., Dimov and Shepherd, 2005; Jaaskelainen et al., 2006). Usually, investors and VCs earn their returns when the venture in which they invested is sold to another organization or when the shares of the company become publicly traded (IPO). Therefore, Large and Muegge (2008) conclude that future studies should place a greater emphasis on measuring directly observable events in companies' life cycle, such as realizing an exit.

Cumming and MacIntosh (2003) argue that the trade sale of a portfolio company is the most common exit route for a VC-backed company, followed by secondary exits or IPOs. Even though IPOs tend to lead to higher returns, the majority of the returns realized by VCs are still derived from trade sales (Gompers, 1996). Figure 1 provides an overview of the number of IPOs and trade sales realized each year in the period 2000 to 2008, comparing Europe with the UK. These numbers verify that trade sales are indeed a more likely exit route than IPOs. Only in the dotcom bubble of 2000 was the number of IPOs higher than the amount of trade sales. In all other years, IPOs are only a fraction of trade sales, both in numbers and value. A similar trend can be noted when considering the deal value of those two exit types of exit routes. Figure 8 displays the total amount of money raised for each type of exit. Again the total amount of money raised with trade sales is consistently larger than for IPOs, with exception of the dotcom year 2000. Hence, the portfolio's ability to realize a trade sale is equally

important for a VC firms' exit success as the ability to realize IPOs. Surprisingly, trade sales have not been analyzed as an indicator of portfolio company success in the venture capital literature.

Figure 8: Annual evolution of trade sales and IPOs in Europe and the UK: number of companies[5]

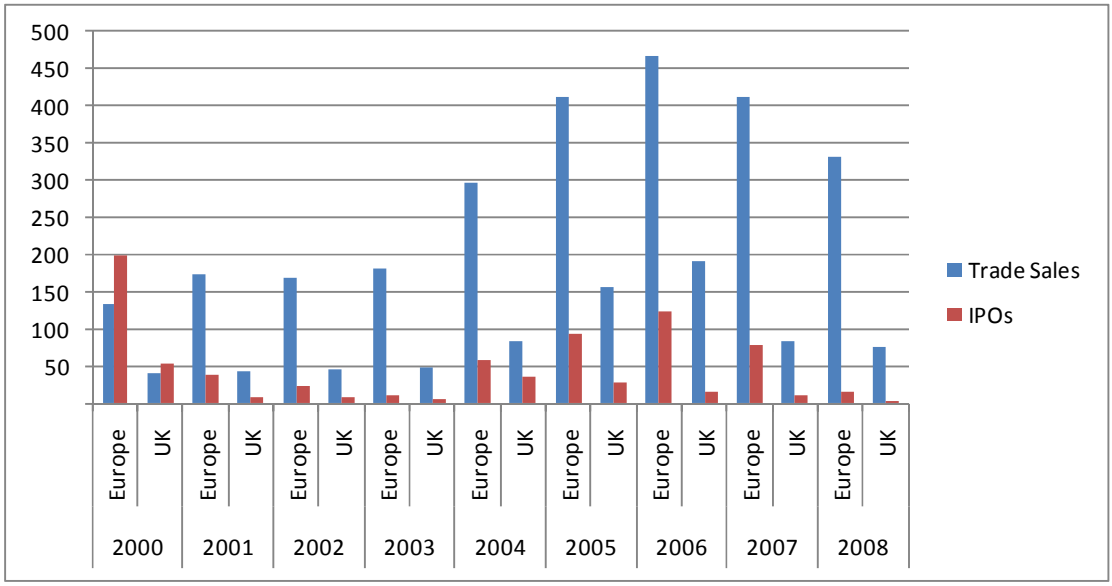
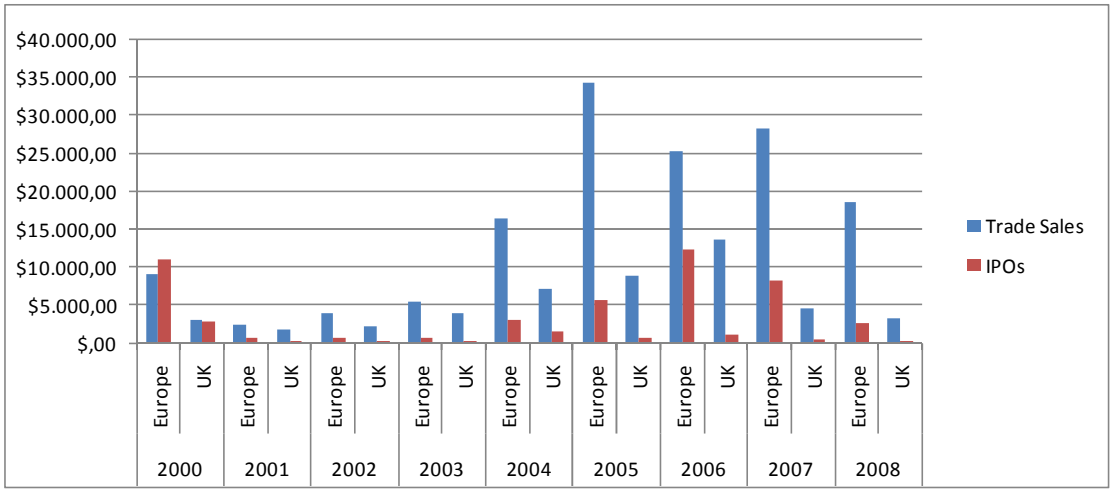


Figure 9: Annual evolution of trade sales and IPOs in Europe and the UK: Total amount of money raised (million $)



[5] Figures obtained from VentureSource (www.venturesource.com)

Even in the entrepreneurship literature, the evidence on which factors determine the potential for a trade sale is very weak. Gans et al. (2002) considered trade sales as a form of cooperation between start-ups and incumbents and concluded that the strength of the appropriability regime increased the chances of realizing a trade sale. Start-ups operating in environments where the technology is easy to protect have a higher chance of a trade sale than start-ups operating in weak appropriability environments. Other studies such as Porrini (2004) have specifically focused on the managerial decisions which a start-up can take to increase the likelihood of realizing a trade sale. Porrini (2004) shows that collaborating with potential acquirers increases the likelihood of the start-up to be acquired by one of those collaborating partners. Cooperation in a pre-acquisition stage is supposed to decrease the information asymmetry between a start-up or young firm and its potential acquirer and hence increases the likelihood of acquisition.

As trade sale success is such an important variable for both the start-up and the VC firm investing in the company, a major research question which remains to be investigated is then to which extent a VC firm can contribute to the trade sale of a portfolio company. In this paper, we build on the results of the VC literature in finance, but add a theoretical perspective to explain why experience of VCs might have a positive effect on the likelihood of realizing a trade sale. The theoretical perspective used to explain this is learning theory.

4.3. Hypothesis Development

The learning literature distinguishes between three clear forms of learning (Kim and Miner, 2007): vicarious, experiential and congenital learning. Vicarious learning refers to learning from other organizations' experiences (Ingram and Baum, 1997). Experiential learning refers to the learning that takes place in a history-dependent, routine-based incremental way (March, 1991). Finally, the learning literature refers to congenital experience as experience that has already

accrued within an industry before a focal firm is founded (Meyer and Rowan, 1977). We will build upon these three different concepts adopted from the learning literature to elaborate our hypothetical framework.

Experiential Learning. This notion of learning is rooted in the behavioral theory of the firm: an organization's behavior and actions are viewed as based on past activities and previously developed routines (Cyert and March, 1963). VC firm level experience might still be considered the primary source of learning among VC firms with regard to trade sales. Trade sales are complex events, which tend to involve a high amount of tacit knowledge. This knowledge is argued to be cumulated through discovery, learning by doing and experience, each of which are indicators of experiential learning (Yang et al., 2009).

Experiential learning thus assumes that VC firms learn from conducting activities repeatedly and adapting their routines to their past experiences. This kind of learning requires repetition, as VC firms need to evaluate the outcome responses to their actions. In other words, VC firms need to evaluate whether decisions which have led to previous trade sales were successful or not and which components can be translated into routines that might become a roadmap for future trade sales. Existing routines are then assumed to be the outcome of this trial and error process along with the selection and retention of routines and procedures developed in the past.

Experiential learning implies that the more experience a particular VC firm has with trade sales, the more routines it will have developed to guide future trade sales. Interestingly, learning theory assumes that both positive and negative trade sales will generate a learning experience which provides value added in comparison with those VC firms that do not have any trade sale experience at all or very little trade sale experience.

Our qualitative investigation supports the value of experiential learning as a process, taking place at the level of the VC firm. Four of the eight VCs we interviewed mentioned explicitly that they share their liquidation experiences among the different investment managers of the VC firm, which indicates that experiential learning takes place at the firm level. In two cases, this knowledge has been used for developing standard processes to better steer the exits, including internal reporting and standard six-monthly evaluation of later stage companies in the portfolio. In 2 other cases this common knowledge about liquidation experiences has been transformed into rules such as *always syndicate investments, work only with certain investment and operational partners,* and *invest in serial entrepreneurs*.

Therefore we argue:

Hypothesis 1 : The more trade sale experience the lead VC firm has, the greater the likelihood that its portfolio company will end up in a trade sale.

Vicarious Learning. Theories of organizational learning imply that successful experiences in the VC community (such as trade sales) are important sources of vicarious learning (Lant and Mezias, 1990). Such previous trade sales are composed of rich, complex information, which can be embedded in a series of accumulative events, which form the process leading to the closure of a successful trade sale (Kim and Miner, 2007). A large number of trade sales in the industry provide VCs with many opportunities to observe the underlying factors which have potentially led to the successful trade sale. In other words, the observed trade sales serve as a series of experiments and are an essential source of information. VC firms observe other firms' trade sales to gain information to make new investments and to adjust the strategy of their portfolio companies. However, as much of the trade sale information tends to be complex information, traditional learning theory suggests that VC firms will experience difficulties to

learn from that information unless they have a direct access to the VC firms possessing this information (Cyert and March, 1963).

VC firms do have a particular way of learning from each other, namely syndication. It has been shown in the VC literature that VC firms syndicate to have a chance to benchmark their own thinking against other knowledgeable sources (Wright and Lockett, 2003; De Clercq and Dimov, 2008). If two or three firms syndicate, they contrast each other's opinions (Lerner, 1994). Moreover, they exchange templates of procedures and share best practices to optimize the decision-making within the syndicate. This kind of knowledge exchange is what is called vicarious learning in the learning literature. Along this line of reasoning, we would expect that a VC firm which is syndicated with other VC firms that have an in-depth experience in trade sales, will learn from their syndicating partners and transpose this knowledge towards their own portfolio companies.

The interviewees provided qualitative evidence that syndication partners are an important source of knowledge, both for junior as well as for more senior investors. A senior investor stated:

> "After eight acquisitions and one IPO as investment manager, I am still learning from the syndicating partners. I learn management skills from older VCs, and I also learn to identify the best entrepreneurs, passionate, smart and flexible. This is probably the most difficult task for a VC."

Possibly but not necessarily, the vicarious learning takes place in the specific syndicate that has invested in the focal portfolio company. It can also be that the VC firm learns from colleague VCs that have syndicated with the VC firm in other

portfolio companies than the one which we have studied. So, we take into account that a specific VC will not be active in a particular syndicate where they are not the lead, but will have access to a broader network of VCs and other professionals, which represents the accumulation of syndicates and exit experiences in which the VC firm takes part. A VC shared an example with us:

> "We invested in a drug discovery start-up in syndication with three other experienced VCs. It was the syndicating investment manager at SV Life Sciences who helped the company recruit a chairman who recently completed a trade sale of a similar company. Our business was subsequently sold to the same trade buyer and so I have no doubt that the experience and networks of the syndicate made a difference"

Therefore we argue:

Hypothesis 2: The more a lead VC firm is syndicated to other VC firms with experience in trade sales, the greater the likelihood that its portfolio firm will end up in a trade sale.

Congenital Experience / Learning. Congenital experience refers to the experience that has already accrued within an industry before a focal firm is founded (Meyer and Rowan, 1977). This type of experience results from the knowledge brought into the firm by recruiting experienced investment managers or - in case of a new VC firm - by setting up the VC firm with general partners/investment managers with past experiences in the VC industry. If a new VC firm is created, it is unlikely that this new firm will have to build up its practices and rules from scratch. It is more likely that the general partners setting up the firm have personal experience from working with other VC firms. The availability of congenital experience when the VC firm is created is likely to influence its future learning outcomes as well (Huber, 1991). In other words, the experience of the

investment managers setting up and/or joining the firm is likely to determine the decisions that are taken afterwards and the way in which these decisions are taken.

Congenital learning thus goes beyond vicarious learning from syndicate partners. It touches upon the experience accumulated at the individual level, regardless where this experience comes from. Our qualitative investigation provided evidence of the learning experience that was available at the moment the partners started the VC firm. As an example, the founder of the search engine Ask.com who, after his company was traded on the NASDAQ stock and retired upon the acquisition by InterActiveCorp at US$1.85 billion, started a VC firm. He said:

> "Selling a company is like a selling a car. Once you learn how to sell a car fast and for a high price, you just do it every time you want to sell another car."

The previous example shows how congenital learning is transferred from one job experience to a new VC firm. The general partners who set up a VC firm and the investment managers working for a VC firm probably have gone through trade sales while working for other VC firms, or may have taken their own companies through a trade sale as an entrepreneur. The stock of knowledge accumulated through these experiences is likely to determine their decision-making process and to change the way in which they prepare the portfolio companies for a trade sale. Three of the VCs mention that hiring plays an important role in accessing congenital experience. For example, one of the interviewees stated that his VC firm gained significant knowledge about exits by hiring the VP of a big multinational corporate venture. The partners at the VC firm learned how to build and prepare a company to be acquired by a big corporation. In some other cases, the interviewees have pointed to the benefits of hiring partners with

entrepreneurial experience and coming from experienced VC firms as they bring along very valuable knowledge to the firm.

Therefore we argue:

Hypothesis 3: The more trade sale experience the managers raising/joining a VC firm have, the greater the likelihood that its portfolio firm will end up in a trade sale.

4.4. Method

4.4.1. Sample

To test our hypotheses, a unique hand-collected sample of 206 VC-backed companies was constructed. As a sample frame, we used the VentureSource database provided by Dow Jones. VentureSource offers a comprehensive database which tracks the key developments of more than 30.000 venture-backed companies situated in the US, Europe, Israel and China. The ventures in our sample are all situated in the UK. Furthermore, the database offers detailed company reports which track the financing history in addition to information about target markets, products, milestones, financial performance, key customers, management team and board members. Besides these company profiles, VentureSource also provides access to investor profiles. These give a detailed overview of the fund raising activity, the general partners and/or investment managers managing the VC firm, and how the portfolio is diversified in terms of industry, geography and investment stage. This information allows us to analyze VC firms' performance by measuring the number of companies that realized an IPO, were sold or went out of business. In other words, this information allowed us to calculate the success of each investor with respect to realizing trade sales.

We started the construction of our sample by searching in VentureSource for all acquired ventures situated in the UK. Subsequently, we used the matched pair methodology introduced by Megginson and Weiss (1991) to identify similar VC-backed companies which haven't been acquired. For each acquired firm in our sample, we identified a similar company that was not acquired. As matching criteria, we used the sector, founding year and nationality of the companies. To match the companies as closely as possible, we used the three-digit sector classification. If no companies matched that profile, sector classification was extended to match the two-digit classification. This resulted in a sample of 206 VC-backed companies situated in the UK, of which 106 companies were acquired by 2009. The companies in the matched sample were still active in 2009. All companies in the sample were created between 1982 and 2006, and the acquired companies were acquired between 1997 and 2008. Consequently our window of observations covers the period 1982 to 2009, implying all companies were tracked from year of founding until 2009.

4.4.2. Survival Analysis

Our statistical analysis relies on survival analysis. Survival analysis techniques are highly suitable to address our research hypotheses as we are interested in explaining the factors that contribute to the hazard of being acquired. Furthermore, the non-acquired firms in our sample were still active in the year 2009 (i.e. the last year of our window of observation), implying that these firms are still at risk of being acquired. Together, these factors make survival analysis the most appropriate technique of analysis. More specifically, this paper uses the Cox proportional hazard model. The Cox proportional hazards regression model (1972) asserts that the hazard rate for the *j*th subject in the data is

$$h(t|x_{1j}, x_{2J}, \dots, x_{kj}) = h_0(t) \exp(\beta_1 x_{1j} + \beta_2 x_{2j} + \dots \beta_k x_{kj})$$

The major advantage of the Cox model is that it avoids making potentially untenable distributional assumptions about the hazard rate. Although this model

does not make any assumptions about the baseline hazard, there is one important assumption which should be taken in account, namely the assumption of proportionality. This assumption implies that the survival curves for two strata must have hazard functions that are proportional over time (i.e. constant relative hazard). The validity of this assumption is often questionable as the impact of many covariates are clearly time dependent. This issue can be tackled by introducing time-dependent covariates in the model which represent the interaction of the original covariate with time (Allison, 1990).

4.4.3. Dependent variable

Given the use of survival analysis as method of analysis, our dependent variable is the hazard that a subject will be acquired in a given year. As trade sales have been identified as the most likely exit route for VC-backed firms (Cumming and MacIntosh, 2003), the hazard of being acquired is a suitable dependent variable in our research design.

4.4.4. Independent variables

To capture the three forms of learning previously defined, we used the information provided by the investor profiles in VentureSource. We only considered the impact of the lead investor (Higgins and Gulati, 2006) in the latest round of financing, i.e. the financing round closest to exit, as we expect that the lead investor of the latest financing round will have the highest impact on the exit process. According to learning theory, which suggests that actors learn both from positive and negative experiences, we consider all trade sales rather than limiting the study to the successful ones. Some of the trade sales realized by a VC have a negative return (i.e. the acquisition price is lower than the amount of VC received), while other trade sales are highly successful as the acquisition price is a multiple of the amount of venture capital received. The first type of trade sales can be seen as failures, while the second type of trade sales are clearly successes. Several studies on the outcome of learning from success and failure have

confirmed that organizations learn both from failures and successes (e.g. Kim, Kim and Miner, 2009; Lant and Montgomery, 1987).

Experiential learning (VC_experiential): Experiential learning or learning by doing refers to the knowledge base the VC firm has built over the years by performing similar activities repeatedly. Therefore, the amount of experiential learning is closely related to the number of trade sales the VC firm has realized in the past. To capture this, we counted the number of trade sales in the portfolio of the VC firm in a given year. Experiential learning is thus measured as the accumulated number of trade sales realized by the VC.

Vicarious learning (VC_vicarious): In order to capture the extent of vicarious learning by each lead investor, we needed both information on the number of syndicate partners each VC firm has and the experience of these partners in trade sales. Using the information provided by VentureSource, we identified the VCs who the lead VC syndicated with and the experience of these partners with trade sales. Vicarious learning was measured as the total number of trade sales of all syndication partners of the lead VC.

Congenital learning (VC_congenital): To gauge congenital learning, we analyzed whether the general partners/investment managers who set up and/or joined the VC firm, already had previous trade sale experience before their appointment in the firm. The trade sale experience could either be as an entrepreneur who had sold his company or as an investment manager previously working for another VC firm. We used the information available from VentureSource to check whether each of the investment managers/general partners has been involved in trade sales before. A dummy variable was constructed, indicating whether the investment managers/general partners of the firm had trade sale experience or not. As soon as one of the general partners has previous experience with trade sales, this dummy takes value one.

Control Variables: We control for a number of variables, some of which relate to characteristics of the portfolio company itself, while others relate to the lead VC firm investing in the portfolio company. Regarding the VC firm, we control for VC age, for the fact whether the lead VC is a corporate VC or not and for the fact whether the lead VC was already involved in the first financing round or not. Controlling for VC age (VC_age) is important, as age may be an indicator for its experience. The older the VC firm, the more likely it will have built up experience in realizing trade sales (Dimov and Shepherd, 2005). In addition, we also control for whether the lead investor is a corporate VC (Corp_VC_dummy). This is important as many large companies use corporate VC as a window on future technologies and as a first step in acquiring promising technology-based ventures (Benson and Ziedonis, 2008). Finally, we use a dummy to control for the fact whether the lead investor already invested in the first financing round or not (VC_first_round_dummy). Doing so, we control for reverse causality since it might be possible that VC firms with a lot of experience in trade sales enter syndicates as lead investors in the last financing round, when the likelihood of a trade sale is already very high.

At the level of the portfolio company, the following controls were included: patent stock, number of financing rounds, amount of VC financing received, number of syndicate VC partners and number of team members. First, we control for the accumulated number of patents (patent_stock) in possession of the portfolio companies in a given year. The work of Gans et al. (2002) indicates that strong appropriability regimes positively affect the likelihood of being acquired. Patents are typically used as indicators of the strength of the appropriability regime (eg. Gans et al., 2002). Second, number of team members at start-up is included as control measure (N_start_team). Previous research indicates that human capital is crucial for the success of young technology-based ventures (e.g. Eisenhardt and Schoonhoven, 1990; Cooper, GimenoGascon, and Woo, 1994) and influences investor decisions (Higgins and Gulati, 2006). As a result, we expect

that it also contributes to the attractiveness of a young technology-based firm as an acquisition target. A study of Graebner (2004) confirms that much of the value of technology ventures depends on the human capital. If key personnel leaves after acquisition, the value of the human capital decreases. Finally, we included some controls relating to venture capital deals made by the portfolio company such as the total amount of VC financing received by the firm (VC_amount), the number of financing rounds (N_fin_rounds) and the number of syndicate partners (N_syndication), representing the number of VCs firms that invested in the portfolio company besides the lead investor, as all three variables are potential indicators of the quality of the venture and thus contribute to the likelihood of being acquired (Nahata, 2008). VCs constantly monitor the performance of the ventures in which they invest, continually evaluating the venture's promise, need for additional capital, use of capital and whether to liquidate the investment or not. Consequently, VCs will only provide additional capital and follow-on funding when the company continues to do well (Gompers, 1995). In addition, Brander, Amit and Antweiler (2002) provided evidence that syndicated VC deals obtain higher returns. As a result, one might expect that they also have a higher likelihood of being acquired. We control for this by taking in account the number of syndicate partners of the lead VC.

Thus, in our model the hazard of being acquired is the following function:

$h(t|\text{trade sale}) = h_0(t) \exp((\beta_1 + \beta_2 t)\text{Patent\_stock} + (\beta_3 + \beta_4 t)\text{Number of Financing Rounds} + \beta_5\text{Number of Syndicate Partners} + (\beta_6 + \beta_7 t)\text{Amount of VC financing} + \beta_8\text{Number of Team Members} + (\beta_9 + \beta_{10} t)\text{VC\_age} + \beta_{11}\text{Corporate VC dummy} + \beta_{12}\text{VC first round dummy} + (\beta_{13} + \beta_{14} t)\text{VC\_experiential} + \beta_{15}\text{VC\_vicarious} + \beta_{16}\text{VC\_congenital})$

For those variables that vary in time, a interaction term of the respective variable with time was included besides to original variable.

4.5. Analyses

4.5.1. Descriptives

Table 9 provides the descriptive statistics of our sample, including the mean and standard deviation. Table 10 compares the status of the acquired and non-acquired firms in the year of acquisition.

Table 6: Descriptives of complete sample

Variable	Definition	Mean	Std. Dev	Min	Max
Trade Sale	Equals 1 if company realized a trade sale in a given year	0.0496	0.2172	0	1
VC_age	Age of the lead VC investor in a given year	13.3174	15.8772	0	73
VC_first_round_dummy	Dummy indicating whether the lead VC already invested in the first round	0.7231	0.4475	0	1
Corp_VC_dummy	Dummy indicating whether the lead VC is a corporate VC	0.0310	0.1734	0	1
Patent_stock	Acumulated number of patents in a given year	1.0175	7.8492	0	171
N_fin_round	Accumulated number of financing rounds in a given year	1.5034	1.4416	0	9
VC_amount	Accumated amount of VC received	6705985	14900000	0	160000000
N_syndication	Number of syndication partners lead VC has invested with in that particalar firm	2.4806	2.9414	0	14
N_start_team	Number of team members at start-up	5.0129	2.6489	1	19
VC_experiential	Accumulated number of trade sales the VC has realized in a given year	24.1011	57.9186	0	465
VC_vicarious	Accumulated number of Trade sales realized by the syndication partners of the VC	285.3151	574.5636	0	2269
VC_congenital	Dummy indicating whether the general partners setting up de VC firm have experience with trade sales	0.4140	0.4927	0	1

Table 7: Comparison of acquired and non-acquired firms in year of acquisition

	Non Acquired			Acquired			Results T-Test	Results Wilcoxon Ranksum test
	Median	Mean	St. Dev.	Median	Mean	St. Dev.		
VC_age	9,5	17,73	17,75	16,00	20,29	17,87	/	/
VC_first_round_dummy	1	0,75	0,43	1,00	0,78	0,41	/	/
Corp_VC_dummy	0	0,04	0,19	0,00	0,06	0,24	/	/
Patent_stock	0	1,40	8,65	0,00	1,22	3,20	/	/
N_fin_round	3	3,09	1,95	2,00	2,59	1,54	**	*
VC_amount	4.456.592	10.100.000	15.500.000	6.400.019	12.000.000	13.700.000	/	**
N_syndication	1	2,24	2,93	1,00	2,24	2,80	/	/
N_start_team	5	4,93	3,01	5,00	4,88	2,35	/	/
VC_experiential	5,5	40,06	75,35	11,50	53,26	81,97	*	**
VC_vicarious	142	461,97	706,43	173,50	634,48	818,36	**	*
VC_congenital	0	0,28	0,45	0,00	0,44	0,50	***	**

***: $p < 0.01$

**: $p < 0.05$

*: $p < 0.10$

There are a number of significant differences between the group of the non-acquired companies and the acquired companies. Regarding the measures at portfolio company level, it seems that the two groups mainly differ in terms of the financing they receive. On average, the non-acquired companies went

through 3.09 financing rounds, which is significantly more than the acquired firms who on average went through 2.59 financing rounds. In terms of amount received however, it looks as if the acquired firms have accumulated a larger amount of VC financing (about 12 million British pounds against 10.1 million for the non-acquired firms). A finding which is confirmed by the T-test, the medians however do not significantly differ. There seem to be no significant differences between the acquired and the non-acquired firms in term of intellectual capital, number of team members at start-up and number of syndicate partners.

The two groups also demonstrate some differences regarding the lead VC. The lead investor investing in the acquired firms is on average 20.29 years old, while the lead investor of the non-acquired firms has an average age of 17.73. The differences are even bigger when looking at the medians. While these differences seem substantial, they are not significant as the p-values for the T-test and Wilcoxon ranksum test are below 10%. More important however are the differences regarding the various types of experience. For all three types, we find significant differences between the acquired and non-acquired firms. The lead VC of the acquired firms has realized on average 53 trade sales, while the lead VC of the non-acquired firms counts on average only 40 trade sales in his portfolio. Furthermore, we find that the lead VC of the acquired companies has an average of 634 trade sale in his syndication network, while the lead VC of the non-acquired companies has a network which represents on average only 462 trade sales. Finally, with respect to the congenital experience of the VC firms, about 44% of the lead VCs had previous congenital experiences with trade sales. This is substantially more that the lead VCs of the non-acquired firms, where only 28% of the VC firms had congenital experience with trade sales.

4.5.2.Main Model

To determine whether the above differences play a role in estimating the probability of exit by trade sale, we performed a Cox proportional hazard regression. Model 1 summarizes the results for the base model, only including

the control variables. None of the control variables seems to have a significant impact on the hazard of being acquired. In the next three models the impact of each type of learning is entered separately, while in the last model all three modes of learning are entered simultaneously.

In model 2 of table 3, the first explanatory variable, experiential learning of the VC is introduced in the model. In comparison with model 1, the patent stock has now a positive impact on the hazard of being acquired, although this influence is only marginally significantly, with a p-value lower than 0.10. More importantly however is the influence of experiential learning on the hazard of being acquired. While the coefficient in the main model is positive and significant, the coefficient in the time-varying covariates equation is negative and significant. Together, these results imply that experiential learning has a significant positive impact on the acquisition hazard, which decreases over time. These findings are confirmed in model 5 where all explanatory variables are included. Experiential learning continues to have a significantly positive but decreasing impact as the p-value even drops below 0.01. We thus find manifest support for the first hypothesis.

In model 3 of table 3, the impact of vicarious learning (i.e. learning through trade sale experience of other VCs) is tested. In this model, the only variable with a significant impact is the explanatory variable vicarious learning. The p-value is below 0.01 implying support for hypothesis 2. Again, the significant impact of vicarious learning is also confirmed by the full model ($p < 0.05$).

Finally, in model 4, the third explanatory variable, congenital experience, is introduced. According to this model, there is no support to accept hypothesis 3. The full model confirms this. Thus, hypothesis 3, which states that congenital experience has a positive impact on the hazard of being acquired, cannot be accepted.

Table 8: Results of cox regression

	1 Base Model	2 H1	3 H2	4 H3	5 Full Model
Main					
VC_age	-0.6341	-0.6542	-0.7747	-1.4417	-3.3705
	(0.5758)	(0.5006)	(0.5847)	(0.0971)	(2.2278)
VC_first_round_dummy	0.1883	0.1394	0.0534	0.1847	0.0562
	(0.2418)	(0.2437)	(0.2490)	(0.2488)	(0.2539)
Corp_VC_dummy	-0.3221	-0.1938	-0.2095	-0.2858	-0.1516
	(0.5386)	(0.5657)	(0.5332)	(0.5102)	(0.5242)
Patent_stock	39.56	55.63 *	41.1943	36.5693	57.3015 *
	(32.46)	(31.11)	(33.1577)	(32.6540)	(34.5827)
N_fin_round	43.38	43.45	28.9631	45.669	27.5455
	(100.48)	(101.81)	(99.4842)	(101.0767)	(101.3849)
VC_amount	6.33E-06	-3.43E-06	6.52E-06	8.42E-06	-1.14E-06
	6.57E-06	(7.83E-06)	7.26E-06	(6.99E-06)	(8.73E-06)
N_syndication	-0.0628	-0.0636	-0.0815	-0.0497	-0.0636
	(0.0522)	(0.0503)	(0.0562)	(0.0531)	(0.0569)
N_start_team	-0.0021	-0.0071	-0.0081	-0.0051	-0.0112
	(0.0348)	(0.0347)	(0.0355)	(0.0343)	(0.0353)
VC_experiential		3.1585 **			4.0716 ***
		(1.2743)			(1.4033)
VC_vicarious			0.0004 ***		0.0004 **
			(0.0001)		(0.0002)
VC_congenital				0.2041	0.1662
				(0.2137)	(0.2203)
tvc					
VC_age	0.0003	0.0003	0.0004	0.0007	0.0017
	(0.0003)	(0.0002)	(0.0003)	(0.0005)	(0.0011)
Patent_stock	-0.0197	-0.0277 *	-0.0205	-0.0182	-0.0285 *
	(0.0161)	(0.01555)	(0.0165)	(0.0163)	(0.0172)
N_fin_round	-0.0216	-0.0217	-0.0144	-0.0228	-0.0137
	(0.0501)	(0.0508)	(0.0496)	(0.0504)	(0.0505)
VC_amount	-3.15E-09	1.72E-09	-3.24E-09	-4.19E-09	5.77E-10
	(3.28e-09)	(3.90E-09)	(3.62E-09)	(3.48E-09)	(4.35E-09)
VC_experiential		-0.0016 **			-0.002 ***
		-0.0006			(0.0007)
N observations	2112	2112	2112	2112	2112
N subjects	206	206	206	206	206
N failures (i.e. trade sales)	105	105	105	105	105
Log Likelihood	-522.99	519.50	-519.08	-521.78	-515.28

Notes: variables in tvc equation interacted with _t

***: p < 0.01

**: p < 0.05

*: p < 0.10

4.6. Discussion

In this paper, we have evaluated the extent to which VCs contribute to the potential trade sale of their portfolio companies. More specifically, we have taken a learning perspective, to examine alternative explanations for the behavior of different VC firms.

The results of our analysis show that among the three types of learning, experiential and vicarious learning of the VC firm significantly contribute to the likelihood of a trade sale of its portfolio companies, but congenital learning has no significant impact. These findings seem to suggest that VC firms build up their own routines over time through a process of trial and error, while the knowledge investment managers had before joining the venture capital firm – congenital knowledge – becomes irrelevant. Even if the investment managers of the VC firm have trade sale experience before founding the firm, these routines and procedures developed before the start-up of the VC firm tend to change over time as the firm develops its own insights through learning by doing. Therefore, one might expect that the impact of congenital experience fades away over time, potentially explaining why congenital experience makes no significant contribution to the hazard of being acquired. Regarding vicarious learning, the results are in line with previous findings in the VC literature which tend to emphasize the importance of syndicate partners as sources of knowledge. Syndicate partners are often seen as valuable sources of information which can complement the lack of experience of the lead investors in one or more domains. However, when comparing the coefficients of both forms of learning, it is clear that experiential learning contributes more to the hazard of being acquired than vicarious learning. We can explain this through the fact that certain types of knowledge such as tacit knowledge are difficult to transfer and can only be learned through learning by doing (Hansen, 1999). However, an alternative explanation might be that experienced syndicate partners are attracted to lead investors which have built up their own experience resulting in the emergence

syndicate networks of experienced VC firms, which outcompete those of relatively unexperienced partners. Recent work of Hopp (2010) provides some evidence in line with this reasoning, as his results demonstrate that greater industry experience is associated with more syndication. Moreover, our data suggest that experienced lead VCs also have access to more experienced syndication partners. In a post-hoc analysis, we compared the vicarious learning of experienced lead VCs with unexperienced lead VCs. A Wilcoxon ranksum test confirmed that the experienced lead VCs have significantly more trade sales in their syndication network than the unexperienced lead VCs.

Furthermore, as we control for VC age, these results seems to suggest that it is not experience as such which contributes to the trade sale hazard but the specific knowledge a VC has with trade sales. In this respect, this study contributes to previous research in the VC literature, which has predominantly operationalized experience as age of the VC or a dummy. We find that age of VC firms is not a good indicator. Certain firms might survive for a long term because they can for instance tap into various sorts of public money but despite their long time presence, they are not necessarily more likely to contribute to the trade sale hazard of their portfolio firms.

4.7. Conclusions, practical recommendations, limitations and future research

We can conclude from the analysis above that working with *experienced* VC firms is beneficial for portfolio companies aiming for a trade sale. If a VC firm has realized one or more trade sales before, this increases significantly the probability that the portfolio company will be able to realize a trade sale. The marginal impact of more trade sales however decreases over time. This suggests that working with a VC firm which has done no trade sales at all, is the most risky strategy for a new venture as the chances of a trade sale are then very low. Moreover, this relatively inexperienced VC firm might not be able to form a good

syndicate (Hopp, 2010) which in turn further decreases the chances on a good trade sale.

Congenital learning, on the contrary, does not significantly contribute to the hazard of being acquired. This is in contrast with the insights gained from our qualitative study which suggested that the more experienced investment managers point to congenital learning as one of the most important learning forms. Although the practitioner literature suggests that experienced investment managers are by far more successful in securing funds, their experience does not seem to contribute to trade sales. We have no straightforward explanation for this. Potentially, our operationalization of congenital experience is too imprecise. Our dummy variable is an indicator of the presence of congenital experience but does not capture the amount of congenital experience. A better way to capture this might be to consider the total number or percentage of investment managers with prior trade sale experience (cfr. De Prijcker et al., 2011).

Regarding vicarious learning, both experienced as well as junior VCs agreed that this type of learning is an important source of knowledge. Furthermore, they pointed towards being part of and syndicating with the VC firms in the "cluster of the best" as the key method for maximizing vicarious input. However, when comparing the coefficients for experiential learning and vicarious learning, we notice that the contribution of experiential learning is considerably higher.

The interview data we have on this subject tend to suggest that VCs do indeed learn from one another about methods and best practices such as converting loans into equity before trade sale negotiations, overviews of off balance liabilities to facilitate due diligences, data room disclosure and the way in which preferred liquidation rights with carried interest are stipulated in shareholder

agreements[6]. These best practices tend to include codified knowledge, which can easily be transferred. However, experiential learning seems to include a more tacit knowledge, which cannot easily be transferred from one VC firm to the other. This tacit knowledge involves business model decisions in the years after start-up and the way trust can be created among the various partners in the company.

In practice however, we see that many VC firms underestimate the complexity of trade sales and overestimate the amount of vicarious learning they can do to catch up when they are lacking congenital experience at the start of the VC firm. In some cases, this vicarious learning does not even take place through syndicate networks but is based on a much weaker form of knowledge transfer, for instance informal networking at symposia. The results in the paper clearly indicate that this form of learning will never substitute for the lack of experience. This is important as many government funds are set up as co-investment schemes with the specific objective to learn from syndicate partners rather than developing all the knowledge in house. Other public or university-related funds are only allowed to perform small investments per deal and therefore do not recruit experienced investment managers, but prefer to syndicate with so-called "experienced" partners to learn the business. The complexity of a trade sale seems to require many different forms of knowledge, which go far beyond the exchange of best practices in a typical syndicate.

As any other study, also this one is fraught with a number of limitations which provide opportunities for further research. First, the paper only includes learning variables at VC firm level, ignoring the entrepreneurs' perspective. Both the learning and the VC literature could benefit greatly from this kind of

[6] In one case, a VC told us that the preferred liquidation rights in their initial shareholder agreements were so aggressive that only afterwards they realized that the entrepreneurs in a potential trade sale would keep less than 5% of the value added, which they then had to share with the management. In a number of portfolio companies this had explained why the entrepreneurs were so passive in looking for trade sale opportunities or even neglected opportunities.

hierarchical analysis in which data at different levels is collected. An insight in the interaction of individual and firm level learning would contribute to our understanding of how different learning processes interact with each other. Second, the study includes only the measurement of trade sale as a dummy, ignoring the value of the trade sale. Other dependent variables such as time to trade sale and trade sale under- or over-pricing might be equally if not more important.

These two limitations are certainly areas for further research which could contribute both to the entrepreneurship and the learning literature. Additional research is also needed to identify the way and mechanisms in which the knowledge is transferred among VC firms and among investors within the VC firm. Finally, more research is also required to identify the driving mechanisms of a trade sale and thus the type of learning that determines entrepreneurs' and VCs' success. One of the senior VCs interviewed emphasized:

> "The VC industry is one of the most difficult businesses. Around 1995-1997, we thought that we knew everything about this business. But then we realized we had a lot to learn. Today, VCs are still learning and I am continuously learning as well."

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5. Conclusions

5.1. Conclusions and implications for management science

5.1.1. Acquirer perspective

The first paper used a case study design to explore how the various components of the acquisition process interrelate to shape the acquisition outcome. The findings indicate that the decisions and managerial actions taken in the search and selection phase have an important impact on the success of implementation. We identify search and involvement of the client department as crucial mechanisms in the acquisition process. Search is defined as the search for potential acquisition targets. It is a dynamic capability and involves partnering, corporate venture capital, participating in conferences etc. Our case study evidence demonstrates that search capabilities help the company to achieve acquisition success via two mechanisms: learning and trust. By engaging in partnerships the company gathered important technical and market information about the market it was about to enter. In addition, pre-acquisition collaboration with the acquisition target enabled a level of trust, which facilitated the further acquisition process. A second finding deals with the management of the selection process. From the interviews, we learned that involvement of the client department (i.e. the department responsible for the implementation of the acquisition) in the selection process is crucial for the following two reasons. First, it offers some valuable input with regard to estimating the potential synergies to be created. The client department disposes of thorough market knowledge necessary to estimate the future sales that could be realized with the new technology. Second, by involving the client department in the early stages of the acquisition, one creates an atmosphere of trust and co-responsibility, which is crucial for acquisition success. Furthermore, we discover that the interrelatedness of the different process components has important implications for the structure and composition of the team that manages the acquisition. Given that search, selection and implementation have an impact on one another, it is important that mechanisms are installed which allow the various team members involved to share and transfer knowledge.

These results make an important contribution to the acquisition literature. Many studies have tried to unravel the success factors of acquisitions. While these studies are very informative and provide detailed insights into every aspect of the acquisition, they

rarely focuses on the acquisition process as a whole. To address this gap in research, we studied the complete acquisition process of a young technology-based firm and investigated how the various components of the acquisition process are interrelated and jointly shape acquisition process. In doing so, we not only contribute to the acquisition literature, but also enrich the literature on knowledge management as it provides some deeper insights in the learning mechanisms contributing to technology acquisition success.

5.1.2. Perspective of young technology-based firm

The second paper takes the perspective of the YTBF and analyzes to what extent managerial actions undertaken by these firms impact its likelihood of being acquired and its eventual acquisition return. We build on insights from resource-based theory to develop hypotheses on the impact of resources on acquisition likelihood and return. In a sample of 284 UK YTBFs, we find that patents and the hiring of experienced top managers result in a higher acquisition likelihood, while revenues and partnerships contribute to acquisition return. Our results indicate that the resources and capabilities which contribute to the acquisition likelihood are different from those contributing to acquisition return. These results seem to suggest that the resources needed to increase the acquisition likelihood are the resources which allow the firm to develop to a certain level and reach a certain level of maturity. However, some of those resources might become redundant once the YTBF becomes part of a larger organization. As a result they have no effect on acquisition return.

These results contribute both to the entrepreneurship literature and the venture capital literature. The entrepreneurship literature has looked at cooperation-based commercialization strategies including acquisitions, but focuses predominantly on environmental factors influencing commercialization choice, neglecting to discuss the impact of managerial agency and differences in resource base. In addition, most entrepreneurship literature on cooperation-based commercialization strategies focuses on partnerships. Trade sales are rarely treated as a viable commercialization strategy. This paper tried to fill this gap by exploring the drivers of acquisition success from the perspective of the YTBF. In addition, we contribute to the venture capital literature by

exploring the antecedents of successful trade sales. The majority of the VC literature either focuses solely on IPOs or studies VC performance at portfolio level (considering jointly the number of IPOs and trade sales). This study on the other hand provides valuable insight for VCs as it helps them to advise portfolio companies to focus their resource building activities on those resources which are most likely to contribute to trade sale success. Finally, we enrich the resource-based view by illustrating the delicate trade-off between resources that contribute to acquisition likelihood and those that contribute to acquisition return.

5.1.3. Perspective of venture capitalist

The third paper finally takes the perspective of the venture capitalist and investigates how the venture capital firm can contribute to trade sale success. More precisely, this paper studies how the three various types of experience, namely experiential, congenital and vicarious experience, of the venture capital firm contribute to the likelihood that the portfolio companies of the VC will be able to realize a trade sale. Based on a survival analysis of 206 VC-backed UK start-ups, we find that both trade sale experience of the VC and learning from syndicate partners with trade sale experience significantly increase the trade sale hazard. The routines and procedures learned from experienced syndicate partners complement experience accumulated through trial and error. Congenital trade sale experience of the investment managers on the contrary has no significant influence on the acquisition hazard. By focusing on trade sales as exit route, these findings extend the venture capital literature. The vast majority of literature on venture capital exits looks at the drivers of successful IPOs (f.ex. Arthurs & Busenitz, 2006; Gulati & Higgins, 2003; Robinson, 1999; Deeds et al., 1997), with only a few studies exploring trade sales as venture capital exit mechanism (f.ex. Cumming and MacIntosh, 2003). There is extant literature suggesting that VCs monitor and add value to the companies in which they invest (Sapienza et al., 1996; Knockaert et al., 2006), yet how the experience of the VC contributes the likelihood of portfolio companies realizing an exit by trade sale is an area which is still unexplored. Using arguments from learning theory to hypothesize the relation between vicarious, experiential and congenital learning of the venture capital (VC) firm and the trade sale hazard of its portfolio companies, this paper addressed this gap. In addition, this paper contributes to

entrepreneurship literature, as it informs how the experience of the venture capitalist could help the young technology-based firm to accomplish an acquisition as a cooperation-based commercialization strategy.

5.2. Conclusions and implications for management practice

Besides the contributions to management science, this doctoral dissertation also generated some interesting insights for management practice. As all three parties involved in the acquisition process are studied, this dissertation provides some guidelines for the acquirer, as well as the young technology-based firm and the venture capitalist.

The first paper mainly provides some practical guidelines for acquirers. A first recommendation involves the search process preceding acquisitions. Our insights suggest that search is a crucial component of technology acquisitions. It allows the acquirer to become acquainted with the future acquisition target and gain some valuable insights with respect to the technology owned by the target and the market. As such, well-developed search strategies provide a window and technology and help the acquirer to adequately value and select potential acquisition targets, thereby reducing the risk of a misfit between acquirer and target. A second advantage of search relates to the development of a relationship with future acquisition targets. Collaboration with future acquisition targets allows both parties to develop a mutual supporting relationship fostering trust. The trust built during the collaboration might become valuable when the collaboration evolves into an acquisition. Potentially it reduces the resistance that might exist with the target against the acquisition, leading to a smoother implementation. Furthermore, it contributes to a more friendly atmosphere during the negotiations. Together, these findings suggest that companies which seek to complement their internal innovation strategy with technology acquisitions, should establish appropriate search processes which provide the company with a window on new technologies as well as more detailed information when open-ended search practices evolves towards more committed collaborations with future targets. A second recommendation relates to the involvement of the client department. Our case study suggests that involvement of the client department in the selection stage is beneficial for

acquisition performance for two reasons. On the one hand, it helps the acquirer to adequately select and value acquisition target by combining the insights on the market of both the acquirer and the target. On the other hand, it also helps to secure buy-in and commitment from the department who will be responsible for the implementation as it creates a sense of involvement and co-responsibility. This has important implications for the team responsible for the complete acquisition. Measures should be taken to guarantee that the team responsible for the management of the acquisition involves all parties involved, though their role will change as the acquisition process evolves. While this study focuses on the perspective of the acquirer, also young technology-based firms can learn from this. For example, it might be beneficial for young technology-based firms seeking to be acquired, to enter in collaborations with potential acquirers. This does not only help them to create visibility among future acquirers but also may lead to a better commercialization of their technology.

The second and the third paper in contrast provide some insight that better serve the interest of the seller. Companies seeking to be acquired by an incumbent in possession of the complementary assets necessary to bring their product to the market should consider the following. Regarding the resources and capabilities contributing to trade sale success, our results suggest that different resources and capabilities contribute to acquisition likelihood and acquisition return. Factors contributing to acquisition likelihood are hiring experienced top managers, protecting the technology by patents and attracting venture capital from VCs with trade sale experience. Factors contributing to acquisition return are establishing partnerships –both commercial and research partnerships and the amount of revenues. These results suggest that in order to become an acquisition target, young technology-based firms should have reached a certain level of maturity and provide proof of commercial viability. These insights are not only useful for the young technology-based firm, also the venture capital firm benefits from these insights, as it helps them to evaluate potential investees and focus their value-adding activities at those actions which are most likely to contribute to trade sale success. Finally, also policy makers benefit from these insights as it allows them to better grasp the factors contributing to a successful commercialization of technology which in turn might shape future policy with respect to young technology-based firm that are partly funded by government and academic spin-offs. Furthermore, these findings underline the importance of the experience of the venture capitalist with realizing exits. This is

something that should be considered when setting up new venture capital funds funded by the government. However, the question remains to what extent are technology acquisitions an interesting objective from policy perspective. Many of these young technology-based ventures are acquired by company from abroad which leads to the question "to what extend do nations still benefit from their innovations when they are acquired by foreign companies?". This issue should definitely be considered in further research, which brings me to the final point of this thesis.

5.3. Avenues for further research

As any doctoral dissertation, this study not only provided answers to research question posed but also led to some additional research questions and avenues for future research. With respect to the first paper, additional research is needed to test whether the propositions hold in various contexts. Furthermore, more research is required to further disentangle the search process. To our knowledge, this is the first paper that specifically investigates the search process preceding acquisition. Further research could for instance pose the questions whether search strategies are adequate under all circumstances and whether or not it might slow down the acquisition process leading to lost opportunities. Knowledge management in the context of acquisitions is also an area for further research. More research is needed to unravel how knowledge is transferred between the various parties involved in the acquisition process and which practices work under which circumstances.

The second paper inspired the following research questions. First, it might be interesting to explore the resources and capabilities necessary to realize a successful trade sale longitudinally. This would provide some very interesting insights with respect to the various steps young technology-based firms should take in order to be acquired, as well as the optimal time-to-exit. Furthermore, it would be interesting to see whether there are differences between sectors and industries. For instance, it might be that in sectors with a clear route to commercialization and guaranteed market acceptance (such as many biotech firms), developing a technology for which the technological risk has been minimized is sufficient to realize a successful exit. While in other sectors where the route to commercialization is less clear, young technology-based firms should take their

company one step further along the company life cycle and also provide proof of market acceptance with early adopters or even the mainstream market.

The third paper finally instigated following avenues for further research. Our evidence indicate that trade sale experience of the VC is important for realizing trade sales. This raises the question whether the experience of the entrepreneur could also contribute to trade sale success. In addition, it might also be interesting to study how individual level learning and organizational level learning interact, considering both the experience of the entrepreneurs and the venture capitalists. Furthermore, it would be fascinating to differentiate between success experiences and failure experience. Finally, additional research could shed some light on how experiences are shared within and across organization boundaries.

5.4. References

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