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實質選擇權觀點於策略聯盟後之併購行為探討：生技醫藥產業之個案分析

When did alliance lead to acquisition?

Real options view of Pre-acquisition alliances in

Bio-Pharmaceutical Industry



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(When did alliance lead to acquisition?
A real options view of pre-acquisition alliances in
bio-pharmaceutical industry)

本論文係郭松光君 (R99724070) 在國立臺灣大學國際企業學研究所完成之碩士學位論文，於民國 2012 年 7 月 9 日承下列考試委員審查通過及口試及格，特此證明。

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“論文” 不只是一份必須做的事情，它反而是一段過程以及訓練。

“論文” 就是要投入探討到無法跟好友分享的話題，卻可以讓我跟朋友更熟悉。

“論文” 一開始是陌生的事情，但最後可以讓一個人更了解自己的想法。

“謝謝” 指導教授的指教。

“謝謝” 家人以及朋友們的鼓勵。



Abstract

Drug discovery pipeline and knowledge asset can be considered as important factors in pharmaceutical industry. In order to gain access to external knowledge and other asset that could support the discovery process, pharmaceutical firms usually adopt acquisition activity since it allows firms to acquire the assets immediately. However firms also have to face with risks from the uncertainty. By considering alliance activities as real options reasoning it could help firms solve the uncertainty and lead to complete acquisition activities. In order to support the use of alliances as options, this research aims to investigate the conditions of “how engaging in alliance (as options) helps facilitate the acquisition of alliance partner subsequently”.

This research applies case study method (Multiple cases) to explain the circumstance, by selecting 5 pair of bio-pharmaceutical firms which have pre-acquisition alliances experiences as study samples. By investigating this issue through real options reasoning lens, this research finds that the situation between sequences of alliances and acquisition could be separated into four steps, in each step contain different conditions that could facilitate firm s’ decision to acquire there alliances partner. The study propose that alliance as option could (1) provides firm opportunities to enjoy variety of choices (2) allows firm to influence & control target, (3) develops mutual understanding between both side, (4) confirms target firm complementary abilities, (5) helps firm to identify the right time to acquire, (6) provides rights to acquire when external factors change. Therefore real options reasoning concept could be consider as a concept that bridge alliance and acquisition together.

Key words: Alliance, Acquisition, Pre-acquisition alliance, Real options reasoning, Pharmaceutical industry, Biotechnology industry

論文摘要

在醫藥產業當中，「藥品研發」和「知識資產」是非常重要的能力與資產。藥廠為了快速由外部累積這些資源，通常會選擇透過併購達成。此方法雖然能降低時間成本，但由於企業短期內不易瞭解其合作夥伴，故可能會面臨不確定性以及訊息不對稱的風險。為了降低風險，企業可選擇採取實質選擇權方式，與不同標的（生技公司）進行策略聯盟，而非只投資於一家公司，在合作的過程中逐漸了解對方，等待合適機會再採行併購計劃。本研究以實質選擇權的概念，探討藥廠採行策略聯盟後，在何種因素之下，會由策略聯盟關係走向併購。

本研究選取五組生技醫藥先策略聯盟後併購的個案進行多重個案分析，發現企業由策略聯盟走向併購的過程可劃分成四個階段，並且以實質選擇權觀點來看，在這過程當中有六個因素會促進個案公司決定由策略聯盟關係走向併購：（1）提供多個併購標的選擇、（2）影響並控制標的公司、（3）讓雙方建立互信、（4）確認併購目標是否具備互補能力、（5）可選擇適當時機進行併購，例如當併購標的的研發計劃達到雙方訂定的目標、（6）或當外部環境變化時仍有機會進行併購。

關鍵字：策略聯盟、併購、併購前策略聯盟、實質選擇權、醫藥產業、生物科技產業

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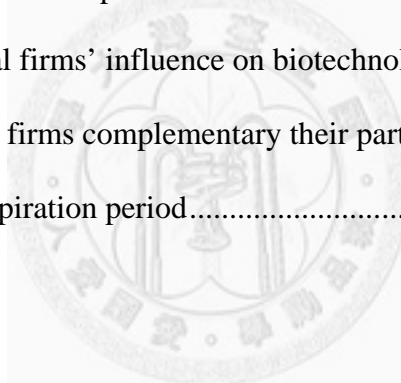
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Chapter 1: Introduction

This research purpose is to investigate how real options reasoning concept can be used to support firms' investment decision over level of ownership. This chapter can be separated in two sectors including (1) research motivation (2) research objective and outline.

1.1 Research Motivation and Scope of study

In this fast changing environment, all firms have to struggle to survive especially firms in high-tech industries that have to catch up with the change otherwise they will fall behind. Research and development (R&D) is key success for firms in this area, but since the R&D process contains high cost, and high try & error rate therefore it may not be easy for firms to pursue all the possibilities alone. Firms are forced by the environment to look for external knowledge in order to support their competitive abilities, and one of the fastest solutions is to access external knowledge through alliance or acquisition. If firms decide to internalize, the main concern is that "what are the right choices of external knowledge to internalize?" Firms will have to go through this tough decision to decide before internalizing the knowledge, because all the choices have specific level of uncertainty that is embedded behind. How about "ally then acquire" concept that was implemented by various firms recently? This research motivation is to crack out the key circumstances behind this sequence.

This study is expected to help firms dealing with uncertainty by exploring the sequence that could happen between alliance and acquisition in the bio-pharmaceutical industry in order to understand firms' decision-making process and conditions that could influence firms' decision over level of relationship through Real options reasoning lens.

Reasons why this thesis decided to focus on ally then acquire relationship in pharmaceutical industry, and real options reasoning concept are listed below.

Alliances and acquisitions reflect different level of ownership, but both terms can be recognizing as activities that help tighten level of collaboration, and increasing firms' competitive abilities in market by creating access to external resources in a short period of time. Unfortunately, the failure rates of partnership's relations are quite high. Despite firms already applied the process of due diligent to make sure about strategic fit over the collaboration, but most acquisitions and alliances are failed, just only few of them succeed (Dyer, Kale, & Singh, 2004). When the acquisitions failing apart, both sides have to face with lost, and this will also lead to decelerate of firm and industry development. The failure happens since all firms have specific factors that won't be able to identify during the short period of due diligent process, which usually last only 2-3 months (Rankine & Howson, 2006). Moreover firms also have to face with unpredictable changes, which could impact firms' strategies. When firm change their strategies the expectation over ownership level and investment's direction also changed, these changes could impact the effectiveness of firm acquisition activities. Respect to the challenge over partnership relations this research presumes that the study over the sequence and condition in between alliances and acquisitions could lead to preminent understanding over firm decision making process and factors that could decrease uncertainty and conform firms' confident level over partnership.

Why focus on biotechnology and pharmaceutical firms? Bio-pharmaceutical industry is worth to study, the reasons is not only because the development outcome of this industry could bring better life quality to humanity, but also because industry characteristic that has high level of collaborations. In 2005, six out of ten leading

biotechnology firms were acquired by pharmaceutical companies (Malik, 2009). The relations in this industry are just like massive web that link all firms together under the concept of mutual benefit. Moreover during these few years rate of acquisition also increase, this could be since small biotech companies have to find access to research budget in the middle of economic depression, or find development and commercial support (Malik, 2009). At the same time, Pharmaceutical firms also rely on acquisition to fill up their pipelines in order to increase value and maintain competitive position. Under such a situation, the investigation can be conduct more easily by observing the dynamic in relation between alliance and acquisition partners.

Regarding to theoretical concept, this research would like to focuses on the relation through **real options reasoning (ROR) lens**. This is since ROR concept has an interesting characteristic. The uniqueness is flexibilities of choices that help firm preserving the right to make decision in the future while firm facing high uncertainty (McGrath & Nerkar, 2004). This concept also matches with bio-pharmaceutical industry which embeds high level of risk and uncertainty and also helps bridging the gap between alliance and acquisition.

1.2 Research objective and outline

Base on the motivation, this research objective is to investigate the conditions that support firms' intension to acquire their alliance partners after a period of time, by looking at this issue through real options reasoning lens. Therefore the puzzle of this study is: *Under what conditions engaging in alliance(s) helps or facilitates the acquisition of alliance partner afterwards?*

According to the puzzle, this study expects to develop extended view that could help firms deal with the uncertain and accommodate the internalize process by:

- Reviewing the process between alliance and acquisition process in pharmaceutical industry
- Pointing out the condition that engaging alliance could lead to future acquisition
- Giving the recommendation on how real options reasoning concept could be apply to support firms' investment decision.

In the subsequence part of this research, literature review will be present in chapter 2 then follow by research method. Five case studies about relations between biotechnology and pharmaceutical firms will be providing in chapter 4. Cross case analysis will be provide in chapter 5. Conclusion, limitation and further study will be mention in chapter 6.

Chapter 2: Literature Review

2.1 Bio-pharmaceutical industry review

: Relations between biotechnology and pharmaceutical firms

Before get into the strategic management concept, it's important to understand about characteristic of pharmaceutical industry. Firstly, this section will provide brief idea about characteristic of pharmaceutical and biotechnology industry, and then explain reasons why they need to develop partnership relations. After that this research will describe about the form of relationships and identify problems that firms are facing after they decided to acquire their target.

Large pharmaceutical firms can be considered as a well established business, with great number of financial assets (Malik, 2009) and human capitals especially in term of sales person that will lead to greater market reach when compared with biotechnology firms. These pharmaceutical firms have long-standing routine and great potential to guide new drugs from developing stage to meet FDA's regulatory, then to market (Rothaermel & Deeds, 2004). In contrast, biotechnology companies can be perceived as emerging business. These firms focus on new knowledge, mostly biologic medicines which were produced within microorganisms' organ (Malik, 2009), unlike pharmaceutical firm which mostly focus on chemical base drug. Even though most Biotechnology firm have great value of knowledge asset, they usually have limited cash in hand. Most of them have long and complicate product development process, highly rely on scientific research, and technologies; therefore it's undeniable that this industry has high budget burning rate. In some cases small biotechnology firms don't even have enough capabilities to deal with manufacturing and commercialization, therefore they

have to rely on partnership collaborations or licensing out patent contracts to generate revenue.

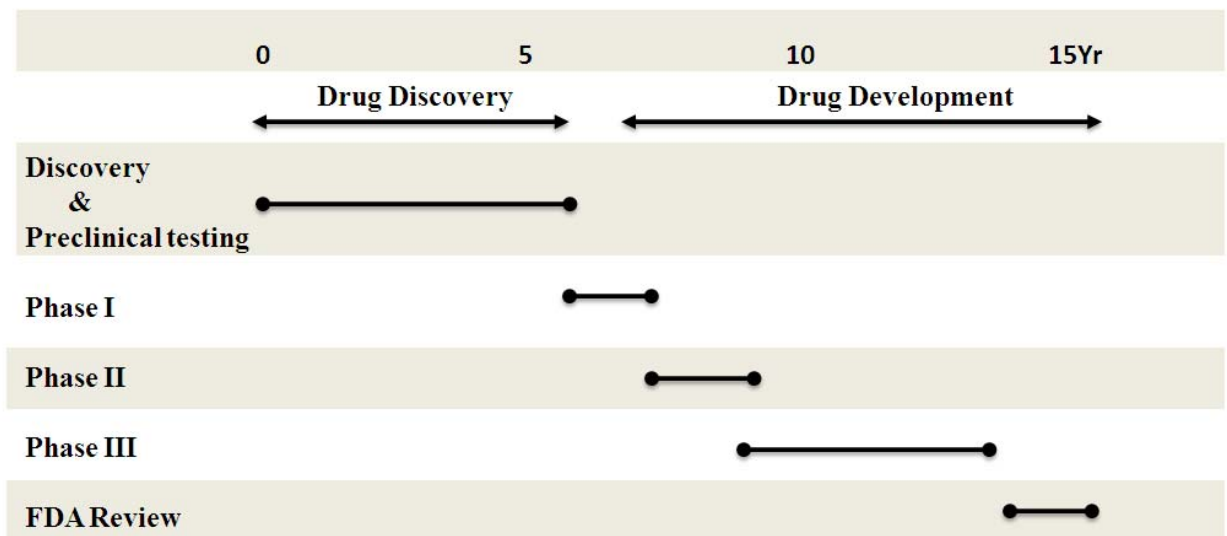
Next come to reasons behind the relationship between biotechnology and pharmaceutical firms. From large pharmaceutical firms point of view, they need to acquire resources from biotechnology companies because of various factor including: large proportion of blockbuster drug patents which consider an important sources of income are going to expire (Esteban, Lien, & Youn, 2008), and some firms may have weak internal pipeline. Therefore they are in a great need of external resources especially knowledge's' that can help upgrade their portfolios. Form biotechnology firms perspective, relation with large pharmaceutical firm can help increase their share values, and also to gain more knowledge, expertise in development process and FDA filling. In some case, small biotechnology firms need to develop relation in order to gain financial funding to decrease the pressure of research cost (burning rate) and the support in order to bring products to the market because they have limited capability.

In term of relation between biotechnology and pharmaceutical firms, the relation can be created in various forms depending on firms' objectives and how firms decided to manage their times and resources which usually related to firms expectation over benefit from the relation(Al-Laham, Amburgey, & Bates, 2008). Form of relationships under this industry mostly happen in form of collaborative R&D, licensing agreements and also marketing & distribution agreement (Rothaermel & Deeds, 2006). Moreover in order to lock in specific external capabilities and knowledge firms may decide to acquire its partner.

However according to industry characteristic which rely on the bet over the scientific outcome, there are high risk behind the investment in both developing and creating relation, since 95 % of all drug candidates are not able get through clinical trial

process (Rothaermel & Deeds, 2004). Therefore the risks from uncertainty in this industry are quite high, and it's more likely that if pharmaceutical firms make decisions improperly they may acquire the asset at higher prices or acquire the asset that didn't generate value as expected. Therefore how to develop a relationship with the right target is the most important issue that firms need to consider.

Figure 1: Overview process of drug discovery & development



Sources: (Liu & Schmid, 2008)

2.2 Theoretical Review

By investigating firms' relationship and the gap between concept of alliance & acquisition, this study will discuss about how firms' decision to engage in ally then acquires afterward, could be set in sequences under the setting of real options reasoning concept (ROR). This theoretical review will introduce the challenge of uncertainty, then scope down to introduce 3 main concept of alliances, acquisition and ROR , and finally show the relation why this three concept could be put in a sequence base on pharmaceutical industry context.

2.2.1 The challenge: Uncertainty

First of all, In order to explore about firm decision over level of ownership, **transaction cost concept** can be consider as one of the important factors the help explain firm's behavior. This concept can be perceived as factor related to the cost of time and expense, which created during the searching and negotiating period. It also includes the cost of operation to complete the contract and prevention of unexpected condition between both firms (Besanko, 2010). Therefore the level of transaction cost helps firm to determine the level of ownership whether to make, buy or hybrid.

Regarding to transaction costs concept, there are two main factors that could impact firm's governance decision including (1) level of uncertainty, and (2) level of asset specificity (Walker & Weber, 1984). This research will focus on the impact of uncertainty, since the uncertainty exists in all aspect of management, and the misestimating such a concept could lead to negative impact and high level of sunk cost. Regarding to the challenge of uncertainty, this study will investigate on how firm handles ambiguity in the sequence between alliance and acquisition relationship.

2.2.2 Acquisition: Facing the unknown risk – Uncertainty

Acquisition helps firm to get external resources that are important for firm's success (Vanhaverbeke, Duysters, & Noorderhaven, 2002) and provide firm's complete ownership over acquired target (Yin & Shanley, 2008). The concrete reasons for seeking growth through M&A are including: to reach in new geographic market, maximize shareholder value, to control the market share, to develop new product and to gain control and lock in suppliers (Borghese & Borgese, 2002). As mention, firm can benefit by lock in external resources and prevent knowledge spillover.

However the risks and uncertainty still exist, acquirer firm will have to handle with the consequences of bad deal for long period. Base on AT Kearny research on 25,000 samples, they found that 50% of acquisition firm not successful since the M&A doesn't added value to the firm (Rankine, 2006). Even though the acquiring strategy can be consider as an effective way to gain external asset, but there are various unpredictable factors that will impact the results of the acquisition. In short period of time due diligence analysis may be just focus on value and financial deal, but not fully evaluate the operation sector and cultural issue may be ignored (Borghese & Borgese, 2002). Moreover the external condition always changes. Therefore the risk in acquisition still exists; especially when the investment decision is not able to reconsider after firms decided to invest.

2.2.3 Alliance: Facing uncertainty with flexibilities

Similar to acquisition, strategic alliance can be use to source external resources that are important for firm's success (Vanhaverbeke et al., 2002) both activities also share same motivation, and objective to create synergy (Zollo & Reuer, 2009). However both activities entail different level of flexibility and risk, this is since alliances still

allow reassessment of partner contribution (Mitsuhashi & Greve, 2009). According to the characteristic that firm can reassessment, the firm's investment won't be lock in, unlike acquisition, therefore the risk that firm have to face will be in a minimum level. Moreover according to the research about strategic alliances (Das & Teng, 2000); strategic alliances can take place in a different forms, including, joint venture, minority equity alliances, R&D contacts, Joint R&D, Joint production agreement and licensing agreements. These activities allow firm to design more flexible form of relationship which match with firms' objective and expected relationship. At the same time alliances is just a partial investment or just in form of cooperation therefore the cost of activities to integrate external resources and risk in investment budget are lower when compare to the cost of acquisition.

2.2.4 Real options reasoning: as a solution to dilute uncertainty problems

Real Option Reasoning (ROR) is a strategic framework in strategic investment that helps firms preserving the right to make future decision under high uncertainty condition (McGrath & Nerkar, 2004). This concept combines the financial base model which concern about uncertainty and behavioral theory of firms' decision making. However there are some identical different between the concepts of financial base option and real option reasoning. The financial real option, is more likely to rely on estimating concrete value of strategy (Luehrman, 1998) while ROR is more like a 'way of thinking' and strategic implementation therefore the analysis of ROR could include the factor that can't be evaluate by financial evaluation (Krychowski & Quelin, 2010). In order to own an options firm must make and upfront investment and, to gain the most out of it, firms suppose to monitoring the options and try to influence variable that can help improve value of the asset, ultimate the outcome, and then exercise the options at

the right time (Luehrman, 1998). In term of ROR the strike signal can be perceive from the value to wait and see, since the real options reasoning doesn't have specific expiration date and firms have to keep monitoring and identify the strike signal by themselves (Bowman & Hurry, 1993).

ROR values increase with level of uncertainty, since it allow firm to capture opportunities in positive circumstance, at the same time its help limit downside risk under uncertain environment by limiting loss to the minimum (Krychowski & Quelin, 2010). As a consequence, with options investment investor still have enough budget to explore in various number of potential project than when compare to fully invest in one specific project.

However the concept of ROR can't be applied to all investment decision, since it requires some specific condition to be effective. Base on previous research (Krychowski & Quelin, 2010) identified that four main conditions that make RO concept become appropriate including; irreversibility, uncertainty, flexibility and information revelation. ROR would be more compliment to the project which have high irreversibility and uncertainly. With low level of irreversibility and uncertainly it could be more effective to apply simple concept of NPV. Moreover, in order to fully benefit from option, firm must have some flexible choices to choose from. Last but not least, information revelation or abilities to acquire related information that could reduce risk in decision making process are also important when firm consider to apply ROR (Krychowski & Quelin, 2010) since it could support firm logic to manage the options.

2.2.5 The sequence: Ally first then acquisition in bio-pharmaceutical industry

Ally first then acquire later was drive by the concept that firms' decision to acquires new partners cannot be separated from both past experience and relationships (Lin, Peng, Yang, & Sun, 2009). To pursue acquisition firms will have to face the high

uncertainly, not only in term of technical challenge and target firm's value but also in term of organization management. At this point, prior alliance experiences could allow firm to gain further information to consider whether the target firm will be complementary to the firm or not. Base on Porrini 2004 Acquisition of alliances partners ensure target specific, value and integration possibilities of target firm (Porrini, 2004).

The concept of ally first and acquire later could be very effective especially when firm have to face with high level of uncertainty. Pharmaceutical industry also can be view as one of the industry that contain high level of risk and unpredictable change, since bio-pharmaceutical related research contain great level of uncertainly, budget are irreversible since it will continuously burn out during the discovery process, and the final value of knowledge base resources won't be known till the end of scientific process and won't generate revenue until its approved by regulatory administration.

Therefore one of the solutions is to handle the risk and uncertainty with "Flexibilities" in from of real options reasoning. This research would like to point out that by viewing the whole issue through ROR lens (alliances as options) could lead to the understanding over the sequence of firm decision making process between alliance and acquisition.

Chapter 3: Research Method

As mentioned, the purpose of this study was to understand the conditions that help facilitated the acquisition of alliance partner by viewing the situation through real options reasoning viewpoint. Respect to the purpose of the study, this research intents to identify “what are the conditions” and “how the conditions could” support and influence firms’ decision over level of ownership under high uncertainty environment.

The scope of this study was to focus on pre-acquisition alliances in bio-pharmaceutical industry. Since this industry have high alliances and acquisition rate, and on the other hand it’s also possible to claim that alliance and acquisition play an important role in this industry since both pharmaceutical and biotechnology firms required complementary of resources from each others.

3.1 Case study design & Research Structure

Author decided to adopt case study method because case study’s applications are able to explain complex causal links in under specific situation, also to describe the context that the situation has occurred (Yin, 2003). In this research, case study is applied to help explain reasons “how” alliances activities could be considered as options to acquisition target companies in the future, and to identify “what” are the tendency that could facilitate pharmaceutical firms’ decision to acquire their biotechnology partners after they develop alliances relationship. By the way, in this thesis the author applied qualitative method to explore the relation between firms even though previous study in this field are more likely to adopt the qualitative method to analyze factors that could lead to the acquisition of alliances partner. The reasons why author decide to

choose the in depth method are to focus on the sequence, and condition which embedded in firm relation which can't be observe by the quantitative data set. In addition the number of case that conduct pre-acquisition alliances which provide sufficient and accessible information are quite low, this could lead to the insignificant result of quantitative research. Therefore qualitative method could be perceived as an effective way to investigate the relation between firms.

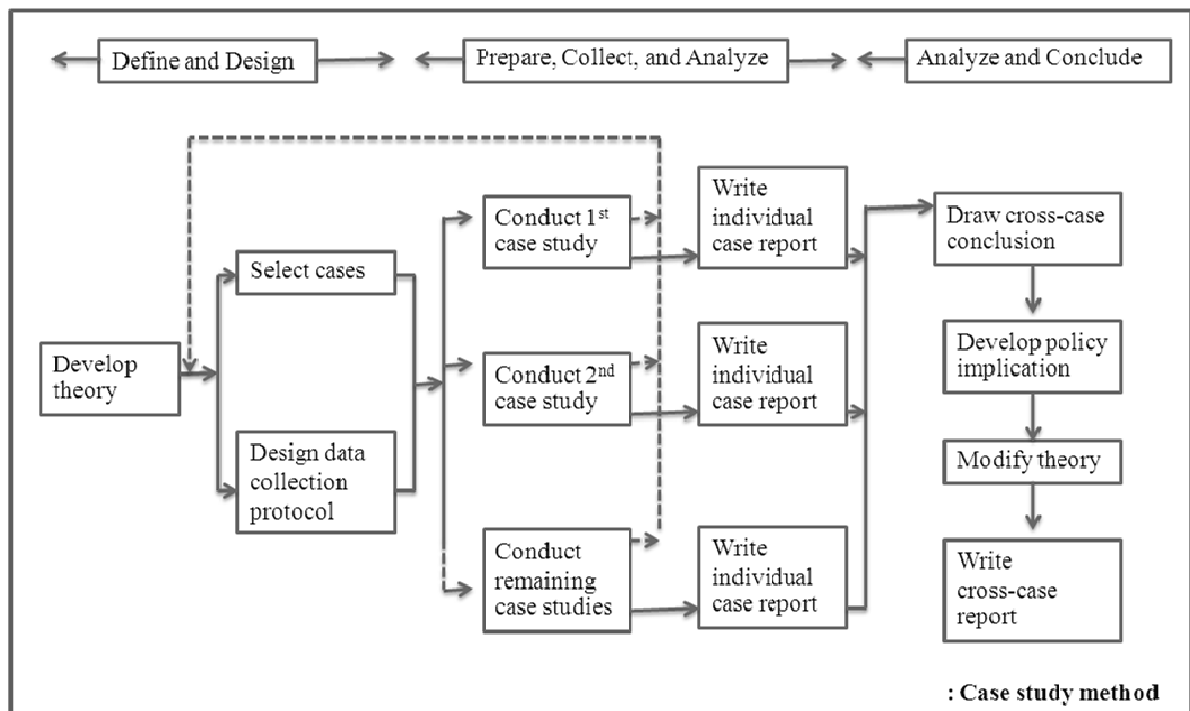
For units of analysis, since evidences from multiple cases are often considered more compelling, and replication of multiple-case could support the finding (Yin, 2003) this lead to decision of applying multiple-cases design to predicts the similar result and to figures out the pattern over firms' decision. In order to find proper case studies, top 50 biotechnology firms were identified. Then all were screened for those firms that have pre-acquisition alliances record. After all 5 case studies were selected for further study and analysis.

For cases selection, since the objective of this research is to identify the sequences of situation and relations between partners consequently this study set high priority on the cases that have high level of collaboration, mostly exploratory collaboration. By the way, reasons that most biotechnology firms selected in this research are mostly large and middle size firm is because this research concern about the possibility to acquire information and companies' detail, after biotechnology firm were acquired. Since base on data collection experience, most small firms' websites are merged in pharmaceutical firm after the acquisition, or doesn't provide enough information about firms and their strategies. Moreover information of the small biotech firms, which own by private sector doesn't open to public. Due to these limitations all selected firms are listed in stock exchange market. After all, five pairs of alliances

include: Pfizer acquisitions of Icagen, Bristol Mayers acquisitions of Medarex, AstraZeneca acquisitions of Cambridge Antibody Technology, Sanofi Pasteur acquisitions of Acambis, and Roche acquisitions of Genentech were use for further exploration in this research. At this point it is important to note that number of case samples are smalls and have wide variety in size and structure, consequently it could lead to the question about the generalizability of the finding, but in order to process the in depth study it is undeniable to facing this condition. Therefore in implementation process, the reader should be aware of this limitation.

Eventually case samples and relation between firms were investigated in order to find set of conditions that would facilitate firms to move forward acquisition relationship, and then examine them under cross-case analysis to identify replication that could be developed into propositions.

Figure 2: Case study method (Multiple cases)



Source: (Yin, 2003)

3.2 Information collection

Information in this research was acquired from multiples sources. After acquire name list of target samples the author searches through Recombinant Capital (Recap) database, to identify firms past collaboration experience.

Recap is a database from a consulting firm specializing in pharmaceutical and bio-technology industry. It could be consider as one of the most important databases since it helps identify the biotechnology and pharmaceutical firms' information and activities for a length of time. Mostly data available there are from three main sources including biotechnology and pharmaceutical firm press release, company presentations and financial report for investors. This database contains alliance initiated since 1973, with wide range of agreements, from preliminary alliances to acquisition. However recap database output option are limited, which make it difficult to use in a large-scale analyses (Schilling, 2009).

Moreover in order to understand target firms' strategy and other impact over firms' decision over level of ownership, the information collection process also including the information sources like company websites, news reports, and report from biotech-industry's journals, these information are mostly from Factiva database because some old information were deleted from their original online sources. However the information from search engine, database and press release are not enough and could lead to concern about information bias.

Therefore for more specific detail, this study acquired information from U.S. Securities and Exchange Commission (SEC), EDGAR database in the year that closest to the time of acquisition. SEC is U.S. independent regulatory agency. It regulates

the stock market and prevents corporate abuses relating to the offering and sale of securities and corporate reporting. According to the law, SEC was given the power to license and regulate stock exchanges, brokers and dealers who conducted the trading. Information from this database can be considered more trustworthy and accurate than information from press releases. The main sector of reports that were applied in this thesis include 10 – K which include annual report pursuant of firm registered in U.S. and 20-F Annual and transition report of foreign private issuers pursuant.

In term of theory related concept and information, this paper rely on academic publications and business school analysis reports to gain in depth and various viewpoint over the concept and relation of alliance, acquisition and real options reasoning. All of the information are secondary information, the in depth focus and first hand information are not available due to in accessible, and also because the objective of this study to follow the sequence between alliances and acquisition which some could take longer than 5 years period before their final decision to step in to acquisition stage was make, and also because these concept of study are quiet broad therefore it related to various group of related person with inaccessible to conduct primary interview.

Chapter 4: Case Background

This research will present the relationship between 5 pair of Bio-Pharmaceutical firms including Pfizer - Icagen, Bristol Mayers – Medarex, AstraZeneca – Cambridge Antibody Technology, Sanofi Pasteur – Acambis, Roche and Genentech. All of them can be consider as disparity relation, and all firm did go through the experience of ally first and then acquire later. Each case including: introduction of acquisition, companies' background, partnering strategy, collaboration relation and follow by the table present firms' relation and deal structure.

4.1 Pfizer acquired Icagen

Introduction of the acquisition

Clear strategic direction is very important for firm to make decisions whether to ally or to acquire. Firm with internal conflict or in the middle of power transition may not consider paying a large investment in such a period of time. However the relationship between Pfizer and Icagen can survive through such a situation, Pfizer and Icagen alliances' decision was make during period of power transition. Firm decision to acquired Icagen was announced in July 2011. This is just seven months after Jeff Kindler CEO of Pfizer get resign from his position! What are reasons behind this issue? Why Pfizer was so interesting in Icagen, and willing to continue in such a period of time?

Companies' background

Pfizer

Pfizer was incorporated under the laws of the State of Delaware on June 2, 1942 as a research-based, global biopharmaceutical company. Base on Fortune 500 (2010) the world biggest company record, Pfizer ranks at 140, with 116,500 employees. The main objective of firm is “to improve health and well-being at every stage of life”. The

company also have diversified global healthcare portfolio which can be separated into 2 main sectors, biopharmaceutical and diversified. The firm also focuses on biopharmaceutical. By year in 2010 portfolio of Pfizer included products that prevent and treat cardiovascular and metabolic diseases, central nervous system disorders, arthritis and pain, infectious and respiratory diseases, cancer, eye disease and endocrine disorders.

Icagen

Icagen, Inc. is a biopharmaceutical company based in Research Triangle Park, North Carolina. It was established in 1992, by 2007 number of employees record is 40 people. The firm conducts the whole stage of development from discovery to commercial. It specializes in orally administered small molecule drugs that modulate ion channel target. Icagen ion channel concept is to manipulate ion channel, the cell's gate, to open or to close in respond to ion substances. The company utilizes in ion channel to target third party drug developer, whose innovation rely on cell channel access. Icagen operates both research and development activities. The firm also joins in collaboration with leading pharmaceutical companies, under specific disease areas, including epilepsy, pain, inflammation, sickle cell disease and dementia, including Alzheimer's disease.

Partnering strategy – How do they fit together?

Why they do need each others? To respond with challenging operation environment, Pfizer need to increase its strength. Pfizer strategically believes in comprehensive approaches, which also include – maximize research projects in hand and gain access to external scientific knowledge. Pfizer focus on 5 therapeutic areas like immunology, oncology, and metabolic etc. Ion channel is also one of it interest. Another reason to explain why Pfizer decide to ally and acquired later, may base on the

condition of knowledge since the study in ion channel is extremely specific, though it can be consider as attractive and effective, therefore it may not worth for Pfizer to develop by itself in the first hand since the cost are too high, therefore Pfizer just step in to alliances first, then acquire later. By the way in term of size and equity, Icagen can be considered as a small firm, with small size it could be consider easy to manage after acquire. Moreover, liability of Icagen is very low when comparing to its competitor and this among of depth is easy to be paid off by giant firm like Pfizer.

In term of resources, giant firm like Pfizer can provide full length of support in large scale of clinical trials future match up with third party drug developers. Moreover, in term of sale and marketing Pfizer is already being well known for its broad channel in difference locations.

From biotechnology firm things can be perceive differently, strategic alliances is required since firm need external resources for future development. For Icagen, it uses knowledge in hand, the ion channel, as bargaining factor to assure and persuade large pharmaceutical firm to invest in the project. This is because alliances will allow firm to access external resources like therapeutic area of expertise and research. These factors will allow firm to increase its expertise in pipeline development.

Collaboration relation

In August 2007, Pfizer and Icagen start their first collaboration in developing Sodium ion channel, a new potential treatment for pain related disorder. Their relationship is in form of collaboration and licensing agreement in development and commercial of final product. Under this equity agreement, Pfizer researchers also join in research committee. Base on the deal condition, Pfizer will pay \$ 12 million in exchange with license agreement, and also pay \$15 million as for equity investment,

\$ 5 million for common stock and \$10 million for equity put option which Pfizer will have right to exercise during next 18 months.

Before the expiration date of the stock purchase option, on 6 February 2008, Pfizer exercises the option by purchasing 5,874,953 shares on common stock at cost of \$1.71 per share. Later on in 21 Sep 2009, Pfizer provide \$5 million budget extensions to the licensing agreement, not so long after that Icagen announces it positive progress in sodium channel pain, which compounds are now being advanced into first-in-man studies. This situation make Pfizer feel more certain about Icagen ability and decide to provide 5 million USD to extend its licensing agreement. Within few months after that, Icagen announce that it's ready to initiate Phase I clinical studies of potential Nav1.7 compound.

Up to this point this study can identify perception toward alliances partner through quote from both firms' press release.

"We are very pleased to announce this extension of our previous collaboration with Pfizer," "We have had a great partnership thus far and remain confident that the combined abilities of our two companies will help identify novel drug candidates directed at one or more of these important sodium channel targets for the treatment of pain and related disorders."

P. Kay Wagoner, Ph.D., President and CEO of Icagen.

"We have made substantial progress over the first two years of our collaboration and look forward to working with Icagen in the upcoming year in seeking to identify drug candidates from these targeted programs."

Gillian Burgess, Ph.D., Chief Scientific Officer of Pfizer's Pain Research Unit

(www.sec.gov: Icagen announces the extension of Pfizer collaboration)

After four years of strategic alliances, on July 2011, both firms agreed in definitive merger agreement. Pfizer decided to acquire all of the remaining stock (89%)

for \$ 6 per share, approximation of overall transaction value is \$ 56 million. In term of relation both side have positive perspective toward this acquisition, since during these four years of collaboration, each side has developed mutual appreciation of the expertise and capabilities of the other. Base on online report every scientist in Icagen was retained and they stayed, this can also reflex Pfizer’s trust over the development team. Late on in 2012, in order to create greater sense of connection between Pfizer and new subsidiary, Icagen changes its name to Neusentis.

Figure 3: Pfizer and Icagen’s deals structure

Pfizer	Icagen
2007 August: Collaboration over Sodium ion Channel	
Pfizer Provide: <ul style="list-style-type: none"> • \$5 million for common stock purchase • \$10 million for put options (18m) 	Icagen Provide: <ul style="list-style-type: none"> • License and commercialize right for ion Channel final product
2008 February and 2009 September: Collaboration continue	
Pfizer provide: <ul style="list-style-type: none"> • \$10 million purchasing stock • \$5 million continuous funding on collaboration project 	Icagen Provide: <ul style="list-style-type: none"> • Project development on ion channel
2010 December: Collaboration on clinical study of Nav.17	
Pfizer provide: <ul style="list-style-type: none"> • Funding on all aspect of Nav.17 	Icagen provide: <ul style="list-style-type: none"> • Right to commercialize the product
2011 July: Pfizer acquired Icagen	
Pfizer provide: <ul style="list-style-type: none"> • Total of \$56 million to purchase Icagen at cost of \$6 / share (89% premium) 	Icagen provide: <ul style="list-style-type: none"> • Its specialize portfolio – ion channel in human cell • Intellectual property

4.2 Bristol-Myers Squibb acquired Medarex

Introduction of the acquisition

Bristol-Mayers Squibb (BMS) and biotechnology firm Medarex join in collaboration since 1998. Both firms also pursuit same field of study by focus on human antibody. The question is that why don't BMS decide to purchase Medarex at the beginning period? While it decides to wait, even though they know that the longer its wait, the cost of acquisition will be higher? What are triggers points in BSM decision making process?

Companies' Background

Medarex

Madarex biopharmaceutical has full scale of discovery, development and commercialization process. The firm was incorporated in United State, NJ in 1987. On December 2008 it employed 488 full-time employees. Medarex's important knowledge asset like UltiMAb® and ADC, technology platform for generating antibodies, can be used to develop fully human antibody-based therapeutics to treat debilitating diseases, like, cancer, inflammation, autoimmune disorders and infectious diseases. Madarex views these platforms as strategic assets that provide them with the strategic options to either retain full rights to innovative antibody therapeutics or seek favorable commercial partnerships. In term of development, a number of fully human antibody product candidates have been generated from Medarex technology and are being developed separately by licensing partners, including companies such as Amgen Bristol-Myers Squibb Company, Centocor, Eli Lilly and Company, MedImmune, Novartis Pharma AG and Pfizer Inc

Bristol-Myers Squibb

Bristol-Myers Squibb (BMS) was incorporated under the laws of the State of Delaware in August 1933. According to SEC report by 2008, the company employed approximately 35,000 people. BMS is engaged in the discovery, development, licensing, manufacturing, marketing, distribution and sale of pharmaceutical and nutritional products. As a diversified worldwide health and personal care company, its principal businesses portfolios including pharmaceuticals, consumer products, nutritionals and medical devices. It provides solution for cardiovascular, metabolic and infectious diseases, central nervous system and dermatological disorders, and cancer. The company is also can be considered as a leader in consumer medicines, orthopedic devices, wound management, nutritional supplements, infant formulas, and hair and skin care products.

Partnering strategy – How do they fit together?

In term of strategic management, BSM applied “String of a pearl strategy” to accelerate the discovery & development process and increase internal capabilities by finding right partner alliances and acquisitions. The transaction that happens through string of pearl strategy is target to fit firm strategy focus to create new idea of company expertise, strengthen firm pipeline, and increase firm’s productivities. Base on BSM document its views alliances as an important complement to its own discovery and development activities. Another motivation for firm to step in to alliances is to reduce research and development expenses that do not lead to revenue-generating products.

BSM’s area of partnership interest is in new chemical entities and new molecular, research partnerships and collaborations, drug discovery and development technologies, and Commercial expansion. BSM’s key Disease Areas also

include the expansion of immuno-science, during that time Madarex also run a research project on Ipilimumab substances that related to immune-science.

For Medarex, as a biopharmaceutical company with smaller scale and less fund it requires external collaboration to support its development and clinical trial. Base on the fact, BSM support budget in year 2007-2008 approximately weight 65% of overall development budget. This will help Medarex to deal with the burn rate that usually quite high during the development and trail process, the initial budget will also help firm to reduce the risk from failure. Moreover in term of commercial scale, Medarex need large pharmaceutical firm to support its reach in worldwide market

Collaboration relation

The first relationship between Medarex and BSM began in 1998, under the form of research agreement. Under the agreement, BSM will gain access to Medarex's HuMAb- Mouse technology, which can be used to create human antibody for drug discovery program. In term of exchange, Medarex will receive approximately \$20 Million for license fee and milestone payment.

The relationship in developing human antibody investigational was continue, in November 2004 both companies decide to join in a collaboration to develop and commercialize MDX-010Z (also known as Ipilimumab) which is substance used for the treatment of melanoma, a skin type cancer, which the substance will activating the immune system in human body. The development of MDX-010Z can also be further developing to cure prostate cancer and lung cancer. Under the term of collaboration the BMS will responsible for 65% of development cost related to clinical trial for EU regulation office approval; the rest 35% will be responsible by Medarex. For the cost of United State - FDA approval both firm will share the cost equally. Base on regulation agreement, Medarex would receive up to \$205 million if all regulatory milestones are

met, plus \$275 million for sales related mile stone. The initial cash payment from BSM to Medarex is \$25 millions, Moreover BSM also spend \$25 million to purchased the total of 2,879,223 unregistered shares of the Company's common stock at a purchase price equal to \$8.6829 per share.

Revenue from partners representing 10% or more of total revenues for the years ended December 31, 2008, 2007 and 2006 is as follows:

Figure 4: Revenue from partners 2006-2008

Partners	2008	2007	2006
BMS	29 %	36 %	37 %
Pfizer	21 %	19 %	21 %
Centocor	16 %	14 %	—

Source: Medarex –SEC Report 2008

According to the continuous collaboration and improvement in R&D process, in July 2009 BSM was announces to acquire Medarex, by purchasing the rest of stock in the market at cost of \$16.00 per share, in cash. Total value of the acquisition is approximately \$2.4 billion. This acquisition complete on On September 01 2009 as a result Medarex become a wholly-owned subsidiary of Bristol-Myers Squibb, through its wholly-owned subsidiary Puma Acquisition Corporation. Base on BSM point of view, this acquisition is quite profitable to them.

"Medarex's technology platform, people and pipeline provide a strong complement to our company's biologics strategy, specifically in immune-oncology,"

"With its productive and proven antibody discovery capabilities ability to generate interesting therapeutic programs and unique set of pre-clinical and clinical assets in development, Medarex represents what we're looking for in terms of our String of

Pearls strategy. This acquisition is another important step in our BioPharma transformation."

James M. Cornelius, chairman and chief executive officer, Bristol-Myers Squibb

(www.sec.gov: Bristol-Myers Squibb to Acquire Medarex)

Base on the acquisition, BSM will get the fast access to Medarex's UltiMAB Human Antibody Development System, Antibody-Drug Conjugate (ADC) technology, full ownership and rights to ipilimumab, which, if approved by FDA, it could be an important contributor to Bristol-Myers Squibb's future growth. Moreover Medarex will receive rights to seven antibodies in clinical trials under Medarex's sponsorship, three other antibodies being co-developed with other partners, and also receive royalties based on percentage of sales for SIMPONI(TM), STELARA(TM) and ILARIS(R) which are Medarex bio-base drug which already available on the market.

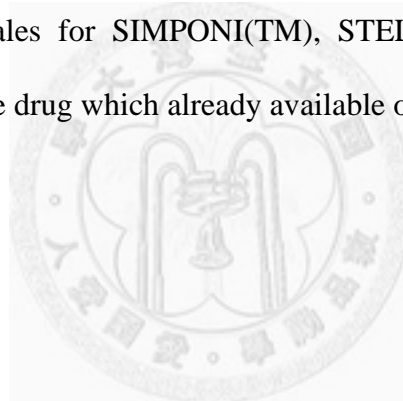


Figure 5: Bristol-Myers and Medarex's deals structure

Bristol-Myers Squibb (BSM)	Medarex
1998 June: Research agreement over Medarex's HuMAb- Mouse technology	
BSM provide: <ul style="list-style-type: none"> • \$20 Million for license fee and mile stone payment. 	Medarex provide: <ul style="list-style-type: none"> • Access to HuMab-Mouse
2004 November: Collaboration to develop MDX-010 and MDX-1379 for melanoma	
BMS provide: <ul style="list-style-type: none"> • Budget support in discovering process • Initial cash payment of \$25 million • \$25 million to purchase Medarex common stock • Approximately \$275 million agreement if firm can reach milestone 	Medarex provide : <ul style="list-style-type: none"> • Focus on the development of MDX-010 and MDX-1379 for melanoma • Responsible of 35% cost of development
2009 July: BMS acquired Medarex	
BMS provide: <ul style="list-style-type: none"> • Total \$ 2.4 billion to purchase Medarex share at \$16/ Share 	Madarex provide : <ul style="list-style-type: none"> • Human Antibody development system • Antibody Drug conjugate (ADC) technology • Full ownership of Ipilimumab • Right over Medarex sole develop patent

4.3 Sanofi –Aventis acquires Acambis

Introduction of the acquisition

In the summer of July 2008, just as the beginning of world business crisis, Wayne Pisano president and chief executive officer of Sanofi- Pasteur agree to purchase British vaccine maker Acambis Plc for \$547.8 million. The agreement offering provide 64 percent premium for Acambis stakeholders. What are logics behind this deal that make firm feel so certain and lead to the acquisition in the middle for world business crisis? How do Sanofi-Aventis be sure that this acquisition will bring a great profit outcome?

Companies' background

Sanofi-Aventis (SA) 2007

Sanofi-Aventis (SA) was incorporated under law of France in 1994. Its headquarter located in Paris. The company presents in 100 countries, with around 100,000 employees worldwide. Base on IMS record in year 2007 Sanofi-Aventis could be consider as a leading player in pharmaceutical industry since its sale reach the first rank in Europe and forth rank in world stage. Key mission of SA is to discover and develop innovative molecules and vaccines; and make them available to patient throughout the world. SA has a global present in therapeutic field, it has 8 blockbuster drugs, which annual sales over one billion Euros in hand.

In term of vaccines development Sanofi-Paster (SP) , subsidiary of SA in United State which specialize in vaccines development and already established a high potential market like influenza, pediatric combination etc. SP is working to secure firms long-term growth by trying to meet client need, stepping up R&D project and create contract alliances with potential firm. To maintain future growth, SA's strategy including keep tight control over cost and staff number, optimize potential in R&D

project, continue building on key therapeutic field, reach out major market through a regionalization, and promote access to medical treatment

Acambis (2005)

Acambis is a developer of vaccines against infectious diseases. It was established in 1994, England, and started as a research focus organization. Nowadays, as a fully integrated firm, it has capabilities of developing new vaccines from discovery stage research to introducing sale of approved product. Acambis employment base are in UK, US, and Canada. Number of its employee's reach 285, in 2005 record. Acambis is best known for its work in Small pox vaccine; in 2003 it was receive a contract from US government to supply 209 million doses of it investigation ACAM 2009 vaccine. Due to a broad portfolio, yellow fever and Japanese encephalitis vaccines are also develop under Acambis's laboratory.

Partnering strategy: How do they fit together?

Sanofi- Pasteur, subsidy of Sanofi-Aventis, has a strong interest to partnering with firms in Research & Development. Its main interest is in the field of active and passive human immunization, as well as technologies support including: Vaccines, Monoclonal antibodies, Agents to enhance vaccine immune response etc. The prospect partners can be in all stage of development, including the early-stage research.

In term of resources and experiences, Sanofi-Pasture itself has great multidiscipline team to manage the partnership relations to create mutual understanding between both firms. SP, under SA group has great distribution channel worldwide, at the same time as big pharmaceutical firm it also has greater resources and budget to support various phase of trails. In order to extensively build growth, Sanofi – Pasture not only run R&D by itself but also spends great number of investment to create potential collaboration, and to own marketing license from smaller biotech firm

For Acambis, even though it has a strategy to be a self-restrain and can operate the whole system from early-stage development to manufacturing, but the resources in hand is still limited when compare to large pharmaceutical firm. In order to develop early stage research, the company has to bear the cost of high budget burn out rate. If the project is failed the firm will face a great sunk cost therefore collaboration is important since it can reduce the risk. Moreover vaccine industry are dominated by 5 much larger pharmaceutical firms, like SP, GSK, Merck, Weyth and Novatis these firms already generate around 80 percent of worldwide sell. For reason related to intellectual property, infrastructure, it is hard for Acambis to fight alone. Continue looking at external factor, this area need long-term investment in R&D and also facing tighten regulatory, these condition make it harder for Acambis to stand alone, and have higher entry barrier. Therefore firms in this industry end up with consolidation strategy by getting alliance relationships. If we look at Sanofi-Puster's competitors in vaccines development area we will also find they are already apply this strategy – GSK's acquisition of ID Biomedical, Novartis's acquisition of Chiron and Crucell's acquisition of Berna Biotech.

Collaboration relation

First partnership agreement, between Sanofi-Paster and Acambis was announce in February 2007, the objective's to collaboration in developing ChimeriVax vaccine to helps improve public health in the Asia – Pacific region. Under the agreement Acambis has granted Sanofi-Pasteur marketing, distribution, and certain manufacturing right to ChimeriVax-JE worldwide. For Acambis the firm will provide the raw materials for ChimeriVaX and receive a royalty on sales. Moreover it will receive milestone payment depended on the marketing approval in endemics countries and Europe.

Later on in November 2007, both firms agree to sign further agreement to develop and market West Nile Virus. Base on this deal, Acambis will receive \$10 million as upfront payment, up to the filing of a license application in US; the upfront payment for this project could be up to \$70 million.

The relationship, trust and mutual understanding were developed during this period of time, in July 2008 Sanofi-Pastuer agree to buy Acambis for \$547.8 million. Wayne Pisano, President of Sanofi said that Acambis is a long term partnership on several project, and it is considered as “logical step” for Sanofi to acquire in Acambis. Peter Fellner, chairman of Acambis also point out that Sanofi will benefit strategically not only from Acambis’ pipeline and technologies in vaccine development, but also from its U.S. - base R&D and manufacturing infrastructure.

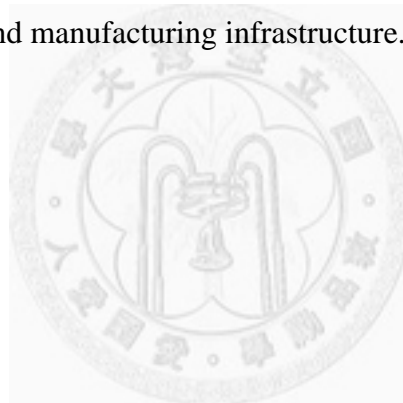


Figure 6: Sanofi-Pasteur and Acambis's deals structure

Sanofi Pasteur	Acambis
2007 February: Collaboration on ChimeriVax vaccine	
<p>Sanofi Pasteur will provide:</p> <ul style="list-style-type: none"> • Milestones deal of €22.5 million, if firm receives market approval for Chimeri Vax-Je in key endemic countries and Europe • Marketing authorization for ChimeriVax-Je in Europe • Channel to market for ChimeriVax-Je 	<p>Acambis provide:</p> <ul style="list-style-type: none"> • Right to marketing, distribution and certain manufacturing rights to ChimeriVax-JE vaccine
2007 November: Collaboration on ChimeriVax & West Nile vaccine	
<p>Sanofi Pasteur will provide:</p> <ul style="list-style-type: none"> • \$ 10 million as upfront milestone payment • Milestone payment up to 70 million USD based on product approval & sale in US. 	<p>Acambis provide:</p> <ul style="list-style-type: none"> • Collaboration in the deal to bring West Nile vaccine to market
2008 July: Sanofi acquired Acambis	
<p>Sanofi Pasteur will provide:</p> <ul style="list-style-type: none"> • Purchase Acambis for \$547.8 million, or 190 pence in cash for each share (64% premium) 	<p>Acambis provide:</p> <ul style="list-style-type: none"> • Vaccine in development against C. difficile and influenza • Acambis manufacturing capability • Contract agreement with US government to provide ACAM 2000 (To cure - Smallpox)

4.4 Cambridge Antibody Technology & AstraZeneca

Introduction of the acquisition

At the time of acquisition, Cambridge Antibody Technology is still loss-making. The development projects have high burning rate. Moreover it only has one successful product in market that generates revenue back to the firm. Why AstraZeneca interested in such a firm? How do they make sure that, this is a potential choice to acquire?

Companies' background

Cambridge Antibody Technology

Cambridge Antibody Technology (CAT) is a biopharmaceutical company; in 2004 CAT employed 281 people. The company was incorporated and registered under the laws of England and Wales since 1995. CAT focused on research and drug development in the field that related to human monoclonal antibodies. CAT has an advanced proprietary platform technology for rapidly isolating human monoclonal antibodies using Phage Display and Ribosome Display systems. CAT also has antibody libraries, which derived antibody-producing cells from human donors and other sources of human antibody genes. Currently, the library incorporated more than 100 billion distinct antibodies. These libraries are the important support for CAT's capability to develop a portfolio of antibody-based drugs.

In term of strategic asset, CAT has approximately 30 patent families in its portfolio. There are three key patent families including Winter II, McCafferty, and Griffiths. All of them are technology related to antibodies and molecules which found in the human body. All in all, CAT relies on trade secrets and proprietary know-how. Therefore the firm needs to seek protection through confidentiality and proprietary information agreements.

AstraZeneca

AstraZeneca was formed on 6 April 1999 through the merger of Astra AB of Sweden and Zeneca Group PLC of the UK. As a global, innovation-driven biopharmaceutical company, by 2004 the AstraZeneca has more than 64200 employees in 45 countries. Half of firm employments are in Europe. The firm focuses on the discovery, development and commercialization of prescription medicines. It also so can be considered as leader in gastrointestinal, neuroscience, respiratory and inflammation, oncology and infectious disease medicines.

Partnering strategy – How do they fit together?

AstraZeneca's mission is to “make the meaningful different to health through great medicines that bring benefit for patients and add value for stakeholders and society”. In order to achieve the mission, the firm strategy not only focuses on developing its world class R&D, it also focuses on external extension collaboration and operation efficiency with flexible cost base. AstraZeneca interested are quite diversify, just like other large pharmaceutical firm that need to expand its pipeline and strategic asset in order to remain in competitive position, the scope of development including biologic development, and respiratory & inflammation.

From the position of large pharmaceutical company it will be able to provide support in clinical, regulatory capabilities since it has greater experience than small biotechnology firm. Moreover with its great subsidiary in various countries, AstraZeneca ability in commercial also has higher coverage. AstraZeneca already has the infrastructure in places, the budget allocated, and all internal experts, and also have great possibility to conduct Phase III trial and finish it in a short period of time.

For a biotechnology company like CAT collaboration is very important, since it allow firm to access skill and information that it doesn't possess, fund its R&D

activities, which helps firm to obtain regulatory for product candidates and also to gain support in commercialize process. For CAT its development process has high budget burning rate. Moreover HUMIRA[®] its only product, which already goes to the market and receives royalties from the sales doesn't create enough revenue to support overall developing project. Without collaboration agreement the number of product candidates and development project may be limited. Base on CAT strategy in that period of time, it does not plan to develop significant manufacturing, marketing or sales capabilities. The firm relies heavily on collaborators for these functions. Therefore these two firms can become “complementary” for each others.

Collaboration relation

The first collaboration was in 31 August 1999, just within one year after the merger between Astra of Sweden and Zeneca Group. The research collaboration focuses on antibody-based research for cell-surface receptors and intracellular. Base on the agreement CAT will use its ProAb[®] and ProxiMol[®] technology, patented antibody discovery/functional genomics tools, to isolate and provide antibody-based research. CAT receives revenues from AstraZeneca and retains all rights to develop and commercialize any antibodies generated in the collaboration.

Next collaboration took place in November 2004, in term of financial collaboration AstraZeneca agreed to subscribe in cash for 10,217,983 CAT shares at a price of £7.34 per share for a total investment of £75 million.

Under the terms of the collaboration agreement in research and development in 2004, CAT and AstraZeneca agreed to jointly develop human monoclonal antibodies, as drugs in the field of inflammatory diseases. CAT maintains the right to co-promote selected products in the United States. For AstraZeneca, it will be granted the option to opt-in to, and jointly fund, certain of CAT's existing and future discovery programs.

The alliance included five years in discovery initiation phase. The research investment will be a minimum of U.S. \$175 million, which both parties will fund 50:50. CAT will contribute the greater part of the resource in this discovery phase, principally responsible for antibody discovery, manufacturing process development and the supply of material for exploratory clinical trials, while AstraZeneca will be principally responsible for translational biology, clinical development programs, regulatory filings and commercialization. Both sides agree to establish a Joint to oversee the discovery and development process.

In May 2006, AstraZeneca bought Cambridge Antibody Technology (CAT) in a deal valuing CAT at 702 million pounds (\$1.3 billion). AstraZeneca pay 1,320 pence a share in cash, which is 67 percent above CAT's closing price on the day before the acquisition. After acquisition CAT will be merge in to Med Immune the operationally independent and strategically aligned biologics business unit of AstraZeneca. All the staff will be retained after merger. According to AstraZeneca point of view, this Acquisition will bring AstraZeneca one product in Phase II clinical trials and another in Phase I. This Acquisition can also considered as result of past alliance success, by buying CAT, AstraZeneca will not have to share the profits of any drugs, which resulting from their previous collaboration project.

Figure 7: AstraZeneca and CAT's deals structure

AstraZeneca	Cambridge Antibody Technology
1999 August : Agreement upon ProAb® and ProxiMol® technology	
AstraZeneca provide: <ul style="list-style-type: none"> • Research revenue 	CAT provide: <ul style="list-style-type: none"> • support on the use of ProAb® and ProxiMol® technology in research procedure
2004 November: Collaboration on Human Antibodies for Inflammatory Disorders project	
AstraZeneca provide : <ul style="list-style-type: none"> • Total investment of £75 million to purchase share of CAT 10,217,983 • Agree to provide 50 % of research investment in this project • Primary responsible for clinical trial, regulatory filling and commercialization 	CAT provide: <ul style="list-style-type: none"> • Agree to provide 50 % of research investment in this project • Primary responsible for discovery , manufacturing process and supply for clinical trail
2006 May: AstraZeneca acquired Cambridge Antibody Technology	
AstraZeneca will pay : <ul style="list-style-type: none"> • \$ 1.3 billion to purchase CAT share at cost of 1320 pence / share 	CAT provide: <ul style="list-style-type: none"> • Late stage pipeline in biological , with at least two project in trail phase II • Royalty fee from Humira anti-arthritis license

4.5 Roche acquired Genentech

Introduction of the acquisition

In 2008, just in the between of world business crisis while most firm just tighten their belt, Roche Holding just announce an acquisition deal that will be rank in top 10 of acquisition worldwide at cost of 43.4 billion dollars, by purchasing all the stake of it American partner Genentech.

Before the acquisition, Roche already hold almost 60% of shares since 1980, and both firms have a great collaboration record since then. Why Roche decide to wait and not acquire all the stock at the beginning of the collaboration? Why firm so confident to spend a great number of investments in the middle of business crisis?

Companies' background

Genentech

Genentech was founded in 1976 by Robert A. Swanson and biochemist Dr. Herbert W. Boyer. It is a leading biotechnology company that discovers, develops, manufactures and markets pharmaceuticals for significant medical needs. The company headquarters is in South San Francisco, California. By 2007, the company employs 11,174 employees, which make the firm to be considered as one of the largest firm in biotechnology industry.

Roche

Roche Ltd. was founded in 1896 by Fritz Hoffman – La Roche. The company headquarter is in Basel, Switzerland. It was known as the world's leading research-focused healthcare groups in the fields of pharmaceuticals and diagnostics. By 2007, the company has 66,707 employees worldwide. In term of research and development Roche also well known in-vitro diagnostics and drugs for cancer and transplantation. The firm is a market leader in virology. It is also active in other major therapeutic areas such as

autoimmune diseases, inflammatory and metabolic disorders and diseases of the central nervous system. The group structure can be separated in to 3 main sectors including pharmaceutical, diagnostics and corporate which focus on smaller scope of product like vitamin, fine chemical and customer health product.

In term of collaboration, Roche has R&D agreements and strategic alliances with numerous partners, the top two that have a great impact on Roche's portfolio including Genentech and Chugai.

Partnering strategy – How do they fit together?

This case study is somehow different than other case studies. Since biotechnology firm, Genentech has a well develop structure, which have its own manufacturing, and commercialize capability. It doesn't require the support from Pharmaceutical firm to complete the overall process and generate revenue. However in from of resource exchange the collaboration and acquisition still bring great benefit to Genentech and its partner. This is since Genentech specialize in bio-development; it has various intangible asset of knowledge in hand. In term of Roche, as a giant world leading group, the firm also has great resources in development and commercializes process. Both firms can work as a complementary to strengthen their innovation and commercialize process.

Base on the long period relation between Genentech and Roche, both firms did go through various collaboration projects. Roche also own some part of Genentech since 1980, in that period of time Roche still didn't plan to acquire Genentech, not until 2008. However base on Roche strategic, to focus on innovation in therapeutic and diagnostic along with the benefit from "hub & spoke concept", which focus on arranging the system to move along spoke and connecting to the hub at the center; acquisition seem to be the most effective way to lock in the firm like Genentech . The

other reasons that will lead to strategic fit can be link to R&D and operation sector. For R&D development the collaboration and acquisition will create diversify approach in research, firm will be able to openly share the knowledge which include the library of Antibody technology, IP technology and its network connection with third party. In operation process, the acquisition will reduce the complexity and duplicate in the system, moreover it can leverage its scale and competitive strategy in United State.

As the time go by, the proportion of product that both firms co-develop in the past have increase, some even reach the top rank of Roche's sale top 20 products in 2007. Therefore the asset like Genentech is quite valuable to lock in.

Collaboration relation

The first cooperation took place in January 1980, when Genentech licensed patent and know-how of Roferon-A, sterile protein product which use by injection. Later on, Genentech and Roche Holding Ltd develop an agreement in which Roche will invest approximately \$492 million in capital into Genentech and purchase 60% of its stock for \$36 per share(\$36 price is a 65 percent premium). Roche will own 60 percent of Genentech, however base on the agreement Genentech still remain independent in governance.

"Genentech will have the resources and the independence to fully deliver the dream of biotechnology,"

Robert A. Swanson, founder of Genentech.

"We are committed that Genentech proceed with its business and maintain its enterprising spirit with autonomy. Both companies will retain independent control of their research agendas and continue their existing business relationships with other pharmaceutical and biotechnology firms."

Fritz Gerber, chairman and chief executive officer of Roche

(Genentech press release: Friday, Feb 2, 1990)

After the acquisition, Genentech and Roche joined in various collaboration projects together. In March 1992, they joined in a development of Library screening, TNF & IgE. June 1995, both firms agreed on the collaborative clinical development, registration and marketing of DNase enzyme in all major countries of Europe. Genentech will supply product and received milestone payments and technical support from Roche. These two companies will share the development, marketing and selling costs as well as the profits from sell in Europe.

In 1998 , both firm again join in agreement over Herceptin® (Trastuzumab), Genentech's new and innovative anti-HER2 monoclonal antibody treatment for metastatic breast cancer, which have positive outcome in first trial test and also list as fast track product by the US food and drug administration (FDA). Under this agreement Roche will pay a substantial up-front fee, cash milestones tied to product development activities in 50-50 basis. At the same time Roche will receive that commercial right of this product outside US market.

The second acquisition took place on 2 June 1999; this agreement is base on 1990-1995 call option Roche agree to purchase 19 percent of Genentech shares, however in term of governance, both firm still works independently. One of the reason that the call options were exercise is because Genentech performance well during the past four years.

Four years after the acquisition, both firms again join in to the development program of Avastin, recombinant humanized therapeutic antibody which have potential to leading tumor regression. The success of phrase III Avastin development project is the outcome of the combination of R&D resources between Roche, Genentech and Chugai which lead to Group's innovation capacity under Roche umbrella. At this point,

it can prove that this success did strengthen the relationship between Roche and Genentech. In July 2004, both firms collaborated in a Joint research in oncology, immunology & protein therapeutics.

“With this agreement for Avastin, we look forward to continuing our successful relationship with Roche in the development and commercialization of novel targeted therapies for cancer that can provide clinical benefit to patients around the world,”

Susan D. Hellmann, M.D., M.P.H., Genentech's executive vice president

(Roche media release: 8 July 2003)

The final acquisition took place in 21 July 2008, Roche announced that it decided to acquire the rest of Genentech stock, overall value of this acquisition is 46.8 billion – \$89.00 / per share. After the acquisition, Genentech Research Center will still operate as an independent unit under the Roche Group. Roche believes that this acquisition will create a unique opportunity to evolve Roche’s hub-and-spoke model which will allow the firm to strengthen its focus on innovation and accelerate the search for new solutions for unmet medical needs.

Figure 8: Roche and Genentech's deals structure

Roche	Genentech
1980 January: Collaboration over Roferon-A sterile	
1990 September: Roche acquired 60% of Genentech share	
Roche provide: <ul style="list-style-type: none"> • Total budget of \$492 million to purchase Genentech share at cost of \$36 / per share 	-
1992-1995 : Collaboration project over library screening & development of DNase	
Roche provide: <ul style="list-style-type: none"> • Roche conducted a secondary offering of \$20 million to Genentech (1995) • Provide substantial upfront fee and milestone Cash 	Genentech provide: <ul style="list-style-type: none"> • Development of library Screening • Clinical development of DNase • Supply product for clinical trail • Award marketing right outside US. • *Both firms equally share the cost of development and profit from final product
1998 July : Commercialize agreement over Herceptin®	
Roche provide: <ul style="list-style-type: none"> • Substantial upfront –fee • Milestone cash • Royalty payment 	Genentech provide: <ul style="list-style-type: none"> • Exclusive marketing right outside US.
1999 June: Roche stock purchasing	
2003 July: Joint development of Avastin	

<p>Roche provide:</p> <ul style="list-style-type: none"> • Hub for research and collaboration between Genentech and third party under Roche umbrella 	<p>Genentech provide:</p> <ul style="list-style-type: none"> • Market right outside US.
<p>2004 July: Joint research in oncology, immunology & protein therapeutics</p>	
<p>2008 July: Roche acquired Genentech</p>	
<p>Roche provide:</p> <ul style="list-style-type: none"> • Total budget of \$46.8 billion to purchase Genentech stock price at \$ 86 /share 	<p>Genentech provide:</p> <ul style="list-style-type: none"> • Benefit for product in its pipeline • Manufacture capacity • Benefit in strategic of scale

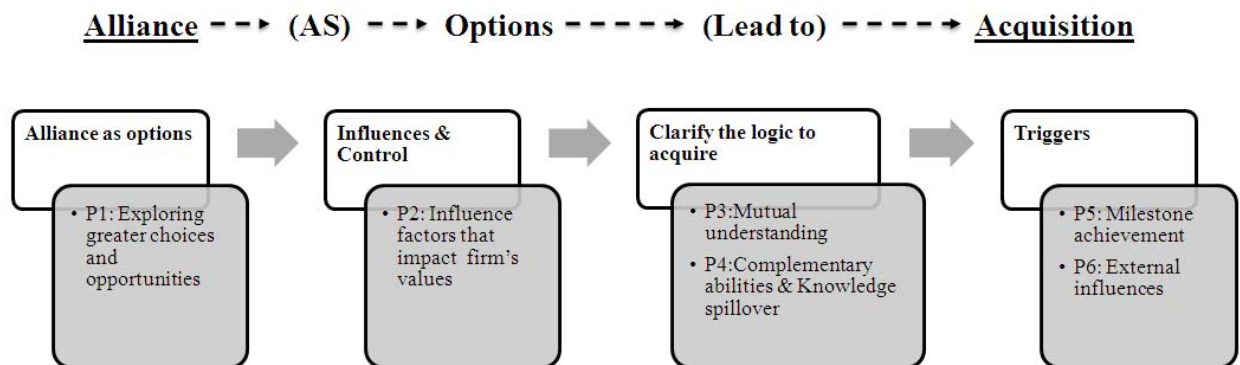


Chapter 5: Cross cases analysis

Drawing from the case studies above, this research can present the condition in between firms' decision "to ally" and "to acquire" by separating firms' action and decision making process in 4 main steps including (1.) Identify the right target (2.) Influence and controls the target (3.) Strengthen the logic to acquire, and (4.) Facing with triggers that inspire firm to strike the options (acquires the target). In this section, the study will systematically discuss about how alliance as option will lead to acquisition by relying on these four steps, in order to answer the research puzzle by identify the condition that alliance relations help facilitate the acquisition of alliances partner from real options reasoning point of view.

Puzzle: Under what conditions engaging in alliance(s) helps or facilitates the acquisition of alliance partner afterwards?

Figure 9: Flow of activities in between partners alliance and acquisition



Part 1: Identify the right target

In order to find the right acquisition target, firm strategy should be “Open” for new opportunity, so that firm can expose to greater variety of choices and lead to the finding of the most suitable target to acquire.

Alliances help increase choice of options to acquisition.

Under alliance relationship firm can prolong the time and don't have to rush in an uncertain relationship. When compare with acquiring or developing in-house R&D the cost of alliance is lower, this is since firm don't have to responsible for all the cost of acquired firm, it may just require to pay some partial support depend on project base. Moreover by applying alliance relationship firm don't need to deal with operation and integration process, which usually take time and possess high cost. Data from prior case study suggest that by implementing alliance as options pharmaceutical firm can diversify its portfolio of choices by developing alliances relation with various biotechnology firms. This condition could support the use of alliances as options. This is because the use of real options reasoning concept will be most effective when there is a flexibility of choices (Krychowski & Quelin, 2010); or in the condition that when it's time to make decision about what to acquire the firm has viable choice of alternatives in hand.

Based on the case studies, we can identify that with low level of acquisition project, without fully investment in operation and integration, firm can enjoy diversely alliances portfolio. Sanofi create variety of alliance relationships with other biotechnology firms which working in the same field with Acambis, including Regeneron Pharmaceutical which focuses on the development of therapeutic human antibody treatment of cancer, and Crucell which working on the discovery process of

rabies monoclonal antibodies. AstraZeneca is not only allies with CAT; the firm also develops relations with other firm like Abgenix which also focus on human monoclonal antibody drug, and other pharmaceutical firms like Array and KuDos. BMS is in the same way, it also allies with Exelixis, to develop XL-184 an oral anti cancer compound and also co-investment with firm like Pierre Fabre, and Gilead. Lastly Pfizer, during 2010 it invested in couple project related in discovery process by allying with FoldRX and Teuto.

The variety of options which created through alliance activities allow pharmaceutical firms to explore first and acquire later, this situation is usually happen when pharmaceutical become more certain about its target. This study therefore proposes:

Proposition 1: Allying with biotech firms allows pharmaceutical firms to reduce costs in term of in-house R&D and therefore to explore more opportunities by partnering biotech firms to be acquired afterwards.

Part 2: Influence and control

Under the term of acquisition, firms are more likely to acquire the most suitable choice for them. However, the targets that exist during that time may not appear to be exactly match with their preference. Therefore it would be more profitable for acquirers to enhance their target before step in to acquisition process.

Influence variances that can ultimate the option's value

In line with prior literature, this research also finds that under the context of alliances and acquisition firms can influence the variances, which impact option's value in various forms. Based on Tomatoes gardening metaphor (Luehrman, 1998) , this literature not only suggest that investors should waiting for the right time to exercise the option, but also should monitoring the options and searching for ways to influence variances that can ultimate the option's value in order to receiver greater return when compare to other passive investor. Focus on firm acquisition decision, after firms adopt alliances as options firms are not just going to wait to exercise the option when the expiration comes. But with alliances as option in hand firms could decide to monitor and influence in aspect to increase value of target firm.

Under the context of bio-pharmaceutical alliances, this study can identify several actions that pharmaceutical firms could implement in order to control, influence, and increase value of their target firms. Activities could be conduct in term of equity support, knowledge transfer, and production & commercialize support.

Figure 10: How pharmaceutical firms' influence on biotechnology firms

	Sanofi & Acambis	AstraZeneca & CAT	Bristol & Medarex	Roche & Genentech	Pfizer & Icagen
Budget in R&D	✓	✓	✓	✓	✓
Real option purchase				✓	✓
Stock purchase (Before full acquisition)		✓	✓	✓	✓
Collaboration in R &D Knowledge		✓	✓	✓	✓
Market support	✓			✓	✓

Sonofi-Pasteur uses firm's worldwide distribution channel to market Chimeri Vax-Je in Europe, and also provide budget support for Acambis in form of milestone payment. In 2007, the promise of milestone value is up to \$70 million if the product was approved and sale in US market. This great number of milestone reward could inspire Acambis to focus on achieving milestone.

European's giant pharmaceutical firm like AstraZeneca provides research investment up to 50% for Cambridge Antibody Technology's research projects and offer to responsible for clinical trials and regulatory filling.

Bristol-Myers Squibb provides both partial initial budget and milestone payment for Medarex to develop MDX 010 – MDX -1397 the medicine to cue melanoma, a type of dangerous skin cancer. If this discovery successfully reaches market it will become an important asset for both firms.

The top US Pharmaceutical firm like Pfizer spends great sum of money to support Icagen ion channel development project. In term of budget support over research study, it invests in Icagen stock and options up to \$45 million. Pfizer also

provides support in term of collaboration by sending in research team to co-development the product.

For Roche and Genentech even though both firm can be consider as one of the top players in pharmaceutical and biotech industry but collaboration is still in need. Based on the agreement Roche provides Milestone payment, technical support and information hub for Genentech.

According to the information above this research can clearly identify the influence of pharmaceutical firm over biotechnology firm. Pharmaceutical firms have a great role to support the discovery, development, and commercialize process of bio-based medicine and also increase value of their partners. At time same time, pharmaceutical firms can enjoy the benefit form licensing, distribution and in some case also benefit for the increasing of it target firm stock price, if the firm has biotech firm's stock options in hand. This condition can be consider as win- win situation, since the complementary condition allow both firm to collaborate for mutual benefit. Moreover when the value of target biotechnology firms raise and the uncertainty level decrease, it will be easier for pharmaceutical firm to step in and acquired their partners. According to this, this research would purpose:

Proposition 2: Allying with biotech firms, pharmaceutical firms more likely serve self-interests through the control right of equity holding, knowledge transfer and scale-up expertise, facilitating the decision making of acquisition afterwards

Part 3: Clarify the logic to acquire

Prior study (Carayannopoulos & Auster, 2010) has pointed out that firm's decision to move from alliance to acquisition will be based on the synergies and value that are achieving from the combination of firms effort. Therefore in order explore the factors that will strengthen firms' relationship this study will focus on condition that impact firms' perception toward partner. These two factors include (1) level of understanding which helps firm to be more certain about its decision, and (2) expertise & complementary ability which helps reduce the uncertainty and confirm that the new acquires division could fit with acquirer's strategy in some way.

Understanding is one of the most important steps toward acquisition.

Mutual understand is one of the important factor that can impact firm decision to step in to acquisition. In this part, alliance (as options) will be emphasizing as a better path way for firm's decision making process since it can be perceived as a tool to reduce risk of commitment while firm isn't clearly understanding its target and also importantly in term of information gathering tools. This is since the traditional process of due diligent may facing some limitation, which may be because the firm may face time limitation or only focuses on financial value and neglects the human resource issue and team collaboration. According to this alliance experiences could provide greater access to information and also including information about management style and internal relationship, which usually take time to understand.

Based on case studies, firms that conduct pre-acquisition alliance could have in dept understanding over their target. Moreover the mutual understanding that develops during alliance could lead to apparent decision. When Pfizer definitive announcement to merge Icagen (2011) the press release to investor can help emphasize that mutual

understanding between both firms during alliance period lead to friendly approach in acquisition, both side reflex positive view of further collaboration.

"We are very pleased to announce this extension of our previous collaboration with Pfizer, We have had a great partnership thus far and remain confident that the combined abilities of our two companies will help identify novel drug candidates directed at one or more of these important sodium channel targets for the treatment of pain and related disorders."

P. Kay Wagoner, Ph.D., President and CEO of Icagen.

"We have made substantial progress over the first two years of our collaboration and look forward to working with Icagen in the upcoming year in seeking to identify drug candidates from these targeted programs."

Gillian Burgess, Ph.D., Chief Scientific Officer of Pfizer's Pain Research Unit

(www.sec.gov: Icagen announces the extension of Pfizer collaboration)

To sum up this research identifies the connection between the use of alliances as options to develop in depth understanding and support firm decision making process, this paper therefore purpose:

P3: Better understanding of partner(s) through alliance relationships earlier helps facilitate the decision making of acquisition afterwards.

Complementarily and intention to interlace resources help clarify firm's logic

Resource complementary could be viewed by acquirers as target firms' attractiveness. Target firms' value could increase when they bear complementary asset or knowledge which can support acquirer strategy. How does this issue related to alliances as option? The answer is that by stepping in to alliance relations acquirers can influence their target firms to develop in direction that complement to their strategic.

Moreover based on alliance experience acquirer will have greater chance to identify and understand their target firms' ability to complement with its strategic plan.

When tracing back to the reasons why pharmaceutical firms acquire their biotech partners, the prior research did introduce 5 main reasons, which can be imply as how biotech firm could be complementary to its pharmaceutical partner strategically. 5 reasons including (1) to enter in new therapeutic area, (2) to acquire franchise in particular product (3) to acquire discovery innovation platform (4) to fill up its pipeline and last but not least (5) to gain access to target market (Malik, 2009). At the same time some biotech firms also expect the acquisition, since they expect benefit from stock premium and also pharmaceutical firm's production and commercial support.

The case studies will present how biotech firms' complementary abilities can lead to acquisition could be considered under various circumstances, depend on pharmaceutical firms' strategic.

Figure 11: How biotechnology firms complementary their partners.

	Sanofi & Acambis	AstraZeneca & Cambridge (CAT)	Bristol & Medarex	Pfizer & Icagen	Roche & Genentech
Complementary	Pipeline and R&D Knowledge	Pipeline and R&D Knowledge	Pipeline and R&D Knowledge	Pipeline and R&D Knowledge	Pipeline and R&D Knowledge Market expansion Operation Scale

Sanofi- Pasteur and Acambis: By considering Acambis' portfolio, the author could identify that products in the pipeline could support Sanofi's objective to be a leader in vaccines market. Acambis's knowledge assets could be separated in to 3 important sectors including: A Contract with US government to distribute ACAM2000, which is a vaccine to cure small pox. The firm will also gain early stage of developing vaccine to cure Clostridium difficile-Influenza-genital herpes, and the most important one, the Late and mid stage development programs over vaccines against dengue, Japanese Encephalitis and West Nile virus.

AstraZeneca and Cambridge Technology: From AstraZeneca point of view, the Acquisition will bring AstraZeneca one product in Phase II clinical trials, another in Phase I and other 6 projects that are in the discovery process. The entire projects are related to antibody and biotechnology product, which match with AstraZeneca interest.

Medarex and Bristol-Myers Squibb: BMS intention to merge Medarex as a part of it String of pearl strategy, which is to develop a chain of relation with Biopharmaceutical Company, since BMS believe that the pipeline and specialize of CAT can effectively fill up its pipeline, since it developed Ipilimumab substance which related to BSM key interest in immune-Science

Pfizer and Icagen: Acquisition of Icagen by Pfizer in the first step happens because Pfizer's interested in Icagen's ion channel. This ion channel didn't link with Pfizer's core development, but it still fit in to Pfizer diversify portfolio. Another reason that trigger Pfizer's intension to acquire Icagen is that their collaboration project over pain and epilepsy treatment already reaches phase I of clinical trial. In term of market and revenue, Pfizer sees the potential of the project outcome to reach blockbuster level in the future and also to expect it mitigate the loss of firm revenues when the patent of Viagra and Lipitor expire.

Roche and Genentech: Roche full acquisition over Genentech fit with Roche's Hub and spoke project, by lower boarder between firm that acquisition could create environment the encourage knowledge transfer between both side. Moreover in term of market expansion the total acquisition allow French firm like Roche to have stronger presence in US, since Genentech has a strong base of both manufacture and market in US. At the same time the acquisition will lead to benefit in form of economic of scale and create operation synergies to cost down the development and operation process.

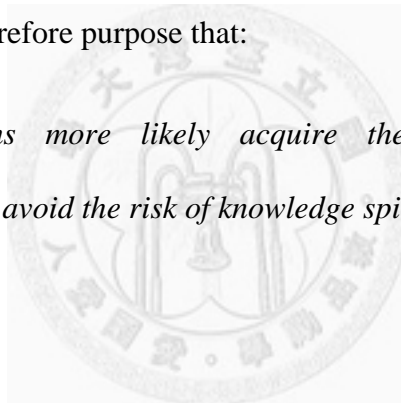
By the way, it's also possible to view this issue from transaction cost viewpoint. This is since transaction cost could be view as a tool that helps explain firms' intension to proceed from hybrid relation to internalization by introducing two circumstances that could support firms' logic to internalize their alliances partner. Firstly, internalization could locked-in the knowledge asset and reduce the risk of knowledge spillover. The other reason is that by interlace the overall discovery and development process; firms could reduce transaction cost that caused by activities which involve in the complication of contract negotiation and obstruction in knowledge transfers (Besanko, 2010).

By applying this concept with the case studies in pharmaceutical industry, the research could provide the evidence to explain the circumstance which mention above. First, in term of prevention of resource spillover, even though biotechnology is a very specific asset, but this asset could fit in with various players in pharmaceutical industry. This is since pharmaceutical firms lately set their focus toward bio-base pharmaceutical and moreover these pharmaceutical firms already have enough capacity to bring such a discovery to market. Therefore the logic to acquires can be strengthening by the fear that firm may lose some specific knowledge since it can't completely control its alliances partner.

Secondly in terms of transaction cost and knowledge transfer, biotech firm could fear of the loss of its proprietary knowledge therefore the knowledge transfer may be limited, and in order to collaborate in specific project both sides may also have to go through the design of contract agreements which usually take time and lead to the increasing of transaction cost. Consequently if the biotechnology firm is attractive enough and its asset can proved to be complementary, pharmaceutical firm may considers internalizing its partner, since it will lead to the complete knowledge transfer and reduce the transaction cost.

In sum this research also agrees with the prior studies, which claim that resources complementary and transaction costs have great impact over firms' logic to acquisition their targets, therefore purpose that:

P4: Pharmaceutical firms more likely acquire their biotech partners with complementary expertise to avoid the risk of knowledge spillover.



Part4: Trigger

Real options reasoning have one characteristic which is totally different from options in financial field which is that ROR doesn't have specific expiration date. Therefore firm with options in hand not only require to "wait and see", but it also have to look for the strike signal. This strike signal usually come when the value to wait is at the lowest point and the firm is required to decide the next move whether to reduce sunk cost by stopping further investment or to capture the opportunity by putting in further investment. According to unfolding form of investment in options (Bowman & Hurry, 1993) firms' decision to strike the option depend on firms' resource allocation, sense making, organization learning and strategic position. Therefore triggers of firms' intension to strike could be different, based on firms' specific condition. However based on the study of pharmaceutical industry, this research can identify that discovery stage and external force are important factors that could influence on firm's decision to acquire.

Milestone achievement as a strike signal

When target firm reach milestone agreement, this reduce the uncertainly, increase value and also prove firm's ability to complement acquirer strategy. Therefore it can be considered as signal, that the time to wait and see is ended, firm should strikes its option to capture the new opportunity.

In bio-pharmaceutical industry, the highest uncertainly could be during discovery stage, which have high level of burning rate and high risk. During this period very few pharmaceutical firms willing to step in and embrace all the risk, therefore most pharmaceutical firm design the deal by applying milestone payment. According to the agreement pharmaceutical firm only required to spend partial initial payment in order to

obtain the options to co-development in further stage and commit to pay great sum of reward payment if biotechnology firm can achieve the goal. Reaching milestone in R&D could rise up the firm's value, increase its bargaining power and reduce uncertainty overnight. Therefore target firm's value will also be attractive for pharmaceutical firm.

Based on case studies of Sanofi and Acambis, this research can identify that in the period of acquisition Acambis's development are in remarkable progress. ChimeriVax-JE development project already reach milestone by presenting positive result in phase 3 and moving forward to filling for FDA registration in 2009. While other 3 projects' development outcome were estimate to announce at the end of 2008. Therefore this study can assume that Sanofi's offer to acquisition Acambis just take place 3 months before Acambis reach milestone agreement.

The acquisition between BMS and Medarex also in the same direction, the acquisition was agreed in 2009 the year after Medarex project on ipilimumab already reach stage III of development, and have great potential to be accepted by FDA. This research therefore purpose:

P5: Pharmaceutical firms are more likely to acquire alliance partner(s) successfully reaching the R&D milestones mutually agreed upon.

Impact of external forces on firms' decision to acquire

Even though the decision about acquisition is more like the issue between alliances partners, the decision making process of acquirers still impacted by external condition. This is because external condition could impact the level of uncertainty and benefit of opportunity, therefore it can be considered as another strike signal that firms

also required to consider. In bio-pharmaceutical industry this study can identify 3 main external conditions that could impact pharmaceutical firms' decision to strike option including; patent expiration, market condition and competitors movement.

Patent expiration: During discovery and development stage pharmaceutical firms have to bear high cost, and great level of risk. The regulations that protect firm's benefit after the discovery stage is patent right, which prevent other firms to manufacture the same product in specific time period. However the patent itself also has time limit which usually last around 20 years. Recently the numbers of patent expirations are increasing, this situation could impact pharmaceutical firm about future revenue, since revenue from blockbuster drugs could drop because other generic drug manufactures could step in to the market by setting pricing strategy at production cost.

Figure 12: Estimated patent expiration period

<u>Brand name</u>	<u>Company</u>	<u>Estimated patent expiration</u>	<u>Received FDA approval</u>	<u>Global sales, 3Q 2007 (in \$ millions)</u>
Crestor	<u>AstraZeneca</u>	2012	2003	\$691
Seroquel	<u>AstraZeneca</u>	2011	1997	\$1,055
Symbicort	<u>AstraZeneca</u>	2012	2000	\$371
Plavix	Sanofi/Bristol	2011	1998	\$1,250
Aricept	<u>Pfizer / Eisai</u>	2010	1996	\$100
Diovan	<u>Novartis</u>	2012	1996	\$1,267
Zometa	<u>Novartis</u>	2012	2001	\$318
Lipitor	<u>Pfizer</u>	2011	1996	\$3,170
Xalatan	<u>Pfizer</u>	2011	1995	\$402
Taxotere	<u>Sanofi-Aventis</u>	2010	1995	\$694
Aprovel	Sanofi/ Bristol	2011	1998	\$392

Sources: Data monitor; Dolphin; WSJ.com research

Due to the circumstance pharmaceutical firms become more active to acquire new potential discovery project in order to fill up its pipeline, protect its future revenue, and reduce cost. Conforming to case studies Pfizer acquires IcaGen, ion channel to fill up its pipeline and increase its specialty in biotech field. While Roche acquires Genentech to reduce overlap cost in order to create balance with declining sale revenue, which partially due to the expiration of patents.

Market condition: Market condition is also one of the important factors that impact firm decision, contrast to general belief that usually say “firm will be more willing to spend the investment when markets are stable and in upward trend”, bio-pharmaceutical acquisition decisions are more likely to take place in bearish market. Reasons that support this condition include, the revenue of pharmaceutical firm not really impacted by the market condition, since it is a necessity good that can't be reduced when consumers want to tighten their belts. At the same time it will become more difficult for Biotechnology firms to look for external financial support for their discovery projects; therefore it is more likely that biotech firms will turn to pharmaceutical firms to seek for investment budgets. By the way in a downturn business the costs of acquisition are also lower, one of the reasons is that the share price of biotech firms could fall because of the condition of a bearish financial market (Malik, 2009). Therefore financial crisis could be considered as an excellent opportunity for pharmaceutical firms to strengthen their pipeline through acquisitions.

By looking at case studies, there are 3 cases that firms step in to acquisition relationships during 2007-2008 which is the period of world business crisis. These 3 cases include: AstraZeneca's acquisition of Cambridge Antibody Technology, Roche's acquisition of Genentech, and Sanofi-Pasteur's acquisition of Acambis.

Competitive move: Competitor movement is one of the factors that firms should consider since it may impact firms' supply and market share. Even though in this industry biotechnology firms can alliances with various pharmaceutical firm to again investment for different project, but when one of the biotech firm was lock in (by acquisition), other pharmaceutical firms also going to look for potential target in order to lock in the sources of new discovery and protect its' market share in specific market.

This research presents the sample of vaccine developers; Sanofi acquires Acambis to protect its' supply chain in vaccines manufacturing. This acquisition took place after pharmaceutical firms which are Sonafi's competitor in vaccines market already acquired with other potential biotech firm. GSK acquired ID Biomedical, Novartis acquired Chiron (2005) and Crucell acquired Berna Biotech (2006). In sum this study can emphasize the impact of external forces on firm's decision-making process, since it can be adopted as a strike signal. Finally this paper therefore purpose:

P6: The external forces (such as patent expiration, competitive moves, and bearish markets) necessitate the decision of pharmaceutical firm to acquire their biotech partner in the alliances.

Chapter 6: Conclusion and further discussion

6.1 Conclusion and implementation

After investigating factors that could facilitate firms to acquire their alliances partner, this study can explain firms decision-making process, and identifies conditions that influence firms to acquire their alliances partner by adopting real options reasoning concept to bridge the gap between alliance and acquisition.

Rely on case studies, the process in between alliance and acquisition could be viewed systematically by separating it into four steps include (1) create options then identify the right targets, (2) influence and control targets, (3) strengthen logics to acquire, and (4) capture factors that could trigger firms' decision to acquisition. In each step, this research also explains the conditions that alliances as an option could facilitate the acquisition later on; the final propositions of this thesis include:

Step 1: Alliance as options

Proposition 1: Allying with biotech firms allows pharmaceutical firms to reduce costs in terms of in-house R&D and therefore to explore more opportunities by partnering biotech firms to be acquired afterwards.

Step 2: Influences and control

Proposition 2: Allying with biotech firms, pharmaceutical firms more likely serve self-interests through the control right of equity holding, knowledge transfer and scale-up expertise, facilitating the decision making of acquisition afterwards

Step 3: Clarify the logics to acquire

Proposition 3: Better understanding of partner(s) through alliance relationships earlier helps facilitate the decision making of acquisition afterwards.

Proposition 4: Pharmaceutical firms more likely acquire their biotech partners with complementary expertise to avoid the risk of knowledge spillover.

Step 4: Trigger

Proposition 5: Pharmaceutical firms are more likely to acquire alliance partner(s) successfully reaching the R&D milestones mutually agreed upon.

Proposition 6: The external forces (such as patent expiration, competitive moves, and bearish markets) necessitate the decision of pharmaceutical firm to acquire their biotech partner in the alliances.

In touch with prior literatures & Contribution: This research supports the pervious literatures by Porrini in 2004 which point out that alliances between acquisition partners ensure target specific information and helps develop experiences, that could support firm's decision making process and integrating process (Porrini, 2004). Moreover the case studies also reflex the condition that, the situations that impact firms' decision to acquisition are different, all base on firms' structure and sense making. Even the industries that have high level of similarity like pharmaceutical industry, the condition that trigger firms' decision to acquire are also difference. The conditions and triggers of firms' decision to acquire their partners in this case could support the study of Bowman and Hurry which claims that firms' decision are depend on firm individual structure (Bowman & Hurry, 1993).

In addition, by looking at the ally then acquire relationship through real options concept; this research would like to claim the extended viewpoint from (Peng, Lin, & Yang, 2011) which can also be considered as key paper for this research. The previous literature view this concept by focusing on firm characteristic like social network and behavioral learning, then point out several characteristics of firm that could drives the acquisition of alliances partners. This research also pursuit the same objective in the beginning, but by combining the alliance characteristic in the cross case analysis process. Propositions of the study could be rearranged systematically and adjusted in to a process. This contribution could support firm decision making process in acquisition of alliance partners in the future.

Implementation of alliances as options: It's not easy to embrace the risk, since firm will have to face the trade off in form of investment cost. Though real options reasoning concept is prove to be useful by reducing risk form uncertainty, but to become more certain real options pricing (financial evaluation) also should be considered by the management team in order to estimate the concrete value not just rely on the uncertain opportunity.

Therefore firstly, it would be more proper if acquirer identify its strategy clearly whether its require options to wait and see, or not. Then, after firm decide to embrace the risk and apply this ROR concept firm can apply each step of collaboration in to their process, and consider propositions which are mention above step by step base on the situation, by getting in to alliance relationship to create options before decide to invest in one specific target. Then control them in the expected direction which usually can help increase the value of target firm, and follow by identifying synergies that could happen in the collaboration process. The synergies could be in form of both mutual

understanding relationship and asset complementary. Lastly firm will have to monitoring for the signal to exercise options.

All in all, when it comes to relationships between firms there is no specific answer, whether to ally or acquire. The set of proper logic that helps firm identify the level of ownership would be “decide step by step, enjoy the flexibilities, embrace risk, and remember this not a game to bet.”



6.2 Limitation

A Fundamental limitation of the case study comes from the limitation of data available. According to the lack of target firms' internal connection, the author is unable to obtain first hand data. The information provided in this research are secondary resources, some are press releases that provide by pharmaceutical firm to communicate with stakeholders. Therefore the content over firms' management decisions and firm's efficiency in management may contain some bias. Moreover the time period between ally and acquire in some case study is quite long, therefore some detail information over investment budget may be missing and only provide very few information about internal relations.

In term of result interpretation, this research is interpreted in light of limitation since only focus on Bio-Pharmaceutical industry. As mention before, the characteristic of this industry is quite unique; especially in term of product development process, level of risk, and firm structure. Therefore the result may only applicable to explain only in bio-pharmaceutical industry, not for other industries.

The other concern is about the characteristic of real option reasoning concept. Even though the concept of value and validity of this theory is quite match with pharmaceutical industry, but ROR itself may also leads to failure outcome (contrast with our research) that cause by oversampling the pass success, cognitive bias and manipulation of measurement standard (McGrath & Nerkar, 2004). Therefore firms should be careful not to overestimate the use of ROR concept.

6.3 Further research

There are several opinions for future research direction. First of all in order to get through the limitation of Bio-pharmaceutical industry, it would be interesting to extend the real options view of pre-acquisition alliances to other industries, in order to find the possibilities to develop this theory as part of a framework in firm relationship management.

Next, the lesson can be learning not only from successful case, but also the failure one. If researcher able to find the sample of failure case after conducts pre-acquisition alliance, future research could focus on the cause of failure and compare with the successful one.

Moreover by focus on relation between bio-pharmaceutical firms, the future research could view this issue from biotechnology firm viewpoint. The innovation asset in hand of biotech firm could be view as another kind of options for biotech firms; whether to use them as a bargaining power to avoid the acquisition from pharmaceutical firm and acquire financial support from financial institution, or apply them as a tool to attract the attention from pharmaceutical firm. If the acquisition by pharmaceutical firm are preferred, the further research also can consider the relationship between firm an explain conditions that could persuade pharmaceutical firm to acquire their alliance partners afterward.

Last but not least, during information collection process author can identify the great number of alliances and acquisitions activities in this industry. Biotechnology firms can join in collaboration projects with various partners, and at the same time. Larger pharmaceutical firms also able to agree in alliances and development deal with various biotechnology firms and also other pharmaceutical firm, even though they are

competitor in the market. How do firm manage this kind of relation, how Biotech firm protect and prevent knowledge spillovers or conflicts between them? This issue could be another interesting topic for further study.



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