Dissertation Title: Enabling Business Model Innovation – A Study on the Development of Dynamic Capabilities in Academic Spin-off Companies in Hong Kong

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Degree: Doctor of Business Administration

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WONG, Geoffrey Man Yuk
5 January 2014
Enabling Business Model Innovation –
A Study on the Development of Dynamic Capabilities in Academic Spin-off Companies in Hong Kong
ABSTRACT

University spin-off companies perform a pivotal role in commercializing research, facilitating transfer of knowledge and technology to industries, and contributing to regional economic growth. This qualitative study explores, analyzes and compares the strategy developments of three academic spin-off companies in Hong Kong, on how they sustain competitive advantages, and what roles dynamic capabilities and business model innovations play for these companies. The research methodology adopts a constructivist paradigm, an exploratory research design, using a case study approach for collecting primary data through semi-structured interviews, and applying a multiple case studies method for analysis and comparisons. This study serves to help filling in a potential gap in the strategy and entrepreneurship literature, where interests in studying the phenomenon of links between dynamic capabilities and business model innovations at the firm level have just only recently emerged. The need for investigation is especially relevant given the lack of research in this direction for academic spin-off companies in Hong Kong. This study will enhance understanding of academic spin-off company’s ability to orchestrate on-going re-configuration of resources and capabilities effectively with business model changes to engage opportunities in Hong Kong and other foreign markets. Findings suggest that a company’s strategy will determine the business model. The spin-off company will grow over time and nurture the appropriate bundle or configuration of dynamic capabilities to support the chosen business model.
However, companies need to reconfigure their business models, and reconfigure their dynamic capabilities that will in turn reconfigure (adding, transforming, unbundling and recombining, sun-setting or omitting through obsolescence) the full or part of the set of current operational capabilities, so as to move its business model to another level or dimension to overcome the dynamic environment of volatilities and uncertainties.
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1. CHAPTER 1 - INTRODUCTION

1.1 Introduction

As Hong Kong strives to maintain its competitive edge in the new economy, universities in Hong Kong have responded to demands from industries to commercialize research output by setting up spin-off companies.

An academic spin-off company is formed by incorporating the intellectual property from research output developed in the parent university (Wright et al. 2009), with the aim of commercializing and exploiting the market potential of the license or invention generated by that university (Guerrero-Cano et al. 2007). In the US, research universities had taken the lead many years ago in terms of nurturing the growth of academic entrepreneurs and promoting the phenomenon of academic spin-off companies. Some famous examples of academic spin-off companies that eventually grew into world class corporations include Hewlett Packard from Stanford University, Digital Equipment Corporation from the Massachusetts Institute of Technology (MIT), and, more recently, Genometrix Genomics, Inc., also from MIT.

In Hong Kong, universities have been lagging behind in terms of developing a strategic focus on technology transfer and commercialization of university research output. It was only until the mid 1990s that universities started to explore the avenue for service engagements outside of the long standing policy of tenure-track scholarly activities for research and teaching, and the establishment of technology transfer offices (Leung and Mathews 2011; Sharif
and Baark 2008). Meanwhile, extant literature on academic spin-offs within the Hong Kong scene is very limited. Research on how academic spin-off companies compete in the domestic or international markets is scarce (Leung and Mathews 2005; Leung and Mathews 2011; Mok 2005; Sharif and Baark 2008), and then their research focus was either on policies issues at the levels of the government of Hong Kong Special Administrative Region (HKSAR) and higher education sector, or on the establishment of and role of technology transfer offices (TTO) in the universities in the commercialization of university research.

It would not be surprising to know therefore that academic spin-off companies in Hong Kong had to overcome government and university policy matters, organizational issues before they might finally embark on their spin-off journeys. Yet still during the formative years after start-up, academic spin-off companies in Hong Kong have been tackling a number of challenges. In terms of strategy management, key challenges revolve around the need to identify the resources, capabilities, and related organizational factors of new academic spin-off companies, as well as the ways by which these factors can contribute to their survival and competitive advantage.

1.2 Organizational context for spin-off companies in the commercialization of university research

Nurturing spin-off companies in tertiary academic institutions, notably universities and affiliated research laboratories that aim to enhance knowledge transfer and technology transfer, commercialization of academic research and make a contribution to regional economic growth, has been a key economic
policy issue at both the national and local levels (Meyer et al. 2004; van Geenhuizen and Soetanto 2009; Gilsing et al. 2010; Muller 2011)

Spin-off companies positively contribute to competitiveness, innovation, growth, and socio-economic environment (Monacad-Paterno-Castello et al. 2001; Hini 2012). Policymakers believe that the commercialization of academic research via university spin-off companies help sustain regional economic growth (Ndonzuau et al. 2002; Dickel et al. 2007). The successful launching of university research outputs by spin-off companies helps fulfill the commercialization of the intellectual assets of academic institutions. By generating research ideas and applying research outputs to support the business and industry sectors, entrepreneurship and technological developments encapsulated in the spin-off companies can help ensure that the public funding for universities can make important contributions to regional economic advancement (Helm and Mauroner 2007).

By actively converting scientific discoveries into spin-off activities (O’Shea et al. 2005), US universities that specialize in the generation of innovative ideas, new technologies, and scientific knowledge create spin-off companies to commercialize research outputs for the betterment of technology-based sectors in the region. Notable examples include Stanford University in Silicon Valley and MIT in the Boston area (Helm and Mauroner 2007).

Universities have responded to demands from stakeholders, governments, quasi-government agencies, and local industries to commercialize their research outputs by implementing technology transfer and licensing operations, as well as by establishing actors within the commercialization process in the form of academic spin-off companies.

In the new economy, however, business firms are confronted with an
increasingly volatile and complex environment “characterized by growing complexity, triggered by hyper-competition and globalization” (Onetti et al. 2012, p.338). These challenges become more critical for academic spin-off companies that often times are under pressure to quickly capitalize on their new technologies in the commercialization process. Bjørnåli and Aspelund (2012) pointed out that during these formative years, academic spin-off companies must deal with volatile complexities and uncertainties in the external environment. At the same time, they are required to adopt a resource-intensive strategy to manage capital and investment funding in the face of resource constraints, all while facing a wide variety of emerging marketing, financial and operational risks in the companies’ day-to-day business.

Early on and well ahead of the incorporation of an academic spin-off company as a business, it designs an “appropriate business model for transferring the invention from the academic world to the commercial world” (Pries and Guild 2011, p.151). Moreover, as a start-up that needs to develop and grow its business, academic spin off companies should also strive to explore and maximize every opportunity “to identify a business model that best suits its technology and product needs while providing a competitive edge to sustain the organization in a changing market environment” (Shimasaki 2009, p.43).

This window of opportunity has also proven to be more acute for academic spin-off companies that are essentially “technology-based” companies. As “technological dynamism” (Dickel et al. 2007) sweeps across the volatile environment, technological breakthroughs, and the resulting technological substitution or obsolescence, are taking place at an accelerated speed. To ensure their survival and sustainable growth, academic spin-off companies must possess and nurture their unique dynamic capabilities, including organizational agility and the capability to sense and respond, to reconfigure organizational processes and resources, as well as the ability to shift and change gears with
1.3 Overview of the conceptual framework, motivations, and assumptions

This study adopts an iterative approach (Druilhe and Garnsey 2004, p.270) to the development of the research framework, literature reviews, case analysis, conceptualization of theory and, hopefully, to theoretical contributions.

This study draws on the conceptual framework on basis of reviews of literature on entrepreneurship and strategy management to identify and pursue the topics of interests, notably academic entrepreneurship, academic spin-offs, business model, business model innovation and dynamic capabilities. The concepts developed are used to build the basis for the preliminary exploratory investigation, generating ideas for research methodology notably sampling and development of the necessary interview protocol, as well as case analysis. Analysis of primary data gathered from discussions and conversations with key informants, and, in addition, secondary data from sources on the Internet and company publications, are then channeled back into yet another round of literature review process to help explain the differences between the conceptual and reality / practical aspects of the phenomenon of the study.

In terms of extant literature, there is only just a very small number of journal articles that focus on academic spin-offs from universities in Hong Kong. This situation evolves amidst the local business context in Hong Kong that the number of academic spin-off companies from universities in Hong Kong has been small if not negligible when compared to the large number of small to medium-sized companies, and that the small number will most probably
continue to be so in future. Leung and Mathews (2006; 2011) listed the number of “total university-based spin-offs and start-up enterprises population spun off in the period 1991 to 2004” (Leung and Mathews 2011, p.175) and then up until 2007 at 84 companies from five of the eight universities in Hong Kong (Leung and Mathews 2011, pp. 180-185). The number of academic spin-off companies is to be considered small when compared to developments in US and European countries, and conspicuously small when expressed as a percentage of the three hundred thousand plus small to medium sized enterprises (SME) or companies in Hong Kong (to be more specific, 308,000 firms as reported in the government’s annual report for 2012)(Government Yearbook 2012).

However, the academic spin-off companies can be considered as the home-grown technology-based start-up companies while the overwhelming majority of the other small to medium sized companies in Hong Kong are geared towards trading or services oriented industries.

It is therefore well worthwhile to explore and investigate how academic spin-off companies in Hong Kong have developed, survived and grown beyond the initial start-up stage.

This project is an exploratory study of firm-level dynamic capabilities, business models and competitive advantages on basis of data collected and analyzed of three case study companies that represent academic spin-off companies in Hong Kong. However, it must be emphasized here that the objective is not to study the academic spin-off companies in Hong Kong as an industry and therefore as a unit for analysis.

The samples selected are academic spin-off companies because they are unique in the sense that their start-up and spin-off are tied to research outputs and the
concept of technology transfer or knowledge transfer from parent universities. This approach seems to be more feasible than doing a quantitative study of surveying the three hundred thousand small to medium-sized enterprises in Hong Kong, majority of which are trading firms, agency businesses, services companies, and for the larger enterprises, headquartered offices in Hong Kong that operate manufacturing and assembling facilities in cities of the Pearl River Delta in the Chinese Mainland.

Rather than the usual research angle of investigating the technology transfer aspects or innovation capabilities (one notable example of dynamic capabilities) of academic spin-off companies, the intention is to adopt a new perspective that looks at dynamic capabilities and business model (including business model innovations) of a number of academic spin-off companies and, hopefully, through within-firm and cross-firm comparisons, identify some linkages between dynamic capabilities (sensing, seizing, reconfiguring or transforming), changes to or transformations of business models, and firm-level competitiveness as well as business viability in the longer term.

It is reasonable to assume that academic spin-off company should maintain its uniqueness by refining its special know-how by continuing on its R & D on some niche areas, or more specifically, its innovation capabilities (as one key dynamic capabilities special and unique to academic spin-off companies as opposed to corporate spin-off companies). However, the literature has pointed out that the R & D or innovation capabilities is only one of the dynamic capabilities and its strong impact on firm performance is more relevant at the start-up and early stages of the academic spin-off companies. A lot of academic spin-off companies had to cut off their ties with parent universities and their in-house innovation capabilities wither or R&D conversations with parent universities slow down or dry up because somewhere down the road the university executive sponsors and management team of the spin-off companies
changed hands or company got acquired by another for-profit business entity. It would seem more appropriate to say that dynamic capabilities in the business aspects (corporate finance, venture capital, marketing orientation, entrepreneurial orientation of founders and major shareholders or stakeholders) impact on the long-term success or survival of the academic spin-off companies. Business model changes will reflect on these dynamic capabilities (from the business side) that the academic spin-off company has acquired and nurtured in order to remain strategic and viable. The three case-study companies are good examples that demonstrate this phenomenon. R&D capabilities or innovation capabilities are just one of the numerous dynamic capabilities for academic spin-off companies, and in fact, these firms cannot sustain if they pursue business by exploiting only their capabilities in R & D or technological innovations.

1.3.1 Business Model Innovations as a potential source of competitive advantage

The conceptual and theoretical bases of firm-level competition and competitive advantages have been firmly established by strategy scholars for more than two decades (Casadesus-Masanell and Ricart 2010a & 2010b). However, the term “business model” as a unit of analysis first appeared in the literature in 1996 (Lambert and Davidson 2012). In the mid-1990s, during the beginning of the Internet era, when e-commerce companies sought to compete against brick-and-mortar companies on the basis of what they conceived as the new “models” of doing business, the concept of the business model had been accorded prominent attention by both researchers and practitioners (Yip 2004).

With the arrival of the new economy, and in due recognition of increasing uncertainties, volatilities and risks of doing business in the global market, the
dynamics of competitive environments have to be properly addressed (Casadesus-Masanell and Ricart 2010a & 2010b). The business model concept, previously rooted in entrepreneurial and information technology studies (Lambert and Davidson 2012), has since evolved and now being studied in other empirical research areas, particularly strategy and strategic management. In the words of Lambert and Davidson, “opportunities for future research exist with respect to the investigation of the relationships between strategy theory and business models as well as the process of successful business model innovation and its relationship with organizational learning, leadership, entrepreneurship and change management.” (Lambert and Davidson 2012, p.11)"

Successful firms create substantial value for customers and, in return, generate value for the firm (Teece 2010). The business model of a firm reflects its strategic choice of using a unique combination of firm resources, capabilities, and strategic actions. Meanwhile, Bowonder et al. (2010) listed business model innovation as one of the strategy frameworks used by successful companies to create competitive advantage. Zott et al. (2011) reported that business models could be a source of competitive advantage as well. Casadesus-Mansanell and Ricart (2010b) maintain that how a firm’s business model interacts with the environment and produces products or services offerings that create value and capture value helps to establish the firm’s competitiveness. A firm’s business model is key to its ongoing viability.

However, as yet there is still a lack of empirical studies and therefore direct evidence claiming that firms will become more competitive and enjoy competitive advantage by designing and deploying the ‘right’ business models, although the literature does provide stories or case studies of successful companies with good business models (Magretta 2002). Besides, studies of business models as a subject of study in the literature on research-based spin-off
companies is scanty (Mustar et al. 2006).

Clausen and Rasmussen (2013) focused on research-based spin-offs (including academic spin-offs) and argued that business models rather than industry position or firm resources are more meaningful and purposeful for managerial decision making, that firms’ business models are associated with firm-level innovativeness. Perhaps it is this differentiation factor, innovativeness, and innovation capabilities, a strong dynamic capabilities for academic spin-off companies that are unique in their technological know-how and knowledge-base and R & D capabilities, can aim at creating a competitive edge through innovativeness including business model innovations.

Innovation capabilities appear to be necessary, but not sufficient just by their existence within the individual academic spin-off company, to create and sustain the competitive advantage in the longer term. There are more to the various components of a viable business model, for example, the interactivities amongst the key actors, the firm level dynamic capabilities to reconfigure, transform and innovate the firm’s business model, and dynamic capabilities to orchestrate and coordinate the deployment and implementation of business model strategies, to achieve business model innovations.

Shafer et al. (2005) maintains that all for-profit organizations must perform the ‘value creation’ and ‘value capture’ functions in order to remain viable and sustain over the longer term. Both ‘value creation’ and ‘value capture’ have been endorsed by strategy scholars as the major and essential attributes of the business model concept.

For the academic entrepreneurs and management teams of business enterprises, it is also worthwhile to point out the importance of the business model concept or construct as a management tool, including, inter alia, the use of business
model design as part of the strategic planning exercise, to “capture, visualize, understand, communicate and share the business logic” of the respective business enterprise (Pekuri et al. 2013, p.16). Often times, researchers tend to look at business models from the angle of strategy formulation, probably because of the interest in theoretical developments notably in strategy management. Business models as strategy frameworks facilitate the understanding and application of theoretical principles about competition and firm-level competitive advantage but given the heterogeneity of business models and divergent firm-specific business situations, Richardson (2008) argues that it is also important to look at strategy in action and establish business model as a framework for strategy execution or implementation, “then the business model framework helps to create a consistent logical picture of how all of the firm’s activities form a strategy (p.143).

Shafer et al. (2005, p.207) maintains that given the changes in the external and internal environments, “an organization’s business model is never complete as the process of making strategic choices and testing business models should be ongoing and iterative”, and argues that “the probability of long-term success increases with the rigor and formality with which an organization tests its strategic options through business models”.

It seems reasonable to establish the expectation therefore that a strategic focus in business model innovations for a business enterprise will enhance the firm’s position for competitive advantage.

Business model innovations are difficult for the other firms to follow or copy, not only because it would be very difficult to reverse-engineering the strategy formulation part of the business model concerned, coordinate, orchestrate and execute the business model changes across the board at the same time, but more so because any new business model has to fit in with the firm’s long term
strategy, corporate culture, capabilities and much of the organizational routines that have been firmly embedded explicitly or tacitly in the organization (Bucherer et al. (2012).

Massa and Tucci (2013) argue that business model innovation helps to enable firms with developing new propositions, engaging new customer segments, and entry into a new industry. Business model innovation therefore supports firms “in exploiting new opportunities (seizing ‘white space’)”(p.24).

1.3.1.1 Business Model for long-term business viability

Teece (2010) rightly points out that the business model of a firm reflects its strategic choice of using a unique combination of firm resources, capabilities, and strategic actions. Casadesus-Mansanell and Ricart (2010b) affirms that business model is key to the firm’s viability by reason of strategic focus on decisions of value creation and capture for stakeholders. Their views have taken the business model concept to a new level above and beyond the competitive advantage paradigm. In the current volatile and complex eco-environment, perhaps collaborations, complementary alliances, networked effects, value creation and capture are more meaningful and worthwhile to generate the necessary business values for keeping the firm going and growing.

From the perspectives of investors or venture capitalist, a firm’s viability depends on its business model, and often times, decisions about financing and funding of a business, and the associated risks thereof, are dependent on the factors that flow from the various components of a business model. Taulli (2010, p.129) refers to the investment angle of venture capitalist Bill Gurley and offers the suggestions about key factors to look in order to help establish the “good” and “viable” business model:
• Sustainable competitive advantage for engaging the competition in the long run, such as brand reputation, network effects (single- and two-sided network effects), innovative technologies and infrastructure;
• Predictable revenue in terms of new market, growth market, value pricing and repeated customers, that will offer higher level of assurance for revenue;
• Customer retention or stickiness for the firm’s products and services that will warrant low churn rate, or can be due to high switching costs;
• Highly valued products or services thus high gross margins – safety margin and room for more assertive investments in marketing;
• Customer fragmentation – a large diversified customer base and not a small minority of customers paying for a significantly large percentage of overall revenues;
• Marketing – the lower the cost of customer acquisition versus the competition the better.

Drawing on the business model construct developed by Osterwalder (2010) that will be covered in more details in Section 5.2 of Chapter 5 – Analysis and Comparisons, the following diagram is an attempt to present a monetized view of the value creation and value capture functions of a business model to demonstrate its support for on-going viability of the business:
Figure 1.3.1.1  Business Model for long-term business viability

1.3.2 Firm-level dynamic capabilities and competitive advantage

Scholars who adopted the resource-based view argue that firm-specific resources, if both rare and valuable, create competitive advantage for the firm. Moreover, when these resources are “non-imitable”, “non-substitutable nor transferable”, they become VRIN resources that may produce a sustainable competitive advantage for the firm (Barney 1991).

However, some strategy scholars argue that the resource-based view is static, and question the mere availability of unique bundles of VRIN resources will be sufficient and adequate to secure and sustain the firm’s competitive advantages in a rapidly changing and complex volatile environment (Wu 2010). Rather, these strategy scholars advocate that it is the dynamic capabilities of firms that would enable the firms to achieve a sustainable competitive advantage. Innovative firms gain temporary competitive advantages (Sirmon et al. 2010) over their competitors while competing in dynamic environments. However, such advantages are seldom sustained to keep up with rapid changes in market environments. In fact, these firms must continually reconfigure their resources to protect their competitive lead (Teece et al. 1997; Sirmon and Hitt 2003; Sirmon et al. 2006 as cited in Zahra, Sapienza, and Davidsson 2006; Sirmon et al. 2011). Dynamic capabilities are high-order capabilities used to manage and reconfigure lower-order operational capabilities, as well as all tangible and intangible resources to achieve a sustainable competitive advantage (Wang and Ahmed 2007; Sirmon et al. 2011).

Teece et al. (1997) provided a seminal definition of the theoretical basis for dynamic capabilities. They also set the stage for the emergence of a wide body of scholarly research on how dynamic capabilities foster firm-level competitive advantages. Teece (2007) further proposed that three groups of dynamic
capabilities exist, and these include the following: “Sensing”, the capability to identify opportunities, threats and create knowledge; “Seizing” for the capability to exploit organizational knowledge assimilation and integration for making decisions; and “Reconfiguration”, the capability to reshuffle, recombine, and transform the organizational resource base (including the business model of the company) in order to achieve strategic fit and proactively co-evolve with the external dynamic environment for a sustainable competitive advantage (Dottore 2009; Teece 2010; Mustar et al. 2006).

1.3.3 Business Model Innovations and Dynamic Capabilities

Firms are required to design and deploy an appropriate business model to continuously create value and reconfigure their business models so as to remain dynamically capable of sustaining their competitive advantage (Casadesus-Masanell and Ricart 2010a & 2010b). Firms must also explore how their business model and product market strategies interact and influence performance (Zott and Amit 2006). Onetti et al. (2010) drew on studies of young technology-based firms and argued that these companies require new ways of defining their value proposition and business model innovations. Such firms must do this while commercializing technology for new markets in their home market and while developing growth capabilities in international markets.

As previously mentioned, firms must develop and leverage its dynamic capabilities for sustainable performance, and a firm’s dynamic capabilities also determine its ability to transform and reconfigure its business model on an ongoing basis. Thus, investigating the potential relationships between business model changes and the dynamic capabilities of academic spin-off companies in Hong Kong is a worthy subject.
1.4 Purpose of the dissertation - Research objectives and research question

The purpose of this multiple-case qualitative study is to explore the contexts and situations of three companies. Each company represents an academic spin-off company from one of the publicly-funded universities in Hong Kong. The following research objective guides this research study:

*In what ways and how would dynamic capabilities enable academic spin-off companies in Hong Kong with the required business model innovations to achieve sustainable competitive advantage?*

The main research question is supplemented by a list of sub-questions that have been developed and outlined in an interview protocol document. The Human Research Ethics Committee (HREC) has approved the document to be used for this research study. These questions were used during semi-structured interviews with informants from the three academic spin-off companies. Chapter 3 - Research Methodology provides additional details with a copy of the interview protocol as an attachment to this dissertation.

Specifically, this study seeks to explore and generate insights on how the companies produce and sustain their competitive advantage in the industry segments where they are situated. To generate relevant data and insights, we interviewed senior executives who are founders, shareholders, or chief executive officers of the three academic spin-off companies. This study also investigates the roles played by firm-level dynamic capabilities and business model innovations within their respective companies.

Moreover, this study also aims to explore, make comparisons, and investigate
the possibility of replication logic across cases, given that the parent universities of these academic spin-off companies do not necessarily share the same or equivalent orientations, strategies, and infrastructural set-up for supporting their respective processes in the commercialization of research outputs (Eisenhardt 1989; Vohora et al. 2004). This work also aims to identify commonalities or differences in terms of the development of spin-off companies in relation to business model innovations and dynamic capabilities.

1.5 Brief introduction to the research methodology and approach

This exploratory study adopts a qualitative approach with multiple case studies, semi-structured interviews, and access to secondary data for triangulation. Its purpose is to study how an academic spin-off company leverages its dynamic capabilities in redesigning and reconfiguring its business model to ensure sustainable competitive advantage.

The case study research method is selected because of its ability to generate rich and in-depth data. An exploratory case study research strategy is adopted and qualitative methods are applied (Eisenhardt 1989; Miles and Huberman 1994) based on two considerations: (1) the early stage of research on the dynamic capabilities of firms in the areas of innovation and knowledge management, and (2) research on business model innovation is just beginning to gain momentum. The adoption of a qualitative methodology is also consistent with the fact that dynamic capabilities are embedded in the organizational routines and processes of firms (Eisenhardt and Martin 2000), thus, very difficult to identify through quantitative research.
By adopting multiple case studies in the research design for this paper, the objective is to identify, compare, and assess the possible similarities and differences across companies (Jantunen et al. 2012). Another advantage of adopting multiple case studies is that the resulting research is more robust and generalizable (Eisenhardt and Gradbner 2007). Furthermore, the researchers can make comparisons across cases for similarities and differences (Ó hÓbáin 2012).

This exploratory study also aims to complement existing studies by assessing the contribution of the dynamic capabilities of firms, which can also lead to business model innovations. Notably, the findings can enhance academic understanding of firms’ ability to effectively orchestrate the ongoing reconfiguration of resources and capabilities. The current study also aims to generate new insights regarding business model flexibility and agility in seeking and maximizing new opportunities (Teece et al. 1997; Teece 2010) in the Hong Kong context, as well as in the context of small to medium-sized firms (SMEs) that are expanding into international markets and achieving success in foreign markets (Lu and Beamish 2001; Zahra and Garvis 2000; Dimitratos et al. 2004; Koch 2010).

Furthermore, the study should provide future research possibilities regarding business model innovation and the dynamic capabilities of spin-off companies, especially corporate spin-offs of “born-global” (Knight and Cavusgil 2004) firms in Hong Kong and elsewhere in the region. Finally, even if findings from the study may not be able to directly address and provide answers to the research questions, the research study would still serve to highlight the need to further study in the areas of firm-level dynamic capabilities or business model innovations, given the increasing uncertainties and volatilities experienced by organizations and their stakeholders.
1.6 Scope and limitations

This research focuses on academic spin-off companies in Hong Kong. Given the limited size of the sample companies for the case study, one identified limitation is in terms of generalizing the research findings for other academic spin-off companies. For the same reason, the limitation is even more apparent with regards to applicability in larger commercial communities.

Notably, research on academic entrepreneurship is “fragmented” (Rothaermel et al. 2007). Despite progress made with respect to the study of a theoretical basis for dynamic capabilities, there is still a significant lack of support in terms of empirical research findings (Weerwardena and Mavondo 2011). In the area of business model innovation, more effort have to be devoted to the development of generally-accepted business model definitions and taxonomies of the business model (Dottore 2009; Osterwalder et al. 2005). Thus, the current exploratory study is a challenging but worthy first step towards broader and more in-depth studies on the relationships between firm-level dynamic capabilities and firm-level business model innovations by way of future research initiatives.

1.7 Structure of the dissertation

The evolving relationships and interplay between business model innovations and dynamic capabilities of academic spin-off companies shall be explored in greater depth in the remaining part of this dissertation. The research objective and research questions serve to drive the subsequent chapters of this paper.

Chapter Two reviews the literature on academic spin-off companies, business
model, business model innovation, dynamic capabilities, the related terms and definitions, as well as the conceptual and theoretical bases for this study. This chapter addresses the gap in strategy management literature, and concludes that for both theoretical and practical purposes, there is a need to explore on how the dynamic capabilities of a firm help enable business model innovation to achieve sustainable competitive advantage.

Chapter Three explains the research methodology adopted and used to conduct the study. The research design and case study strategy are outlined to ascertain that the study is valid and reliable.

Chapter Four focuses on the collection of primary research data, in particular through semi-structured interviews with key informants of the three case study companies. The first part of the chapter provides a setting description that outlines the company background and industry context of each of the three academic spin-off companies. The second part presents a narrative description based on research data collected through qualitative data collection tools including the semi-structured interviews, face-to-face conversations, written responses to interview questions and follow-up email exchanges. The final part of the chapter is a summary section that consolidates the views and perceptions of company informants about their firm-level business model innovations and dynamic capabilities.

Chapter Five contains the results of the analysis and key findings of this study. The purpose of this chapter is to analyze and explore for knowledge regarding the evolving business model components and dynamic capabilities in place and embedded in the case study companies. The chapter provides descriptions and deliberations on the kinds of tools most recently developed by scholars in strategy and strategic management in assessing and making comparisons of business model innovations and dynamic capabilities situations respectively.
For each of the three companies, a within-case analysis will be conducted to focus on the spin-off company’s business model then on dynamic capabilities. Cross-case analyses will then be conducted to compare and present the commonalities and differences amongst the business models and dynamic capabilities of the three case-study companies.

Chapter Six summarizes the key findings and implications for both researchers and practitioners. Concluding remarks on the paper’s research findings and contributions to the literature, limitations of the study and recommendations for future research are also presented.
2. CHAPTE 2 - LITERATURE REVIEW

2.1 Introduction

Literature review was conducted throughout the different phases of the study, that is, during data collection, data analysis, and comparison. This chapter presents a review of the current literature. The three major areas covered are academic spin-off companies, firm-level business model innovations and dynamic capabilities of firms,

The review also covers relevant terms and definitions as well as the conceptual and theoretical basis for this study.

A review of the literature on academic spin-off companies in the United States and countries of the European Union, with due recognition of the more advanced situations in these two economic regions and geographies, facilitates a better understanding of the industry context for this study on Hong Kong-based academic spin-off companies. Strategy management literature on both business model innovations and dynamic capabilities shows the relations between these two, providing study implications for scholars and practitioners, particularly, the senior executives of companies and corporations.

2.2 Academic Spin-off Companies in Hong Kong

In the last two decades, Hong Kong has strived to expand and transit into
tertiary services while the small- to medium-sized enterprises (SMEs) in labor-intensive and low-tech manufacturing segments have relocated to the Pearl River delta townships of the Chinese Mainland. These SMEs in Hong Kong have trailed behind their counterparts in other regions of East Asia, in terms of technological development, production, and marketing (Yam et al. 2011).

In an attempt to catch up with these economies, the Hong Kong Special Administrative Region (HKSAR) revisited its policies on promoting technology and innovation (Yam et al. 2011). "The government recognizes that SMEs, which are over 300,000 in number, are the backbone of the economy in Hong Kong and China. SMEs constitute over 98 percent of the local business establishments and provide about 48 percent, or over 1.2 million, of total employment in the private sector. The government is committed to facilitating their growth and supporting their continuous development " (Trade Industry and Commerce Department, Hong Kong 2012).

Since the early 1990s, the government has encouraged universities in Hong Kong to devote faculty resources and related supporting non-academic resources such as the equivalent of technology transfer office within the respective research universities, and transfer research outputs in knowledge or technologies to the local industries, particularly to the SMEs. The government has stepped up to provide university initiatives in scientific and technologies discoveries with increased attention and a more comprehensive support infrastructure, for example, through the Innovation and Technology Fund (ITF), the Applied Research Fund (ARF), and the Hong Kong Science and Technology Parks Corporation (HKSTP), as well as through various technology incubation programs within the universities and government-funded organizations (Yam et al. 2011). Such developments advanced by the government reflect its increasing recognition of the contribution of the
commercialization of research output towards Hong Kong’s economic growth (Ndonzuau et al. 2002).

2.2.1 Academic Spin-off Companies vs. Corporate Spin-off Companies

An academic spin-off company is created based on the research outputs, notably intellectual property, knowledge or technology developed in the parent university (Pirnay et al. 2003; Wright et al. 2009) to commercialize and exploit the market potential of the license or invention of the university (Guerrero-Cano et al. 2007). Creating an academic spin-off company typically involves the transfer of the intellectual property vested within a leading edge technology or knowledge previously developed by academics in one university from this university to a new company with a legal entity independent of the parent university, with the inventor or academic as founding member of the new company (O’Shea et al. 2005).

Academic spin-off companies are different from corporate spin-offs from the business and industrial sectors, as the latter markets products and services originally developed in their respective larger parent corporations or enterprises (Velde and Bart 2006), often as a result of branding, alignment or re-alignment, restructuring, or reorganization.

One way to uniquely identify an academic spin-off company as opposed to a corporate spin-off company is to consider the company’s constituencies, affiliations as well as its mission and objectives. Cantner and Goethner (2010) proposed to define an academic spin-off company as a new start-up company incorporated by academics, staff or student(s) from a university whose business objective is primarily to commercialize research outputs (leading edge
technologies, knowledge or ideas invented or developed at the parent university). Thus, in terms of entrepreneurship and technological development, academic spin-off companies are incorporated with some form of explicit mandate to transfer knowledge or technologies to the business and industry community while corporate spin-offs often are required to keep R&D output in knowledge and technologies proprietary within the firm for confidentiality and business performance reasons (Oakey 1995; Callan 2001).

Universities tend to focus on leading-edge research, especially with respect to scientific exploration and new technology discoveries (Chesbrough 2003; Saxston 2006). Velde Els et al. (2008) argued that because research at universities are more focused on cutting edge technologies and knowledge, therefore university spin-off companies most often would start out with radically new and disruptive technologies, while business enterprises are more marketing oriented and thus more keen about enhancing their brand and product lines through product or service innovations.

2.2.2 Academic Spin-off Companies in the United States and European Union

The literature suggests that in the United States academic spin-off companies are more attuned to seek out public listing on the exchanges than the other start-up companies as well as to help creating more job openings (Shane 2004; O’Shea et al. 2005). These companies tend to survive better and remain in business longer than the average new companies. In a study of 3,376 academic spin-off companies incorporated between 1980 and 2000 in the United States, Litan (2007, p.10) found that “68% remained operational in 2001, a much higher percentage than the average survival rate of new firms in the United States.”
A key factor that gives rise to entrepreneurial universities in the United States is the additional role that universities play in economic development at the regional or national levels. Rothaermel et al. (2007) maintained that in the United States, several socio-economic developments since the early 1990s have contributed to the US leadership position in nurturing academic entrepreneurship. These developments include the passage of the Bayh-Dole Act in 1980, which provides federal funding to encourage universities to patent research output; the emergence of venture capital as investment vehicles; the arrival of the Internet-based paradigm and IT era, nurturing talented scientists and technologists; and technological breakthroughs in “computing, biotechnology, and, more recently, nanotechnology” (Rothaermel et al. 2007).

Developments in Europe suggest a pattern similar to that in the United States, particularly for universities in Germany, Italy, Sweden, and the United Kingdom, however, the pattern is not as distinct because of differences in legal, regulatory, and policy issues in the countries of the European Union (Rothspermeel et al. 2007). A study on the efficiency of support for academic spin-off companies suggests that companies in the European Union “tend to remain relatively small and fail to grow,” comprising “usually no larger than 10 employees after 6 years of existence” (Geenhuizen and Soetano 2009, p.671).

However, because academic spin-off companies are typically technology-based start-up firms incorporated by academics or staff of the parent university on the basis of research outputs previously developed in the university, the founders of these companies typically do not have the business acumen or management experience to overcome the technical, marketing, and financial funding risks associated with commercialization (Vohora et al. 2004). The literature suggests that although academic spin-off companies have unique, inherent high-tech and technology-based characteristics, they should be considered as part of the small- to medium-sized companies (SMEs) in the local economy. The present
study focuses on the sustainable competitive advantage of the companies
included in the case study rather than on the growth in the size of their
operations.

Barnes and Ho (2012) consider SMEs as entrepreneurial and pivotal to the
economic stability and growth of Hong Kong in the international arena. In
terms of the size of their operations, that is, the number of staff employed,
nearly all of the academic spin-off companies would be considered as SMEs.
However, academic spin-off companies have key roles in promoting leading
edge technologies and knowledge based on their research and development
relationships with their respective parent universities. SMEs in the
“communications, computer hardware, computer Internet, computer
semiconductors, computer software, other electronics related, biotechnology,
medical, instrumentation and medical, pharmaceutical” (British Venture Capital
Association, as cited in Vohora et al. 2004, p.149) commercial sectors would
benefit much from these high-tech initiatives.

2.2.3 Academic Spin-off Companies in Hong Kong

Extant literature provides focused studies on university spin-off companies and
the development of high-tech clusters in the context of the United States, and on
a smaller scale, similar start-up companies in countries of the European Union
that invest heavily in the research and development of new technologies. A
notable example is the connections between Stanford University and the Silicon
Valley based start-ups in information and communication technology (e.g.,
Google), nanotechnology, and biotechnology (Lerner 2005; Manning 2013).
Other examples in the United States and European Union are the biotech
industry in the San Francisco Bay Area, Boston, and San Diego regions
(Kenney and Patton 2011); and as cited in the study by Manning (2013, p.6),
“the Boston/Route 128 for biotechnology; the Research Triangle in North Carolina for life sciences and medical technology; Silicon Fen (Cambridge, United Kingdom) for software, electronics, and biotech; OPTEC in Berlin-Brandenburg (Germany); and other photonics clusters in West Midlands (England) and Arizona (United States)”.

However, studies regarding the spin-off companies in Hong Kong have remained scant. The available literature focused on historical developments and technology transfer processes and hardly discussed the development of firm-level strategies and the domestic or international market competition that these academic spin-off companies face (Leung and Mathews 2006; Leung and Mathews 2011; Mok 2005). These studies, limited in scope and focus as they might be, did point to the fact that academic spin-off companies had to thread through government and university policies, or for that matter lack of policies, and various forms of challenges in the commercialization process and so forth, before reaching the point of start-up and spin-off.

Mok (2005) focused on Hong Kong government’s changing role in promoting collaborations between the higher education, business and industrial sectors in Hong Kong, in particular with reference to the establishment of new funding and support programmes. Study by Leung and Matthew (2005) was more specifically geared towards university spin-off companies in Hong Kong. By surveying a list of eighty four university-based spin-off companies incorporated by five universities in Hong Kong during the period 1991 to 2004 (with some extension and up until 2007), Leung and Mathews (2005; 2011) presented an exploratory study of spin-off issues (motivation, company profiles, mode of technology transfer process and practices, set-up of technology transfer offices or other supporting infrastructural facilities in the universities, and obstacles impacting on the technology transfer process) confronted by these companies in the Hong Kong context. In line with growing interests in academic
entrepreneurship and technology / knowledge transfer at the time, Sharif and Baark (2008) took a well defined but more narrow focused look at the technology transfer offices (TTO) of the City University of Hong Kong (CityU) as well as that of The Hong Kong University of Science and Technology (HKUST), and investigated the evolving role of TTOs in supporting the technology transfer mission and university start-up companies.

The University Grants Committee (UGC) is a non statutory body that advises the Government of the Hong Kong SAR on the funding and strategic development of the higher education sector in Hong Kong and oversees as well as gives steering advice to the management of universities in Hong Kong, notably via allocations of block grants and recurrent funding on a triennium basis. The universities in Hong Kong are all public institutions funded by the Government of the HKSAR or, prior to the transfer of sovereignty in 1997, the Hong Kong Government via the establishment of the UGC. The UGC mainly allocates capital funds and recurrent funds to universities in Hong Kong on a triennium basis and according to the number of full-time equivalent students in each academic institution, with clear and explicit policies that such funds would serve only the university mandates of teaching and research. Focus was always on manpower planning at the tertiary education level (UGC 1993).

The UGC describes the “economically active spin-off companies” of these “institutions” (universities), as follows:

“Registered companies set up to exploit the IP (intellectual property) that have originated from within the institution which are still economically active. This includes two types of spin-off companies: (i) those with some institutional ownership and using intellectual property from the institution; and (ii) those with no institutional ownership and using assigned or licensed IP.” (UGC
The UGC considers research and teaching not only as the two most important responsibilities of Hong Kong universities but also as the two main missions supporting economic development in Hong Kong. Consultancy services are often considered as “services” or the third mission—that is, it is of third priority in evaluating the tenure performance of academic staff. These services, which include activities that could lead to the marketing, licensing, or even commercialization of academic research, are sometimes regarded by the UGC as self-financing activities. A case in point is the “incubating spin-off companies” that up to 2009 were only listed under “Front-line Knowledge Transfer Activities” along with the two other major categories of knowledge transfer activities, “Capacity Building” and “Knowledge Generation.” The UGC included these activities in the newly designated recurrent funding of the HKSAR Government for the 2009 to 2011 triennium to encourage universities to increase their capacities in knowledge transfer (UGC 2009). Adopting the funding perspective, the UGC views academic spin-off companies as vehicles or mechanisms to facilitate knowledge transfer from the higher education sector to the local business and industries, and not so much in the context of providing incentives or encouragement to universities for creating academic spin-off companies to commercialize the research output of research-tracked universities.

The long-standing position of the UGC explains the relatively late arrival of academic spin-off activities in Hong Kong (as compared to the United States or Europe) and the conspicuous absence of large-scale mushrooming of academic spin-off companies in Hong Kong over the past two decades.

Against this backdrop, the universities in Hong Kong continued to debate up the early 1990s about the allowable percentages of faculty time (for example,
one day per workweek) for pursuing consultancy and executive/professional training services, including liaison with and marketing of research outputs or professional services to industries in Hong Kong. Such requests by individual academic staff were often times granted conditionally and on a case-by-case merit basis.

In the early 1990s, Hong Kong witnessed the arrival of university-based spin-off companies.

In 1994, the Hong Kong University of Science and Technology (HKUST), under the auspices of the late Michael Gale, then Chairman of the Cable & Wireless HKT, incorporated the HKUST R and D Corporation Limited to spearhead the research, development, and marketing of Hong Kong SuperNet, the first fee-based Internet services provider in Hong Kong and the region. To avoid complications involving UGC funding guidelines, the HKUST R and D Corporation was established as a wholly owned subsidiary of HKUST yet it maintained its own board of directors, independent legal ownership, accounting, tax, and operations (HKUST R and D Corporation Ltd. Business Plan 1994).

In the same year, the City University of Hong Kong incorporated Signal Communications Ltd. to produce and market proprietary closed-circuit TV systems designed and developed by faculty researchers in electronics and signaling. The company successfully went public in the Growth Enterprise Market (GEM) Board on May 8, 2001 and was listed under the name TeleEye Holdings Ltd. (HKEx No. 8051.HK on GEM).

Over the years, Hong Kong universities have created a number of academic spin-off companies to serve the local business and industrial community. Table 2.2.3.1 shows the number of academic spin-off companies between 1996 and 2007, whereas Table 2.2.3.2 shows the more recent numbers, based on reports
on “Knowledge Transfer” or academic spin-off activities presented by the five named universities, as requested by the UGC for the period from 2009 to 2010 and 2010 to 2011.

Table 2.2.3.1  Number of spin-off companies established by universities in Hong Kong between 1996 and 2007

- University of Hong Kong (HKU)
- Chinese University of Hong Kong (CUHK)
- Hong Kong University of Science and Technology (HKUST)
- City University of Hong Kong (CityU)
- Hong Kong Polytechnic University (PolyU)

<table>
<thead>
<tr>
<th>University (short name)</th>
<th>Department or Business Unit responsible for liaising with industries on the commercialization of academic research</th>
<th>Number of Spin-off Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>CityU</td>
<td>CityU Enterprise Limited</td>
<td>25</td>
</tr>
<tr>
<td>HKUST</td>
<td>HKUST Technology Transfer Centre/HKUST R and D Corporation Limited</td>
<td>36</td>
</tr>
<tr>
<td>PolyU</td>
<td>Partnership Development Office (PDO)</td>
<td>11</td>
</tr>
<tr>
<td>HKU</td>
<td>Versitech</td>
<td>9</td>
</tr>
<tr>
<td>CUHK</td>
<td>Centre for Innovation and Technology (CINTEC)</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 2.2.3.2  Number of economically active spin-off companies from the five named Hong Kong universities for the UGC reporting years of 2009 to 2010 and 2010 to 2011

<table>
<thead>
<tr>
<th>University (short name)</th>
<th>Number of Economically Active Spin-off Companies for the Reporting Year 2009 to 2010</th>
<th>Number of Economically Active Spin-off Companies for the Reporting Year 2010 to 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>CityU</td>
<td>Information not provided</td>
<td>11</td>
</tr>
<tr>
<td>HKUST</td>
<td>28</td>
<td>31</td>
</tr>
<tr>
<td>PolyU</td>
<td>Information not provided</td>
<td>Information not provided</td>
</tr>
<tr>
<td>HKU</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>CUHK</td>
<td>21</td>
<td>21</td>
</tr>
</tbody>
</table>


The academic spin-off companies founded by the universities in Hong Kong are absolutely and relatively few compared with the average population size (approximately three hundred thousand) of small- to medium-sized companies in Hong Kong. However, given that these companies are start-up companies that originated from their respective parent universities and that they provide the Hong Kong industries and business sectors with technology-based research
output, investigating the business models supporting their business endeavors as well as the dynamic capabilities that help them sustain and grow their business is important.

2.3 Business Model Innovations

2.3.1 Business model research

The term “business model” became a buzzword among business executives, e-business consultants, information technology specialists, and even financial analysts during the mid-1990s, with the rise of the dot-com era (Burkhart et al. 2011). Business model changes (for example, “brick and mortar” versus “B2B” for business-to-business or “B2C” for business to consumers) and concepts such as “first-mover effects” were touted by practitioner-oriented journals and magazines as fast paths to capturing the market and delivering the value propositions of companies. However, the academic research on “business models” then was fragmented (Burkhart et al. 2011) and mainly confined to information systems and strategic management areas (Zott et al. 2011).

Since the dot-com bubble burst in 2000, academic research on business models has been lagging. An upsurge of interest in business model innovation was witnessed at the turn of the century. Many US corporations found the business model construct useful for business and performance planning purposes (Malone et al. 2006), although a significant lag was still noticeable between management practice and scholarly research (Dottore 2009).
The primary reasons for such lag are the lack of consensus and of concerted effort among researchers and practitioners having disparate interests in the fields of information technology, entrepreneurship, strategy management, innovation, small- to mid-sized enterprises, or knowledge management. Major debates and arguments mainly revolved around the lack of standard definitions and taxonomies of the business model (Dottore 2009; Osterwalder et al. 2005). Views about defining the “business model” concept and determining its components were fragmented. Chesbrough and Rosenbloom (2002) offered a functional perspective of the business model but maintained that agreeing on how to operationalize a business model concept for strategic management, particularly, for firm-level sustainable competitive advantage, is empirically difficult.

2.3.2 Problems in Defining the Business Model

Lambert and Davidson (2012) examined the literature and concluded that at least three major themes of empirical studies are present in research on business models: in terms of enterprise classification, performance or innovations.

A business model can be defined in multiple dimensions, depending on the background and theoretical perspectives of the researchers. Strategy scholars refer to business model innovation as one of several strategic frameworks employed by successful firms to create competitive advantages. The focus of entrepreneurship scholars, however, is not about defining a business model but rather what business models do (Doganova and Eyquem-Renault 2009).

Instead of deliberations about definitions, there are others who pursue the components approach of identifying the modules or building blocks of a business model framework and how they interact with each other (Alt and

Osterwalder and Pigneur (2010, p. 14) suggested that “a business model describes the rationale of how an organization creates, delivers, and captures value” and proposed a framework that they referred to as the “business model canvas”. The concept has since received wide recognition from corporate executives and industry practitioners (Kaplan 2010; Hafkesbrink and Schroll 2010), as Osterwalder and Pigneur (2010) leverage the framework and, with some easy-to-understand facilitation for the busy executives and practitioners, operationalize a business model concept, as well as some indications towards business model innovations, according to the following nine building blocks:

<table>
<thead>
<tr>
<th>Table 2.3.2  Nine Building Blocks of a Business Model Construct</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Customer segments</td>
</tr>
<tr>
<td>2. Value propositions</td>
</tr>
<tr>
<td>3. Channels</td>
</tr>
<tr>
<td>4. Customer relationships</td>
</tr>
<tr>
<td>5. Revenue streams</td>
</tr>
<tr>
<td>6. Key resources</td>
</tr>
<tr>
<td>7. Key activities</td>
</tr>
<tr>
<td>8. Key partnerships</td>
</tr>
<tr>
<td>9. Cost structure</td>
</tr>
</tbody>
</table>

Source: Osterwalder and Pigneur (2010)
2.3.3 Business Model Innovation

Business model innovation as a process that deliberately changes the core elements of a firm and its business logic (Bucherer et al. 2012, p. 183). Firm-level business model innovations are considered as the determining factor for its success in the long run. New business models are difficult for competitors to follow, not only because they require considerable time and effort to simultaneously change various elements, but also because the required transformations or changes to the firm’s current business model, or in the case of being subjected to disruptive changes in the environment, adoption and execution of a completely new business model, has to be in a strategic fit with the firm’s long-term strategy, corporate culture and core competencies (Bucherer et al. 2012, p.183).

2.3.4 Business Model Innovation as a potential source of competitive advantage

Business model “provide powerful ways to understand, analyze, communicate, and manage strategy-oriented choices among business and technology stakeholders” (Al-Debei and Avison, 2010, p.369).

Successful firms create substantial value for customers and, in return, capture value for the firm (Teece 2010). A company’s firm-level business model reflects its strategic choice of unique combination of resources, capabilities, and strategic actions.

Despite the prevalence of Porter’s conceptualization of competitive advantage as the mainstream framework for corporate strategy over the past three decades, Casadesus-Mansannell and Ricart (2010a) argued that firm-level
competitiveness is dependent on how well the firm’s “business model interacts with its environment to produce offerings that add value.” (p.124). Casadesus-Masanell and Ricart (2010a, p.143) advocated that the future of a business is dependent on its ability “to imagine, design, and implement new business models successfully”. As a departure from Michael Porter’s (1990) effort to consider national or regional clusters as unit of analysis to explain competitiveness, Casadesus - Mansannell and Ricart (2010a, p.125 and p.126) advocated the use of business model as a unit of analysis. Accordingly, Casadesus-Mansanell and Ricart (2010a) exploited the concept of a business model as construct for value creation and capture and came up with two major considerations, “set of choices” and “set of consequences derived from these choices” (p.126). Their study of case companies suggested that firm-level “competitiveness can be achieved through business model reconfiguration” (or changing into a completely new business model), and during the business model transformation process, these firms “have entailed developing powerful and robust new virtuous cycles that allow them to create and capture value” (p.142),

Casadesus-Mansanell and Ricard (2010b) reviewed the industrial organization theory, RBV, DCV and game theory to trace the development of theories and research approaches for business models. In their minds firms that manage to take advantage of the “structural changes to innovate their business models” to “compete differently” (p.195) will be able to thrive in the fast changing environment. They proposed their definition of a business model as that “depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities” (Casadesus-Mansanell and Ricart 2010b, p.197). Casadesus-Masanell and Ricart (2010b) analyzed the business models of three companies, Ryanair, TDC and Tenmore, and set out to define and differentiate the business model concept from strategy and from tactics. A conceptual framework was proposed to
separates strategy from business model but then links up strategy with business model and along with tactics. Casadesus-Masanell and Ricard (2010b) argued that a business model “is a reflection of the firm’s realized strategy.” (p.195). Transformational changes in some of the components of a firm’s business model may result in significant performance differences (p.212).

Markides and Chaitou (2004) advocated that a firm’s business model can be a source of competitive advantage. This view was also shared by Zott et al. (2011).

According to Afuah and Tucci (2001, p.45), companies with well-formulated and innovative business models enjoy competitive advantages over their competitors, resulting in higher profits.

Bowonder et al. (2010) listed business model innovation as one of the strategy frameworks that successful companies use to create competitive advantage.

In recent years, there is an increasing interest in business model innovations amongst corporate offices of business enterprises in the United States in their strategic management discussions, due to globalization and probably fueled by an increasingly fierce competitive environment with networked global, regional, and local players. Firms need to stay agile and flexible so they can enhance their capabilities to extend, modify, adapt, transform, or renew their business models in responding to real world complexities and challenges. Assuming a central role, business model innovation is being advocated as “critical to success in today’s increasingly complex and fast-changing environment” (Giesen et al. 2010) and “leading to successful financial results” (Giesen et al. 2007).

Many companies falter not because of wrong strategy or poor execution but
because they have been using old business models for too long that they fall prey to market dynamism and become victims of path dependency or strategic rigidity (Doz and Kosonen 2010).

The business model of a business enterprise is thus key to its survival and on-going competitive advantage.

The divergent and diversified characteristics of new technology-based companies create heterogeneity in their business models and development in terms of growth paths and performances (Wright et al 2008). The need for careful analysis and strategic decision making regarding value-creation and value-capture through business models is of paramount importance to business viability and sustainability of technology-based start-up companies especially the academic spin-off companies (Markman et al. 2008).

2.4 Dynamic Capabilities

2.4.1 Evolving developments of the Dynamic Capabilities View (DCV)

2.4.1.1 Brief Introduction
The concept of dynamic capabilities as a construct has its theoretical roots in a multitude of theories in the literature, and therefore, a situation of “multiplicity of definitions of dynamic capabilities” exists (Di Stefano et al. 2010, p.28). Di Stefano et al. (2010)’s bibliographic study identified “371 journal articles published on dynamic capabilities since the term appeared in the literature and
up until 2007, representing the “Intellectual Core of Dynamic Capabilities Research” (p.1191) that they considered useful in exploring the chronological perspectives of developments in scholarly research in the dynamic capabilities domain. Di Stefano et al. (2010) claimed that, since Teece et al. (1997)’s first introduction of their conceptual framework and definition of dynamic capabilities, this topic has received the most research interest in the field of strategic management (p.1187).

While the dynamic capabilities framework was initially proposed as “an approach to understand strategic change” (Helfat and Peteraf 2009, p. 92; Teece et al. 1997), the ensuing research has provided more focus and definitional perspectives to help identify and articulate the firm level hierarchical structure of resources, capabilities and dynamic capabilities (Wang and Ahmed 2007) required to engage the external volatile and complex environment, and the microfoundations of “sensing”, “seizing” and “reconfiguring” (Teece 2010) that will operationalize the dynamic capabilities framework.

In terms of theory development, Helfat and Peteraf (2010, pp. 92-93) argued that the evolving dynamic capabilities view had its roots in a number of “clearly identifiable theoretical foundations”, notably “evolutionary economics” that had given dynamic capabilities its focus on “routines and path dependencies”, and “resources-based view” (RBV) that links resources and capabilities to firm-level competitive advantage.

While an appreciation of the evolving development of the conceptual framework for dynamic capabilities may be relevant and meaningful in support of the current study, it would appear reasonable and effective to start off with discussions about the resources-based view that preceded the dynamic capabilities view with respect of theoretical developments.
2.4.1.2 Resources, Capabilities and Resources-based View (RBV)-

The notion of competitive advantage, resources, capabilities, processes and routines, and frameworks of analysis including the resources-based view and the dynamic capabilities view are related and inter-linked.

The issue of sustainable competitive advantage and the potential source(s) of competitive advantage have been subjects of academic research and arguments for a long time. Early scholars and researcher develop their views primarily along industry effects and firm-specific factors (Hawawini et al. 2001), the lines of possession and deployment of distinct resources. Some of the notably research paradigms included the contingency framework, the Structure-Conduct-Performance model of industrial economics theory (Barney 2001; Williams and Smart 1993).

In the early- and mid-1980s, the dominant theoretical frameworks for competitiveness was mainly the S-C-P based theories of competitive advantage (Barney 2001), including notably market structure and “positioning”-based approach as advocated by strategy professor Michael Porter (Katkalo et al. 2010).

2.4.1.3 Resources, Capabilities and Organizational Capabilities

Strategy scholars turned their focus on firm-unique internal resources to explore and investigate a firm’s ability to capture value or profit for the organizations.

Capabilities are routines or processes employed by firms to leverage their competencies and exclusive resources for creating their desired competitive advantage; an example is the ability to create embedded processes for sensing and responding to dynamic and complex external and internal environments (Moingeon et al. 1998).
Firms must be able to find and deploy “capabilities” as one of the major challenges they regularly face is the “capability identification process” (Vorhies and Harker 2000, p.146). A firm must constantly review and update its organizational structure to ensure a strategic fit between structure and strategic intent, as well as dynamic alignment of its organizational structure with strategies that support the objectives of the firm (Moingeon et al. 1998).

The views of strategy scholars with regard to organizational structure, resources and capabilities coincided with the perspectives pursued by organizational scholars. For example, Rindova and Kotha (2001)’s case study of two companies, Yahoo! and Excite focused on changes in organizational form (in terms of the “structural features and patterns of organizations” (Rindova and Kotha 2001, p. 1263) or “organizational arrangements, including structures, routines, resources and capabilities” (Rindova and Kotha 2001, p.1264)); functions (operational functions such as “product strategy” and firm-level competitive advantages. Rindova and Kotha (2001) argues that dynamic changes by way of continuous on-going transformations, or what they would described as “continuous morphing”, to organizational form, products, resources, capabilities are necessary to help firms to achieve “competitive advantage under conditions of hyper- competition” (Rindova and Kotha 2001, p.1276).

An organizational capability refers to the ability of an organization to perform a coordinated set of tasks, utilizing organizational resources, for the purpose of achieving a particular end result (Helfat and Peteraf, 2003, p.999)

Some of the strategy scholars pursued further by identifying the strategy content of capabilities and then proposed to group some of those as “organizational capabilities” that would be served with specific intent to act upon and change the more generic or operational capabilities (Helfat et al. 2007;
In so doing, the literature has identified separate levels of capabilities. Zott (2003, p.100) cited Collis 1994 (p.149) as suggesting that “Higher-order organizational capabilities allow firms to overcome the path dependency that led to the inimitability of the lower-order capabilities.”

According to Winter (2003, p.991), “an organizational capability is a high-level routine (or set of routines)” that provides the management of a firm with decision options in the input-output processes. According to Moingeon et al. (1998),

“[Organizational capabilities] refer to the firm’s ability to use its competencies. Capabilities refer to the dynamic routines acquired by the organization concerning the managerial capacity to improve continuously the effectiveness of the organization, such as the creation of new production functions (Lipman and Rumelt 1982). Capabilities represent ‘the firm’s collective tacit knowledge of how to initiate or respond to change that is built into the organization’s processes, procedures and systems, and that is embedded in modes of behaviour, informal networks and personal relationships.’” (Collis 1996, as cited in Moingeon et al. 1998, p. 298)

The concepts of organizational learning is also discussed by Real, Leal and Roldan (2005) who consider that organizational learning as one of the key organizational capabilities, given its characteristics of heterogeneity, path-dependency (i.e. sustainable through experience accumulation and historical developments of the respective firm)

Spanos and Prastacos (2004) showed the analogy between the weaving process and the creation of organizational capabilities in integrating strategic resources. In discussing the scarcity and finite supply of resources, they suggested that
capabilities are “dynamic, non-finite, firm-specific, and path-dependent processes that are not obtainable in the market place, are difficult to copy, and are accumulated through long-term, continuous learning” (Spanos and Prastacos 2004, p.31). Spanos and Prastacos (2004) also reaffirmed the view that organizational capabilities are “the fundamental source of sustained competitive advantage” (Grant 1996a, 1996b, as cited in Spanos and Prastacos 2004, p.31).

Helfat and Winter (2011) distinguished dynamic capabilities from the generic operational capabilities and organizational capabilities in terms of their “intended” and “specific” purposes, and the capacities for “repeated and reliable performance”, “practiced or patterned behavior” of activities (p.1244).

2.4.1.4 The Resources-based view
The focus on resources bundles and capabilities within a firm to help address and achieve the goal of sustainable competitive advantage gave rise to the conceptualization of the resources-based perspective. Given that firm-level resources and capabilities are strategy bearing, and development of such resources and capabilities will require considerable length of time instead of something that can be bought or acquired in the open market on an ad hoc or short-term basis, the issue of “supply inelasticity” (Peteraf 1993, as cited by Barney 2001, p.645) becomes a major concern. Scholars advocating the resource-based view (RBV) of firms argue that firms can sustain their competitive advantages if they possess valuable, rare, inimitable, and non-substitutable (VRIN) resources or assets. Resource-based theory maintains that the strategic capabilities of firms comprise resources (both tangible assets and intangible or tacit knowledge assets) and competencies and that their performance over time is dependent on their strategic capabilities in anticipating, responding, changing, and adapting to the fast changing, volatile,
and complex environments (internal and external). RBV suggests that a firm must be able to nurture, create, and exploit the firm’s own resource “bundles.”

RBV also attaches great importance to organizational processes and routines that are considered “building blocks of corporate strategy” (Stalk et al. 1992, as cited in Ray et al. 2004, p.26).

RBV theorists further maintain that different outcomes in terms of competitive advantage occur due to several combinations of business processes and strategic resources (Ray et al. 2004). A firm must organize its business processes efficiently and effectively to fully realize its potential for leveraging resources and capabilities against the competition (Ray et al. 2004).

2.4.1.5 Dynamic Capabilities and Dynamic Capabilities View (DCV)

Since the 1990s, the increasing volatile competitive environment imposed tremendous pressure on companies to perform. Observing the diverse and complex performance differences for companies at large, big questions were raised on “Why do firms perform differently?” and “Why do firms in the same industry perform differently?” (Zott 2003, p.97). Zott’s study attempted to explore on “how exactly dynamic capabilities affect firm performance” (Zott 2003, p.120), ran a simulated model analysis on dynamic capabilities for “imitation” and “experimentation” and concluded that effects from “timing of resource deployment”, “cost of resource deployment” and “ability to learn to manipulate resource position via imitation and experimentation” impact on performance differences (Zott 2003, p.120).

While on the subject of dynamic capabilities and firm performance, Helfat et al. (2007) proposed “two conceptual measures of performance for dynamic capabilities” (Helfat and Peteraf 2009, pp.97-98) – “technical fitness” for the
effectiveness of a specific dynamic capability in performing its functions as perceived and intended, and “evolutionary fitness” for the ability of a specific dynamic capability for enabling a firm’s performance.

Review of extant literature suggests that academics and researchers have been building their arguments on the various streams of the resource-based theory with their focus on the asset side of “resources”, capabilities that take into consideration embedded routines with resources, then on to organizational capabilities in terms of strategy content, and finally constructs (integration, reconfiguration and organizational learning) for a group of high order capability - “dynamic capabilities” – that will contribute to creating competitive advantage for the business. Examples that have been quoted as in the “dynamic capabilities” category include strategic actions and processes such as “new product development”, “alliance development”, “management of acquisitions or alliances”, “supply chain management” “customer relationship management”, “new firm formation”, “market orientation” and “innovativeness” (Skilton 2003; Winter 2003; Oxtoby et al. 2002; Newbert 2005; Mengue 2006). However, the literature provides barely little details and no descriptions whatever about what and why these are being considered as such.

Scholars in the resource-based-view (RBV) area maintain that firm-specific resources, both rare and valuable, determine the competitive advantage of a firm. When such resources are simultaneously not imitable, not substitutable and not transferable, they may produce a competitive advantage that is sustainable (Barney 1991).

However, strategy scholars argue that a firm’s dynamic capabilities enable sustainable competitive advantage. Competing in dynamic environments, innovative firms gain temporary competitive advantages (Sirmon et al. 2010)
over their competitors but such advantages seldom sustain long enough to keep up with rapid changes in the market environments. These firms have to continually reconfigure their resources to protect their competitive lead (Sirmon and Hitt 2003; Sirmon et al. 2006 as cited in Zahra, Sapienza and Davidsson 2006). Dynamic capabilities are high-order organizational capabilities (Winter 2003; Spanos and Prastacos 2004) to manage and re-configure the lower-order operational capabilities as well as all tangible and intangible resources to achieve sustainable competitive advantage.

Other authors contribute to the definition of “dynamic capabilities” by referring to the fundamental, cultural and values aspects within the organization context such that dynamic capabilities should be routines and learning that have been embedded deeply in the organizational structure over time.

Teece et al. (1997) defined dynamic capabilities as the firm’s ability to integrate, build, and reconfigure organizational resources and competencies to engage in the volatile and complex external environments.

Teece et al. (1997) referred to the concept of dynamic capabilities and emphasized two key aspects that have not received much attention in prior literature on strategy. By identifying the “dynamic” nature of “dynamic capabilities”, Teece et al. (1997) sought to overcome the traditional static view of firm-level resources in prior literature in strategy management and brought in the concept of the continuously moving and changing ability to build, transform and reconfigure operational capabilities to match up with a fast-changing business ecosystem. At the same time, the term “capabilities” emphasizes the strategic routines or processes in integrating, building and reconfiguring organizational resources and lower-level routines or processes to engage the uncertainties, volatilities, and risks external to the organization.
Eisenhardt and Martin (2000) maintained that dynamic capabilities are unique value-creating organizational processes, and they defined dynamic capabilities with emphasis on the capacity of these processes to “integrate, reconfigure, gain, and release resources” (Eisenhardt and Martin 2000, p.1107).

Winter (2003) echoed the definition by Teece et al. (1997) but pointed out that dynamic capabilities represent high-order routines that prevail over the other organizational capabilities and operational routines.

While emphasizing and reiterating the importance of the dynamic capabilities framework as a “comprehensive multidisciplinary approach” to strategic management (Teece 2011a, p.512), Dynamic capabilities are further defined as “high-level competences that determine the firm’s ability to integrate, build, and reconfigure internal and external resources / competences (including its intangible assets) to address and shape a changing business environment” (Teece 2011a, p.504).

Wang and Ahmed (2007) argued that there should be a hierarchical structure of firm level resources and capabilities, such that resources and capabilities at different levels are expected to bring about different levels of potential impact on the firm’s performance and competitive position in response to the dynamic environment in which the firm is situated. Their views reflected and served as follow on to prior claims by researchers on organizational capabilities as higher order capabilities as distinct from other lower-level capabilities, for example, in Collis (1994, p.149) as cited in Zott (2003, p.100).

Organizational resources that are in the VRIN “valuable, rare, inimitable and non-substitutable” (Barney 1991) category are to be considered as at the “zero-order” level. VRIN resources cannot by itself enable the firm’s competitiveness in the long run and therefore the firm requires higher level
capabilities to plan and deploy resources to achieve the firm’s strategic objectives. Capabilities are ranked as “first order”, while core capabilities, firm level critical capabilities that “differentiate a company strategically” (Leonard-Marten 1992), and combination of firm resources and capabilities that contribute to the firm’s short-term competitive advantages at a certain point in time, are to be considered as “second order”.

However, resources, capabilities or core capabilities that seem to be valuable, rare, inimitable and non-substitutable for a definitive if not only short period of time are vulnerable and subject to rigidity, erosion, obsolescence, threats of imitation or substitution over a long period and extended timeframe, Wang and Ahmed (2007) posited further therefore that dynamic capabilities, being positioned at the third-order level up in the hierarchical structure, represent the high-order capacity and organizationally embedded routines capable of for the “renewal, reconfiguration, and re-creation of resources, capabilities, and core capabilities to address environmental change”, thus “conducive to the long-term performance of the firm”. (Wang and Ahmed 2007, p.36)

Teece (2007) classified dynamic capabilities into the capacity to (a) sensing opportunities and threats, (b) seizing opportunities, and (c) reconfiguring the intangible and tangible assets of the business enterprise. In a more recent work, Teece (2011a and 2011b) elaborated on these three sets of activities and capabilities: (1) continuously scanning of the internal and external environments for opportunities and threats as well as evaluating how they fit in with the firm’s strategic developments (sensing), (2) deploying and integrating firm resources to engage an opportunity for creating value and to capture value during the process (seizing), and (3) continuously making strategic decisions to bundle, unbundle, transform or reconfigure company resources and embedded routines (reconfiguring).
In examining extant literature, Weerawardena and Mavondo (2011) claimed that despite the recent theoretical advancements, the dynamic capability view still lacks a strong empirical base. However, Weerawardena and Mavondo (2011, p.1221) believe that groupings of dynamic capabilities into “sensing”, “seizing” and “reconfiguring” capabilities as advocated by Teece (2007) “may provide a basis for estimation of dynamic capabilities.” They do not see a strong case of firm-level dynamic capabilities leading directly to competitive advantage, although they support the view that dynamic capabilities may help reconfigure or transforming resources and capabilities bundles in pursuit of competitive advantage.

2.4.1.6 Dynamic Capabilities and business model innovation

Teece (2011a) also established the connections between dynamic capabilities and business model innovation by pointing out that “seizing capabilities” (one of the three clusters of dynamic capabilities above) involves designing business models to satisfy customers and capture value (p.514).

Teece (2011b) argues that a firm’s business model is one of its strategic intangible assets. The design and deployment of the firm’s business model will structure the firm’s value proposition and delivery of business solutions to its customers, and more importantly, business model innovations (in terms of transformations or changes) are therefore required and necessary in order for the firm to be successful. A firm’s dynamic capabilities in business model innovations, in terms of its capacity of “transforming” or “reconfiguring” the components of its business model and interactivities amongst these components, become critical in helping the firm to successfully engage the volatile market and emerging complicated risks and opportunities.

In so far as Teece’s notions (Teece 2011a and 2011b) are relevant to the
academic spin-off companies, technologies and entrepreneurship aside, firms should be well advised to consider the capabilities to resolve financial and funding matters, talent and knowledge management, as well as relationships with networked partners, all within the purview of "seizing capabilities". Companies must create and deploy resources and processes to sustain and grow the business, and when opportunities emerge in the dynamic environment, reconfigure or transform the resources-capabilities combinations so as to achieve a strategic “fit” and alignment within the ecosystem.

2.4.2 Dynamic Capabilities and Sustainable Competitive Advantage

Scholars adopting RBV maintain that company resources that are of VRIN (Barney 1991) in nature will create competitive advantage for the firm and that such competitive advantage may become sustainable over time if VRIN attributes shall sustain (Barney 1991).

However, strategy scholars argue that at best, RBV represents a static view of firm resources and that by competing in dynamic environments, innovative companies with VRIN resources gain temporary competitive advantages (Sirmon et al. 2010) over their competitors, but such advantages seldom last long enough for the firm to keep up with the rapid changes in the market environments. These companies have to nurture and execute the appropriate dynamic capabilities to stay ahead of the competition (Sirmon and Hitt 2003; Sirmon et al. 2006, as cited in Zahra, Sapienza and Davidsson 2006). Dynamic capabilities are high-order organizational capabilities that manage and reconfigure the lower-order operational capabilities as well as all tangible and intangible resources to achieve a sustainable competitive advantage.
Drawing from extant literature, Salunke et al. (2011) conceptualized on service innovation and competitive advantage in a project-based business context. They proposed a set of four different learning capabilities and advocated that these dynamic capabilities would enable the entrepreneurial service firms achieve greater innovation and sustain competitive advantage.

Strategy scholars have in general supported, by way of case studies and empirical quantitative studies, that firm-level dynamic capabilities, VRIN resources and capabilities lead to sustainable competitive advantage.

2.5 Conceptual Framework for Linking Dynamic Capabilities and Business Model Innovations

2.5.1 Sustainable Competitive Advantage: Interactions between Business Model Innovations and Dynamic Capabilities

Uncertainties in the market (e.g., new products and services; intensified competition; new or transformed business models adopted by current, emergent or other sectors; government or regulatory changes) can cause long-standing, prevailing business models of firms to falter or become obsolete or unprofitable. Thus, “continuous business model innovation is an important capability for every firm seeking success in the long run” (Sosna et al. 2010, p.384).

Teece (2011) maintained that in a globalized environment a business enterprise must devise a new and unique value proposition for local customers in every
geographical location it participates and competes. Designing and implementing the appropriate business model innovations for each of these new markets are key to success in these geographically spread locations.

Business model innovation implies a need for change or transformation, whether disruptive or incremental, which requires a reconfiguration of the different components of the existing business model and the interactivities or interlocking processes among these components. Dottore (2009) argued that firms achieve “sustained superior performance” in a dynamic environment through appropriate deployment of “superior strategic assets,” notably, the business model of a firm.

If the business model of a company is a strategic organizational resource, then the capability to reconfigure a business model is a required organizational dynamic capability for success. However, Dottore (2009) believes that achieving superior performance does not depend on dynamic capability alone:

“If managing reconfiguration is logically clearly an aspect relevant to business model adaptation, so is sensing the threat or opportunity that could occasion the change. In turn, seizing the current or prospective opportunity can depend upon business model design and adaptation.” (Dottore 2009, p.491)

The above view is shared and confirmed by Teece (2007; 2010; 2011), that dynamic capabilities should include sensing, seizing, and reconfiguring capabilities:

“The capacity an enterprise has to create, adjust, hone, and, if necessary, replace business models, is foundational to dynamic capabilities.” (Teece 2007, p.1330)
It is therefore reasonable to advocate that firm-level dynamic capabilities of sensing, seizing and reconfiguring are required to design and implement business model changes. Business model transformations or innovations serve to operationalize the overall strategy that is required of the firm to achieve competitive advantage over the long haul.

2.5.2 Business Model Innovations and Dynamic Capabilities

Companies should design and deploy an appropriate business model to create value and should continually re-configure their business models to remain dynamically capable of achieving competitive advantages (Casadesus-Masanell and Ricart 2010a & 2010b). Firms should also investigate and explore how their business models fit in and interact with their strategies for product and services to influence performance (Zott and Amit 2006). Onetti et al. (2010) argued that young technology-based firms require new ways of defining their value propositions and business model innovations when engaging in commercializing a technology for new markets in the home market and developing growth capabilities in international markets. Doz and Ksonen (2010) argued that despite the uncertainties, discontinuities, and disruptions that create pressure to modify business models, the current business model of most companies have thus far been effective and very stable but having fallen trapped in strategic rigidity. Thus, some form of dynamic capabilities is necessary in overcoming the strategic rigidity inherent in the current business model and in developing a new business model for the company.

As firms develop and leverage their dynamic capabilities to reconfigure and transform their resources and capabilities base to engage the eco-environment,
they need also to apply the dynamic capabilities to re-configure and transform their business models. Investigating the potential relationships between business model changes and dynamic capabilities of small and medium sized companies, and in particular of academic spin-off companies in the current research context, is a worthwhile undertaking.

2.6 Chapter Summary

2.6.1 Business Model Innovation as a Source of Competitive Advantage

Successful firms create substantial value for customers and, in return, gain value for the firm (Teece 2010). The business model of a firm reflects its strategic choice of unique combinations of its resources, capabilities, and strategic actions.

Bowonder et al. (2010) listed business model innovation as one of the strategic frameworks that successful companies use to create competitive advantage. Zott et al. (2011) maintained that business models are basis for competitive advantage. Casadesus-Mansanell and Ricart (2010) argued that the business model of a firm is the key to its sustainable advantage.

2.6.2 Dynamic Capabilities and Sustainable Competitive Advantage
Scholars adopting RBV maintain that company resources that are of VRIN (Barney 1991) in nature will create competitive advantage for the firm and that such competitive advantage may become sustainable over time if VRIN attributes shall sustain (Barney 1991).

However, strategy scholars argue when innovative firms compete in dynamic environments, they may well obtain temporary competitive advantages (Sirmon et al. 2010) over their competitors, but such advantages seldom last long enough for these firms to keep up with rapid changes in the market environment. Dynamic capabilities are high-order organizational capabilities for managing and reconfiguring the lower-order operational capabilities as well as all tangible and intangible resources to achieve sustainable competitive advantage.

2.6.3 Business Model Innovations and Dynamic Capabilities

Firms need to design and deploy appropriate business models to create value, and they need to continuously reconfigure their business models to remain dynamically capable of achieving competitive advantage (Casadesus-Masanell and Ricart 2010a & 2010b). Based on studies of young technology-based firms, Onetti et al. (2010) argued that these companies require new ways of defining their value proposition and business model innovations while commercializing a technology for new markets in the home market and developing growth capabilities in international markets.

In order to strive for achieving a sustainable competitive advantage, companies must continuously change and innovate their business models as well as develop and leverage their dynamic capabilities. Therefore, investigating the
potential relationships between business model changes and dynamic capabilities for the companies in the case study is a worthwhile undertaking.

2.6.4 Comparing Business Models and Dynamic Capabilities in Academic Spin-off Companies in Hong Kong

Mustar et al. (2006) suggested out that academic spin-off companies are unique in terms of their inherited resources (notably intellectual assets), business models, and linkages with parent universities.

This exploratory study aims to generate insights into the strategies of academic spin-off companies in Hong Kong for achieving a sustainable competitive advantage and the specific roles that dynamic capabilities and business model innovations play in these companies.

The expected findings aim at complementing developments in the literature on strategy management, dynamic capabilities and business model innovations. Moreover, the present study fills the gaps in the literature on strategy management and entrepreneurship, where it is only recent that Teece (2011) gets to throw light and focus on the relationships between dynamic capabilities and business model innovations at the firm level. The need for investigation is especially relevant given the lack of research in this direction, and such investigation is pertinent to the context of academic spin-off companies in Hong Kong.

This study deepens understanding of the ability of academic spin-off companies to effectively orchestrate the on-going reconfiguration of their resources and capabilities for business model flexibility. Likewise, it examines firms’ agility
in engaging in new opportunities (Teece et al. 1997) within the context of Hong Kong and of firms joining foreign markets (Lu and Beamish 2001; Zahra and Garvis 2000; Dimitratos et al. 2004).
CHAPTER 3 - RESEARCH METHODOLOGY

3.1 Introduction

This chapter introduces the research methodology of the study and how the methodology is applied to explore the phenomenon of business model innovation and dynamic capabilities as they are adopted and evolve in a number of academic spin-off companies in Hong Kong. The research methodology adopts a constructivist paradigm (Baxter and Jack 2008; Freeman et al. 2012), a case study approach, and an exploratory research design using a multiple case study method (Yin 2003).

3.1.1 Qualitative Research and Exploratory Study

Given the exploratory nature of the current study, the orientation is not on the statistical analysis or quantitative aspects of the existence or casual relationships between business models and dynamic capabilities with the expectation to test hypothesis and generalized for academic spin-off companies. Instead, the study aims to examine the multiple facets or perspectives of the case-study companies to help identify and reveal the key perceptions of informants regarding the development of business model innovations and dynamic capabilities within the complicated organizational contexts and processes. The quantitative research approach does not seem to prevail in this situation (Johl et al. 2012; Neuman 2000), and adopting a qualitative approach with comparative case analysis is deemed more appropriate than quantitative
methods (Birkinshaw et al. 2011 as cited in Tsang 2012).

A qualitative research process is adopted to explore and investigate the organizational phenomena of business model innovation and dynamic capabilities within the context and boundaries of academic spin-off companies. Data will be collected and analyzed as if the study is engaged in an organizational setting with the researcher observe and listen to the perspectives and thinking processes of the informants of the participating academic spin-off companies. Bryman (2004) refers to this process as ethnography design, and the case study approach represents a procedure of inquiry (Merriam 1998 as cited in Bryman 2004). Cresswell (2008) considers case study as one of the key types of ethnography.

Creswell (2008) points out that case study is one form of ethnographic designs as qualitative procedures for describing, analyzing, and interpreting data on basis of an in-depth exploration of a phenomenon.

Kaplan and Maxwell (1994) maintained also that a quantitative approach does not serve well for working with textual data and thus not appropriate for facilitating the researcher’s understanding of the informants’ perspectives and organizational contexts. The qualitative research paradigm can achieve a better understanding of the phenomena of business model innovation and dynamic capabilities, as situated and established within the contexts of the three case-study companies. The tools and techniques for data collection and analysis as applied in qualitative research methodology are well designed to help focus on the human world of “actors,” “views of actors” (Tellis 1997), and interactions, instead of those techniques used in quantitative research methodology for the “natural” world. Qualitative research significantly presents more robust and better informed perspectives in terms of strategic management and competitive advantage of academic spin-off companies and emerging small
to mid-sized companies in Hong Kong.

### 3.1.2 Business Model Innovation as a Source of Competitive Advantage

Successful firms create substantial value for customers, and in return, they capture value for the firm (Teece 2010). The business model of a firm reflects its strategic choice of the unique combinations of firm resources, capabilities, and strategic actions.

Bowonder et al. (2010) listed business model innovation as one of the strategic frameworks that successful companies use to create competitive advantage. Zott et al. (2011) maintained that a business model could be a source of competitive advantage. Casadesus-Mansanell and Ricart (2010) argued that the business model of a firm is foundational to its long-term competitive advantage.

### 3.1.3 Dynamic Capabilities and Sustainable Competitive Advantage

Scholars in the resource-based-view area maintained that firm-level organizational resources that are in the VRIN category, “valuable, rare, inimitable and non-transferable” (Barney 1991) will contribute to the company’s competitive advantage on a sustainable basis.

However, strategy scholars argue that it’s the dynamic capabilities of a firm comprising high-order strategic capabilities and embedded organizational processes that will enable sustainable competitive advantage, instead of company resources or assets that become static in nature. Innovative firms gain
temporary competitive advantages (Sirmon et al. 2010) over their competitors when they compete in dynamic environments. However, such advantages are seldom sustainable to keep abreast with the rapid changes in the market environments. Firms must reconfigure and transform their capabilities and resources to maintain their leadership positions (Sirmon and Hitt 2003; Sirmon et al. 2006 as cited in Zahra, Sapienza and Davidsson 2006). Dynamic capabilities are high-order firm-level capabilities to manage and re-configure the lower-order capabilities, as well as all tangible and intangible resources to achieve sustainable competitive advantage (Wang and Ahmed 2007; Sirmon et al. 2011).

3.1.4  Business Model Innovations and Dynamic Capabilities

Firms need to design and deploy an appropriate business model to create value and re-configure their business models on an on-going basis to remain dynamically capable of achieving competitive advantage (Casadesus-Masanell and Ricart 2010a & 2010b). Firms must also explore and exploit for the appropriate interactions between firm-level business models and marketing strategies to deliver business performance (Zott and Amit 2006). Onetti et al. (2010) drew on studies of young technology-based firms and argued that these companies, while engaging in commercializing a technology for new markets in the home market and developing growth capabilities in international markets, would require new means of defining their value proposition and business model innovations.

Given that firms need to change their business models to achieve competitive advantage, and granted that a firm needs to develop and leverage its dynamic capabilities to achieve sustainable competitive advantage, investigating the
potential relationships between business model changes and dynamic capabilities for the academic spin-off companies in Hong Kong seems worthwhile.

### 3.1.5 Research Questions

To understand the phenomena under study within their respective contexts, this exploratory study aims to generate insights into how academic spin-off companies in Hong Kong strategize to sustain in business and compete for business, and what roles dynamic capabilities and business model innovation play for these companies; specifically:

*In what ways and how would dynamic capabilities enable academic spin-off companies in Hong Kong to devise, deploy and renew their business models to create and capture value for their organizations, and to sustain in business and compete for business?*

Some of the sub-questions to be posed during this study would serve to explore along the following dimensions:

- What organizational capabilities are considered by academic spin-off companies as their unique dynamic capabilities? How would these companies nurture and develop their dynamic capabilities in the innovation and knowledge management areas? How would they leverage the firm-level dynamic capabilities to enable organizational changes and transformation, as manifested through business model changes, for sustainable competitive advantage?
• How would firm-level dynamic capabilities of the three firms (case study companies) interact, change or transform their respective business models to impact on firm competitiveness?
• What types of business models have been adopted by the three academic spin-off companies that are covered in this study during the period from start-up to current business situations?
• What are the business model changes that academic spin-off companies have strategized, designed, and implemented over time? What processes are in place, and how would these processes transform/reconfigure the business model(s) of the company?

This study seeks to address the what, how, and why of social and organizational phenomena and the case study research strategy appears to be well positioned and appropriate for serving this purpose (Saunders et al. 2009, p.146).

In the following sections, a focused research objective is identified to address the research questions outlined in Chapter 2 and the introduction of this chapter. The subsequent section examines and describes the research design, sample selection, data collection, data analysis, as well as some data trustworthiness considerations in qualitative studies.

3.2 Case Study Methodology

This section provides a general discussion on the case study methodology and a brief summary of the methodology adopted and used in this research.
3.2.1 Case Study Methodology

Vernon and Abdullah (2012) recommend the case study methodology to observe, explain, and explore social or organizational phenomena in their respective real-life contexts.

“Case study research is a qualitative approach in which the investigator explores a bounded system (a case) or multiple bounded systems (cases) over time through detailed, in-depth data collection involving multiple sources of information (e.g., observations, interviews, audiovisual material, and documents and reports) and reports a case description and case-based themes.” (Creswell et al. 2007, p. 245)

A case study methodology is adopted for this exploratory study, and qualitative research approach is used to analyze the data collected. The case study research method is selected because of its ability to generate rich and in-depth data. Given the lack of empirical research on the business model innovation and dynamic capabilities of firms, and considering that research in business model innovation is beginning to gain momentum for the strategy school of scholars, an exploratory case study research strategy is adopted, and qualitative methods are applied (Eisenhardt 1989; Miles and Huberman 1994).

Case study approach is a qualitative research method (Freeman et al. 2012). The case study approach is based on a constructivist paradigm (Stake 1995; Yin 2009) in which reality is subject to personal interpretation and socially constructed as opposed to objectively determined (Noor 2008). The method is most suitable for investigating social phenomena, thus allowing the analysis of human motivations, cultures, values, and ideas, and understanding the behavior, actions, and performance unique and specific to particular situations or contexts.
Yin (1981) argues that the case study approach represents a research strategy and considers a case study analogous to an experiment or simulation exercise. Yin (1989) refers to the case study methodology as an empirical inquiry that investigates a contemporary phenomenon within its real-life context using multiple sources of evidence. Yin (2003) advocates further that a case study design is suited for use to address the “how” and “why” types of research questions.

Eisenhardt and Martin (2000) pointed out that dynamic capabilities are embedded in the firm-level organizational routines and processes, thus, very difficult to identify through quantitative research. The adoption of a qualitative methodology is therefore considered as consistent and appropriate.

The present study on business model innovation and dynamic capabilities aims at identifying and assessing business model changes made by the case-study companies and the different iterations over the years of growth path of each of the companies with re-configurations of dynamic capabilities to enable such business model changes. A case study approach is chosen because of the situation and context in which the case-study companies develop their respective business model(s) and dynamic capabilities. Focusing the research on any of the case-study companies with business model changes and development of firm-unique dynamic capabilities would be impossible without considering the context within which the situation has evolved and occurred.

3.2.2 Multiple-Case Study

Now that it is agreed to conduct the study using a case study approach,
researchers must also consider if conducting a single case study is sufficient or if situations and contexts of the phenomenon warrant conducting a multiple-case study.

The purpose of this multiple-case study is to explore a sample of three academic spin-off companies in Hong Kong for their understanding and perceptions on how they conceptualize and implement business model innovations to strategic company objectives, and how they identify and nurture the necessary high-order organizational or dynamic capabilities, as defined in Chapter 2, to help achieve these objectives.

This paper adopts a multiple-case study as the research design; the objective is to identify, compare, and assess the possible similarities and differences across companies (Jantunen et al. 2012). Other advantages of adopting multiple-case study include a research study that is “more robust and generalizable” (Eisenhardt and Graebner 2007). The researcher can compare the similarities and differences across cases (Ó hÓbáin 2012).

Yin (2009) supports the use of multiple-case study design to apply the “replication logic” to help reveal support for theoretically similar or contrasting results, in which each of the case studies can be considered as an independent case to yield new insights that “may confirm, reject, or extend the theoretical background” of the multiple case study.

Eisenhardt and Graebner (2007, p.27) concurred with Yin (1994) that, “multiple-case studies typically provide a stronger base for theory building”, “better grounded, more accurate, and more generalizable” when the study “is based on multiple case experiments.” Eisenhardt and Graebner (2007) further re-affirmed the claim of Eisenhardt (1991) that “multiple cases enable comparisons that clarify whether an emergent finding is simply idiosyncratic to
a single case of consistently replicated by several cases,” and maintained that “theory building from multiple cases typically yields more robust, generalizable, and testable theory than single-case research” (Eisenhardt and Graebner 2007, p.27).

The current study follows the procedures and steps of conducting a multiple case study by adopting with modifications (notably given that the sample includes only three case-study companies) from the approach as introduced by Noor (2008), Yin (1994), and Leidner et al. (2006), as depicted in Figure 3.2.2.

![Figure 3.2.2. Steps Involved in a Multiple-Case Study](source)

**Source:** Noor (2008, p. 1603)
3.3 Research Design

A research design provides a structure and the supporting procedures for collecting, analyzing, and interpreting research data (Bryman 2004; Creswell 2008). The research design also “defines the domain of generalizability, that is, whether the obtained interpretations can be generalized to a larger population or to different situations” (Nachmias and Nachmias 1992, pp. 77–78). Decisions regarding the research design for a case study design include the following:

- What are the research questions for the phenomena under study?
- What case(s) are appropriate, and within which contexts?
- What data are relevant?
- What data should be collected?
- How should the data be analyzed, and the results interpreted?

The following list summarizes the steps used in establishing the appropriate research design for this multiple-case study:

1. Prior to the collection of research data, a literature review was conducted to appraise extant literature in business model innovation, dynamic capabilities, and academic spin-off companies;

2. Following the research proposal, the researcher submitted a formal application to the Human Research Ethics Committee (HREC) of the University of Newcastle in Australia, for the required ethics approval to proceed with the proposed qualitative case study research. HREC approval (H-2012-0198) was granted on August 14, 2012. The HREC ethics approval provides explicit stipulations for all procedures and processes required to ensure adherence and compliance with the standards for the study of human
subjects, including the Interview Protocol document (please refer to Appendix A) for conducting the required qualitative semi-structured interviews, participant information letter on participant confidentiality and voluntary participation, and informed consent documents for both individuals and corporate entities.

3. For the purpose of preparing the proposed Interview Protocol document (Appendix A), a meeting was conducted by the researcher with two experts in the field of academic spin-off companies, organizational capabilities, and learning organizations, to test, pilot, and fine-tune the proposed Interview Protocol document to be presented to HREC for approval, as well as for subsequent release to the participants who gave their consent for semi-structured interviews. One of the experts, a director/head of a center of one of the universities in Hong Kong, has over 40 years’ experience working with incubation programs, supporting entrepreneurship programs, forming industry liaisons with small and mid-sized companies, and commissioning applied research projects, as well as serving on the panels and boards of the Hong Kong government on industries, innovation practices, and technologies. The other expert, a legal attorney/advisor for a number of private and public companies, has extensive experience in commercial dispute and litigation.

4. Potential research participants from the sample case-study companies, Company A, Company B, and Company C, were initially contacted by email requests directly, and then followed up with direct telephone calls. Informants who agreed to participate in the semi-structured interviews were requested to review the HREC approved participant information sheets, and sign and return the relevant organizational/participant consent form(s) to indicate their consent to participate in the semi-structured interviews.
5. Semi-structured interviews and/or dialogues or face-to-face conversations were conducted with the executive director (shareholder and member of the board of directors of the case-study companies), the chief executive officer or founder(s) of the case-study companies, depending on the approval given by the respective participants who finally gave their consent for the interviews.

6. Interview data collected based on the semi-structured interviews were analyzed.

7. Summary of notes taken at the interviews were provided as feedback to the participants for review and cross-checking for relevancy, accuracy, and consistency.

8. The interview data collected were tabulated, and secondary data from other sources with regard to the case-study companies and respective participants were used for triangulation.

9. The on-going review of the literature provides the theoretical grounding and further extensions for the study.

10. Discussions and conclusions were drawn to finalize the study.

### 3.4 Research Sample

#### 3.4.1 Purposive Sampling

Purposive sampling (Merriam 1998) is adopted with the objective that
information-rich cases relevant to the research questions are selected. The cases have been intentionally selected to facilitate better understanding of the phenomena under study (Creswell 2008). The logic of purposive sampling lies in its objective of selecting the cases that are considered to be more information-rich, and therefore, able to yield relevant insights and understanding of the phenomena under investigation.

In view of the need to compare across cases, the maximum variation sampling strategy has been adopted, which is consistent with the recommendations of Creswell (2008).

“One characteristics of qualitative research is to present multiple perspectives of individuals to represent the complexity of our world. Thus, one sampling strategy is to build that complexity into the research when sampling participants or sites. Maximal variation sampling is a purposeful sampling strategy in which the researcher samples cases or individuals that differ on some characteristic or trait.” (Creswell 2008, p. 214)

Research on academic spin-off companies in Hong Kong is very limited (Leung and Mathews 2005; Leung and Mathews 2011; Mok 2005; Sharif and Baark 2008). A review of the reports on knowledge transfer submitted by the eight Hong Kong universities to the University Grants Committee (UGC) in Hong Kong indicates that as of 2012, only four universities (University of Hong Kong, The Chinese University of Hong Kong, The City University of Hong Kong, and The Hong Kong Polytechnic University) have been active in commercializing their academic research and offering technology transfer support (that is, incubation programs and entrepreneurial support programs) to academic spin-off companies founded by their academic faculties.
The following table is compiled based on the limited information available via the UGC website, the extant literature, and access to the websites of the four Hong Kong universities:

Table 3.4.1 Partial List of Academic Spin-off Companies, UGC-supported Institutions

<table>
<thead>
<tr>
<th>Name of Spin-off Company</th>
<th>University Affiliation prior to Spin-off</th>
<th>Year Found</th>
<th>Number of Employees at Start-up</th>
<th>Number of Employees (as of 2006) (or 2007)</th>
<th>Number of Employees (as of 2012)</th>
<th>Industry Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>e-Energy Technology Limited</td>
<td>CityU</td>
<td>2001</td>
<td>8</td>
<td>15 (FY2006)</td>
<td>11-50 (including manufacturing facility in Hainan, China)</td>
<td>Environmental electronic lighting products</td>
</tr>
<tr>
<td>TeleEye Holdings Limited</td>
<td>CityU</td>
<td>1994</td>
<td>36 in Hong Kong; 16 in Chinese Mainland and overseas operations (FY2007)</td>
<td>38 in Hong Kong; 12 in Chinese Mainland and overseas operations</td>
<td>38 in Hong Kong; 12 in Chinese Mainland and overseas operations</td>
<td>CCTV and DVR products</td>
</tr>
<tr>
<td>MaCaPS International Limited</td>
<td>CityU</td>
<td>1996</td>
<td>11 – 15</td>
<td></td>
<td>11 – 15</td>
<td>Access control, smart card security products</td>
</tr>
<tr>
<td>Wisers Information Limited</td>
<td>CUHK</td>
<td>1998</td>
<td>10</td>
<td>220 (FY2006)</td>
<td>501 – 1,000</td>
<td>Electronic news</td>
</tr>
<tr>
<td>mCommerce Online Limited</td>
<td>HKU</td>
<td>2002</td>
<td>5</td>
<td>10 (FY2006)</td>
<td>6 – 10</td>
<td>Mobile technology GPRS</td>
</tr>
<tr>
<td>Hong Kong DNA Limited</td>
<td>HKU</td>
<td>2001</td>
<td>26</td>
<td></td>
<td>26 – 50</td>
<td>Bio-medical</td>
</tr>
<tr>
<td>Jenesis Computing Limited</td>
<td>HKU</td>
<td>2003</td>
<td>Dissolved</td>
<td></td>
<td>Dissolved</td>
<td>e-security systems</td>
</tr>
<tr>
<td>Name of Spin-off Company</td>
<td>University Affiliation prior to Spin-off</td>
<td>Year Found</td>
<td>Number of Employees at Start-up</td>
<td>Number of Employees (as of 2006) (or 2007)</td>
<td>Number of Employees (as of 2012)</td>
<td>Industry Type</td>
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<td>--------------------------</td>
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<td>------------------------------------------</td>
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<td>---------------</td>
</tr>
<tr>
<td>LiteMagic (HK) Limited</td>
<td>HKUST</td>
<td>2003</td>
<td></td>
<td>101 – 500 (including manufacturing facility in Shenzhen, China)</td>
<td></td>
<td>LED lighting systems</td>
</tr>
<tr>
<td>MoFinity Limited</td>
<td>HKUST</td>
<td>2003</td>
<td></td>
<td>6 – 10</td>
<td></td>
<td>Wireless application service provider</td>
</tr>
<tr>
<td>SinoCDN Limited</td>
<td>HKUST</td>
<td>2000</td>
<td>13</td>
<td>6 – 10</td>
<td></td>
<td>CDN technology</td>
</tr>
<tr>
<td>TIM EDPlatform Limited</td>
<td>HKUST</td>
<td>2000</td>
<td></td>
<td>26 – 50</td>
<td></td>
<td>Info management systems for schools</td>
</tr>
<tr>
<td>Eco-Tek Holdings Limited</td>
<td>PolyU</td>
<td>1999</td>
<td>2</td>
<td>35 (FY2006)</td>
<td></td>
<td>Bus / car exhaust filters</td>
</tr>
<tr>
<td>Name of Spin-off Company</td>
<td>University Affiliation prior to Spin-off</td>
<td>Year Found</td>
<td>Number of Employees at Start-up</td>
<td>Number of Employees (as of 2006) (or 2007)</td>
<td>Number of Employees (as of 2012)</td>
<td>Industry Type</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------------------------------------</td>
<td>------------</td>
<td>--------------------------------</td>
<td>------------------------------------------</td>
<td>--------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Innover Home Limited</td>
<td>PolyU</td>
<td>2002</td>
<td>6</td>
<td>2 (FY2006)</td>
<td>Company dissolved</td>
<td>Metal furniture systems</td>
</tr>
<tr>
<td>PolyU TCM Research Institute Limited</td>
<td>PolyU</td>
<td>2003</td>
<td>4</td>
<td>9 (FY2006)</td>
<td>26 – 50 (Company sold off by PolyU to related parties of PuraFarm Group in HK)</td>
<td>Traditional Chinese medicine</td>
</tr>
</tbody>
</table>

**Sources:** Leung and Mathews (2005), Leung and Mathews (2011), Mok (2005), Sharif and Baark (2008), UGC Annual Reports on Knowledge Transfer (2009 to 2010; 2010 to 2011), websites of universities and higher education institutions in Hong Kong, and Hong Kong Trade Development Council on-line market search services, retrieved on 15 November 2013 from [http://www.hktdc.com/services-suppliers](http://www.hktdc.com/services-suppliers) and [http://www.hktdc.com/sourcing/hk_company_directory.htm](http://www.hktdc.com/sourcing/hk_company_directory.htm)

### 3.4.2 Case Selections

The case selection was based on inclusion criteria adopted from Michelini and Fiorentino (2012).
(1) The academic spin-off company remains in business and is operational, is notably still registered as an “Active” private limited company or publicly listed company under the Companies Ordinance of Hong Kong.

(2) No more than one academic spin-off company is selected from one industry segment.

(3) No more than one academic spin-off company is selected from any of the universities in Hong Kong.

Following the maximal variation sampling strategy, three academic spin-off companies, one from each of the three universities, have been selected for the study. The three case-study companies are respectively listed as Company A, Company B, and Company C in this research to maintain anonymity and confidentiality.

Table 3.4.2 provides a brief summary of the profiles of the selected academic spin-off companies.

<table>
<thead>
<tr>
<th>Company</th>
<th>Informant / Participant</th>
<th>Company Size (number of employees)</th>
<th>Industry Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Executive Director</td>
<td>Small (8 to 10 people in Hong Kong)</td>
<td>Systems Integrator</td>
</tr>
<tr>
<td>B</td>
<td>Executive Director</td>
<td>Small (12 to 15 people in Hong Kong)</td>
<td>Bio-Technology services provider</td>
</tr>
</tbody>
</table>
3.5 Data Collection

This section is devoted to the data collection methods to support the case study methodology. The section includes deliberations on the kinds of processes, procedures, steps, techniques, or tools used to collect the necessary and relevant data.

3.5.1 Semi-structured Interviews as Primary Data Collection Method

Data are primarily collected through in-depth semi-structured interviews, and supplemented by reviews of publications and annual reports published in the company websites. Other secondary data are collected from publicly available sources, such as newspaper and magazine articles, slide presentations (e.g., as trainer or guest speaker at industry and trade conferences or open forums), reports or public relations/press releases from parent universities, UGC publications, industry documents, financial reports, security analysts’ commentaries, conversations, email exchanges, blog updates, and relevant Internet publications.
Data collection method in the form of semi-structured interviews was used because the approach offers more open-endedness and flexibility for the participants to respond (Noor 2008). The objective of open-ended questions, notably the initial questions, fosters rapport with participants, resulting in an “active follow-up strategy” (Wengraft 2012, p. 159) that offers participants the mental frame and mental space to express their views, as well as to become more responsive to prompts or follow-up questions to the next levels of details or more reflective in nature.

In-depth semi-structural interviews (about one and a half hours) are convened to meet with senior executives of Companies A, B, and C who have given their consent to participate in the study. The interviews are conducted to understand the existence of formalized management practices and embedded processes for supporting dynamic capabilities, notably innovation capabilities and knowledge conversion capabilities, as well as to inquire into the relationship between such dynamic capabilities and the interviewees’ assumptions or perceptions on the corporate strategies of the company, including business model innovations.

3.5.2 Interview Protocol Document

To maintain an open-endedness required to solicit and explore the ideas of the respondents while ensuring a smoothly orchestrated interview process, an Interview Protocol document (Appendix A) was prepared to facilitate and enhance communication of the purpose of the study, the research questions, and the interview questions. The Interview Protocol document was designed and developed with support from two experts in the commercialization of academic research and technology transfer activities in the tertiary education sector, as well as in the field of academic spin-off companies, organizational capabilities, and learning organizations. Both experts were invited to review and provide
feedback to the researcher for incorporation in his submission to the HREC for ethics approval.

3.5.3 Interview Process

Upon the human ethics approval from HREC, the researcher sent requests via email to prospective participants, with explanations on the purpose of the study to invite their support and participation. The Interview Protocol document was appended to the email requests along with some background reference notes on the definitions and conceptual frameworks for business model innovation and dynamic capabilities. The individuals from the target academic spin-off companies who agreed to assist would email back to confirm their acceptance. Further email exchanges may be necessary to help clarify certain concerns that potential participants might have. Thereafter, the researcher would provide the participants with the organizational/individual participant information sheet(s) through email, as well as a copy of the organizational/participant consent form(s) for the participants to sign and return to the researcher. In the meantime, researcher would confer with participants on the date, time, and place of the meeting for the semi-structured interviews.

The Interview Protocol document essentially provides participants with a list of open-ended interview questions to prepare them for the semi-structured interviews. These interview questions have been designed and developed by referring to the review of extant literature on business model innovations and dynamic capabilities. The questions were subsequently modified and adapted based on the recommendations of the two experts who assisted with the pilot testing of the interview questions and the review the Interview Protocol document.
In all the semi-structured interviews and face-to-face conversations or discussions, the questions and responses between researcher and participants have been conducted with open-endedness and flexibility. Although the interview was limited to one hour to one and a half hours, both the researcher and participants were mindful of the interview questions contained in the Interview Protocol and strove to stay focused on the main themes of business model innovations and dynamic capabilities for competitive advantage.

Every effort was exerted to transcribe the interviews as soon as possible, and in all cases, the transcription was completed within two business days. Detailed verbatim notes were obtained from each of the semi-structured interviews, and the participants were provided with transcripts for feedback. On two occasions, the participants required further clarifications on their responses to certain interview questions, or gave additional comments.

3.5.4 Triangulation of Data Sources

Following the steps as outlined in Massa and Testa, (2011, p.477), “after transcribing the interviews, data were coded to identify issues and parameters that could be analyzed with regard to the research”. The interview data were then triangulated with secondary data from other sources (Easterby-Smith, Thorpe and Lowe 2002) to “minimize interviewee hindsight bias and the limitations of memory recall” (Jantunen et al. 2012).

The use of the semi-structured interviews approach, as well as secondary sources of research data, was considered appropriate for enhancing “the richness of data” and “constructing a full picture” of the phenomena under study (Massa and Testa 2011).
3.6 Data Analysis

This section is focused on the ways and means of organizing, analyzing and interpreting the research data collected from the semi-structured interviews and other relevant sources, including the findings arising out of this research study. Review of the literature was conducted throughout the different phases of the study, that is, during data collection, data analysis, and comparison.

3.6.1 Stage 1 – Consolidation, aggregation and categorization of data

The study involves data analysis on data obtained from semi-structured interviews with members on the boards of directors, founder(s), or chief executive officers of the three case-study companies, as well as secondary data for triangulation purpose.

Secondary data include data collected through reviews of company publications and annual reports, company websites, university newsletters and press releases, newspapers, and other print media.

The general qualitative research approach of “constant comparative analysis” (Thorne 2000 p. 69) is employed to help identify patterns and commonalities of human experience of different people from the different case-study companies who had similar or different experiences or perceptions of the topical areas of the study.

Research data collected are consolidated, aggregated, and categorized according to the two major themes, namely, business model innovation and dynamic capabilities, to create a narrative structure that summarizes the profiles of the
three case-study companies, notably:

- Company background and industry context;
- Business structure;
- Intellectual property and knowledge transfer; and
- Business projects and commercial developments.

3.6.2 Stage 2 – Data Analysis Tools for Within-Case Analysis

In the second stage of data analysis, data on the case-study companies are analyzed according to the Business Model Canvas (Osterwalder and Pigneur 2010) to highlight their business model developments and innovations. Data are also analyzed according to the components of dynamic capabilities identified by Teece (2010), in terms of sensing capability, seizing capability, and re-configuring capability.

The data analysis tools for within-case analysis will be discussed in more details in Chapter 5 – Analysis and Comparisons (Please refer to Sections 5.2.1 and 5.2.2 respectively).

3.6.3 Stage 3 – Data Analysis Tools for Cross-Case Analysis

In the third stage of data analysis for comparative studies, the focus is on cross-case analysis whereby tools will be used to compare the business models and dynamic capabilities across the three case-study companies.
The data analysis tools for cross-case analysis will be discussed in more details in Chapter 5 – Analysis and Comparisons (Please refer to Sections 5.6.1, 5.6.3 and 5.7 respectively).

3.6.3.1 Comparing Business Models and Comparing Business Model Attractiveness

To compare business models of the three companies, Osterwalder’s framework of “Nine Elements of a Business Model” (Osterwalder 2004), an assessment rubric for business model comparison, is used to allow the researcher to assign ratings of the perceptions / status presented by the key informants and reported according the proposed nine business model elements. The ratings are then compiled and compared using a radar chart to facilitate explicit visual presentation.

Another analysis tool is the McGrath Scoring Scheme, a framework developed by McGrath (2011) to assess the level of attractiveness of a business model of a company. The McGrath’s Scoring Scheme can be applied also to evaluate and compare firm-level business model innovations across companies.

3.6.3.2 Comparing firm-level dynamic capabilities

As yet, quantitative research on dynamic capabilities is limited and empirical studies are few. Comparative studies on the dynamic capabilities between firms and amongst multiple firms within same industry or across industries are scanty (Jantunen et al. 2012). A scoring tool that was developed and used in Jantunen et al. (2012) has been adopted with modifications (Jantunen et al. 2012; Pavlou and Sawy, 2011) in order to facilitate comparison of dynamic
capabilities across the three case-study companies.

3.6.4 Tools and Indicators – Reliability Issues

Because of the limited scope of research undertaken in the current study and the fact that these tools developed by Osterwalder (2004, 2006), McGrath (2011) and Jantunen et al. (2012) have not been subjected to extensive empirical testing and validation, the tools have been adopted or adapted for use in this study as frameworks or rubrics for assessments and evaluations only.

It should be noted here that the scores and ratings as presented in the Osterwalder’s assessment rubric of the “Nine Elements of a Business Model” (Osterwalder 2004), the radar chart (Osterwalder, 2006), the McGrath Scoring Scheme to assess business model attractiveness (McGrath, 2011) and Jantunen’s scoring tool for comparing firm-level dynamic capabilities (Jantunen et al. 2012; Paylou and Savy, 2011) have been assigned based on perceptions / status presented by the key informants.

In view of the small number of case-study companies and granted that a single researcher only was involved in the study, consistency in terms of assessing and assigning of ratings or scores is considered reasonable and justifiable. Reliability issues of “Stability”, “Internal Reliability” and “Inter-observer Consistency” (Bryman 2004, pp. 70-72) are appropriately addressed via the trustworthiness and authenticity criteria applicable to qualitative research and studies (Bryman 2004, pp.273-276).
3.7 Ethical Considerations

Qualitative research has unique ethical considerations because of its emergent and flexible design. Ethical issues can indeed arise in all phases of the research findings.

For the most part, ethical issues focus on establishing safeguards that will protect the rights of participants, including informed consent, protecting participants from harm, and ensuring confidentiality.

For purpose of compliance and fulfillment of the Human Ethics requirements as promulgated and enforced by the HREC of the University of Newcastle in Australia, a formal application was made for this study, and full approval was granted by the HREC on August 14, 2012 (HREC approval: H-2012-0198).

3.8 Chapter Summary

By reason of their prior affiliation with parent universities, academic spin-off companies often times are well equipped with uniquely “acquired” or “inherited” knowledge base and technological capability through licensing or patent arrangements at the time of their incorporation. Academic faculties who later become academic entrepreneurs however must quickly develop their acumen for marketing and financial management to facilitate their pursuit of emergent opportunities and operationalization of the new business models for the companies. Moreover, in order to ensure business viability, academic spin-off companies must nurture higher order dynamic capabilities and embed the necessary combination of routines and processes to reconfigure the business models and resource bases. For academic spin-off companies, their strategic
initiatives and actions upon start-up are still very much exploratory in nature. It is therefore very opportune and appropriate to adopt qualitative approach and employ semi-structured interviews with senior executives of these case-study companies to touch base and gauge how these case-study companies develop their capabilities and manage their business model changes to achieve sustainable advantage.

The multiple-case study approach will prove very useful in helping to construct within-case analysis and cross-case analysis of rich and robust data that would otherwise be hard to obtain via quantitative methods such as questionnaire surveys and statistical analysis.

This chapter provided a detailed description of the research methodology employed in this qualitative study. The research methodology adopts a constructivist paradigm, a case study approach, and an exploratory research design using a multiple-case study method.
CHAPTER 4 – CASE STUDIES AND CONTEXTS

4.1 Introduction

This chapter presents the results of data collection on three case studies of spin-off companies, one each from three universities in Hong Kong. The objectives are to explore and identify the business model that a new academic spin-off company creates in implementing its business strategies, as well as investigate the dynamic capabilities that the spin-off company has acquired from its network with the parent organization or interactions with customers or partners. Each case analysis is presented in the following steps:

First, a setting description briefly outlines the company background and external environment (industry context);

Second, a narrative description is provided based on research data that are collected through various forms of qualitative data collection tools (namely, semi-structured interviews, face-to-face conversations with founders and corporate executives of the case study companies, written responses to interview questions and follow-up e-mail exchanges, seminar presentations, and follow-on questions and answers sessions) that would frame the growth and development paths of the three case study companies. The information covered in these “stories” would serve as basis for more elaborate and detailed analyses in Chapter 5: Analysis and Comparisons with respect to:

- The spin-off company business model
- The spin-off company perception of the role of dynamic capabilities in enabling and supporting the business model changes that the academic
spin-off company has instituted over time in pursuit of sustainable competitive advantage.

Finally, a summary section highlights the reflections of company informants on their perceptions and concepts of the business model and dynamic capabilities.

4.1.1 Business model: Data collection

Firms need to design and deploy an appropriate business model to create, deliver, and capture value, as well as to re-configure their business models on a continuing basis to remain dynamically capable of achieving the competitive advantage that is necessary for business survival (Casadesus-Masanell and Ricart 2010a & 2010b). Similarly, firms need to explore how their business model and product market strategies interact to affect performance (Zott and Amit 2006). Onetti et al. (2010) drew on studies of new technology-based firms and argued that these companies, while engaging in commercializing a technology for new customers in the local market and developing growth capabilities in international markets, would require new methods of defining their value proposition and business model innovations.

The Business Model Canvas (Osterwalder and Pigneur 2002; Osterwalder et al. 2005; Osterwalder and Pigneur 2010), a business model-mapping tool developed by Alexander Osterwalder, is recommended for use to frame the story (Kaplan 2012) and to facilitate a narrative description of the business model stories of the three case study companies that relate the spin-off companies’ core business model elements.
4.1.2 Dynamic capabilities: Data collection

Teece, Pisano, and Shuen (1997) defined dynamic capabilities as the firm’s ability to integrate, build, and reconfigure organizational resources and competencies to engage in the volatile and complex external environments.

Katkalo et al. (2010) argued that a company’s organizational capabilities may be able to serve well in normal circumstances, allowing the firm to perform its day-to-day business activities in a “business as usual” manner efficiently. However, it will be the company’s dynamic capabilities that determine the firm’s ability to explore, as opposed to exploit, the opportunities and challenges (such as shift of paradigm, disruptive technology, and so forth) in the dynamic eco-environment that is no longer static nor predictable but rather full of complexities and uncertainties.

Teece (2007) classified dynamic capabilities into the capacity to (a) sensing opportunities and threats, (b) seizing opportunities, and (c) reconfiguring the intangible and tangible assets of the business enterprise. In a more recent work, Teece (2011) elaborated on these three sets of activities and capabilities: (1) continuously scanning of the internal and external environments for opportunities and threats as well as evaluating how they fit in with the firm’s strategic developments (sensing), (2) deploying and integrating firm resources to engage an opportunity for creating value and to capture value during the process (seizing), and (3) continuously making strategic decisions to bundle, unbundle, transform or reconfigure company resources and embedded routines (reconfiguring).

Katkalo et al. (2010) supported Teece’s concepts and suggested that dynamic capabilities may be classified based on whether they support sensing, seizing, or transforming, as follows:
Table 4.1.2  Dynamic Capabilities for Creating and Capturing Value

<table>
<thead>
<tr>
<th>Sensing</th>
<th>Seizing</th>
<th>Transforming</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creating value</td>
<td>Investment discipline;</td>
<td>Achieving reconfigurations</td>
</tr>
<tr>
<td>Spotting</td>
<td>commitment to research and development;</td>
<td></td>
</tr>
<tr>
<td>opportunities; identifying</td>
<td>building competencies;</td>
<td></td>
</tr>
<tr>
<td>opportunities for research and</td>
<td>achieving new</td>
<td></td>
</tr>
<tr>
<td>development; conceptualizing</td>
<td>combinations</td>
<td></td>
</tr>
<tr>
<td>new customer needs and new</td>
<td></td>
<td></td>
</tr>
<tr>
<td>business models</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capturing value</td>
<td>Positioning for first mover and other</td>
<td>Managing threats;</td>
</tr>
<tr>
<td></td>
<td>advantages; determining desirable entry timing</td>
<td>honing the business</td>
</tr>
<tr>
<td></td>
<td></td>
<td>model; developing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>new complements</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Katkalo et al. (2010), p.1180

This framework will be adopted to facilitate data collection in respect of dynamic capabilities that are embedded and deployed in the three case-study companies.
4.2 Case I: Company A

<table>
<thead>
<tr>
<th>Pseudonym of academic spin-off company</th>
<th>Company A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry Type</td>
<td>Information Technology; Telecommunications</td>
</tr>
<tr>
<td>Line of Business</td>
<td>Systems Integration Services</td>
</tr>
<tr>
<td>Pseudonym of parent university</td>
<td>X University</td>
</tr>
<tr>
<td>Pseudonym of the technology transfer office of X University</td>
<td>TTO</td>
</tr>
<tr>
<td>Pseudonym of informants of Company A</td>
<td>Professor V, Founder and Chairman of the Board of Directors, (Director 1); Board member T (Director 2); Dr. W (Executive 1)</td>
</tr>
</tbody>
</table>

4.2.1. Company background and industry context

Company A was incorporated as an academic spin-off company under the Technology Innovation program in 2002 by the technology transfer office (TTO) of X University, one of the research universities in Hong Kong.

Established in 1994, TTO was incorporated as a non-profit company and a wholly owned subsidiary of X University, with prominent business people serving on its Board of Management. TTO negotiates, executes, and manages commercial business contracts and agreements on behalf of the university.

According to Board member T (Director 1), “X University wanted to adopt the (academic spin-off) model that has been used successfully by many leading universities in the world to commercialize research results to fruition so as to reduce the wastage claim from society about pure academic research spending.”
TTO likewise negotiates with venture capital funders or investors in securing funding for academic spin-off companies.

Company A made its successful debut as an X University academic-industry collaborative initiative to engage in a request for proposal (RFP) and tendering project issued by the Hong Kong government Drainage Service Department (DSD). Through this collaborative effort, DSD successfully improved its flood monitoring and reporting system by installing the Mobile and Online Surveillance and Incident Controller II (MOSAIC II) system for gathering and transmitting hydrometric information based on wireless telemetry technology (Chui et al., 2006). The leading and first of its kind system in the Asia-Pacific region at that time, MOSAIC II employs the advanced mobile communication technology of general package radio services (GPRS) to compress and transmit various data collected from the gauging station to the DSD control center at a speed eight times faster than the more commonly available GSM mobile phones. “Due to the application of these innovative technologies, the average failure rate of the gauging stations during adverse weather conditions was significantly reduced from 17.4% in 2001 to 4.6% in 2004” (Drainage Services Department, Annual Report 2004).

Taking advantage of knowledge transfer from the X University mentors, Company A continues to develop its products and draws on the expertise and R&D resources of X University.

The edge of Company A lies in its capability to utilize emerging technology in capturing electronic data (including GPS) and sending them to micro-processors via the GSM/GPRS network. Company A likewise exhibits the expertise to integrate partner hardware and software products from local and overseas suppliers to expedite its solutions development process.
Dr. W (Executive 1), VP of Engineering, refers to the partnership of Company A with Eliot SA in France in integrating the Connect One firmware-based iChip Internet Controller chip (Frontline Solutions 2002). He states that, “Connect One’s iChip provided a faster and easier path to migrate our product from SMS to GPRS-enabled and to catch market needs,” “…It enabled us to avoid Internet programming, while we put all of our efforts into utilizing the GPRS wireless network for regular reporting over the Internet.”

Since then, Company A has assumed its business model as a system integrator and engineering company that specializes in telemetric and fleet management solutions. All Company A core products are embedded with a GSM/GPRS modem and a data logger to collect, store, analyze, and transport data via a local mobile network and the Internet. This system can be integrated with a GPS receiver and built-in RS-232 serial ports, digital inputs, and relay outputs for different data sensor or external peripheral connections. The key benefit is to provide the valuable and accurate management information needed to improve productivity, reduce excessive operating costs, and enhance customer services. Company A offers proprietary software for end users, operating under an MS Windows OS, which can be customized for customer individual needs. The software is designed for Web-based access that can be easily used by different customers—from small owner/operator to large fleet operation. Moreover, Company A provides customers with easy-to-use API, GPRS Gateway Software and GUI-based Console Utility, as well as Web-based digital mapping software to avoid complex GPRS and TCP/IP communications.

In terms of systems integration offerings, Company A provides turnkey solutions and applications for government projects and various industries that enable government and key (corporate) account customers to better manage their fleet of vessels, vehicles, assets, and deliveries. A few products serve a niche market that requires efficient and effective mobile technologies in
telemetric applications, such as the Integrated Mobile Dispatching System (IMDS), Mobile Online Information Replay (MOIRE), Mobile Online Surveillance and Incidence Controller (MOSAIC), Mobile Online Security Management System (MOSS), and Mobile Online Vending Enabler (MOVER). Company A utilized the GSM/GPRS platform to transfer data captured on site in multiple remote locations to a computer, which would perform the back-office analysis.

As a systems integrator, Company A bundles its supply of customized hardware and telemetric application software with Company A support and services, including feasibility study, product prototyping and development, system integration, and project management.

4.2.1.1 Business Structure

X University supported the spin-off process via the TTO incubator program, whereby Company A would only pay nominal monthly rent for the office space allocated by the X University estates management office.

Upon the incorporation of Company A as a private limited company, Professor V, a university-appointed TTO director, became the founder and Chairman of the Board of Directors of Company A.

Professor N and Dr. A, both members of the Department of Electrical and Information Engineering of X University, supported the spin-off by licensing their research (notably the patented MOVER product) previously developed in the GPS Research Laboratory of the Department of Electrical and Information Engineering to Company A. Both professors offered in-kind and fee-based consultancy services to Company A as consultants. They had a role to play for
Company A in exploring relationship marketing opportunities with the HKSAR government departments through their associations with X University.

TTO did not provide seed money to Company A. The university has established a governance policy such that Company A, as an academic spin-off, is a separate entity with external private investors and external shareholders. Moreover, except for Dr. A who subsequently left the university to join Company A as vice-president (Engineering), Company A has been managed by professional managers that include the chief executive officer (CEO), chief financial officer (CFO), as well as other project managers and solutions developers.

The following table provides a chronological outline of the business growth path for Company A:

<table>
<thead>
<tr>
<th>Year</th>
<th>Shareholders</th>
<th>Management</th>
<th>Product Launched</th>
<th>Number / Locations of Offices</th>
<th>Number of Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>Company A was set up as a private limited company with external private investors and external shareholders. Professor V, Director of TTO of</td>
<td>Board member T (Director 2) appointed as Executive Director; Dr. A left University X and joined Company A as VP (Engineering) Dr. A developed (as software</td>
<td>Mobile Online Surveillance And Incident Controller (MOSAIC) system; MOVER - Mobile and Online Vending EnableR</td>
<td>Hong Kong Office located within the Technology Innovation &amp; Incubation Building of University X</td>
<td>5</td>
</tr>
</tbody>
</table>
University X, became founder and Chairman of Board of Directors of Company A. One other professor from University X served as one of the four directors of the company, also owner of patent for the technology platform for MOVER product; Two shareholders (one individual who is deputy head of University X’s TTO, and one corporate holding company) developer) the MOVER - Mobile and Online Vending EnableR product in 2000 that won the Silver award of the Hong Kong Electronics Industry Association for Outstanding Innovation and Technology products.

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>Professional managers recruited from the telecom industries to serve as CEO, CFO</td>
</tr>
<tr>
<td>2004</td>
<td>Successful sale and implementation of MOSAIC for Civil Engineering Department; MOSAIC II Drainage Flow Data Logger for Drainage Services</td>
</tr>
<tr>
<td>Year</td>
<td>Event</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>2004</td>
<td>Dr. A left Company A</td>
</tr>
<tr>
<td>2004</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>Professor Y ceased to serve as Chairman of the Board of Directors in May 2006</td>
</tr>
<tr>
<td>2008</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>Change of shareholding. Shares acquired by one corporate investor</td>
</tr>
</tbody>
</table>

**Sources:** Company A website; University X TTO website; Company Search via Hong Kong Companies Registry, Government of HKSAR
4.2.1.2 Intellectual Property and Knowledge Transfer

Patent transfer from X University to TTO and then to Company A
US Patent – Wireless Purchase and Online Inventory Apparatus and Method for Vending Machines

The invention relates a method for the wireless purchase of merchandise from a vending machine by using a mobile phone. The invention likewise relates to an apparatus and a method for online inventory management as well as just-in-time service and merchandise delivery.

The following are products developed by Company A based on the transfer of one patent from X University and the ongoing access to knowledge/expertise of academic faculty members who act as technology mentors or as consultants on a retainer contract basis.

- IMDS
- MOIRE
- MOSAIC
- MOSS
- MOVER

4.2.1.3 Business projects and commercial developments

- Drainage Services Department – MOSAIC II for drainage flow data logger;
- Civil Engineering Department – MOSAIC for wireless rain gauge;
- Electrical and Mechanical Services Department – MOSAIC II for wireless data logger;
Environmental Protection Department – RTTMV for real-time tracking and monitoring of (dumping) vessels;

4.2.2 Supplementary Information Collected with respect to Company A Business Growth and Competitive Advantage

Company A was established in 2002 utilizing the latest technology in capturing electronic data (including GPS) and sending them to microprocessors via the GSM/GPRS network. The company provided turnkey solutions, notably the design and implementation of large-scale telecommunications platform or networks over and across Hong Kong. The company targets its business at government projects and major corporations for industries where consolidating and aggregating remote distributive data from a central corporate server location are needed.

At its inception, Company A aspired to offer a better value proposition than its competitors. The time to market element could be considerably shortened because the company possessed proven and readily available technology.

As a spin-off company for X University, Company A had secured the license of patents and knowledge transfer from the TTO of X University, specifically the intellectual properties associated with the GSM / GPRS technologies developed by the faculty at X University. Company A had a number of application products that served a niche market, such as IMDS, MOIRE, MOSAIC, MOSS, and MOVER. Company A utilized the GSM/GPRS platform to transfer data captured on site to a computer, which would perform the back-office analysis.

Company A benefitted from the ability to reference successful projects in order
to prove its value proposition. Its link with X University likewise enhanced the credibility of the company.

Unfortunately, Hong Kong was affected by SARS (Severe Acute Respiratory Syndrome) between November 2002 and July 2003. The epidemic outbreak in Southern China had caused 5,328 reported cases and 349 deaths in the Chinese Mainland, and by spreading over to Hong Kong, caused 1,755 reported cases and 299 deaths in Hong Kong. A lack of interest in investments prevailed and sentiments were passive or negative in Hong Kong. The company was unable to attract external funding from private investors or venture fund managers but extensively borrowed through director loans and unsecured bank overdrafts for its daily operations.

Given that the company was thinly capitalized since inception, SARS and the resulting economic environment forced Company A to change its strategy. Rather than perfecting its products for mass-market consumers and users, the company needed to rely on government projects to survive. By so doing, little resources were allocated into R&D, eroding the long-term competitive advantage of Company A.

Company A maintained close liaison with X University, as well as with the potential user departments within the Hong Kong government. In addition, Company A had partnerships with various telecom operators to help them to develop and sell products that would attract more data usage in the mobile network. However, the company could not afford the financial resources needed to invest in more capital-intensive and leading edge research and development initiatives.

In parallel, while Company A had to lean on its ability to win government contracts, the Hong Kong government policy required more than one vendor as
bidders in every tender situation. Moreover, most of the projects being tendered are system integration work, and proprietary technology exclusive to a single vendor is not welcome.

Although the technology designed and implemented by Company A was advanced at the time, the installed application software was not patentable per se. Competitors that are systems integrators or applications developers could copy the idea and then develop their own system and platform utilizing similar information systems and software technologies. Given time and financial resources, competitors could catch up with, imitate, or emulate the solution of Company A. Initial success of the company comes from its association with X University and through various job references for the Hong Kong government. Unfortunately, software technology and applications programming are not patentable. Over time, other competitors emerged and rapidly caught up in the market.

Therefore, the lead-time advantage was phased out during the years leading to 2010. Company A initially invested heavily on proprietary hardware device (e.g., IMDS unit) used to capture and transmit data via the GSM/GPRS platform to stay on the leading edge and maintain the competitive position of the company. Company A likewise modified its value proposition to provide tailor-made turnkey solution for its customers, which is the cardinal rule for a system integrator to win over its customer. The company became a system integrator utilizing technology associated with the GSM/GPRS network.

The board of directors must be convinced that a business case for the new model exists to agree to model implementation. Proper analysis on the new business model is necessary, including the base case and various sensitivity analyses. Adequate finances must be in place before embarking on the new business model. The company began to appoint more professional managers in
the company. For example, a senior marketing executive from a listed telecom company with extensive relationship networks with major telecom services providers was appointed CEO. Another senior financial executive and professional accountant from another major telecom company was designated CFO. Dr. A, a faculty member of X University, was hired to serve as Vice-President for Engineering.

As a start-up, Company A strived to survive by staying lean and mean. The company utilized every staff within the organization to implement the new business model, and thus no change occurred in the company organization and operations. The management team appointed a specific project leader to champion, be accountable and responsible for the new business model.

Innovational changes came when the company mentor at X University passed on new research results and when such changes came during project implementation.

The degree of change and innovation in the telecommunications industry, especially the mobile commerce market, is rapid and enormous. A successful business model innovation must be supported by a great idea, innovative technology, good market reception, and adequate financing. An example is Steve Jobs, who revived Apple and turned it to one of the most successful high-tech companies in the world.

New and disruptive business models come from everywhere—from new players within and outside the industry. For example, the iPhone is the hand-held device that telecom operators had been dreaming of for ages. Communication patterns changed forever the day that iPhone was launched. The flow-on effect of iPhone’s success hit Nokia and RIM (Blackberry). Company A, which utilized smart phones at remote locations to run real-time
online communication with the central servers, had to adapt its system to the iPhone platform.

With the introduction of iPhone, Google map becoming easily accessible, and 4G network soon to be activated, new business models definitely emerged on a daily basis. However, Company A has to comply with tendering and commercial bidding policies of the HKSAR government and other institutional customers who maintain that the bases for competition would not be changed, that is, more than one vendor, time to market, total solutions, and pricing.

By 2012, Company A has emerged as one of the more popular systems integrators and solutions providers for HKSAR government contracts. By reason of its prior track records in telemetric applications for HKSAR government and given its management team’s conscientious efforts over the years as a priority to strengthen its industry marketing resources, Company A’s name continues to appear on the published lists of contractors maintained by government departments. In this regard, the company is invited to bid or co-bid for major telecom-related projects for tender. However, Company A has essentially moved away from its original position as the provider of telemetric applications in Hong Kong. Company A has successfully transformed its capabilities and resources base from an R & D oriented organization to a marketing oriented organization. Company A has turned itself into a “contractor” that will engage university research team to work as external consultants on tenders and projects implementation. This change in business model appears to be good for Company A to sustain and survive in the volatile environment that telecommunications industry in Hong Kong has been and is still going through. However, Company A has basically detached itself from the R & D focus that it used to enjoy and create value as an academic spin-off company.
4.3 Case II: Company B

<table>
<thead>
<tr>
<th>Pseudonym of academic spin-off company</th>
<th>Company B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry Type</td>
<td>Medical Diagnostics</td>
</tr>
<tr>
<td>Line of Business</td>
<td>Molecular Diagnostics</td>
</tr>
<tr>
<td>Pseudonym of parent university</td>
<td>Y University</td>
</tr>
</tbody>
</table>
| Pseudonym of informants                | Professor M (Director 1)  
Dr. L (Director 2) |

4.3.1 Company background and industry context

Company B is a private limited company in Hong Kong founded in March 2007 by Professor M, a professor from Y University in Hong Kong. The company was initially registered under the name of “Beta Technology Development Limited” (*pseudonym*) and renamed in September 2007 as “Better Medical Laboratories Limited” (*pseudonym*). The current name of Company B was adopted in June 2009.

The business of Company B represents the latest high technology segment of the medical diagnostics industry. In Hong Kong, this industry is comprised mainly of the following six segments:

1. Hematology
2. Microbiology
3. Clinical chemistry
4. Clinical pathology
5. Medical imaging (including Computed Tomography [CT] and Magnetic Resonance Imaging [MRI])
6. Molecular diagnostics
The first five segments can be considered as representatives and incumbents of the traditional lines of business in the medical diagnostics industry. Molecular diagnostics is new and emergent since the late 1990s, given breakthrough technology developments in DNA research and studies. This last segment can be considered as on the leading edge and in the niche area of medical diagnostics.

4.3.1.1 Business Structure

Company B shareholders include Dr. L and “Better Medical Limited” (pseudonym), a corporate entity as the majority holder. Dr. L is a former PhD student under the supervision of Professor M and now manages the company-given transfer of shares from Professor M.

Better Medical Limited is another private limited company that serves the role of holding company of Company B for Professor M. Better Medical Limited was founded in 1999 prior to the inception of Company B by Professor M as an academic spin-off from Y University. Through a series of licensing arrangements, the technology transfer center (TTC) of Y University transferred the intellectual property generated by Professor M to Better Medical Limited, and from then on to Company B.

At the time of the incorporation of Better Medical Limited in 1999, Professor M owned 49% of the shares, while the Y University TTC owned 51%. Better Medical Limited became a subsidiary of Y University. As a result of participation from external investors since 2002, shareholding was subsequently changed such that Professor M and Y University would each own approximately one-third of the issued shares, and the remaining one-third to be owned by no less than three external investors.
In a parallel but a separate arrangement, Better Medical Limited negotiated a partnership with a medical laboratory services limited in Shenzhen in 2006. This strategy enabled the start of the active production of one of the commercialized products based on the research and patents of Professor M, as approved by the China State Food and Drug Administration.

The following table provides a chronological outline of the business growth path for Company B:

<table>
<thead>
<tr>
<th>Year</th>
<th>Shareholders</th>
<th>Management</th>
<th>Product Launched</th>
<th>Number / Locations of Offices</th>
<th>Number of Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>Better Medical Limited incorporated as a private limited company. TTC of Y University held 51% shares and Professor M held 49%</td>
<td>Professor M</td>
<td>Focused research on DNA diagnostic technologies</td>
<td>Hong Kong</td>
<td>5</td>
</tr>
<tr>
<td>2004</td>
<td>Better Medical (Shenzhen) joint venture incorporated</td>
<td>Collaborative effort to launch HPV DNA product series</td>
<td>Hong Kong</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td></td>
<td>HPV DNA product approved by China’s State Food and Drug Administration</td>
<td>Hong Kong</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Event Description</td>
<td>Details</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>------</td>
<td>------------------</td>
<td>---------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>Change of Shareholding at Better Medical Limited – TTC of Y University held 32%, Professor M 34% and external investors 34%.</td>
<td>Beta Technology Development Limited incorporated then renamed as Better Medical Laboratories Limited. Two directors - Professor M and Dr. L. Focused research on biochip and DNA diagnostic technologies.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>Transfer of shares from Professor M to Dr. L. Better Medical Laboratories Limited renamed as Better Medical Limited (Company B).</td>
<td>Dr. L. became only individual shareholder with Better Medical Limited as major corporate shareholder. Dr. L. as Executive Director. HPV detection and genotyping kits for cervical cancer screening; multiplexed detection kit for common sexually transmitted disease pathogens; ovarian cancer screening kit; a series of mutation detection kits for personalized cancer therapy.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>Launched clinical diagnostics</td>
<td>Hong Kong 30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Event</td>
<td>Location</td>
<td>Percentage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>------------------------------------------------------------------------</td>
<td>----------</td>
<td>------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>Launched cancer DNA detection / screening services;</td>
<td>Hong Kong</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Launched personalized cancer DNA diagnostics services</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>No change in shareholding structure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Launched personalized healthcare DNA detection services</td>
<td>Hong Kong</td>
<td>30-50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sources:** Company B website; Y University’s TTC website; Company Search via Hong Kong Companies Registry, Government of the Hong Kong Special Administrative Region.

### 4.3.1.2 Intellectual Property and Knowledge Transfer

The research of Professor M for Better Medical Limited focused on high throughput DNA analysis technology and development of microchip for rapid detection of diseases. Through coordination with and assistance from the Y University TTC, relevant technologies and intellectual properties were licensed to Better Medical Limited, the subsidiary and academic spin-off of Y University.

In a second-stage licensing arrangement, Company B acquired intellectual
property from Better Medical Limited.

The contribution of Dr. L in terms of intellectual property and knowledge transfer lies in his collaborative research with Professor M in high throughput DNA analysis technology, as well as his parallel research efforts. In addition, Dr. L manages Better Diagnostics Limited, in the development of molecular diagnostics kits and the operating system for implementing high-throughput detection of diseases.

4.3.1.3 Business projects and commercial developments

Research output commercialization follows two separate but synergistic paths:

1. Better Medical Limited to focus on collaboration with a joint-venture company in Shenzhen to seek and ensure compliance with the relevant regulatory bodies in China, notably the China State Food and Drug Administration, to obtain detection kit and screening kit products (for disease detection), into volume production. From then on, the process shifts to market the detection kit and screening kit products to hospitals and healthcare organizations across China.

2. Company B to market and establish business relationships with physicians in Hong Kong and to negotiate partnerships or referral arrangements with other medical laboratories (in the other five business segments of the medical diagnostics industry) to secure business for the molecular diagnostics services of the company.
4.3.2 Supplementary Information collected with respect to Company B Business Growth and Competitive Advantage

As indicated in Section 4.3.1, Company B’s line of business is in the molecular diagnostics segment, one of the six segments that comprise the medical diagnostics industry.

The business model of Company B sees the other five groups of medical laboratories as partners that may compete but more often offer complementary or synergistic services to physicians or medical doctors. The Company B client base includes physicians, medical doctors, or clinics in the general Hong Kong community with whom the company has been in contact with. Over an extended period, even before its incorporation, Company B has developed a high level of trust, value for fees of services, logistics arrangements, and relationships marketing with these clients.

From a macro-perspective level, only physicians, medical doctors, or clinics in the private sector are considered as clients or clients-to-be. Hospitals managed by the Hong Kong Hospital Authority have their respective in-house medical diagnostics laboratories, including molecular diagnostics. Part of this context is that medical laboratories competing in the molecular diagnostics business are considered as competitors, and medical laboratories in the other segments of business in the medical diagnostics industry are considered as complementary partners.

4.3.2.1 Funding Model

1. Y University incubation program – objectives in research, IP, and technologies
2. Innovation and Technology Fund from the HKSAR government Innovation and Technology Commission – Research and development in technologies
3. Angel funds (venture capital) – clinical applications

For example, Company B has successfully obtained approximately HK$4 million from the Innovation and Technology Fund, and slightly less than HK$4 million from angel funds. Company B focuses on R&D to help them focus on a single unique leading-edge technology area—bio-chip with fast throughput and DNA-based diagnostics capability.

4.3.2.2 Assets, resources, and capabilities

- Research-based expertise
- Stable products and quality services
- Lower costs (in terms of reducing the overall costs of detection kit and screening kit products for the current bundle and to be identified bundle of diseases under investigation using one patient sample)

4.3.2.3 Factors

- Relationship with parent university – door opener when approaching new clients or venture capital firms but not much beyond that; a university typically does not want to extensively publicize this relationship (policy and governance issues)
- Markets – impacts on competitive and partnering relationships (positioning of own company vs. others, as well as network clustering). Synergetic relationships should be the objective.
- Applied research to commercialize and enable leading-edge technologies to achieve the following.
i. High level of sensitivity (positive or negative)
ii. Instrumentation
iii. Ease of handling
iv. Ease of application
v. User-friendly
vi. Avoidance of high cost of detection kits and screening kits

- **Biochip** – membrane-based surface

- **Skill base** – high throughput; multiplex; traditionally one sample, one objective. With DNA-based diagnostics, multiple objectives can be set for one sample, which is a significant advantage over traditional products and services.

- **Market developments**
  Skewed – big players would further grow into one-stop shop, whereas small niche players would need to work hard to sustain and survive.

Internationally recognized accreditations would provide Company B an exclusive edge over the competition not only for business in Hong Kong, but also for major collaborative marketing or strategic alliances with renowned organizations outside of Hong Kong, including molecular diagnostics laboratories at John Hopkins or Yale. Company B has already secured the following accreditations:

- **Hong Kong Accreditation Service (HKAS)** 香港認可處 - Accredited organizations and scope of accreditation under the HOKLAS scheme for medical laboratories. As of 2013, HKAS has granted accreditation status to 35 medical / clinical institutions comprising 102 medical laboratories and
43 specimen collection centres. 24 of these 102 medical laboratories are operating as private practices (http://www.hkas.gov.hk)

- ISO 15189 accreditation

### 4.3.3 Business model transformation

1. Academic spin-off - invention/discovery model (Better Medical Limited)
2. Better Medical Limited commercializes invention (holding of Company B)
3. Company B marketing its molecular diagnostics services to physicians and medical doctors
4. Company B to develop in-house cost effective detection kits and screening kits
5. The Chinese Mainland market (although the need for different types of accreditation services in the Chinese Mainland and the need to manage a highly different group of regulators.

### 4.4 Case III: Company C

<table>
<thead>
<tr>
<th>Pseudonym of academic spin-off company</th>
<th>Company C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Industry Type</strong></td>
<td>Information Services Provider</td>
</tr>
<tr>
<td><strong>Line of Business</strong></td>
<td>Chinese language news and media services content aggregator with proprietary search engine</td>
</tr>
</tbody>
</table>
4.4.1 Company background and industry context

Company C was incorporated as a private limited company on June 24, 1998, founded by Professor K and Mr. A as a spin-off from Z University. Professor K was then a professor in the Department of Systems Engineering and Engineering Management of Z University, while Mr. A was a project manager at the research center on innovation technologies that Professor K oversaw. He was also a student of Professor K in the Master of Philosophy program of information engineering.

University spin-off is an effective vehicle for technology transfer. The Z University ITTC provides incubation support (coaching, office space, infrastructure, and business network) to student or faculty entrepreneurs to enable them to turn their respective innovations into viable businesses.

As an academic spin-off company, Company C benefited from the research and proprietary software developments of Professor K in Chinese search engine and systems for intelligent processing of Chinese (IPOC). As early as 1992, the technology base that Professor K and his research team had developed in their Z University research laboratory, and later for use by Company C, is essentially
grounded on software tools based on IPOC as the core for the integration of different desktop publishing systems for the local electronic news media and publishing industry. Professor K explored and exploited the IPOC system and the Electronic News Media Processing Operating System (ENMPOS) to provide timely on-line news service to Internet users.

In 1993, the HKSAR government established the “Applied Research Fund” to help finance the development of local high-tech companies. The year 1995 saw the rise of Internet technology and service offerings in Hong Kong. In 1998, the government infused HK$750 million into the fund and appointed three international venture capital fund companies to administer the funding process.

In September 1999, Company C became the first academic spin-off company from all universities in Hong Kong to receive US$1 million in funds from WIIG, one of the three international venture fund companies appointed by the HKSAR government.

C Knowledge Management and Content Service System (C-System), developed by Professor K, received the Innovation Award of the China Computer Federation in 2006. At the time, Z University was the only university outside the Chinese Mainland to have won the award. In a press release issued by Z University on May 1, 2006, the China Computer Federation was quoted as saying that “C-System has combined Chinese information processing technology to provide large-scale clipping, processing and management of newspaper articles. Its editorial function is comprehensive and in-depth, and comprises innovative indexing, categorization, content analysis and information extraction technologies, which are significant for modern Chinese cultural development.” (Y University Alumni Magazine, 2006)

Mr. A likewise contributed his research efforts to Company C. In his capacity
as co-founder and CEO, Mr. A collaborated with the Z University team and successfully obtained a research funding of $673,000 from the University-Industry Collaboration Programme of the Innovation and Technology Fund administered by the government Innovation and Technology Commission. The project, titled “A Knowledge Management System based on Chinese Text clustering and classification algorithm”, commenced on August 1, 2002 and was completed on August 31, 2003 (Mr. A, 2002).

Company C is currently the largest services provider in the search engine market and content aggregator for newspaper-based media in the greater China region. The company client-base spans leading multinationals, listed companies, academic institutions, and government departments. C-News, one of the most successful products of the company, distributes up-to-date information from over 2,500 content sources across the Asia-Pacific region on a daily basis to over 1,500 international clients, including multinational corporations, media firms, news websites, professional groups, government bodies, tertiary academic institutions, and secondary schools. In 2011, the company database archived over 230 million news articles and is accelerating at an average pace of 280,000 news articles per day. The company headquarters is in Hong Kong, but has also established offices and operations in Macao, Beijing, Nanjing, Shanghai, Shenzhen, and Taipei. Company C currently employs more than 700 employees throughout China (Company C recruitment advertisement, 2012).

4.4.1.1 Business Structure

The following table provides a chronological outline of the business growth path for Company C:
<table>
<thead>
<tr>
<th>Year</th>
<th>Shareholders</th>
<th>Management</th>
<th>Product Launched</th>
<th>Number / Locations of Offices</th>
<th>Number of Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>Information Networking Laboratories Limited (Z University); Professor K; Mr. A</td>
<td>Mr. A, CEO</td>
<td>C-News 1.0</td>
<td>Hong Kong</td>
<td>10</td>
</tr>
<tr>
<td>1999</td>
<td>Information Networking Laboratories Limited (Z UNIVERSITY); Professor K; Mr. A; plus 6 other Z University colleagues</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>Ms. N joined Company C as CFO</td>
<td></td>
<td>C-News 2.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td></td>
<td></td>
<td>C-News 3.0</td>
<td>Economy down after 9-11. Year-end downsizing from 100 staff to 70</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td></td>
<td></td>
<td>4 Cities</td>
<td>70 staff</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>Ms. N, took over from Mr. A as CEO</td>
<td></td>
<td>C-Search</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>Company C Information Holdings Company</td>
<td>Ms. N, CEO; In 2005, Professor K and Mr. A sold share-holdings to</td>
<td></td>
<td>Media-C</td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Events</td>
<td></td>
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<td>------</td>
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<td></td>
<td></td>
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<tr>
<td>2006</td>
<td>150</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>C-Search 5; C-Enterprise Premium.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>C-News (iPhone version); C-LIVE.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>C-Info Portal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>HK headquarters; Representative offices in Beijing, Nanjing, Shanghai, Shenzhen, Macao, Taipei 700+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sources:** Company C website; recruitment advertisements on the Internet; Z University Center for Entrepreneurship website
4.4.1.2 Intellectual Property and Knowledge Transfer

As early as 1992, the research of Professor K in designing and developing the core technology for content management, content aggregation, and distribution of information resources of Company C benefited from his research and proprietary software developments in Chinese search engine and system for IPOC and ENMPOS. Professor K explored and employed the IPOC system and ENMPOS to provide timely online news services to Internet users.

“This form of technology transfer is not confined to just a transfer of technology per se, but in fact a transfer of knowledge. With this spin-off approach, the existing research team will be able to pursue further research, on an extended basis or in respect of complementary offerings, to further develop and enhance the functionalities of the emergent technologies. Moreover, it will allow the University to license the relevant technologies without requiring the University to divert its critical research resources to the downstream side of the commercialization process.” (Professor K, 1999)

“The success of Company C is to design, develop and package the Chinese-based search engine as ‘electronic news kiosk’ and ‘electronic new clipping services’ that can be customized and tailored to suit company-wide or personalized needs of the individuals on a subscription-based business model” (Professor K, 1999).

“Company C offers much more than simple aggregation of articles and news sources. Its proprietary Electronic News Media and Publishing System (ENMPS) converts a huge range of simplified and traditional Chinese content into a single searchable and flexible database. While most Chinese search engines use a character-based keyword search, Company C' Information Processing On Chinese
(IPOC) search technology enables searching by phrases, taking into account the semantics and context that are vital to effective searching in Chinese.” (Company C, 2013)

4.4.1.3 Business projects and commercial developments

Professor K, Mr. A, and the Z University research teams explored and employed the IPOC system and ENMPOS to provide timely online news services to Internet users in the early years of Company C. The other company products and services that were launched in later years until the present day are derivatives or further applications of both the IPOC and ENMPOS technology to serve customer needs.

However, the professional management team at Company C should well be commended for their strategic initiatives, as well as their relationship marketing skills, in increasing the number of partner news content providers, expanding the company reach to customers in the Chinese Mainland, Taiwan, and even the ethnic Chinese in ASEAN countries, as well as rolling out new versions and release upgrades of various Company C products and services.

4.4.2 Supplementary Information collected with respect to Company C Business Growth and Competitive Advantage

In a PowerPoint presentation to the NBA Asia Limited on 29 August, 2000, Professor K provided the following operations model of Company C at the time (Professor K, 2000):
Professor K has demonstrated himself as a successful academic cum researcher, with the acumen of an academic entrepreneur. He has already established for himself a clear and definitive vision of the operations and business models of Company C within a mere two to three years from its inception. Company C is to provide the proprietary search engine and content aggregation for newsworthy items in the Chinese language in all media types and formats for its
target customer segments across the Greater China region.

Company C customers are primarily government departments and major enterprises. Its value proposition and solutions fulfillment processes are indicative of a business-to-business (B2B) model. The first client in 1998 was the legislative council, and the first client from the commercial sector was the Centaline Property Agency. The current customer base of Company C comprises 1,500 local (Hong Kong) and international clients, including multinational corporations, media firms, news websites, professional groups, government bodies, tertiary academic institutions, and secondary schools.

The core technologies of Company C, supported by patents and applied research from academic faculty members, lie in the key knowledge assets that enabled Professor K to spin-off the company into a commercially viable business.

- IPOC with bilingual full text searching technology
  In the past, the available normal Internet search engine would involve a word-by-word or character-by-character search, such as the following:
  中 | 華 | 人 | 民 | 共 | 和 | 國 | 的 | 人 | 口 | 多
  IPOC can adopt phrases and character strings in context to perform the search. Whereas most Chinese search engines use a character-based keyword search, IPOC search technology enables searching by phrases, accounting for semantics and context that are vital to effective searching in Chinese. The following is an example of such search method:
  中華人民共和國 | 的 | 人口 | 多

- ENMPS
This technology congregates a number of software to convert content from conventional desktop publishing systems (DTP) of different news media into Internet-compatible Chinese information.

- **C-News** – a personal electronic newspaper clipping service, including articles from most electronic newspapers and magazines for individual users.

- **Newsy.Net** – performs round-the-clock searchers in newspaper archive databases, indices, auto-categorizes, tracks, and stores information in tailored databases for subscribers.

In the words of Mr. A, the two pioneers had “identified a new paradigm, a new eco-system”. Mr. A reflected while presenting during a presentation and luncheon discussion session that both he and Professor K attended at the W College Forum of Z University on 2nd November 2012 (Mr. A and Professor K, 2012). Mr. A claimed that the founders were aiming for disruptive innovation and new industries, which would create new and more jobs.

“In the past clerks would do the physical mundane tasks of cutting newspapers, now you need information analysts. These are major changes switching from personal jobs to professional jobs, (involving) new users, new clients, new user experience.” (Mr. A, 2012)

“We had seen so many laboring hours being wasted in government departments and business organizations to do clipping, cutting and pasting of newspaper items, and the public libraries invested a lot of resources in setting up microfilm services. I reckoned at the time there were twenty to thirty companies that specialized in cutting newspaper items and then fax distribution to clients” (Mr. A, 2012)
“We developed the search engine to search through the newspapers as they got high-tech with providing digital content. We also developed the filtering software to do the classification, grouping and distribution of newspaper clips in digital format over the Internet to our registered clients.” (Mr. A, 2012)

“The outbreak of SARS in 2003 was sad and panicky for Hong Kong citizens, but because people were worried and would like to avoid close contact with other people, our sales actually doubled!” (Mr. A, 2012)

4.5 Chapter Summary

This chapter serves to recap and consolidate the company information, industry-level and firm-level contexts of the three academic spin-off companies (case study companies), as well as responses or notes taken with respect to the semi-structured interviews, presentations, and conversations with key informants of the three case study companies. Where applicable and available, publicly available information related to the research topic is also incorporated to address the research questions on business model and dynamic capabilities for the three case study companies.

In Chapter 5, within-case and cross-case analyses of the information collected in Chapter 4 would be applied to study and compare for the purpose of comparative analysis.
5. CHAPTER 5 - ANALYSIS AND COMPARISONS

5.1 Introduction

Three case studies were presented in Chapter 4. Each case study company represents one of the academic spin-off companies from one of the universities in Hong Kong. These companies initially started with the objective of commercializing the academic research results. This process requires one or two academic faculty-inject patents or proprietary knowledge into the new companies. They undergo different paths to establish themselves and expand into for-profit business in their specialty business areas in the ensuing years after inception.

The latter part of Chapter 4 focuses on the "stories" of how the senior executives of the three academic spin-off companies perceived or actually strategically planned the business model changes and the development of dynamic capabilities of the company.

This chapter analyzes and explores knowledge of applicable business model components by adopting the Business Model Canvas framework as a lens for exploratory understanding (Osterwalder and Pigneur 2002; Osterwalder et al. 2005; Osterwalder and Pigneur 2010). Knowledge of the kinds of dynamic capabilities and how these are being nurtured in the three companies using the sensing, seizing, and transformation capabilities framework are then analyzed and explored (Teece 2007; Dottore 2009; Pavlou and El Sawy 2011; Jantunen et al. 2012).
Sections 5.2 and 5.3 identify and review the tools that were recently developed by scholars and researchers in strategy and strategic management to facilitate analyses and discussions. These tools are used for business model innovation and dynamic capabilities situations. The tools will be applied to the situations and contexts as elaborated by the informants from each of the three case-study companies for investigations and analyses.

Firstly, a within-case analysis is conducted for each company. The analysis focuses on the business model of the spin-off company and then on dynamic capabilities. Firm-level analysis explores and identifies the relationship(s) between the business model and dynamic capabilities of the company. The within-case analysis approach helps us better appreciate the company-specific internal dynamics that shaped the business model changes and dynamic capabilities in each of the three companies.

Secondly, an exploratory attempt using cross-case analysis will be conducted to compare and present the commonalities and differences amongst the business models of the three case-study companies.

Thirdly, another exploratory attempt using cross-case analysis will focus on the commonalities and differences of practices that comprise the dynamic capabilities of the three companies (Jantunen et al. 2012).

Existing literature that provides comparative studies of dynamic capabilities models of multiple firms within the same industry or cross-industries is limited. Jantunen et al. (2012) studied and compared the development of dynamic capabilities for multiple companies in the same magazine publishing industry. However, existing studies conducted by other researchers along this line are limited.
“Most of the research on dynamic capabilities is conceptual in nature. Further, empirical studies in this field are either large-scale surveys and thus cannot identify the differences in actual practices and processes in the firms, or single case studies that do not lend themselves to comparison with other studies.” (Jantunen et al. 2012, p.142)

More in-depth research that compares the dynamic capabilities of multiple case-study companies should be reserved for further research initiatives in the future.

5.2 Tools for Analysis and Comparisons

5.2.1 Data Analysis Tool - Business Model Canvas

The Business Model Canvas (Osterwalder and Pigneur 2002; Osterwalder et al. 2005; Osterwalder and Pigneur 2010), which is a business model mapping tool developed by Alexander Osterwalder, is recommended to frame the story (Kaplan 2012). This approach was adopted to facilitate a narrative description of the business model stories of the three academic spin-off companies and relate the core business model elements of the spin-off.

The Business Model Canvas is a framework presented by Alexander Osterwalder and Yves Pigneur in their 2010 book, “Business Model Generation: a Handbook for Visionaries, Game Changers, and Challengers” (Osterwalder and Pigneur 2010). The framework, which introduces the nine elements as
building blocks of a business model, is used as a template or tool for documenting the existing business model of a firm or for designing and developing a new business model. The nine building blocks are visually introduced and represented across the Business Model Canvas to align the customer segments, value propositions, resources and capabilities, partner networks, and revenue and cost structures of a firm with interactivities to help “operationalize” a business model.

Osterwalder’s conceptualization of the Business Model Canvas initially occurred when he wrote his doctoral thesis in 2004 (Osterwalder 2004). The nine building blocks, including most of the names of the building blocks, and most of the descriptions that accompany the building blocks, actually took shape in 2004. The Business Model Canvas has become popular among corporate executive offices and industry practitioners for use as reference and as a strategic management tool (Kaplan 2010; Hafkesbrink and Schroll 2010). The template is regularly used for business model development, in which key questions are derived and proposed action items are mapped into the building blocks and chained together to develop the new business model (Hafkesbrink and Schroll 2010):

A company should formulate certain assumptions and embed these assumptions into their business model, or operationally, into the business plan or strategic plans to start conducting, expanding, or reconfiguring the business. Haggege (2011) supports Margretta (2002)’s narrative approach of defining a business model as “stories that explain how enterprise works.” This business model concept is consistent with the “scenario based design” of the strategy management literature (Haggege 2011). The Business model Canvas can be an effective tool for highlighting the narrative and story-telling characteristics of business models because of the exploratory nature of business model design and representation.
The Business Model Canvas comprises nine building blocks:

1. Customer Segments
2. Value Propositions
3. Channels
4. Customer Relationships
5. Revenue Streams
6. Key Resources
7. Key Activities
8. Key Partners
9. Cost Structure

Source: Osterwalder and Pigneur (2010)
### The Business Model Canvas

**Key Partners**
- Add partner key companies
- Get support from key partners

**Key Activities**
- Development of software
- Development of websites
- Sales and marketing

**Value Propositions**
- lifetime to key customers
- value to key customers

**Customer Relationship**
- Engages with customers
- Interacts with customers

**Customer Segments**
- Defines segments for customers

**Channels**
- Selects channels for engagement
- Defines engagement methods

**Cost Structure**
- Identifies costs of operations
- Analyzes cost effectiveness

**Revenue Streams**
- Identifies potential revenue sources
- Analyzes potential revenue streams

**Key Resources**
- Identifies key resources

**Key Activities**
- Identifies key activities

**Key Partners**
- Identifies key partners

**Sources:**
[The Business Model Canvas. Retrieved on 5 December 2012 from](http://www.businessmodelgeneration.com)
The simplest and the practitioner version of the nine building blocks of a Business Model Canvas address the following questions, actions, or relationships:

![Business Model Canvas](image)

**Figure 5.2.1c** Business Model Canvas – Key Questions to Ask  
**Source:** Retrieved on 12 October 2012 from [http://www.businessmodelgeneration.com](http://www.businessmodelgeneration.com)

Fritscher and Pigneur (2011) consider the business model canvas as a visually facilitating tool that serves as a simplified (on one single page diagram representation) yet holistic conceptualization of the business logic of a company. This concept is based on a strategic viewpoint, wherein the Business Model Canvas is properly validated and firmly based on ontology research. Fritscher and Pigneur (2011) also identified four perspectives that help group and link the nine building blocks together via actions and relationships.
Figure 5.2.1d Business Model Canvas with the nine building blocks grouped into perspectives and their relations named

Source: Fritscher and Pigneur (2010) p. 32

Thus, the Business Model Canvas represents a more formalized approach, which can be used to describe, visualize, and analyze business models (Krcmar 2011).

Ankenbrand (2011) provides a very concise but precise description of the flows among the nine basic building blocks of the Business Model Canvas:

“An organization serves one or several Customer Segments (1) and seeks to solve customer problems and to satisfy customer needs with its Value Proposition (2), which are delivered to customers through communication, distribution, and sales Channels (3). Thereby Customer Relationships (4) are established and maintained with each Customer Segment. The generated Revenue Streams (5) result from value propositions successfully offered to the organizational customers. Key resources (6) are required to offer and deliver the previously described elements by performing a number of Key

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Activities (7). Some activities are outsourced and some resources are acquired outside the enterprise through Key Partnerships (8). All those activities result in a Cost Structure (9).” Ankenbrand (2011, p.1)

Osterwalder et al. (2010) raised certain questions for each of the nine elements in the Business Model Canvas to facilitate discussions (See text in italics and in parentheses below from 5.2.1.1 to 5.2.1.9). Each of these nine elements is presented with more detailed explanations.

5.2.1.1 Customer Segments
(For whom are we creating value? Who are our important customers?)

These segments comprise a comprehensive descriptive line-up of the various segments of customers to which a company wants to offer value. A company should focus and deliberate clearly and succinctly on the different groups of people or institutional entities the company aims to reach and serve. Such customer segments may be:

- Mass market (of consumers or communities at large)
- Niche market (for example, representative of important key segments in today’s global supply chained management and partnership networks)

5.2.1.2 Value Propositions
What value do we deliver to the customer? Which one of our customer problems are we helping to solve? What bundles of products and services are we offering to each customer segment? Which customer needs are we satisfying?

Value propositions are the complete portfolio of products and services
determined by a company, a total solution that should be produced or provided to the target customer segments. These value propositions notably include the perceived customer hot spots and values of a company, such as:

- Newness or trendiness (in terms of latest technology innovation or fashionable attractions)
- Performance (in terms of functionalities, strengths and power)
- Customization (in terms of co-creation, tailoring to ensure fit with customer purchase decisions and “likeness”)
- Solutions (one-stop-stop full services provider or specialist providers that offer unparalleled un-surpassed performance in the respective line of business)
- Design (superior design as in fashion and consumer electronics industries that sets the tone and trends for competition and following)
- Brand and reputation (the wealth of image and attributes that signals and dignifies their customers)
- Cost reduction (in terms of savings to be had by their customers)
- Risk reduction (ability or capacity to help customers mitigate risks)
- Accessibility (that customers will be able to afford, use or enjoy ownership or possession that previously the same from other companies would have avoided them)
- Convenience/usability (that makes life easy for customers to enjoy ownership or possession)

5.2.1.3 Channels

By which channels do our customer segments want to be reached? How are we reaching them now? How are our channels integrated? Which ones work best? Which ones are most cost-efficient? How are we integrating them with customer routines?
Channels describe the different ways and means a company can contact and conduct business with the customers. Channels can be identified based on:

- Channel types, such as company’s own account marketing teams, customer relations managers, in-store personnel, value-added remarketers, or complementary resellers;

- Phases in the selling/marketing cycle, such as product awareness, purchase, post-sales support, and services.

5.2.1.4 Customer Relationships

*What type of relationship does each of customer segments expect us to establish and maintain with them? Which ones have we established? How are they integrated with the rest of our business model? How costly are they?*

A certain form of customer relationship is established between the company and the customer once a company contacts a customer or would-be customer. This relationship could be a one-off sale and purchase transaction, a repeat sale, or simply a record in the customer relationships management module of the application database of a company.

A company should carefully consider the types of relationships that each of the customer segments of a company will be established and maintained. The company should also determine the revenue opportunities and cost of services for establishing such customer relationships and maintaining these relationships.
5.2.1.5 Revenue Streams
For what value are our customers really willing to pay? For what do they currently pay? How are they currently paying? How would they prefer to pay? How much does each Revenue Stream contribute to overall revenues?

Revenue streams could be generated via the selling of goods and products, from fees for services, subscriptions, and leasing/renting of physical assets, or licensing of intellectual property rights and software. Advertising fees collected from webpages or social media in the Internet-commerce business model can be important revenue for the companies.

Revenue streams describe how a company generates money via a variety of revenue sources.

5.2.1.6 Key Resources
What key resources do our value propositions require? Our distribution channels? Customer relationships? Revenue streams?

Every company requires key resources in the form of physical assets, intangible assets, core competencies, operational capabilities. Key resources allow a company to create, offer, and deliver its value proposition, establish and maintain customer relationships with its target customer segments, and capture the revenue streams to maintain the business.

Thus, key resources may include different measurement attributes such as physical or intangible, capital intensive or knowledge-based, among others.

5.2.1.7 Key Activities
What key activities do our value propositions require? Our distribution
channels? Customer relationships? Revenue streams?

Key activities are the most important functions and actions the company must take to operate successfully. For example, activities related to design, production, product delivery, quality assurance activities, and so forth.

Key activities for service providers may include problem determination for individual customers and identification or sourcing of new solutions. The operations of consultancies, hotels, hospitals and other services-oriented organizations are typically dominated by problem-solving or solution activities. Their business models call for activities such as knowledge management and continuous professional development training (CPD).

5.2.1.8’ Key Partners

*Who are our key partners? Who are our key suppliers? Which key resources are we acquiring from partners? Which key activities do partners perform?*

Key partners help companies leverage their key resources (Osterwalder and Pigneur 2002).

The business model analysis examines the key resources that will benefit the company from its key partners or alliances on the partner networks.

Key partners may include organizations that will co-research and co-develop some inventions and commercialize the products. Collaborations will help reduce risk and uncertainty. However, collaborations in supply chain management help maximize business opportunities for profit optimization.

5.2.1.9 Cost Structure

*What are the most important costs inherent in our business model? Which key*
resources are most expensive? Which key activities are most expensive?

Cost structure comprises the costs the company has to bear to create, market, and deliver the value proposition to its customer segments. The company should assign a dollar value to costs associated with each item of key resources, assets, activities, and partner relationships the company invests or spends.

5.2.2 Data Analysis Tool – Framework for Dynamic Capabilities categorization

“Dynamic Capabilities are the firm’s capacities to integrate, build, and reconfigure internal and external resources / competences to address and shape rapidly changing business environments” (Teece et al, 1997, p.516). Dynamic capabilities provide the company with the capacity and routine to align and re-align, configure and re-configure, integrate and re-integrate the lower order operating capabilities, notably resources and competences, to enable the company to engage business environments (Katkalo et al. 2010).

Teece (2007) proposed that three main groups of dynamic capabilities. “Sensing” pertains to the ability to identify opportunities and threats and create knowledge in this connection. “Seizing” is the ability to make timely decisions based on knowledge assimilation and integration. “Reconfiguration” is the ability to reshuffle or recombine and transform the resources base of the company to facilitate innovation, evolution, and co-evolution with the business environment. Similarly, Wang and Ahmed (2007) proposed a framework for categorizing firm dynamic capabilities based on three main capabilities, namely, adaptive, absorptive, and innovative capability.
Dottore (2009) considers and recognizes the contribution of Teece (2007) in elevating the business model concept to research prominence. The three main categories of dynamic capabilities, namely, sensing and shaping opportunities and threats, seizing opportunities, and managing threats and reconfiguration, were also examined. These dynamic capabilities introduced by Teece (2007) facilitated further empirical studies and the better understanding of practitioners in the industries and business.

Table 5.2.2  Dynamic capabilities in the context of value creation and capture

<table>
<thead>
<tr>
<th></th>
<th>Sensing</th>
<th>Seizing</th>
<th>Transforming</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Creating value</strong></td>
<td>Spotting opportunities</td>
<td>Investment discipline</td>
<td>Achieving re-combinations (of operational capabilities)</td>
</tr>
<tr>
<td></td>
<td>Identifying opportunities for research and development</td>
<td>Commitment to research and development</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conceptualizing new customer needs</td>
<td>Building competencies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conceptualizing new business models</td>
<td>Achieving new combinations (of operational capabilities)</td>
<td></td>
</tr>
<tr>
<td><strong>Capturing value</strong></td>
<td>Positioning for first mover and other advantages</td>
<td>Intellectual property qualification and enforcement</td>
<td>Managing threats</td>
</tr>
</tbody>
</table>
Determining desirable entry timing | Implementing new business models | Honing the business model
---|---|---
Leveraging complementary assets | Developing new complements
Investment of co-investment in “production” facilities

Source: Dottore (2009)

Jantunen et al. (2012) compares the dynamic capabilities framework proposed by Teece 2007 (sensing, seizing, and re-configuring capabilities) with the framework of Wang and Ahmed 2007 (adaptive, absorptive, and innovative capabilities) and that of Verona and Ravasi 2003 (knowledge creation and absorption, knowledge integration, and knowledge re-configuration capabilities). Jantunen et al. (2012) concludes that the framework proposed by Teece should be adopted for categorizing the dynamic capabilities of a firm, including the bundles of practices or “microfoundations” (Teece 2007) that comprise each of the three groups of dynamic capabilities. Jantunen et al. (2012) summarize and adopt the following table to categorize the bundles of practices that comprise dynamic capabilities.
Table 5.2.2.1  Teece’s (2007) grouping of dynamic capabilities as summarized by Jantunen et al. (2012)

<table>
<thead>
<tr>
<th>Category</th>
<th>Function</th>
<th>Practices comprising dynamic capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensing</td>
<td>Scan and monitor changes in the operating environment, identify new ideas</td>
<td>Related to internal R&amp;D</td>
</tr>
<tr>
<td></td>
<td>Related to customer need for identification</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Systematic ways of tapping into technological development and innovations in the market</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Systemic ways of getting innovation-related input via complementors and suppliers</td>
<td></td>
</tr>
<tr>
<td>Seizing</td>
<td>Link the innovativeness to products and markets</td>
<td>Related to determining the business model and the customer offering</td>
</tr>
<tr>
<td></td>
<td>Decision-making practices concerning new ventures</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Decision-making practices related to partners and distribution channels</td>
<td></td>
</tr>
<tr>
<td>Reconfiguring</td>
<td>Align the resources and capabilities of the firm</td>
<td>Related to the redeployment of existing assets, the management of complementary assets and reconfiguring processes</td>
</tr>
<tr>
<td></td>
<td>Related to asset co-specialization (internally and with external partners)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leadership practices promoting</td>
<td></td>
</tr>
</tbody>
</table>
commitment and new ways of allocating resources, such as incentive systems

Knowledge management and learning

Source: Jantunen et al. (2012), p. 144, Part of Table 1: Categorization of dynamic capabilities

Na and Tse (2011) utilized the competitiveness of Samsung Electronics group in the global electronics industry to argue that a company should be able to shape (transform) its enterprise business model for the combined business areas. The new business model will, in turn, help the company secure the appropriate dynamic capabilities to allow the company to “adapt to environment changes, absorb (search and internalize) new technologies, and introduce new (or better) products” quickly.

Pavlou and Sawy (2011) chose to adopt the organizational learning concept and more explicitly embrace integration capability as part of the “seizing” group. Moreover, they believe that “coordination capability” is more appropriate than “reconfiguring capability” or “transformation capability.” This opinion is reasonable because the capabilities or competences at the lower or operational level will be reconfigured or transformed by the “coordination capability.” According to Pavlou and Sawy (2011), Teece et al. (1997) claimed, “[dynamic] capability is embedded in distinct ways of coordinating.” Teece (2007) also argued that, “In short, both innovation and reconfiguration may necessitate co-specialized assets being combined by management in order for (systemic) innovation to occur.”

Pavlou and Sawy (2011) summarize their views about the definition (function) of dynamic capabilities in terms of routines (practices) in the following table.
Table 5.2.2.2 Functions of Dynamic Capabilities
in terms of Practices (Routines)

<table>
<thead>
<tr>
<th>Capability</th>
<th>Function as per Definition</th>
<th>Practice / Routines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensing capability</td>
<td>The ability to spot, interpret, and pursue opportunities in the business environment</td>
<td>• Generating market intelligence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Disseminating market intelligence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Responding to market intelligence</td>
</tr>
<tr>
<td>Learning capability</td>
<td>The ability to revamp existing operational capabilities with new knowledge</td>
<td>• Acquiring, assimilating, transforming, and exploiting knowledge</td>
</tr>
<tr>
<td>Integrating capability</td>
<td>The ability to embed new knowledge into the new operational capabilities with a shared understanding and collective sense-making</td>
<td>• Contributing individual knowledge to the group</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Representation of individual &amp; group knowledge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Interrelation of diverse knowledge inputs to the collective system</td>
</tr>
<tr>
<td>Coordinating capability</td>
<td>The ability to deploy tasks, resources, and orchestrate activities in reconfigured operational capabilities</td>
<td>• Assigning resources to tasks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Appointing right persons to right tasks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Identifying synergies amongst tasks, activities, and resources</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Orchestrating activities</td>
</tr>
</tbody>
</table>

Source: Pavlou and Savvy (2011), p. 247, Table 1: Definition of proposed capabilities that links to the dynamic capabilities literature
The scope of this study does not include the assessment, evaluation, and comparison of the framework of Teece (2007), as adapted by Jantunen et al. (2012), Dottore (2009), or Pavlou and Sawy (2011) for merits and determining the better framework. The practicum point of view suggests the beneficial and productive aspects of using and referring to the line items and descriptive information to fully exploit them as tools for analysis of “dynamic capabilities” functions. Therefore, the use of descriptive line items as outlined in all the frameworks/tables is recommended for analyzing the dynamic capabilities of the three case-study companies.

Figure 5.2.2.3  Dynamic Capabilities as higher order capabilities

Source
Adapted and modified from Figure 2. Business Model Elements of Kaplan (2012) p.18
5.3 Within-Case Analysis I – Company A

5.3.1 Company A Situations

According to the executives of Company A, their company is a typical representative of several other information technology companies that are constantly confronted with technology obsolescence (both hardware and software but fundamentally in a lack of appropriate intellectual property protection or patentable solutions).

IT-enabling has become a strategic agenda item for companies to remain competitive. However, competitive firms that serve as systems integrators and solutions/services providers can seldom rely on proprietary hardware or software technologies. The dynamic capabilities of academic spin-off companies that offer IT-based products or services should be based on their knowledge and experience on the integration of broad array of hardware, software, telecommunication technologies, and their track records in partnering with customers, value-added remarketers, bankers, and investors.

The thin capital base and related issues of Company A that affect its long-term business development are concerns that can be applied to other academic spin-off companies. However, Company A executives maintain that companies in the information technology areas encounter more difficulty than other technology-based companies in attracting private investors or venture capital funds. The dependence of Company A on the loan and debt financing of directors (including un-secured loan facilities from the banks) affects and imposes a heavy burden on the revenue streams and cost structure of the company.
5.3.2 Analysis of the Business Model of Company A

Figure 5.3.2 Business Model Canvas for Company A as shown in the following page has been compiled to identify the key components as well as to provide the relevant links amongst these components:
### Key Partners
- Telecom Network Services Providers
- Specialist supplier(s) of Customized GSM-GPRS Hardware Components
- Academics / researchers / Technology Mentors at Parent University

### Key Activities
- **Sales & Marketing**
  - *Government Tenders and Commercial Bids*
  - *Requests for Proposal (RFP)*
  - *Requests for Information (RFI)*
- **Solutions Design & Development**
- **Project Management, Implementation &**
- **Proprietary Hardware & Software**
- **Intangible Knowledge Assets**

### Value Propositions
- **Innovative Technologies for Telecom Networks**
- **Customised Systems Integration Services**
- **Reputation as IT & Telecom Systems Solutions Provider**

### Relationships
- **Dedicated Professional Services**
- **Solutions Marketing-Systems Integration Projects**
- **Collaborative Projects / Contracts for Services with Clients**

### Channels
- **Direct Large Account Marketing**
- **Indirect Reference Sales & Team Bidding**

### Customer Segments
- **Segmented Market**
  - *Government Departments*
  - *Commercial enterprises with remote retail outlets*
  - *Entities required to perform remote operations*
- **Telecom Niche Market**
  - Customised Internet-based Telemetric Applications

### Cost Structure
- **Project Driven Business**
- **Cost Driven Lean Organisation & Barebone Overhead**
- **Proprietary Hardware expensive**
- **Application Software Non-patentable**

### Revenue Streams
- **Project Driven Transaction Revenue in Payment Streams according to Milestones in Project Plans**
- **Recurring Revenue based on Post-Implementation Support and Maintenance Charges**

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**Figure 5.3.2**  Business Model Canvas for Company A

**Source:**  Compiled on basis of primary and secondary data collected
5.3.2.1 Customer Segments
For whom are we creating value? Who are our important customers?

The positioning of Company A in the telecom niche market enables the company to focus its business predominantly in the segments for large enterprises, notably HKSAR Government departments that require telemetric applications and other commercial enterprises with remote outlets or branch operations across Hong Kong Island, Kowloon, and the New Territories.

5.3.2.2 Value Propositions
What value do we deliver to the customer? Which one of our customer’s problems are we helping to solve? What bundles of products and services are we offering to each Customer Segment? Which customer needs are we satisfying?

Company A endeavors to develop and deliver innovative telecom technologies, notably GSM-GPRS connectivity in telecom bandwidth exploitation for telemetry applications for its customer segments. Company A achieved First Mover Effect ahead of its competition since the inception of the company in early 2002 until mid-2004. Company A Board Member T (Director 2) maintains:

“We certainly consider our company offered a better value proposition than our competitors. The time to market element could be shortened considerably because we had proven technology that was readily available.”

Company A then embarked on transiting/transforming to a project-based business model to develop the business into a systems integrator in the GSM-GPRS projects, and sometimes as prime contractor, but otherwise content
as sub-contractor.

“We had to modify our proposition to provide tailor made turnkey solution for our customers. That is the cardinal rule for system integrator to win over its customer.” (Director 2)

“Company A’s competitive edge has to ride on the proprietary hardware device customized to capture and transmit data via the GSM/GPRS platform. So the products and services are really niche, specialty one-off offerings for industrial clients (as opposed to the mass consumers). However, going the systems integrator route is no easy task as Company A is not capitalized nor staffed up (with key KM resources etc.) to compete, as prime for major Government projects.” Board Member T (Director 2)

5.3.2.3 Channels
By which channels do our customer segments want to be reached? How are we reaching them now? How are our channels integrated? Which ones work best? Which ones are most cost-efficient? How are we integrating them with customer routines?

The customer segments of Company A rely on direct sales and marketing. The CEO and his executive team, and often the VP of Engineering, Dr. W (Executive 1), participates in sales calls and technology briefings in response to request for proposals or tendering meetings. Indirect marketing is done mainly via word of mouth or reference sales by the academic faculty of X University or user communities within customer segments.

“… from the association with the X University and various job
references it has conducted for the Hong Kong Government (requiring telemetric applications).

“Company A’s set up was pretty good with the CEO having strong telecom background and connection (to negotiate collaborative projects with the telecom services providers)” Board Member T (Director 2)

5.3.2.4 Customer Relationships
What type of relationship does each customer segment expect us to establish and maintain with them? Which ones have we established? How are they integrated with the rest of our business model? How costly are they?

Company A offers dedicated professional services in systems development, systems integration, and project management including recurrent maintenance services. However, the role of Company A is essentially a vendor or solutions provider. This role is typical of the kind of relationships that HKSAR Government departments or large enterprises require. This role is attributed to non-technology policy reasons to avoid conflict of interests or exposure to bribery. According to Company A Board Member T (Director 2):

“It is the Hong Kong Government’s policy to open up their projects to multiple tenders and that presents a huge challenge as Company A often times find it is necessary to bid as sub (sub-contractor) instead of as Main (primary contractor).”

5.3.2.5 Revenue Streams
For what value are our customers really willing to pay? For what do they currently pay? How are they currently paying? How would they prefer to pay? How much does each Revenue Stream contribute to overall revenues?
The revenue of Company A is determined by successful completion or loss of sales of each and every system integration projects, which are typical of project-driven mode of operations. The company is dependent on transaction revenues resulting from customer payments (in phrases or stages according to percentages of project completion) of individual tender or systems integration bids. Company A aims to win recurrent revenues resulting from regular customers based on post-implementation support and services and maintenance fees.

However, Company A Board Member T (Director 2) claimed, “the change (to project-based business model) was transformational as the company had burnt all its (cash) reserves. (By 2011,)… The company’s recurring income from maintenance fee (for services) was insufficient to keep Company A afloat so Company A has gone through downsizing of operations as well as negotiations with external investors about mergers and acquisitions.”

5.3.2.6   **Key Resources**
*What key resources do our value propositions require? Our distribution channels? Customer relationships? Revenue streams?*

The resources of Company A are focused on intellectual and knowledge resources to engage in the technology-intensive telecom industry. X University is one of the key resources of the cutting edge research in the parent university. However, Company A is greatly concerned with:

- The need for patentable products/solutions offerings to be competitive in the long term
- Capital and investment funds to help finance growth and business
5.3.2.7 Key Activities

What key activities do our value propositions require? Our distribution channels? Customer relationships? Revenue streams?

Company A switched gears to become a systems integrations company. Considerable executive attention, corporate action, and paper work were directed to participation in the HKSAR government by tendering process and procedures and responses to request for proposals (RFP) or request for information (RFI). Emphasis is placed on:

- Solutions marketing
- Transition from system integration business model of bundling proprietary hardware and non-patentable application software development and implementation to consultancy and solutions business model
- Investor relations (initiatives to attract equity investments, venture capital funding or other third party financing)

5.3.2.8 Key Partners

Who are our key partners? Who are our key suppliers? Which key resources are we acquiring from partners? Which key activities do partners perform?

X University – Parent University

Academic departments as mentors/consultants
Professor N and Dr. A worked on data transfer technology using the GPS/GPRS platform. They created a few successful projects with the government and with the private sector.

As an academic spin-off company, the association of Company A with TTO and with X University creates technology base, credibility, and successful project reference project to prove the value proposition of the company.

Innovational changes occur when the mentor/consultants of the company from the academic department at X University injected their intellectual property or knowledge resources into projects that Company A has been retained as part of the systems integration team. However, Company A does not have sufficient in-house internal research & development capabilities.

“Company A’s association with TTO, or for that matter, X University, has both advantage and disadvantage. As an advantage, it provides the initial technical knowhow and lends creditability to the company. As a disadvantage, outsider may view the company’s solution as being too academic.” Board Member T (Director 2)

“Initial success comes from the association with X University and various job references it has conducted for the Hong Kong Government. Unfortunately, the technology is not patentable which over time allows other competitors to come to the market.” (Director 2)

Telecom and mobile services providers

“Data communication via telecom companies was really hot as they wanted to generate more revenue from data traffic, but the application developed by Company A was software driven and could easily be re-engineered by others.” Board Member T (Director 2)
“The key advantage in teaming up with the telecommunication companies … Company A will be able to tender / bid for sizable government projects, as systems integrator (main and sub).” Board Member T (Director 2)

Venture Capital / Fund Managers / Angel funds
Company A does not appear to have benefited from private investments or funding. Board Member T (Director 2) of Company A expressed his views about the apparent lack of commitment from venture capital firms in Hong Kong:

“The fact (is) that the venture capital industry has never taken off in Hong Kong….. Such fund would not invest in green field projects and would only be interested in firms raising the mezzanine round of financing immediately prior to an IPO.” Board Member T (Director 2)

5.3.2.9 Cost Structure
What are the most important costs inherent in our business model? Which key resources are most expensive? Which key activities are most expensive?

The cost structure of Company A is cost-driven and the margins were not as effective as those expected from high-tech business because of the following reasons:

- Cost of proprietary hardware, GSM/GPRS platform, and application software
- Application software non-patentable products and the need to transit the business model from system integrator to solutions provider
- Every tender bid is unique. Thus, project-based business is not amenable to economy of scale or economy of scope.
5.3.3 Analysis of Company A’s Dynamic Capabilities

5.3.3.1 Sensing

The association of Company A with X University has advantages and disadvantages. Board Member T (Director 2) of Company A elaborated:

“As an advantage, it provides the initial technical knowhow and lends creditability to the company. As a disadvantage, outsider may view the company’s solution as being too academic.”

5.3.3.2 Seizing

In terms of knowledge assets and intellectual capital management, Company A retained Dr. W (Executive 1) as Vice President of Engineering to take charge of the company’s technical department. All projects/products were fully tested and documented. A user manual was prepared with special attention to usability and accessibility because this type of manual is inevitable deliverable in every project. These documents were centrally stored in the company server and only authorized personnel could access these documents.

Company A is yet to develop and implement the necessary organizational structure, knowledge management processes, notably knowledge creating process, organizational capabilities in knowledge creation, and knowledge conversion, notably actors and processes for internalization, externalization, socialization, and combination of knowledge.
5.3.3.3 Reconfiguring

The growth of Company A is constrained by its limited financial resources and thin capital base. Company A encounters major difficulties to transform itself from a system integrator project-based business model to a solution provider business model. These changes were initiated and coordinated at the Board of Directors level by Board Member T and executed by the CEO of Company A.

5.4 Within - Case Analysis II: Company B

5.4.1 Company B Situation

The edge of Company B is its niche patentable research output and its niche diagnostics products and services. Consistent with the growth of biotech start-ups in the US and Europe, Company B managed to stay and grow in business because the premium value of the quality and precision of services in medical diagnostics are key concerns to physicians and patients under treatment for acute and critical diseases.

5.4.2 Analysis of the Business Model of Company B

Figure 5.4.2 Business Model Canvas for Company B as shown in the following page has been compiled to identify the key components as well as to provide the relevant links amongst these components:
Figure 5.4.2  Business Model Canvas for Company B
Source: Compiled on basis of primary and secondary data
5.4.2.1 Customer Segments

For whom are we creating value? Who are our important customers?

The HLKAS accreditation certificate issued by the Hong Kong Accreditation Service (HKAS) specifically refers to Company B’s clientele as “private physicians, medical centers, private and public hospitals and other medically related institutions.”

Dr. L (Director 2) firmly stated that the customer segments of Company B are the physicians and medical practitioners in private practice, including private clinics:

“Hospitals managed by the Hong Kong Hospital Authority have their own in-house medical diagnostics laboratories including molecular diagnostics” (Dr. L)

Dr. L is proactively promoting the specialty services of DNA diagnostics and biochips to medical doctors in private practice even before he and Professor M started the Company B project. Dr. L conducted the promotion during medical conferences and cold calls to clinics similar to the approach of door-to-door salesmen.

5.4.2.2 Value Propositions

What value do we deliver to the customer? Which of our customer’s problems are we helping to solve? What bundles of products and services are we offering to each customer segment? Which customer needs are we satisfying?

Innovative diagnostics technologies

The pioneering research of Professor M and the research team at Y University in fast and high throughput DNA analysis technology and biochips states that:
“High throughput; multiplex” (Dr. L)

“Traditionally it was one sample one laboratory test objective. With DNA-based diagnostics, can be multiple objectives for one sample. This is significant advantage over the service offerings from traditional medical laboratories.” (Dr. L)

Performance
Research at Y University and the applied in-house R&D of Company B allow Dr. L to technically enable an increasing number and multiple arrays of DNA diagnostics on one single biochip using one patient specimen sample.

High level of sensitivity
Molecular diagnostics provides accurate precision tests (“positive” or “negative” for diagnostics results) because of the advances in relevant technologies.

Convenience/Usability
i. Instrumentation
ii. Easy to handle
iii. Easy to apply
iv. User-friendly
v. Reducing costs of detection kits and screening kits

5.4.2.3 Channels
By which channels do our customer segments want to be reached? How are we reaching them now? How are our channels integrated? Which ones work best? Which ones are most cost-efficient? How are we integrating them with customer routines?
According to Dr. L, Company B is retaining its own direct marketing and specialist sales team to physicians and medical professionals. Indirect sales and marketing assistance would be available via reference sales from medical laboratories in other five segments of the medical diagnostics industry.

5.4.2.4 Customer Relationships

*What type of relationship does each customer segment expect us to establish and maintain with them? Which ones have we established? How are they integrated with the rest of our business model? How costly are they?*

“We are committed to dedicated one-on-one personal services to our customers, the medical doctors and physicians, by offering case-based and evidence-based diagnostics service for each patient situation.”

(Dr. L)

“We build our reputation and establish trust with our customers. We reach out to the medical communities by participating and speaking at conferences and trade-shows…professional networking, but it is the trust and confidence in our services that we will add to new customer relationships.” (Dr. L)

5.4.2.5 Revenue Streams

*For what value are our customers really willing to pay? For what do they currently pay? How are they currently paying? How would they prefer to pay? How much does each revenue stream contribute to overall revenues?*

In terms of external funding or investments for sponsoring or supporting research and development, Dr. L stressed that the Innovation & Technology Fund (ITF) of the HKSAR Government allocated several million dollars to the biochip and DNA diagnostics projects.
Dr. L indicated the presence of several venture capital firms or angel funds targeting at providing capital injections or loans to bio-tech start-ups in Hong Kong because of the growing interest in biotech in Hong Kong and neighboring regions.

“Our relationship with the parent university gives us the door opener when approaching new clients or external venture capital firms, the angel firms if you will, but not much beyond that (financially). Typically university does not want to publicize too much on this parent university – academic spinoff relationship. There are policy issues as well as corporate governance issues involved.” (Dr. L)

“For all intent and purposes, the parent university and our company should be at arm’s length so that there will not be any concerns about conflict of interest nor misappropriation of funds from the University Grants Committee (for Y university) or project-based research funding such as the Innovation and Technology Fund (ITF) from government or other public sector sources.” (Dr. L)

Business at the day-to-day operational level is driven by diagnostics jobs, whereas revenue is booked on a per diagnostics job for multiple types per sample for each patient.

Thus far, Company B also received referral fees form medical laboratories in other segments of the industry.

5.4.2.6 Key Resources
What key resources do our value propositions require? Our distribution channels?
Customer relationships? Revenue streams?

The strength of Company B lies in the platform technologies available from the biochip that can accommodate when new detection kits and screening kits arrive. The number of DNA tests on the chip using just one patient specimen sample increased. The leading research team of academics and researchers headed by Professor M of Y University provide key resources to Company B.

5.4.2.7 Key Activities
What key activities do our value propositions require? Our distribution channels? Customer relationships? Revenue streams?

Medical diagnostics is essentially problem solving. Conceptually, Professor M, Dr. L, and their colleagues at Company B believe that performing problem solving tasks on a day-to-day basis is interesting and rewarding. Dr. L is also mindful of the need to send his specialist marketing team to visit new and existing customers.

5.4.2.8 Key Partners
Who are our key partners? Who are our key suppliers? Which key resources are we acquiring from partners? Which key activities do partners perform?

Y University – Parent University
Academic departments/mentors

Research output

Dr. L (Director 2) suggests that, “Professor M (Director 1)’s leading edge research in fast and high throughput DNA analysis technology has been the main competitive edge for us.”
“The other key factor in ensuring commercial viability is the successful development of our micro-chip that has a surface-mounted kind of membrane with the capacity of performing a large quantity of diagnostics on multiples of disease detection using just one single test sample.”

Technology Transfer Centre (TTC) of Y University
The objectives of the university incubation program are promoting academic research, intellectual property, and new technologies. Focus is not on the profitability or performance of the academic spin-off company. In-kind marketing and support services are primarily focused on introducing potential investors to the academic spin-off company; no seed money is involved.

Medical laboratories of other segments of the industry
Dr. L (Director 2) claims that, “We see the other five groups of medical laboratories as partners who may compete but often times offer complementary or synergistic services to physicians or medical doctors.”

Venture Capital / Fund Managers / Angel funds
- Dr. L (Director 2) reflected on the company’s funding situation and suggested:
  - “The Hong Kong scene is not like Silicon Valley.”
  - “There are just a few key players in the biotech area, typically in situations involving clinical applications.”

5.4.2.9 Cost Structure
What are the most important costs inherent in our business model? Which key
resources are most expensive? Which key activities are most expensive?

The operating costs of Company B include the people cost for retaining experienced research assistants and laboratory technicians and specialist marketing/sales personnel. Company funds expensive detection kits and screening kits or testing agents.

Company B enjoys rental concessions from the Hong Kong Science & Technology Park.

Company B also invests or incurs costs in licensing technologies or products from other overseas academic spin-off biotech companies.

### 5.4.3 Analysis of Company B’s Dynamic Capabilities

#### 5.4.3.1 Sensing

Professor M and Dr. L demonstrated their flair and acumen for business and entrepreneurship. Dr. L is proactively marketing biochip and molecular diagnostics services to target medical doctors and physicians even before Company B came into existence. Dr. L is tuned in to the developments of biotech and pharmaceuticals industries and to breakthrough research from biotech academic spin-off companies in US and Europe. He is also keenly aware of the competitive landscape and market situations.
“In terms of market development, we see a skewed situation such that the big players will grow even bigger and become one-stop shops for everything (all six segments of the medical diagnostics industry), while small niche players will have to work hard to sustain and survive.” (Dr. L)

5.4.3.2 Seizing

“In terms of management of knowledge assets and intellectual capital, company will continue to collaborate with the researchers in the field and academic community at large.” (Dr. L)

“Company has acquired, and will continue to pursue compliance of standards required by the Hong Kong Accreditation Service (HKAS) for achieving accredited status and scope of services in the medical diagnostics industry” “ISO 15189 accreditation as well.” (Dr. L)

“Organizational learning is important. The researchers and technicians who worked hard here at Company B are all keen and interested in doing bio-tech and DNA related researchers. They typically came from the research laboratories from the universities and they are attracted to work in Company B primarily because of the research environment and problem-solving spirit, not necessarily because of the monthly salaries available.” (Dr. L)

5.4.3.3 Reconfiguring

Company B aims at synergistic collaboration with companies within the group including Better Medical Limited and Better Medical (Shenzhen) Joint Venture
to become a platform services provider in medical diagnostics industry for medical and healthcare services in the Greater China region.

Professor M and Dr. L believe that their roles are instrumental in orchestrating the formation of Better Medical Limited, the establishment of Company B with Better Medical Limited as its holding company, and the penetration of business in the Chinese Mainland market with the set up of Better Medical (Shenzhen) Joint Venture.

5.5  Within - Case Analysis III – Company C

5.5.1  Company C Situation

Professor K reflected on the lessons he learned from the spin-off and start-up of Company C:

- Innovation = Creativity + Application
- High-tech business = Technology + Business Model + Marketing
- Be creative, patient, and consistent
- Honor your Intellectual Property (IP) and that of others
- Seek help from the technology transfer center (ITTC) of Z University

5.5.2  Analysis of Company C’s Business Model
Figure 5.5.2 Business Model Canvas for Company C as shown in the following page has been compiled to identify the key components as well as to provide the relevant links amongst these components:

Figure 5.5.2 Business Model Canvas for Company C
Source: Compiled on basis of primary and secondary data
5.5.2.1 Customer Segments

For whom are we creating value? Who are our important customers?

Mr. A and Professor K reflected on their research project, the start-up process and early years of Company C, and provided the following comments:

“We were targeting at disruptive innovation vs. continuous innovation.”

“Be alert to emerging changes on the eco-environment. New paradigm creates new eco system. New business models in industries creating new jobs and more jobs.”

“In the past clerks would do the physical mundane tasks of cutting newspapers, now you need more information analysts than clerks. The change was from personal jobs to professional jobs.”

Mr. A and Professor K were inspired by the labor-intensive task of cutting and pasting newspaper clips performed by clerks and secretaries in government departments and corporate offices. The key customer segments of Company C can be found in the departments of the HKSAR Government. The first client of company C in 1998 was the Legislative Council.

The second group comprises business corporations and enterprises. The first client of Company C was from Centaline Property Agency, in the commercial sector.

The current customer set of Company C comprises 1,500 local (Hong Kong) and international clients, including multinational corporations, law firms, public libraries, media firms, news websites, professional bodies, government bodies,
tertiary academic institutions, and secondary schools.

The latest campaign for a new customer set is targeted at a niche market, at institutional clients that are keen at and interested in data mining for branding support, personalized marketing, image, and reputation building for companies.

5.5.2.2 Value Propositions

*What value do we deliver to the customer? Which one of our customer’s problems are we helping to solve? What bundles of products and services are we offering to each customer segment? Which customer needs are we satisfying?*

The core technology and basis of competitive advantage for Company C include:

Information Processing on Chinese (IPOC) with bilingual full text searching technology and normal internet search engine:

中華人民共和國的人口多

IPOC can adopt phrases and character strings in contexts to conduct search. Most Chinese search engines use a character-based keyword search. The IPOC of Company C conducts search via phrases by considering semantics and contexts that are vital to effective searching in Chinese.

Electronic News Media Publishing System (ENMPS)

This technology congregates a number of software to convert contents from conventional desktop publishing systems (DTP) of different news media into Internet-compatible Chinese information.

C-News is a personal electronic newspaper clipping service that gathers
articles from most electronic newspapers and magazines for individual users.

**Newsy.Net** performs round-the-clock searches in newspaper archive databases, indexes and, auto-categorizes, tracks, and stores information in tailored databases for subscribers.

“We had seen so many laboring hours being wasted in government departments and business organizations to do clipping, cutting and pasting of newspaper items, and the public libraries invested a lot of resources in setting up microfilm services. I reckoned at the time there were twenty to thirty companies that specialized in cutting newspaper items and then fax distribution to clients.” (Mr. A, 2012)

“We developed the search engine to search through the newspapers as they got high-tech with providing digital content. We also developed the filtering software to do the classification, grouping and distribution of newspaper clips in digital format over the Internet to our registered clients.” (Mr. A, 2012)

“The outbreak of SARS in 2003 was sad and panicky for Hong Kong citizens, but because people were worried and would like to avoid close contact with other people, our sales actually doubled!” (Mr. A, 2012)

Company C provides a unique one-stop shop solution to government departments and corporations for content search and distribution of news items selected by customers. Company C enables customers to set up user-defined news feeds/clips across multiple content sources.

Company C is committed to provide same-day news for subscribers, even faster
than the print-based newspapers when they become available at magazine kiosks and newspaper stands for general newspaper and magazine readers.

5.5.2.3 Channels
By which channels do our customer segments want to be reached? How are we reaching them now? How are our channels integrated? Which ones work best? Which ones are most cost-efficient? How are we integrating them with customer routines?

- Direct marketing and negotiations with newspaper and media content providers
- Specialist sales and marketing people negotiate deals with institutional clients and vertical industry segments, such as public libraries and secondary schools in the education sector
- Information aggregator business model

5.5.2.4 Customer Relationships
What type of relationship does each customer segment expect us to establish and maintain with them? Which ones have we established? How are they integrated with the rest of our business model? How costly are they?

“Our major customers are government departments, multinational corporations and Hong Kong companies that operate in the Chinese Mainland, Taiwan or even in the ASEAN countries. Our value propositions to these companies include not just real-time data and information feeds of newspaper clips, but also other value-added services. For example, we have institutional clients who want us to
help them monitor media coverage in response to their company’s advertising or public relations campaign. Others find our coverage and information distribution very useful for their efforts in brand management or reputation building. We work hard to create and nurturing long standing relationships with our customers.” (Mr. A, 2012)

5.5.2.5 Revenue Streams
For what value are our customers really willing to pay? For what do they currently pay? How are they currently paying? How would they prefer to pay? How much does each revenue stream contribute to overall revenues?

Revenue is determined by successful recruitment of customers based on a subscription business model. Company C enjoys economy of scale and economy of scope. Content partner base increase will increase customer base. Company C can also leverage its offerings across the Greater China region, which ensures growth path.

5.5.2.6 Key Resources
What key resources do our value propositions require? Our distribution channels? Customer relationships? Revenue streams?

Core technologies based on academia-developed proprietary Chinese search engine and related technologies convert and aggregate news media contents. As a first mover, Company C invested heavily in information technology and infrastructure that cannot be easily copied or imitated.

5.5.2.7 Key Activities
What key activities do our value propositions require? Our distribution channels? Customer relationships? Revenue streams?

Company C provides one-stop-shop service to customers with access to hundreds of thousands of segmented, searchable news material published in Asia and abroad. The initiative is becoming an invaluable data/intelligence mining tool for governments, academia, and commercial entities keen on factual, current/historical information that are otherwise nearly impossible to come by.

Company C expands further to include content from newspapers, magazines, TV, radio, general web sites, and social media. Thus, the company is growing into an even more useful business resource for intelligence mining.

The key activities of Company C from the operations point of view include:

- Platform development
- Data center operations management
- Editorial and customer services operations on:
  - Content aggregation
  - Collection, indexing, classifying, searching, and dissemination
  - Other value-added services

5.5.2.8 Key Partners

Who are our key partners? Who are our key suppliers? Which key resources are we acquiring from partners? Which key activities do partners perform?

Content partners
- Newspapers
• Magazines
• Web portals
• News agencies
• Trade journals
• Radio, TV
• Social media

Z University – Parent University

Academic departments/mentors

Research output

Company C Information Limited is a high-tech spin-off of Z University based on the IPOC search engine and ENMPS news media publishing system developed by the research teams of Professor K and colleagues from Z University.

Technology and Transfer Center (ITTC), Z University

University spin-off is an effective vehicle for technology transfer. Z University’s ITTC provides incubation support, including coaching, office space, infrastructure, and business network, to student or faculty entrepreneurs to enable them to turn their innovation into a viable business.

Venture Capital/Fund Managers/Angel funds

Government of HKSAR – Applied Research Fund

WIIG

Seed Capital

Private investors and Z University Foundation: Company C was incorporated in July 1998 using the seed capital (HK$ 2 million) from eight founders, namely, Professor K, Mr. A, and six other colleagues of Z
University Foundation and Z University Foundation on a matching basis.

5.5.2.9 Cost Structure

*What are the most important costs inherent in our business model? Which key resources are most expensive? Which key activities are most expensive?*

- Fees negotiated with content providers from the newspaper and media.
- Technology infrastructure (server-based clusters) that serves more than 1,500 governmental, institutional, and corporate clients, and congregates and aggregate contents from providers of news information and feeds.
- Professional teams on 24 x 7 arrangements who edit and aggregate information content for distribution to customers.

5.5.3 Analysis of Company C's Dynamic Capabilities

5.5.3.1 Sensing

Mr. A and Professor K reflected on their research project, the start-up process, and early years of Company C Information Limited and offered the following comments (Mr. A, 2012; Professor K, 2012):

“We were targeting at disruptive innovation vs. continuous innovation.”
“Be alert to emerging changes on the eco-environment. New paradigm creates new eco system. New business models in industries creating new jobs and more jobs.”

“In the past clerks would do the physical mundane tasks of cutting newspapers, now you need more information analysts than clerks. The change was from personal jobs to professional jobs.”

“With new business paradigm, comes new business model, new users, new clients, new user experience!”

Mr. A and Professor K are effective at scanning the horizon of the eco-environment for opportunities, contacting potential customers, obtaining feedback, and pursuing real world opportunities.

The incumbent CEO, Ms. N, is skilled at managing the financials and brand marketing. She is supported by external venture funds and leverages opportunities in public relations and reputation building because of her background as the prior chief financial officer of the group in 2004.

5.5.3.2 Seizing

- Signing up more content providers
- Expanding the coverage of the media industry, from newspapers to radio, TV, and Internet-based information services providers and value-remarketers
- Geographic coverage, which cultivates and captures customers beyond the Greater China region and across geographies, such as the ASEAN
5.5.3.3 Reconfiguring

- Successful orchestration of capacities for attracting financial funding resources and new content providers (financial and marketing orientation and partner and network perspectives)

- Successful implementation of transiting the management of Company C by academics and researchers/inventors to professional managers (human resources management perspectives)

5.6 Cross-Case Analysis: Comparison of Business Models

5.6.1 Osterwalder’s Assessment Rubric for Business Model Comparison

Osterwalder introduced his concept of the business model comparison of different companies in his doctoral thesis (Osterwalder 2004, pp.156-158).

Osterwalder subsequently proposed the Business Model Canvas (Osterwalder and Pigneur 2002; Osterwalder et al. 2005; Osterwalder and Pigneur 2010), which was well received by practitioners in the industries as an easy-to-be-understood and easy-to-use construct to identify and chain up the different elements of a business model (Kaplan 2010).
Osterwalder maintains “The Business Model Alchemist” on the Internet to reflect on his insights from meeting other academics regarding the business model. Osterwalder visited Vijaya Thyil and Geoffrey Durden of La Trobe University in Melbourne, Australia. He mentioned about a brainstorming session and “came up with some ideas for different scales for each the 9 business model building blocks which I use to map a company’s business model” (Osterwalder 2006).

Osterwalder used these scales for each of the 9 business model building blocks to “describe the characteristics of each business model building block of a company in a more quantitative way. The whole set of variables of the 9 building blocks will then give us a representation of the entire business model” (Osterwalder 2006).

A framework that can be used to compare two or three different business models of one or more companies based on the comparison of the set of variables of the nine elements (9 building blocks) of a business model may illustrate Osterwalder’s ideas.

**Figure 5.6.1.1 in the following two pages provides a brief outline of the framework developed by Osterwalder:**
Figure 5.6.1.1 The Nine Elements of a Business Model, which Assess the Business Model Elements for Comparative Purposes

Sources: Adapted with modifications from Figure 74 of Osterwalder (2004), p.157 and descriptive notes as outlined in Osterwalder and Pigneur (2010)
Most of the key words and descriptors applied by Osterwalder (2006) are concise and self-explanatory, but perhaps it is worthwhile to point to one dimension, “Degree of Networkedness and Two-sided Network Effects” for the “Key Partners” element here. Contrary to the traditional view of looking at target customers as a group, the business model concept will strive to identify multiple groups of consumers and users, suppliers and business partners for a company’s products and services. This would allow the firm to explore if the groups’ demand and supply situations may generate complementary effects for each other, and, for the
company, offer the company the opportunity of leveraging of virtuous cycle and network connectedness effects contributing to administer differential strategies for pricing and margins, and overall revenue growth. The terms “Networkedness” and “Two-sided Networks Effects” refer to the phenomenon when a firm’s business serves as a platform so that one group of users / consumers of the firm’s services or products on one-side and the other group on the other side of the firm’s business network will create a complementary relationship in contributing to the firm’s revenue (Eisenmann et al., 2006; Rysman 2009). Notable examples can be found in two different groups for the Android platform, the people who bought Android-based smart phones on one-side and the Apps developers on the other. The more users of Android-based smart phones will attract the more Android Apps developers, the more Android Apps in the Android market will attract more buyers for Android smart phones.

5.6.2 Analysis of Assessment Ratings

The perceptions/status presented by the key informants and reported according to the nine business model elements in Figure 5.6.1 are rated respectively on a scale of “0” for low to “10” for high. The ratings assigned to the nine business model elements are therefore based on personal judgment and opinions arising from perception and status presented by the key informants and reported during the interviews and discussions of the project. These ratings framework, just like the McGrath’s scoring scheme, appears to be more of a qualitative assessment rubric than a construct or model that has been applied and tested in empirical research environments. However, the ratings obtained in respect of the three case-study companies do provide some perspectives for comparing the business model elements of the three companies.

The information obtained from the analysis of the three case-study companies were used in the rating in terms of their respective business models (Sections 5.3.2.1 to 5.3.2.9 for Company A; Sections 5.4.2.1 to 5.4.2.9 for Company B and Sections 5.5.2.1 to 5.5.2.9 for Company C). The scores of the nine elements were plotted on a radar chart to compare the three business models of the case
study companies.

Figure 5.6.2.1  Business Model Comparison of the Three Case-Study Companies

Source:  Compiled with adaptations with reference to Osterwalder (2006). Ratings based on judgmental assessments and representations by informants for the three case-study companies with reference to the 9 Elements of a Business Model, Figure 5.6.1.1

The radar chart in Figure 5.6.2.1 should not be construed as an evidence-based, quantitative-driven representation of how the business model of a company stacks against those of the other two companies. This approach was adopted because of the limited information available in terms of numeric amount or quantitative performance metrics disclosed by the key informants. Moreover,
the three case study companies are private limited companies with business registration in Hong Kong (and one or two have their private holding companies registered in the Cayman Islands). However, the diagram vividly and visually depicts the strengths and weaknesses of the relevant business model elements of the business models of the three case study companies. The diagram also offers some hints about the viability of business models. Apparently Company B’s business model creates and captures value more effectively than that of Company C, whereas Company A’s business model is constrained for lack of strategy focus and direction.

5.6.3 Cross-Case Analysis: McGrath’s Scoring Scheme

Rita Gunther McGrath of Columbia University developed a 10-step scoring scheme to assess the level of attractiveness of the business model of a company (McGrath 2011).

McGrath’s scoring scheme (McGrath 2011), which was introduced in her article, “Finding Opportunities in Business Model Innovation” in The European Financial Review on February 17, 2011, is more or less geared towards a practitioner audience. However, this scoring scheme is an effective evaluation rubric that deserves further and more rigorous examination.

Figure 5.6.3 represents a framework designed and developed by McGrath (2011) to describe the scoring scheme for us to evaluate and compare firm-level business model innovation:
McGrath’s scoring scheme by itself appears to be more of a qualitative assessment rubric than a construct or model that has been applied and tested in empirical research environments. In McGrath’s own words, the table (as referenced and reproduced here as Figure 5.6.3):

“…(for scoring Business Model Attractiveness) offers a diagnostic that one can take to assess the attractiveness of a particular model. Simply
score a proposed model somewhere between the two statements to assess the extent to which the statement reflects your best guess of where a proposed model falls.” (McGrath 2011, p. 16)

This study applies the McGrath’s Scoring Scheme to assess the attractiveness of the business models of the three academic spin-off companies under study. The scores assigned to the McGrath’s scoring scheme as per Table 5.6.2 are based on personal judgment and opinion arising from perceptions and status presented by the key informants and reported during the interviews and discussions of the project. The scores are merely opinionated assessments and do not necessarily represent objective rankings. However, the rubric highlights the value of a business model as an effective “abstraction of strategy” (Seddon and Lewis, 2003) for companies.

Table 5.6.3  Business Model Attractiveness – Comparison of the Business Models of Three Case-study Companies

<table>
<thead>
<tr>
<th>Statements for Scoring (as adapted from McGrath 2011)</th>
<th>Company A</th>
<th>Company B</th>
<th>Company C Information System</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 The cost to a customer of switching to another provider is relatively low OR relatively high.</td>
<td>6</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>2 The model is based on individual transactions to be re-purchased each time OR a series of transactions that are subject to renewal.</td>
<td>2</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>The user interface for the model is pretty much the same for all providers OR is different for different providers.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------------------------------------------------------------------</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>The benefits provided by the model are optional or discretionary, OR are required, specified, or mandatory.</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>4</td>
<td>7</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>This business has few network effects, or we are a late mover, OR, we have the potential to create positive network externalities in this model.</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>The model solves customer problems permanently, OR the problem of customers is ongoing.</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1</td>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>The model is arms-length or transactional, OR the model establishes some kind of relationship.</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>2</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>The model has little impact on customer experience or the impact is negative, OR the model involves changing the customer experience significantly and the</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>4</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>
The model operates on a stand-alone basis, or the model creates a platform others can use to accomplish their goals.

We create the offer, or the offer is to some extent co-created.

<table>
<thead>
<tr>
<th>Impact is positive.</th>
<th>Total Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>27</td>
</tr>
<tr>
<td>The model operates on a stand-alone basis, or the model creates a platform others can use to accomplish their goals.</td>
<td>52</td>
</tr>
<tr>
<td>We create the offer, or the offer is to some extent co-created.</td>
<td>47</td>
</tr>
</tbody>
</table>

According to McGrath, “as a general rule,” she “would prefer a score over 40” (McGrath 2011). McGrath’s scoring scheme highlights the extents to which each business model element creates “stickiness,” “loyalty,” or “attractiveness” to convince customers to stay with the company, embraces the value propositions of the company. This scoring scheme also aims to be influenced or constrained by a certain level of relative difficulties or switching costs to increase the willingness of customers to unsubscribe or leave the company for another product or services provider.

The scores accorded to Companies A, B, and C show that business model of Company is attractive. The business model of Company C is reasonable and remains positive despite some innovations, which may be required in the future. The business model of Company A (or the lack of a viable business model) is
shaky and vulnerable.

McGrath (2011) spells out the following recommendations as her “closing thoughts”:

“A key set of issues for leaders to consider is whether they are simultaneously alert to the early warning signs that a business model is facing erosion and to the opportunities presented by the relaxing of constraints that allow enduring customer needs to be met in new ways” (McGrath 2011).

A rough estimate of the overall attractiveness of the business models described by the informants suggests that Company B, a molecular diagnostics company in the medical diagnostics industry should come out first, followed by Company C Information Systems and Company A in the GSM/GPRS telemetry systems integration business. This result was obtained because access to the financial information of the three academic spin-off companies is not available. The Boston Matrix, which is another way of looking for different perceptions in business model attractiveness, shows that the business model of Company B is a star because of the rising glitter of bio-tech industry and the arrival of personalized healthcare in developing countries. Company C Information Limited will become a cash-cow despite upheavals and mergers or acquisitions in the global news and media industries. Company A should reconfigure its business model to adopt a new growth path as a systems integration house. Company A continues to survive because of its track record in the tendering list of approved contractors of the HKSAR Government. However, the future is less than positive for Company A and will someday lose its own identity and disappear from the industry.
5.7 Cross-Case Analysis: Comparison of Dynamic Capabilities

Comparative studies on the dynamic capabilities between firms and among multiple firms within same industry or across industries are limited. Jantunen et al. (2012) studied and compared the development of dynamic capabilities for multiple companies in the same industry and in the same geographic region (of similar cultural and environmental contexts). However, studies conducted by other researchers along this line are limited.

“Most of the research on dynamic capabilities is conceptual in nature. Further, empirical studies in this field are either large-scale surveys and thus cannot identify the differences in actual practices and processes in the firms, or single case studies that do not lend themselves to comparison with other studies.” (Jantunen et al. 2012, p.142)

The qualitative study of Jantunen et al. (2012) was conducted based on a sample of four case-study companies in the magazine and publishing business in Scandinavia. The objective of the study was to investigate the actual processes and practices in firm-level dynamic capabilities for commonalities and differences across firms (in the same industry). All four firms exhibited different practices of dynamic capabilities in terms of sensing, seizing, and reconfiguring (Teece 2007). Thus, this study contributed to “the progression in the field of dynamic capabilities from conceptual work towards empirical operationalization” (Jantunen et al. 2012, p.152).

Jantunen et al. (2012) argued that commonalities in dynamic capabilities across the four companies “do not appear to be intentionally copied from each other” because each company nurtures these common practices in dynamic capabilities
on its own. The practices simply evolve and transform over time on its own, independent of the common practices in other case study companies.

The study concludes also that, “the practices comprising sensing capabilities are likely to be similar across firms within a single industry, while practices comprising seizing and reconfiguring types of capabilities may differ more between companies” (Jantunen et al. 2012, p.152).

The following tables are compiled to compare the dynamic capabilities and/or routines practiced by the case-study companies based on Section 5.2.2 and the modified approaches used in Jantunen et al. (2012) and Pavlou and Sawy (2011):

(3 points) Can be considered, by reason of the capabilities being reported or perceived by the key informants of the three companies, being embedded in the organizations; OR,

(2 points) Can be considered limited, by reason of management inertia, organizational rigidity, path dependency, that the company has not been able to agilely reconfigure its dynamic capabilities so as to successfully reconfigure or transform its operational capabilities to deploy new business model or new organizational strategies;

(N) Can be considered not applicable, negligible, lacking capabilities, that the key informants are not aware of the need to nurture such capabilities or conscientiously choose not focus on developing these capabilities and embed the same in the organizations for new coordinating or orchestrating new initiatives or innovative strategies and processes/routines.
Table 5.7.1.1 Summary of the practices/routines that comprise sensing capabilities

<table>
<thead>
<tr>
<th>Sensing Capability</th>
<th>Company A</th>
<th>Company B</th>
<th>Company C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scan and monitor changes in the operating environment, identify new ideas (Jantunen et al., 2012); The ability to spot, interpret, and pursue opportunities in the business environment (Pavlou and Savvy 2011)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurturing internal R &amp; D</td>
<td>N</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Identifying customer needs</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Tapping into technological developments and innovations in the markets</td>
<td>N</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Tapping into innovations of value networks of partners, suppliers, and complementary business entities</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Generating market intelligence</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Disseminating market intelligence</td>
<td>N</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Responding to market intelligence</td>
<td>N</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td><strong>Subtotal scores</strong></td>
<td>7</td>
<td>20</td>
<td>17</td>
</tr>
</tbody>
</table>

Sources: Jantunen et al. 2012; Pavlou and Savvy 2011
Table 5.7.1.2  Summary of the practices/routines that comprise seizing capabilities including learning capability and integrating capability

Seizing Capabilities:
- Seizing capability: Linking innovativeness to products and markets (Jantunen et al., 2012);
- Learning capability: The ability to revamp existing operational capabilities with new knowledge (Pavlou and Sawy 2011);
- Integrating capability: The ability to embed new knowledge into the new operational capabilities with a shared understanding and collective sense-making (Pavlou and Sawy 2011)

<table>
<thead>
<tr>
<th>Practices/Processes (for)</th>
<th>Company A</th>
<th>Company B</th>
<th>Company C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delineating the business model</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Establishing and implementing decision-making protocols about new ventures or new initiatives</td>
<td>N</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Establishing and implementing decision-making protocols about partners and channels</td>
<td>N</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Acquiring knowledge</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Assimilating knowledge</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Transforming knowledge</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Exploiting knowledge</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Contributing individual knowledge to the group;</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Representation of individual and group knowledge;</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Interrelation of diverse knowledge inputs to the collective system</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Subtotal scores</td>
<td>17</td>
<td>28</td>
<td>25</td>
</tr>
</tbody>
</table>

Sources: Jantunen et al. 2012; Pavlou and Sawy 2011
Table 5.7.1.3  Summary of the practices/routines that comprise reconfiguring and coordinating capabilities

<table>
<thead>
<tr>
<th>Reconfiguring and Coordinating Capabilities</th>
<th>Company A</th>
<th>Company B</th>
<th>Company C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reconfiguring capability: Aligning the resources and capabilities of the firm (Jantunen et al., 2012); Coordinating capability: The ability to deploy tasks and resources and orchestrate activities in reconfigured operational capabilities (Pavlou and Sawy 2011)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practices/Processes (for)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Redeployment of existing assets, management of complementary assets, and reconfiguring processes</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Co-specialization of assets (internally and externally with partners)</td>
<td>N</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Leadership practices promoting commitment and new ways of allocating resources</td>
<td>N</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Knowledge management and organizational learning</td>
<td>N</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Assigning resources to tasks</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Appointing right persons to right tasks</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Identifying synergies amongst tasks, activities, and resources</td>
<td>N</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Orchestrating activities</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Subtotal scores</strong></td>
<td><strong>9</strong></td>
<td><strong>22</strong></td>
<td><strong>20</strong></td>
</tr>
</tbody>
</table>

*Sources: Jantunen et al. 2012; Pavlou and Sawy 2011*
5.7.2.1 Company A Situation

Company A attempted to transit into a business model for systems integrator, which is essentially project-driven, service-oriented, and solutions-based (Ceci and Masini 2011; Davies et al. 2006; Hobday et al. 2005; Karlos et al. 2007; Wikstrom et al. 2010).

The prior approach of Company A to recruit and install CEOs and professional management team with credentials and experience in outbound marketing at large telecom companies in anticipation of major tendering bids failed to create, reconfigure, or integrate their mindsets into intangible resources for the new business model.

Company A did not perform well in terms of networkedness. The company obtained success on leveraging its reference and reputation as an academic spin-off company for GSM-GPRS research from X University. However, the initial advantage of Company A from the first mover effect was not sustained. The company started to losing to big systems integration houses and often found itself in an awkward position of bidding for tenders under its own name as “prime contractor” while working with big systems solutions companies and tendering for the same piece of business as one of the “sub-contractors” by choosing to participate in the systems integration business.

Company A failed to turn itself into a low-cost leader because their profit formula is essentially in cost plus basis. The revenue streams of Company A are extremely limited. Company A receives monies in phases, similar to other contractors or sub-contractors in project business. Company A manages to promote service revenues to support the company on post-installation maintenance fees for the projects that successfully implemented for its customers. The revenue streams situation caused cash flow problems for
Company A.

5.7.2.2 Company B Situation

Company B was successful in leveraging academic research in biotech and DNA at Y University, including patents for the development and marketing of detection kits, screening kits or test agents for DNA-related diseases with the availability of biochip and molecular diagnostics services. Company B managed to stay ahead on the leading edge of bio-tech developments and the emerging trends in US and Europe in molecular diagnostics. This development is a breakthrough in the traditional segments of medical diagnostics industry.

Company B also successfully established relationships with its customers, family doctors, and physicians in medical clinics who are into private practice. Company B is familiar with its customer segments by proactively initiating service marketing even before the techniques or technology products of biochip became available. Company B also is well positioned to benefit from two-side network effects because its products and services will provide accurate and precise test results to family doctors and patients. The reputation of Company B in terms of service quality will attract more customers (medical doctors) and partners (e.g., spin-off bio-tech companies from overseas universities). Thus, two-side network effects as interactions will be reciprocal.

5.7.2.3 Company C Situation

Company C has become a market leader in its own right since its inception by creating a business model for serving the customer segments it sets out to serve. Company C developed its business by expanding into other locations such as Mainland China, Taiwan, and ASEAN countries where native Chinese language
support are required on the Internet.

Company C adopted a smart approach by playing in the business-to-business market mainly by selling its subscriptions-based services in news and media content aggregation, search engine, and information distribution to government departments and corporations. Company C actively avoids direct participation in the consumers market. The business model saved Company C from competing against major global players such as Yahoo, Google, or even Microsoft in the Chinese search engines front and others on the information services front.

Company C is also managing well in the networking area. The company benefits from the two-side network effects because the corporate customers and content providers (partners) of the company find it mutually beneficial to work with Company C, therefore “bypassing” Company C.

5.7.3 Comparison of Dynamic Capabilities

The scores as captured in Tables 5.7.1, 5.7.2 and 5.7.3 serves well to highlight the fact that Company B’s organization is more attuned to practices and routines that are conducive to building the institutional capabilities for sensing, seizing and reconfiguring of internal organizational capabilities. Company B’s scores as listed in the three tables add up to “70”. Company C’s scores add up to “62”, and “33” for Company A. This is not surprising given that the ratings accorded by the informants with facilitating the cross-case comparison of business models produce a similar ranking.

It has been widely accepted by strategy scholars that VRIN resources and
capabilities create competitive advantage, that dynamic capabilities lead to sustainable competitive advantage of the firm in question. Given that firms will require the appropriate dynamic capabilities to design and implement business model changes or business model innovations, it may be reasonable to argue that firm-level dynamic capabilities will be required to enable business model innovations and it will be the companies that design, deploy and execute their respective viable business models to stay competitive in the business.

Company A remains insufficient in its ability to proactively change course by reconfiguring its strategies and business model. Company A suffers from lack of business despite the effort of the professional management team to enter the systems integration business, instead of the GSM-GPRS network telemetry business. The Board of Directors, who are mainly scientists and researchers from X University, considered hiring professional managers from telecommunication companies with strong telecom marketing backgrounds to pursue new business beyond government contracts and tenders. The reconfiguration of core competences and capabilities was not successful because the skills and resources required to function as a systems integration house is vastly different from a solutions provider that was approached by HKSAR government for academic research and projects. Company A also deviated from its R & D base and its direct R & D innovations relationships with X University.

Professor M and Dr. L of Company A are real academic entrepreneurs. They share the vision and foresight of spearheading leading research and commercializing the patents and outputs in the medical diagnostics industry. The group of companies that comprises Company B, namely, Better Medical Limited and Better Medical (Shenzhen) Joint Venture, will transit into a new business model of a platform provider for DNA and molecular diagnostics because of the biochip product developed via Better Medical Limited.
Similar to Company A, Company C decided to employ a professional management team to run the business. However, Ms. N, the current CEO who succeeded Mr. A, performed an excellent “sensing” job of expanding the partner network of Company C (news and media content providers) into new media such as radio and TV and into new geographical spread, notably in the Mainland China and Taiwan. The reconfiguration of operational capabilities ensures growth in business volume from services subscribers. However, Company C continues to operate on a B2B basis and do not tap into the direct consumers/readers market. The commercialization process for the innovative IPOC and ENMPS products contributed to the success of Company C. However, new technologies and Internet-based software solutions are required to take Company C to a new level and possibly to a new business model for sustainable competitive advantage against the main information providers such as Google or Microsoft, which possess their own multiple language-enabled search engines and content providers.

5.8 Analysis of firm-level dynamic capabilities, business models and competitive advantage – An integrated approach

Results of analysis suggest that there is a close link between business model changes and a firm’s competitive position in the industry. Apparently the function and value of the unique technological capabilities that the three academic spin-off companies acquired or nurtured at their inception enabled them to become viable players in the industry / market that they participate.
However, as these companies grew beyond the first few years, the companies would have to tackle obstacles and hurdles in the commercialization process. Technological capabilities cannot tackle the issues of management and marketing, financing and funding, and other problems that require business capabilities or resources (Mustar et.al. 2006; Jorge Niosi 2006; Brink and Holman 2009; Helm and Mauroner 2007). Academic spin-off companies have to confront the commercial reality just as any small and mid-sized enterprises (SMEs).

In the following sections, a number of tables and diagrams will be used to highlight the assessment results of the changes that have taken place at the three academic spin-off companies with respect to their competitive positioning, their business models, and firm-level dynamic capabilities. These will be followed with a Chapter Summary that focuses on theoretical basis and findings based on the within-case and cross-case analysis of the case studies.

5.8.1 Competitiveness and Business Model Changes

The semi-structured interviews and discussions with key informants of the three academic spin-off companies revealed their perceptions and understanding of changes that have taken place since the inception. Business models have evolved as a result of the decisions of the teams of governance (academic entrepreneurs, members of the board of directors and senior executives). Major changes took place because of their capabilities in sensing, seizing and re-configuration of business model elements, notably, value propositions, customer segments, key resources and key activities.
Table 5.8.1  Firm Competitiveness and Business Model Changes

<table>
<thead>
<tr>
<th>Company</th>
<th>Industry</th>
<th>Business Model type at Inception</th>
<th>Changes in competitive Landscape</th>
<th>Business Model type in 2012</th>
<th>Competitive Advantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company A</td>
<td>Telecom</td>
<td>Consultant and Project Management</td>
<td>Teledes compete for bandwidth; 2G/3G/4G; mobile phone - smart phone; Apple iOS and Google Android</td>
<td>Systems Integrator (Telecommunications)</td>
<td>Weak</td>
</tr>
<tr>
<td>Company B</td>
<td>Biotech</td>
<td>Biotech biomarker (Biochips, diagnostic kits and screening kits)</td>
<td>Emergence of diagnostics and screening kits for HPV. DNA technologies; Emergence of Personalized medicine (for disease early alert and prevention, healthcare and well being programmes)</td>
<td>Biotech platform provider (Molecular diagnostics equipment, facilities and services)</td>
<td>Strong</td>
</tr>
<tr>
<td>Company C</td>
<td>Press and news media</td>
<td>Newspaper Content aggregator</td>
<td>Public relations; Marketing; Data-mining techniques; Emergence of readily available Internet access in the Chinese Mainland, Taiwan and ASEAN countries; Emergence of Google and social media such as Facebook; Weibo; QQ in the Chinese</td>
<td>Newsfeed distributor (with proprietary Chinese search engine)</td>
<td>Moderate</td>
</tr>
</tbody>
</table>
5.8.2 Business Model Changes at the three Academic Spin-off Companies

The changes in competitiveness are indicative of the changes in business model elements that have taken place in each of the case study companies. The following tables present an assessment of the changes for each of the companies by referring to and adding information to Fig.1.3.1.1 in Chapter 1.
## The 9 Business Model Elements

<table>
<thead>
<tr>
<th><strong>Offers</strong></th>
<th><strong>Value Proposition</strong></th>
<th><strong>Company A Business Model focus at inception</strong></th>
<th><strong>Company A Business Model focus in 2012</strong></th>
<th><strong>Changes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Value Proposition</strong></td>
<td>Innovative technologies for GSM-GPRS-based telemetric applications for HKSAR government departments</td>
<td>Prime and sub-contractor in government tenders and commercial bids for customized systems integration services</td>
<td>(\rightarrow)</td>
<td></td>
</tr>
<tr>
<td><strong>Customer Segments</strong></td>
<td>Government departments that previously engaged the academic faculty / researchers on systems consultancy</td>
<td>Segmented markets (government departments, large commercial enterprises, e.g., telecos, public utilities)</td>
<td>(\rightarrow)</td>
<td></td>
</tr>
<tr>
<td><strong>Customer Relationships</strong></td>
<td>Consultants, project managers</td>
<td>Professional services in Systems Integration projects</td>
<td>(\downarrow)</td>
<td></td>
</tr>
<tr>
<td><strong>Channels</strong></td>
<td>Collaborative projects through academic faculty; Direct Large Account Marketing</td>
<td>Open tenders and systems bids</td>
<td>(\downarrow)</td>
<td></td>
</tr>
<tr>
<td><strong>Revenue Streams</strong></td>
<td>Project driven transaction revenue in payment streams according to project milestones</td>
<td>Professional services including annual maintenance charges for completed projects</td>
<td>(\downarrow)</td>
<td></td>
</tr>
<tr>
<td><strong>Key Resources</strong></td>
<td>Reputation and experience of academic faculty previously on consultancy engagements; proprietary designed GSM-GPRS interface hardware and Telecom industry marketing and networking</td>
<td>(\uparrow)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Key Activities</strong></td>
<td>Sales and marketing (RFI - Request for Information and RFP - Request for Proposals) on government tenders and commercial bids</td>
<td>Solutions design and development; Project management, implementation and maintenance services</td>
<td>(\uparrow)</td>
<td></td>
</tr>
<tr>
<td><strong>Key Partners</strong></td>
<td>Academis / researchers / technology mentors at parent university (referrals)</td>
<td>Telecom network services providers</td>
<td>(\rightarrow)</td>
<td></td>
</tr>
<tr>
<td><strong>Cost Structures</strong></td>
<td>Proprietary GSM-GPRS hardware expensive; application software non-patentable; venture capital funds not available</td>
<td>Marketing expenses high for project driven project-based business - lack of steady income / revenue streams; lean bare-bone support organization; outsource systems development</td>
<td>(\uparrow)</td>
<td></td>
</tr>
</tbody>
</table>

### The Profit Zone

<table>
<thead>
<tr>
<th><strong>Infrastructure</strong></th>
<th><strong>Profits, return on investment</strong></th>
</tr>
</thead>
</table>

### Figure 5.8.2.1  
**Company A: Business Model changes**

**Source:** Compiled on basis of primary and secondary data collected. Formatted with adaptations from slide presentation by Osterwalder (2007), Management 2.0: Competitive Advantage through Business Model Design and Innovation, retrieved on 1 January 2014 from http://www.slideshare.net/Alex.Osterwalder/management20-competitive-advantage-through-business-model-design-innovation
The 9 Business Model Elements | Company B Business Model focus at inception | Company B Business Model focus in 2012 | Changes
--- | --- | --- | ---
**Offers** | **Value Proposition** | Innovative diagnostics technologies; Biochips design and production | Molecular diagnostics and screening kits; Accredited services for compliance and trust | ↗
**Customer Segments** | Medical laboratories | Medical doctors and specialists in private practice; medical centres and clinics | ↗
**Customer Relationships** | Communities and professional networking | Dedicated one-on-one case-based diagnostics services for | ↗
**Channels** | Own specialist sales and marketing team | Reference sales via doctors or medical laboratories in other segments | ↗
**Value for Money** | **Revenue Streams** | UGC competitive grants and sponsored R&D; Government Innovation & Technology Fund | Fees from diagnostics and screening tests; capital injection and loans from venture capital / Biotech angel funds | ↗
**Key Resources** | Academics / researchers from parent University; Licenses and patents | Platform technologies for molecular diagnostics and screening | ↗
**Key Activities** | Problem-solving in molecular diagnostics | Solutions design and development; Project management, implementation and maintenance services | ↗
**Key Partners** | Parent holding company with licenses and patents; academic & researchers | Other medical laboratories in other segments of industry; other molecular diagnostics companies / academic spin-offs in bio-tech business from overseas | ↗
**Cost Structures** | Detection kits and screening kits expensive; people costs - experienced research assistants and laboratory technicians | Accreditation - Hong Kong Accreditation Services (HKAS): ISO 1189-2007 | ↗
**The Profit Zone** | **Profits, return on investment** | | |

Figure 5.8.2.2  Company B: Business Model changes

Source: Compiled on basis of primary and secondary data collected. Formatted with adaptations from slide presentation by Osterwalder (2007), Management 2.0: Competitive Advantage through Business Model Design and Innovation, retrieved on 1 January 2014 from http://www.slideshare.net/Alex.Osterwalder/management20-competitive-advantage-through-business-model-design-innovation
## The 9 Business Model Elements

<table>
<thead>
<tr>
<th>Offers</th>
<th>Company C Business Model focus at Start-up</th>
<th>Company C Business Model focus in 2012</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Value Proposition</strong></td>
<td>One-stop shop for content search and distribution of relevant news items from contributing newspapers</td>
<td>Same day news for subscribers ahead of print-based items for mass market; user defined news feed across multiple content sources</td>
<td>↗</td>
</tr>
<tr>
<td><strong>Customer Segments</strong></td>
<td>Government departments; commercial &amp; corporate clients</td>
<td>Niche markets; institutional clients interested in data-mining from news items</td>
<td>↗</td>
</tr>
<tr>
<td><strong>Customer Relationships</strong></td>
<td>Dedicated and customized services</td>
<td>Every content partner and every subscribing customer is unique</td>
<td>→</td>
</tr>
<tr>
<td><strong>Channels</strong></td>
<td>Content partners and institutional clients</td>
<td>Content partners and institutional clients</td>
<td>→</td>
</tr>
<tr>
<td><strong>Revenue Streams</strong></td>
<td>Subscriptions driven</td>
<td>Customer base; content partner base; geographical spread</td>
<td>↗</td>
</tr>
<tr>
<td><strong>Key Resources</strong></td>
<td>Proprietary platform; IPOC search engine; ENMPS news media publishing system</td>
<td>IT &amp; telecom infrastructure</td>
<td>↗</td>
</tr>
<tr>
<td><strong>Key Activities</strong></td>
<td>Platform development; data centre operations management</td>
<td>Editorial and customer services operations</td>
<td>↗</td>
</tr>
<tr>
<td><strong>Key Partners</strong></td>
<td>Content partners (newspapers)</td>
<td>Content partners (magazines, web portals, news agencies, trade journals, Radio, TV, Social media)</td>
<td>↗</td>
</tr>
<tr>
<td><strong>Cost Structures</strong></td>
<td>Fees / revenue splits with content partners; technology infra-structure</td>
<td>24x7 professional editorial teams; applications development; marketing and customer services</td>
<td>↗</td>
</tr>
</tbody>
</table>

### Figure 5.8.2.3 Company C: Business Model changes

**Source:** Compiled on basis of primary and secondary data collected. Formatted with adaptations from slide presentation by Osterwalder (2007), Management 2.0: Competitive Advantage through Business Model Design and Innovation, retrieved on 1 January 2014 from http://www.slideshare.net/Alex.Osterwalder/management20-competitive-advantage-through-business-model-design-innovation
5.8.3 Dynamic Capabilities enabling Business Model Changes in the three Academic Spin-off Companies

To follow up with Sections 5.8.1 and 5.8.2, the following table consolidates the information and present an integrated perspective on how dynamic capabilities (sensing, seizing and reconfiguring) affect the changes in the business models of the three academic spin-off companies, and their relative competitiveness in the markets / industries that they participate respectively:
Table 5.8.3.1 Assessment of Company A situation

<table>
<thead>
<tr>
<th>Resources and Organizational Capabilities</th>
<th>Environmental Triggers for Change</th>
<th>Dynamic Capabilities (Practices and Routines)</th>
<th>Business Model Changes / Innovations</th>
<th>Sustainable Business Viability / Competitive Advantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Founder / Academic staff expertise in GSM/GPRS and telemetric applications (MOSAIC); Founder reputation / network with IT groups of HKSAR government; University research outputs (patent for MOVER but other software not patentable);</td>
<td>Emergence and growth of telecom services providers; De-regulation of and promotion of open competition for provision of telecom bandwidth and 2G/3G/4G technologies;</td>
<td>Sensing Conceptualizing the surge in demand for Internet-based application services from government departments and large companies (with presence Hong Kong-wide) notably the public utilities companies;</td>
<td>From consultant and project management role to Systems integrator / Telecommunications Solutions provider</td>
<td>Successfully being recognized in lists of recognized project contractors in HKSAR Government departments; Lacks financial resources (e.g. venture capital; bank loans) and capital base to become main contractor but only sub-contractor to telcos and mobile services providers;</td>
</tr>
<tr>
<td><strong>Company A</strong></td>
<td></td>
<td>Seizing CEO, director and VP with prior work experience with telcos in Hong Kong; Specialist support to tender / bid for major telecom based projects</td>
<td>Transforming Systems integration and project management skills</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Compiled on basis of primary and secondary data
Table 5.8.3.2 Assessment of Company B situation

<table>
<thead>
<tr>
<th>Resources and Organizational Capabilities</th>
<th>Environmental Triggers for Change</th>
<th>Dynamic Capabilities (Practices and Routines)</th>
<th>Business Model Changes / Innovations</th>
<th>Sustainable Business Viability / Competitive Advantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company B</td>
<td>Founder / Academic staff expertise in biotech research especially DNA related diagnostics kits and screening kits, biomarkers,</td>
<td>Emergence of biotech academic spin-offs and DNA research;</td>
<td>Sensing Conceptualizing the surge in demand for personalized medicine and treatments; Emergence and availability of diagnostics and screening kits for HPV and other DNA related technologies;</td>
<td>From provider business model for biomarker, HPV virus inhibitors to Biotech platform provider (Molecular diagnostics equipment, facilities and services)</td>
</tr>
</tbody>
</table>

Source: Compiled on basis of primary and secondary data
Table 5.8.3.3  Assessment of Company C situation

<table>
<thead>
<tr>
<th>Resources and Organizational Capabilities</th>
<th>Environmental Triggers for Change</th>
<th>Dynamic Capabilities (Practices and Routines)</th>
<th>Business Model Changes / Innovations</th>
<th>Sustainable Business Viability / Competitive Advantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company C</td>
<td>B2B business services targeting at corporate customers only; Need for automation of spot-check for newsworthy items from newspapers and news clips cutting services; Emergence of need for data-mining services for public relations campaigns, marketing of products and services</td>
<td>Sensing Conceptualizing the aggregation of information from multiple media services providers, electronic content distribution and Chinese search engine for data distribution and accessibility over the Web; Seizing Networking and partnering with newspaper companies in Hong Kong, Taiwan and Chinese Mainland, then non-print media services companies to act as content aggregator and newsfeed services provider</td>
<td>From content aggregator to B2B newsfeed distributor on subscription business</td>
<td>Strong New CEO successfully expands media partners network as well as establishes business into the Chinese Mainland despite Hong Kong-based operations Compete on scale and lock-in customer relationships given the subscription model Emergent business threats from competitors such as Google, QQ, other social media in news update and sharing, and other Chinese search engines.</td>
</tr>
</tbody>
</table>

Source: Compiled on basis of primary and secondary data
5.9 Chapter Summary

Osterwalder and Pigneur (2011) defined a business model that “describes the rationale of how an organization creates, delivers and capture value.”

Seddon and Lewis (2003, p.2) mapped the conceptual framework of a business model in the context of strategy management and concluded that, “Strategy seems more concerned with competition between firms, whereas business models are more concerned with the ‘core logic’ that enables a firm to create value for its customers and owners.” The strategy of a firm is a broader and a more in-depth representation than that of a business model.

A business model is a strategic management tool and should be an integral part of company strategy. Casadesus-Masanell and Ricart (2010a & 2010b) argue that a firm’s business model refers to the logic the firm, the way it operates and how it creates value for its stakeholders. A company’s strategy will be manifested in its decisions with respect to the choice of business model through which the company will compete in the eco-environment. Companies will have to start working on their business models in order to pursue sustainable competitive advantage. Demil & Lecocq (2010, p.228) maintain that a sustainable business model is seldom found immediately but requires ongoing refinements to create internal consistency to adapt to the external environment. Their views are consistent with the need for dynamic capabilities including the capacity to transfer or reconfigure a company’s business model.

Seddon and Lewis (2003) argued that a firm may design and deploy a business model for the firm, different business models for different levels of the operational hierarchy of the firm, or different business models for different products or projects. This project-based view of the business model of a firm is
also supported by Wikstrom et al. (2010).

The strategy of a company will determine its business model. The company will grow and nurture the appropriate bundle or configuration of dynamic capabilities to support the chosen business model. However, innovative companies will attempt to reconfigure their business models and reconfigure their dynamic capabilities when innovations are required by the external eco-environment. This approach will reconfigure (addition, transformation, unbundling and recombination, and sun-setting or omission via obsolescence) the full or part of the set of current operational capabilities to elevate its business model to another level or dimension to enable the company to engage in emerging dynamism, volatilities, and uncertainties in the disruptive environment.

As detailed in the Chapter, a within-case analysis on firm-level dynamic capabilities and business model innovations was conducted for each of the three academic spin-off companies. The analyses covered some preliminary assessment of the possible relationships between the company’s business model and dynamic capabilities respectively.

A cross-case analysis was also conducted to investigate the commonalities and differences in terms of business models of the three case study companies, followed by another round of analysis to focus on the commonalities and differences in terms of practices comprising dynamic capabilities of the three companies (Jantunen et al. 2012)

A number of tools most recently developed by scholars and researchers in strategy and strategic management were adopted with some minor modifications to perform data analysis and comparisons. These include (a) the “Business Model Canvas” framework and (Osterwalder and Pigneur 2002;
Osterwalder et al. 2005; Osterwalder and Pigneur 2010); (b) the McGrath’s Scoring Scheme for assessing the level of attractiveness for a company’s business model (McGrath 2011); as well as (c) the “sensing”, “seizing” and “reconfiguring” framework for dynamic capabilities categorization (Teece et al. 2007; Katkalo et al. 2010; Dottore 2009; Jantunen et al. 2012; Pavlou and Sawy 2011).
6. CHAPTER 6 – CONCLUSION

6.1 Introduction

This research study presents a first exploratory attempt to focus on academic spin-off companies in Hong Kong and investigates into how these companies strategize to achieve sustainable competitive advantage. Specifically, the qualitative study explores, analyzes and compares the strategy development of three academic spin-off companies, each from one of the research universities in Hong Kong, on how they sustain viability and compete, and what roles dynamic capabilities and business model innovations play for these companies. Extant literature suggests that these phenomena have not been previously investigated in a systematic manner..

This study draws on conceptual frameworks of literature on academic entrepreneurship, academic spin-off companies, the dynamic capabilities view (DCV), business model and business model innovation, as well as firm-level competitive advantage. The literature review process for this dissertation involved extensive study of extant and current literature on (a) academic entrepreneurship and academic spin-off companies in the US, European countries and then, with special focus on the Hong Kong scene; (b) business model research, business model framework(s) and business model innovations; and (c) firm-level dynamic capabilities and firm competitiveness. Review of the literature suggests that business model innovation represents a source of competitive advantage. Firms need to design and deploy an appropriate business model that fits strategically with the external environment to create and capture value, and to reconfigure or transform the business model on an on-going basis. Another stream of the strategy management literature focuses
on firm-level dynamic capabilities and argues that they contribute to sustainable competitive advantage. Extant literature and current literature however have provided very limited insights or knowledge in terms of research into the potential relationships between business model changes and dynamic capabilities for business firms, in particular academic spin-off companies.

The research methodology adopts a constructivist paradigm, an exploratory research design, using a case study approach for collecting primary data through semi-structured interviews, and applying a multiple case studies method for analysis and comparisons,

During the semi-structured interviews, conversations and email correspondence with the founders, CEO or members of the boards of directors, the focus was to explore and collect primary data to facilitate analyses of, first, knowledge of business model components that exist in three academic spin-off companies in Hong Kong and how the business models are designed, deployed, sustained and transformed to create competitive advantage for the three companies and ensure on-going business viability in the longer term, second, knowledge of the types and configurations of dynamic capabilities and how these are being nurtured, embedded, promulgated and reconfigured in the three companies to enable the required “strategic fit” with the evolving business models and from there on, with the external environments.

However, during the inception stage, these academic spin-off companies, and their respective parent universities do not necessarily share the same or equivalent orientations, strategies and infrastructural set-up for supporting their respective processes in the commercialization of research outputs. Therefore, it is also the aim of this study to explore, make comparisons and investigate for possibility of replication logic across cases (Eisenhardt 1989; Vohora et al 2004), and look for commonalities or differences in terms of spin-off
companies’ developments in business model innovations or dynamic capabilities.

6.2 Findings and contributions

6.2.1 Findings and theoretical implications

Most prior case studies and empirical studies of dynamic capabilities, business models and firm-level competitive advantages have been focusing on one topic or stream per study. Strategy management literature would discuss VRIN resources and dynamic capabilities as higher order capabilities over the generic organizational capabilities or definitional arguments with proposing the business model construct as a unit of analysis.

This study extends the earlier findings of prior literature by establishing links between dynamic capabilities and business models and competitive advantages. This study adopts a multiple-case study approach to link dynamic capabilities and business model changes, transformation or innovations together to explore on how they would work together to contribute to firm-level competitiveness and business viability over the longer term.

With respect to theory, the findings of this study support the dynamic capabilities view and business model taxonomy. They are consistent with what are being postulated in the extant literature.

This study finds that firm-level dynamic capabilities of sensing, seizing and transforming (Teece 2010; Jantunen et al. 2012; Pavlou and Saway 2011) are required high-order capabilities to the conceptualization and design of business
models, deploying business models and reconfiguring business models. In this context, dynamic capabilities can be regarded as the tool and enabler for business model changes.

This study also confirms that business models are the key strategy tool for operationalizing and implementing firm-level strategies to ensure sustainability of viability of the business. The business model virtually directs and provides the space for the firm to execute its relationship initiatives and activities to harness and capture value for the organization.

The findings of this study indicate that while firm-level dynamic capabilities enable business model changes, it is the business model changes, and the values including monetary rewards or profits that provide tangible measures to feedback on the strengths of dynamic capabilities embedded in the organization. This study adds to the literature in confirming dynamic capabilities are the main source of competitive advantage for firms, and business model innovations may lead to business viability and competitiveness. Taken together, the findings suggest that firm-level dynamic capabilities enable the business model changes for achieving competitive advantage. Findings also indicate that the power and quality of dynamic capabilities have significant impact on the power and quality of business model changes for securing the successful performance of firm-level strategies.

The study started off with the assumption that academic spin-off companies, by reason of their association with their parent universities, are equipped with the unique technological capabilities for survival and competitiveness. The study finds that two possible developments or outcomes can emerge. Firstly, the academic spin-off companies move away or disconnect from academia and in-house R & D altogether, due to change in company ownership, company management teams, or simply lack of funding, for example, from venture
capital firms. Secondly, the technological capabilities that perform the major
tasks of dynamic capabilities on inception get eroded or being put on a lower
priority while the academic entrepreneurs are being challenged and confronted
with the accumulated capabilities requirements for marketing, financial and
other business capabilities.

Findings of this study serve to extend the body of knowledge for dynamic
capabilities and business model transformation for academic spin-off
companies, and for all small to medium size enterprises that aspire to be
technology-based and technology-driven. However, a key question is about the
industry segments or business sectors that can help nurture the appropriate set
of dynamic capabilities, organizational capabilities to devise and implement the
necessary business models for the relevant industry segments.

The relationship between dynamic capabilities and business models can be
visualized in the follow diagram:
The “Industry” context and impact of the eco-environment will affect firm-level dynamic capabilities and business models. The diagram below serves to highlight the multiple dimensions that firms need to observe:
Figure 6.2.1.2 Changes in eco-system and dynamic capabilities and business models
6.2.2 Findings and Managerial Implications

A company’s conceptualization of value proposition is at the heart of every case study company’s business model. Findings from this research study suggest that all of the three academic spin-off companies, by pursuing commercialization of research outputs from the parent universities, have deployed along different dimensions and scales their uniquely devised business model elements (Osterwalder, A. and Pigneur, Y. 2010). By adding up these business model elements, companies configured their business models at the inception of the business, and continue to do so as the companies grow and sustain their business. The business model elements are configured and supported by a focus on value proposition as the main driving concept and precept for the institution. It is the company’s ability to adapt, adjust and reconfigure or transform their business models that will determine the growth path and growth potential of the case-study companies further down the spin-off and commercialization journey. These findings are consistent with the argument by Storback (2011) that effective business models are characterized by the configurational fit of their elements.

The study also confirmed the presence of firm-level dynamic capabilities in terms of high-order capabilities for “sensing”, “seizing” and “reconfiguring” (Teece 2007; Jantunen et al. 2012) that are helping each of the academic spin-off companies in shaping and operationalizing their operational capabilities for growth and competitive positioning.

In these three case-study companies, Company A had successfully established itself as a major developer of GSM-GPRS turnkey solutions provider of telemetric applications. However, the company’s growth path was hampered by its thin capital base, mismatched leadership and human resources, lack of patentable technology offerings, lack of sustainable knowledge management
practices and embedded routines for re-align and reconfigure its management and technologies marketing resources to overcome, from a dynamic capabilities view, the existing organizational rigidity. Ultimately, Company A was unable to re-design, re-position, reconfigure its resources and capabilities base in time for strategizing on a new business model – that of a systems integrator, which is essentially project-driven, service-oriented and solutions based (Ceci and Masini 2011; Davies et al. 2006; Hobday et al. 2005; Karlos et al. 2007; Wikstrom et al. 2010).

Company B has successfully leveraged university’s research and patents in biotech and DNA to establish its foothold in the medical diagnostics industry. By staying on the leading edge of research and developments in the pharmaceutical industries in US and Europe, Company B pursues its growth path with a new business model, the molecular diagnostics segment of the medical diagnostics industry. Business outlook is positive as it is now on the right track towards joining yet another breakthrough business model, the emergence of personalized medicine in US (Jain 2009; Sabatier et al. 2012). Company B’s internal dynamic capabilities given its ability to transit into new business models and exploit its geographical presence in Hong Kong as the hub for molecular diagnostics business in the region.

Over the past years since its inception, Company C has found itself in a leadership position with its unique value proposition, unique technological platform and embracing the content aggregator and corporate subscription business model. Company C has actively avoided direct participation in the business-to-consumers market. Company C’s business model has saved the company from increasing competition from major global players of search engines and competitors from the social media business models. In the longer term, Company C has to identify and develop a new business model to suit and attract subscriptions from consumers at large, otherwise Company C will face a
business plateau for lack of participation from the mass although existing
corporate customers have demonstrated a lot of loyalty and stickiness. More
importantly, Company C has to be mindful of the imminent risk of
disintermediation in the digital market (Searle 2011). Given the accelerating
technology advancements and platform changes, Company C’s partners and
content providers may opt to increase their own profitability by going their own
for self-publishing and distributive broadcasting.

To facilitate comparative studies of the business models of the three academic
spin-off companies, this research study employed the assessment rubric for
comparing business models developed by Osterwalder (2004) and
supplemented by Osterwalder & Pigneur (2010), as well as McGrath’s scoring
scheme for comparing the level of attractiveness for company business models
(McGarth 2011). Findings from this study suggest that both tools at their
current form are very useful constructs for both highlighting the situations at
the three academic spin-off companies and gaining insights into how well and
effective the three companies perform with their prevalent business models.
Findings from this study confirm that Company B performs better than
Company C and Company A in terms of business model innovation.

In order to explore and investigate the development of dynamic capabilities for
the three academic spin-off companies, this research study adopted with some
modifications the approaches used in Jantunen et al. (2012) and in Pavlou and
Sawy (2011) to compile tables to compare the dynamic capabilities and / or
embedded routines in the case study companies. Focus was on the three
categories of dynamic capabilities, sensing capability, seizing capability and
reconfiguration capability as advocated by Teece (2007). Findings of this
study confirmed the results of analysis that again, same as the findings from
comparisons in business model innovation, Company B’s profile of dynamic
capabilities was ranked higher than that of Company C and Company A. This
analysis presents comparative information that is consistent with the findings on comparing business model innovations in the three companies.

Findings thus far provide some indications to suggest that a firm’s dynamic capabilities will lend support to the firm’s ability in reconfiguring their business models. However, it is recommended that further studies, and support with more extensive empirical data, will be required to provide the required level of evidence from cases in support of this argument.

6.3 Contributions

In Hong Kong, the notion of active participation by universities in the commercialization of academic research, and in particular, the spin-off of business units or formation of private limited companies to pursue the academic-business endeavors, is a relatively new phenomenon as recent as the early 1990s, when compared to developments in the United States or Europe (Lam & Mathews 2006; Lam & Mathews 2011). Yang (2012) argues that “while Hong Kong’s entrepreneurial spirit is strong in local culture and business, its achievement in academic entrepreneurship is relatively low”. It is in this context that this research study is to be considered relevant and constructive in contributing to the strategy management and entrepreneurship literature, especially for Hong Kong and its neighboring region.

This study serves to help filling in a potential gap in the strategy and entrepreneurship literature, where interests in studying the phenomenon of links between dynamic capabilities and business model innovations at the firm level have just recently emerged (Teece 2010; Katkalo et al. 2010; Onetti et al. 2010; Casadesus-Masanell & Ricart 2010a & 2010b; Jantunen et al. 2012; Dottore
Extant literature has been scanty with respect to comparative studies of business model innovations or dynamic capabilities of multiple firms, within same industry or cross industries. To date, empirical studies using industry data within the context of specific industry segments are scanty (Jantunen et al. 2012).

The need for investigation is especially relevant given the lack of research in this direction for academic spin-off companies in Hong Kong. This study will enhance understanding of academic spin-off company’s ability to orchestrate on-going re-configuration of resources and capabilities effectively with business model changes to engage opportunities in Hong Kong and other foreign markets.

6.4 Limitations of this Research and Beyond

This research represents a first exploratory attempt to focus on academic spin-off companies in Hong Kong. The study is also a first original research initiative to look into the phenomena of firm-level dynamic capabilities and business model innovations as nurtured and deployed in these three academic spin-off companies in their respective distinctive industry segments in the commercialization of research output processes. As such, this study inadvertently will be subject to a number of limitations although it is hoped that these limitations will in turn open up avenues to further research and studies in future.

Given the limited size of the sample case-study companies, one identified
limitation will be in terms of generalization of the research findings for other academic spin-off companies. For the same reason, the limitation will be even more apparent in so far as applicability in the larger commercial communities is concerned.

Results are applicable only within academic spin-off contexts. Therefore, caution should be exercised in generalizing our results into other sectors.

As stated in Section 1.3 of Chapter 1, this exploratory study focused on three case studies of three academic spin-off companies in Hong Kong but the objective is not to adopt the perspective of investigating the phenomenon under study with academic spin-off companies as an industry, that is, as a unit of analysis. While it is generally accepted that the uniqueness of academic spin-off companies come from patents or technological know-how, technological / innovation capabilities, knowledge resources should be taken into consideration along with other resources and capabilities when the phenomenon about firm-level dynamic capabilities and business models are being investigated. It would seem apparent that the focus and coverage on the unique but single dimension of technological know-how has been diluted although the study may have successfully achieved its objective of studying the phenomenon from a holistic point of view on firm-level dynamic capabilities, business model innovations and competitive advantages.

The use of one single key informant or just two informants from each of the three academic spin-off companies for this research study has intrinsic limitations. Future studies should aim at recruiting multiple informants, although it is reasonable to assume that senior executives, CEOs, board members are most knowledgeable and were often involved in all aspects of strategic aspects of the business.
It is interesting to note that research in academic entrepreneurship is “fragmented” (Rothaermel et al. 2007); that despite progress made with respect to the study of theoretical basis for dynamic capabilities, there is still a relatively significant lack of support from empirical research findings (Weerwardena and Mavondo 2011); and that business model innovations still in need of generally accepted definitions and taxonomies of the business model (Dottore 2009; Osterwalder et al. 2005). It is indeed challenging and yet well worthy to consider this exploratory study as a first small step towards broader and more in-depth studies of the relationships between firm dynamic capabilities and firm business model innovations by way of future research initiatives.

6.5 Suggestions for Future Research

Kujala et al. (2010) studied the Japanese mobile services provider DoCoMo and concluded that business models for project-based firms should be analyzed at the level of individual solutions, instead of only at the firm- or business unit-level. This is consistent with the observations of the present research study that Company A experienced in making a transition from turnkey project contractor to systems integration (in the “IT solutioning” business). Theoretically speaking and following a practitioner perspective, research on both business model innovations and dynamic capabilities should not be restricted to firm-level analysis only. It would be reasonable to expect expanding from Kujala et al. (2010)’s argument to consider studying business model innovations and dynamic capabilities at a variety of organizational levels, at partnership and network clusters levels, at the levels of multiple industry segments, to better appreciate the interlocking and interplay of actors, activities and other dimensions of business model dynamics as well as the deployment
and manifestation of dynamic capabilities in shaping and reconfiguring the company business models for sustainable competitive advantage. The views as advocated by Kujala et al. (2010) are consistent and in fact serve well to echo the argument by Seddon and Lewis (2003) that there can be multiple business models in support of firm-level strategy for a company. It remains to be seen, however, how to research into the ways and means of tracking and measuring, by adopt a dynamic capabilities view, an ongoing transformation of business models at multiple levels within the company.

A review of extant literature suggest that there is very few comparative studies of dynamic capabilities construct of multiple firms, within same industry or cross industries. While this research study has made an exploratory attempt to focus on the commonalities and differences in terms of practices comprising dynamic capabilities of the three case-study companies, it is recommended that a more in-depth research or study into comparing the dynamic capabilities of multiple case-study companies should be reserved for further research initiatives in the future.

It is well worthwhile to initiate a more rigorous and deep research into business model innovation and dynamic capabilities. Subtleties need to be de-coded and contextualized. For now, empirical studies are very limited. The managerial implication is that practitioner understanding of the phenomena is superficial when they are more concerned about business plans and marketing planning.
6.6 Summary and Concluding Remarks

Findings suggest that a company’s strategy will determine the business model. The spin-off company will grow over time and nurture the appropriate bundle or configuration of dynamic capabilities to support the chosen business model. However, companies need to reconfigure their business models, and reconfigure their dynamic capabilities that will in turn reconfigure (adding, transforming, unbundling and recombining, sun-setting or omitting through obsolescence) the full or part of the set of current operational capabilities, so as to move its business model to another level or dimension to overcome the dynamic environment of volatilities and uncertainties.

This exploratory study will complement existing studies with assessing the contribution of firm dynamic capabilities to enable business model innovations. Notably, it will enhance understanding of a firm’s ability to orchestrate ongoing reconfiguration of resources and capabilities effectively with business model flexibility and agility to engage in new opportunities (Teece et al. 1997; Teece 2010), in the Hong Kong context as well as other context of small to medium-sized firms (SMEs) expanding into international markets and achieving success in foreign markets (Lu & Beamish 2001; Zahra & Garvis 2000; Dimitratos et al. 2004; Koch 2010).

Further, the study should provoke thoughts about future research possibilities on business model innovation and dynamic capabilities of spin-offs, especially corporate spin-offs of “born-global” (Knight & Cavusgil 2004) firms in Hong Kong and the region. Finally, even if the study is not particularly successful in answering the research questions, it should highlight the need for further study of firm level dynamic capabilities or business model innovations, given the increasing uncertainties and volatilities that organizations and their stakeholders experience.
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Appendix 1

Interview Protocol

Title of Research Study
Enabling business model innovation – a study on the development of dynamic capabilities in academic spin-off companies

Purpose
The purpose of this study is to explore and investigate how academic spin-off companies in Hong Kong would identify and nurture key dynamic capabilities to help reconfigure capabilities, and then leverage these capabilities to enable changes to its evolving business model over time to achieve sustainable business competitiveness.

Specifically, the focus will be on identifying:

- Spin-off company’s evolving business model of creating, delivering and capturing value
- The company’s dynamic capabilities that will flexibly orchestrate and reconfigure the company’s key resources, organizational capabilities and processes

and looking into

- How different domains (value proposition, customer relations, customer segments, channels, key resources, key activities, key partners, costing structure and revenue stream) of the company’s business model interact with one another
- How dynamic capabilities will enable the appropriate environment and context for business model changes to help achieve sustainable competitive advantage

Participation in Semi-structured interviews
Participants who volunteer to participate in this study will be asked to join in one or two semi-structured interviews that the researcher will conduct to consult their views and perspectives.

All interviewees from the same company of sample academic spin-off companies are encouraged to speak freely about own company’s business
model strategies in creating and capturing client values, thus competitive
advantages, their experience with managing or reconfiguring own company’s
intellectual capital, knowledge resources and organizational processes thus firm
dynamic capabilities to enable the business model changes towards sustainable
competitive advantage. The standard questions used are designed only to help
initiate and guide the interview process, not as a formal structured outline nor
need to be sequenced rigidly. All the interviews will be audio recorded and
transcribed, and notes will be taken during the interviews when necessary.

Interviewing – Getting Started

- Introduction – researcher and project
- Ask the respondent to sign the Statement of Informed Consent form, explain to him / her if necessary
- Confirm / re-affirm confidentiality: All responses to these questions will be held strictly confidential and respondent will not be identified individually
- Ask respondent for permission of audio-taping: In order to accurately capture all of the informant’s responses, informants will be asked for permission to audio record the interview. In addition, informants will be asked if the study may use some of the quotes from the interview under anonymous pseudonym for purpose of the dissertation and / or publishing papers or conference proceedings.
- When replying to interview questions, respondents will be requested to reflect on the current state as well as the historical perspectives / longitudinal developments
- Towards the end of the each session, the researcher would ask the interviewee if there is any other questions or comments that they would like to make.
- The researcher would close or adjourn the interview session by thanking the interviewee for his / her participation.

Interview Questions


- What is your assessment of your company’s competiveness and competitive advantages (in the 90’s, 2000’s and 2010 to 1Q2012)?
- Would you consider that there are other firms competing for the business on a similar or equivalent basis?)
How difficult it would be for your competitors to catch up, imitate or emulate your value propositions, resources or capabilities?

How difficult it would be to stay on the leading edge and maintain your firm’s competitive position?

How would you describe the key elements that compose your firm’s value proposition (in the 90’s, 2000’s and 2010 to 1Q2012)?

Do you consider your company offers a better value proposition than that of the competition?

Are there and what compromises does your company’s current business models force customers to make?

Does your company have a plan for identifying potential business models, implementing them, and embedding business model innovation capabilities within the organization?

What would your company need to change in the organization and operations to implement a new business model?

Over the past years since your company’s inception, how frequently you’re your company change its business model? How often incremental changes take place? How often do innovational changes take place? Why?

When was the last time your company reconfigure its business model? Would you consider changes in your business model strategy transformational or innovational? Why was it necessary to execute such changes?

What new business models do you see emerging in your industry? Is the basis for competition changing?

Where are new and disruptive business models coming from? From within your industry or from new players / other industries?

What is the degree of change and innovation in your industry? What can you learn from successful business model innovation either in your industry or outside?

Which business model innovation paths are you exploring? Industry model innovation, revenue model innovation or enterprise capabilities model
innovation? Which ones are most aligned with your industry, capability and vision?

- Do you have a systematic way to envision future industry scenarios and implications for your innovation strategy?

- How can you exploit new / emerging revenue models as well as new value propositions, and manage the implications for your business and competitive positioning? Do you have a structured approach to thinking through revenue implications?

- Do you understand – and leverage – your unique capabilities and assets? What capabilities and processes do you have in place to develop, maintain, evaluate and terminate external collaboration for innovation?

- Thinking of the key processes and assets that your company deploys over time to perform its business, how would you describe your company’s operational capabilities that match its operational processes and assets?

- Considering the intellectual capital and knowledge-based expertise and / or resources at your company, how would you list and describe the key areas that are crucial to the firm’s success (in the 90’s, 2000’s and 2010 to 1Q2012)?

- Following from above, please share with us your assessment of how these key knowledge management capabilities and resources can be reconfigured over time (in the context of four major building blocks for knowledge reconfiguration, Actors, Structures and Systems, Physical resources and Culture) (Verona & Ravasi 2003)?

- Considering the formal mechanisms if any that your company has implemented to manage its intellectual capital and knowledge resources, what are your perceptions and comments about your company’s organizational structure, knowledge management processes notably knowledge creating process, organizational capabilities in knowledge creation, knowledge conversion (notably actors and processes for internalization, externalization, socialization and combination of knowledge)?