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Collaboration in the Australian and Chinese Mobile Telecommunication Markets

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Abstract

Inter-firm collaboration has become increasingly important in the global economy. Firms rely on collaborations to access new resources, new technology, skills, latest market information, new markets and knowledge, to increase innovation, to reduce costs and to overcome government policy barriers. Given the importance of business collaboration, it is not surprising that the topic has been extensively researched in both economics and business studies even though the term "collaboration" has not generally not used consistently in the literature. The empirical research has primarily focused on inter-firm collaborations in developed countries and involving large firms. There are many differences between developed countries and developing countries, which may influence the types, motives and results from inter-firm collaborations.

A major objective of this thesis is to identify the key determinants of successful inter-firm collaborations in the telecommunications industry in Australia and China. To provide more reliable results, both qualitative and quantitative research methods are adopted in this thesis as complementary methodologies. The qualitative analysis is based on information from 31 face-to-face interviews conducted in China and Australia between 2008 and 2009. The quantitative method is an ordered probit estimation using data collected from an online survey conducted in 2009 with 339 valid responses. Findings from the thesis show that firms prefer peer or larger sized partners to achieve a higher performance in their collaborations. Trust, communication and firm size play significant positive roles in successful inter-firm collaborations. It was also found that previous experience plays a less important role and that cultural similarity plays a significant negative role in inter-firm collaborations in China and Australia. China and Australia are different in terms of level of development and market size. To collaborate with Chinese partners, it is better to target bringing more profits or increasing their market influence. However, to collaborate with Australian partners it is better to target cost saving. The results also suggest that studies of business collaboration should take into account the cultural background, regulations and industry characteristics in each country.

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List of Papers Arising from this Study

Book Chapter

Zhang Y, Guo S, Hu J, Hodgkinson AT (2008) 'Choosing business collaborators using computing intelligence methods'. In: Huang D, Wunsch II D, Levine D, Jo K (eds.), Advanced intelligent computing theories and applications. SpringerLink, Heildelberg, pp 529–535

Journal Paper

Zhang Y, Cheng ZM, Harvie C (2013) 'The roles of size and size difference in Australian and Chinese inter-firm collaborations'. AABFJ 7(2). (Level B), pp 31–48

Refereed and Presented Conference Papers

Zhang Y, Hodgkinson AT, Harvie C (2009) Inter-firm collaboration in the Chinese telecom market. 6th SMES in a global economy conference. Beijing Information S & T University, Beijing, pp 13–13

Zhang Y, Harvie C (2010a) Size still matters when firms choose business collaborators. The 7th SMEs in a global economy conference 2010 challenges and prospects. Pusat Penerbitan Universiti, Malaysia, pp 1–11

Zhang Y, Harvie C (2010b) Inter-firm collaboration in Australian telecom market. The 7th SMEs in a global economy conference 2010: challenges and prospects. Pusat Penerbitan Universiti, Malaysia, pp 1–11

Zhang Y (2011) 'Trust in inter-firm collaboration', the 8th SMEs in a global economy conference, 2011, Thailand

Zhang Y, Sun C (2011) 'Decision tree in inter-firm collaboration', the 8th SMEs in a global economy conference, 2011, Thailand

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Terms	Explanation
3G	Third-generation networks, which are high-capacity radio access wireless networks providing enhanced data services, improved Internet access and increased voice capacity
4G	Next-generation cellular wireless access standards
ACCC	Australian Competition and Consumer Commission, the government body responsible for administering price caps related to Telstra and for regulating competition policy, anticompetitive conduct or unfair business practices and enforcing the Competition and Consumer Act 2010
ACIF	Australian Communications Industry Forum is an independent body established by industry to manage telecommunications self-regulation
ACMA	Australian Communications and Media Authority, which came into existence on 1 July 2005, is responsible for the regulation of broadcasting, radio communications, telecommunications and online content
ADMA	Australian Direct Marketing Authority is the peak trade association representing the direct marketing industry
ADSL	Asymmetric Digital Subscriber Line, a technology used to transmit data at fast rates (between 16 kbit/s and 640 kbit/s upstream; up to 8 Mbit/s downstream)
ADSL 2+	Successor product to ADSL that raises the maximum data rate to 16 Mbit/s (downstream) or 1 Mbit/s (upstream)
AMPS	First-Generation Technology Advanced Mobile Phone System, a mobile telephone system predominantly based on analogue transmission
AMTA	Australian Mobile Telecommunications Association is the national body representing the mobile telecommunications industry in Australia
Analogue	The term used to describe the continuously variable wave form nature of voices and other signals; a signal for which the amplitude (strength) and frequency (tone) vary continuously
ARPU	Average Revenue Per User; the ratio of service revenues in a given period to the average number of wireless subscribers in the same period; it is presented on a monthly basis
ASP	Application Service Providing, a service that enables enterprises to lease IT applications

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Terms	Explanation
Bandwidth	Denotes the width of the frequency band used to transmit data; the broader the bandwidth the faster the connection
Base Station	Part of the infrastructure essential for network operation; base stations contain the radio equipment which serves the 'cell'
Bluetooth	A system which allows inter-related communication between mobile phones and stationery devices (such as computers)
bps	Bits per second; basic unit of measurement for serial data transmission capacity
Broadband	Broadband is a general term that refers to high-speed connections such as cable, ADSL and satellite; for broadband services, Internet access is not time-based as it is an "always on" connection, the exception being the uplink for satellite
Capex	Capital Expenditure; accrued capital expenditures related to the expansion of the telecommunications infrastructure
Carrier	In very general terms, a carrier provides the physical infrastructure used to supply carriage services to the public
CDMA	Code Division Multiple Access is a type of digital mobile service that differs from GSM digital; CDMA replaced the analogue service
Churn	The process of transferring customer accounts between service providers in Australia
CJV	Contractual joint ventures
CND	Calling Number Display is a service that allows a caller's number to be viewed by the person receiving the call
Content Provider	A company that provides services to mobile phone users or network operators
CSP	Carriage service provider in Australia; person supplying or proposing to supply certain carriage services, including a commercial entity acquiring telecommunications capacity or services from a carrier for resale to a third party
DCITA	The Department of Communications, Information Technology and the Arts in Australia
DGP	Directorate General of Posts of China
DGT	Directorate General of Telecommunications of China
DSLAM	Digital subscriber line access multiplexer is a piece of infrastructure at the exchange that allows for ADSL and a standard phone service to be provided on the same line
Digital	The representation of a signal in the form of a stream of binary numbers rather than as an analogue electrical signal
DVB-H	Digital Video Broadcasting – handheld, a transmission standard that enables users to receive digital TV channels on their mobile phones
ECS	Enterprise Communication Services
EDGE	Enhanced Data Rates for GSM Evolution, modulation on the air interface to enhance data rates in GSM (Global System for Mobile Communications) and TDMA (Time Division Multiple Access) networks
EJV	Equity joint ventures
GHz	Gigahertz, one billion Hertz
GPRS	General Packet Radio Service, technology allowing higher data transmission rates in GSM networks

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Terms	Explanation
GSAs	Global strategic alliances
GSM	Global System for Mobile Communications, global digital mobile communication standard
HCS	Home Communication Services
HSDPA	High-Speed Downlink Packet Access, packet-based protocol that enhances data rates in UMTS networks and lifts transmission speeds into the megabit range
i-mode	A customized packet-based mobile service
ICT	Information and Communication Technology
ICV	International cooperative venture
IEEE	Institute of Electrical and Electronics Engineers
Interconnection	Term used to denote the connections between networks run by various providers, as regulated by the German Telecommunications Act
Internet/intranet	The Internet is a worldwide Internet Protocol (IP)-based computer network that has no central network management; by contrast, intranets are managed IP networks that can be accessed only by specific user groups
IP	Internet Protocol
IPTV	Internet Protocol television, a system where a digital television service is delivered using the Internet Protocol
ISDN	Integrated Services Digital Network, integrate telecommunications services such as telephone, fax and data communication in one single network
ISP	Internet Service Provider, an internet service provider offers various technical services that are required to use or operate Internet services, usually in return for a fee
ITU	International Telecommunications Union
IVR	Interactive Voice Response, a service for mobile voice talk or other services
Java	An industry-standard object-oriented language and virtual machine
Kbps	Kilobits (thousands of bits) per second
LCS	Local carriage service; this is where the access provider provides the wholesale or network elements of local calls and the access seeker provides the retail elements such as billing
M-commerce	Mobile commerce, generated after electronic commerce based on mobile network and wireless technologies (e.g., ring tones, icons, wallpapers, games and premium SMS for reality TV voting and competitions.)
Mbit/s	Megabits per second, unit of data transmission speed
MII	Ministry of Information Industry of the People's Republic Of China
MMS	Multimedia Message Service allows the transmission of various media such as text, image, animations, video and audio clips in a single message
MNE	Multinational enterprise
Mobile Internet	Mobile customers can gain wireless access to the Internet anytime and anywhere by using wireless terminals such as mobile handsets and mobile Internet terminals
Mobile Payment/ Wallet	An integrated mobile payment service can be classified as remote payment and on-site payment, which provides customers with functions such as recharging, payment and enquiries through RFID, WWW, SMS/MMS, etc.

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Terms	Explanation
Mobile TV	Mobile TV is expected to drive margins and 3G penetration for carriers; popular forms of mobile TV are expected to be news clips, sport highlights, music video clips and 'mobisodes' (shows specially made for mobile handsets)
MPT	Ministry of Posts and Telecommunications of China
Multimedia	Term used to denote the real-time integration of text with still images and graphics, video and sound
MLP	Multi-Layer Perception is a method used in computing intelligence to train the system
Naive Bayes classifier	A Naïve Bayes classifier is a simple probabilistic classifier based on applying Bayes' theorem
NN	Artificial neural networks are composed of interconnecting artificial neurons to mimic the properties of biological neurons
Number Portability	Portability; an arrangement that allows subscribers of a telecommunications service to change carriers without having to change their number
Packet switching	A method of transmitting messages by subdividing them into short packets containing the data and a destination address; each is passed from source to destination through intermediate nodes which direct each packet onwards, not necessarily by the same route; the packets are reassembled into the original message at the receiving end
PCS	Personal Communication Services
Prepaid	In contrast to postpaid contracts, prepaid communication services are services for which credit has been purchased in advance with no fixed-term contract obligations
Polyphonic	Polyphonic ringtones vary in specification from phone to phone, but all polyphonic phones support the playing of more than one note together, so a ringtone is generally more musical
Postpaid	Subscriber that has a contract for the use of airtime; the client has no need of activating airtime, it is done so immediately
Premium Services	A carriage service or a content service using a number with a prefix starting with '190' in Australia
PTT	Push to Talk (PPT) offers consumers the ability to talk to another individual or group without having to make additional calls
Real (or true) Tones	Ringtones that are an extract from patented music
RF	Radio Frequency
Roaming	Roaming allows customers to use their mobile phones on other networks (other than the one for which they currently pay); roaming can be national or international
SMS	Short Message Service (SMS) enables mobile phones to send and receive text messages
Spam	Unsolicited marketing e-mail and SMS messages to mobile phones
Spectrum	The bandwidth of a communications system, expressed in terms of the frequencies it can carry
SWOT	Strengths, weaknesses, opportunities and threats
TDD modulation	Time Division Duplexing, a broadband transmission method where the sending and receiving channels use the same frequency but at different times

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Terms	Explanation
TDMA	Time division multiple access
TIO	The Telecommunications Industry Ombudsman (TIO) is a free and independent service for residential customers and small business in Australia that can help them resolve complaints about phone and Internet problems
UMTS	Universal Mobile Telecommunications System, third-generation international mobile communication standard
Value-added services	Services provided over a public or private network which, in some way, add value to the basic carriage services (such as storing and forwarding messages)
Virtual Private Network	A software defined network offered by telephone carriers for voice and data communications among multiple sites; the network provides the appearance of a private network, except that it makes use of the public switched network rather than physically dedicated leased lines
VMNOS	Virtual Mobile Network Operators
VOIP	Voice over Internet Protocol, technology used to make telephone calls via the Internet
VDSL	Very high bit rate Digital Subscriber Line, a new technology used to transmit exceptionally high data rates (5 Mbit/s upstream, 50 Mbit/s downstream)
W-CDMA	Wideband Code Division Multiple Access, a technology for wideband digital radio communications of Internet, multimedia, video and other capacity-demanding applications
Wallpaper	Wallpaper is the background of the mobile phone display
WAP	Wireless Application Protocol, a service for mobile Internet access
Wholesale	The business of selling services to third parties who in turn sell them to their own end users either directly or after further processing
WLAN	Wireless Local Area Network, wireless networks for mobile Internet access; the network can also connect multiple computers to each other or to a central information system, a printer or a scanner
Wi-Fi	Wireless Fidelity, based on 2.5G technology
Wi-MAX	Worldwide Interoperability for Microwave Access, a telecommunications technology aimed at providing wireless data over long distances in a variety of ways, from point-to-point links to full mobile cellular type access; it is based on the IEEE 802.16 standard
WOS	Wholly owned subsidiary
WTO	The World Trade Organization (WTO) deals with the global rules of trade between nations; its main function is to ensure that trade flows as smoothly, predictably and freely as possible

Chapter 1
Introduction

1.1 Introduction

This study investigates the issues of the types, motives, benefits, risks and key determinants of successful inter-firm collaborations in the Chinese and Australian mobile telecommunication markets. Inter-firm collaboration has become increasingly important in the global economy (Lavie 2007). Firms rely on collaborations to access new resources, new technology, skills, latest market information, new markets and knowledge, to increase innovation, to reduce costs, and to overcome government policy barriers. Since 1990 the number of global strategic alliances has grown by more than 25 % annually (Bleeke and Ernst 1995). Inter-firm collaborations between competing firms and firms from different cultural backgrounds increased dramatically in recent years (Vilana and Monroy 2010).

As more firms adopt a collaboration strategy, it adds pressure on non-collaborating firms that are being increasingly subject to global competition (Wilson 2007). As Lank (2006, p. 1) indicated 'no organisation is an island' now. The problem of how to select a good partner, supplier, or customer is a crucial challenge for most firms. It is even more important for small and medium sized enterprises (SMEs) to plan and adopt collaboration strategies to survive fierce global competition (Lee 2007).

The study of inter-firm collaboration has attracted researchers from a number of disciplines including economics, management, and business studies. *Transaction* cost theory (Coase 1937; Williamson 1971, 1979, 1985, 2005), the resource based view (Demsetz 1973; Rumelt 1984; Das and Teng 1998; Barney 2001), and many other management and business theories have contributed significantly to a better understanding of this area (Porter 1980, 2007; Kay 1993; Hart 1995; Kale 1999; Harrison 2004).

Diverse terms have been used in the management, business, and economics literature to describe inter-firm collaboration, for example alliances, cooperation, coordination, coalition or partnership. On the other hand, most models of collaboration have adopted tangible profits or benefits (Contractor and Lorange 1988) as

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the major outcomes from this activity, ignoring some important intangible benefits (e.g. enhanced relationships with government agencies or extended business networks). Therefore, by reviewing different definitions and terms used in the literature, this study defines inter-firm collaboration to be **"inter-firm activities that are aimed at generating tangible and/or intangible benefits for each firm involved"**.

Most of the existing studies focus only on firms from developed countries or/and only on large firms (Link and Bauer 1989; Lavie 2007). Less attention has been devoted to a comparative study between emerging and developed economies (Kuada 2002). In addition, most of the existing literature has focused on very general or traditional (e.g. agriculture or manufacturing) industries (Anderson and Narus 1990; Krogt et al. 2007; Mazzola et al. 2008). As inter-firm collaboration involves very dynamic and complex activity, an interesting and important issue is the identification of how such collaboration is changing in new and emerging industries such as the mobile telecommunication industry. In addition, is there any difference in the characteristics of inter-firm collaboration in different countries? Intangible benefits (e.g. Guan Xi) play a vital role in Chinese inter-firm collaboration (Lu et al. 2006; Su et al. 2009; Jia and Rutherford 2010). However, these benefits play a moderate role in western countries. Thus, there is a need for further and more detailed studies that examine inter-firm collaboration from a comparative industry and country perspective.

To fill this research gap, this thesis analyses and compares the existing literature with the aim of developing a general model of inter-firm collaboration. It provides an empirical analysis of collaboration in the mobile telecommunication industry in China and Australia. It will also identify key determinants of successful inter-firm collaboration in Australia and China by means of both qualitative and quantitative methods.

1.2 Contributions and Significance

Most empirical research on inter-firm collaboration has focused on the U.S., Japan, and a small number of European countries (e.g. Hamel et al. 1989; Hagedoorn 1993, 1995; Gulati 1995; Kale 1999; Hagedoorn and Duysters 2002), with little research having been conducted for most developing countries (Beamish 1985; Humphrey and Schmitz 1998; Narteh 2008) and Australia (More and McGrath 1999; Lohrke et al. 2006; Zhang and Harvie 2010). Some studies have omitted the majority of micro and small firms by using only annual reports and stock market reports.

The emergence of wireless and mobile networks has accelerated global communication and inter-firm collaboration (Fitzek and Katz 2006). New business opportunities and markets require new business models and collaborating strategies. However, there is a lack of studies on inter-firm collaborations in new and globally oriented industries. Previous collaboration types and models may not be

applicable for these newly developed industries and in an environment of global competition. A continued study on inter-firm relationships is essential to develop a robust understanding of business strategy (Singh and Mitchell 2005).

To address the gap in the existing literature regarding developing countries and new industries, this study will first conduct an empirical analysis of the Chinese and Australian mobile telecommunication markets and identify the major differences between them. In addition, this thesis will explore and highlight the key ingredients for successful collaboration in different countries. This thesis will also contribute to a better understanding of the importance and role of each factor in the outcomes and performance of collaboration.

With rich information obtained from specific interviews and robust data analysis from a quantitative survey, the results of this thesis will shed light on how to improve inter-firm collaboration, build a trusting relationship between firms, enhance collaboration performance and reduce collaboration barriers in local and global markets.

1.3 Research Questions and Methodologies

The aim of this thesis is to identify the collaborating types, benefits, risks, and factors that influence the final success rate or performance of collaboration in the Australian and Chinese mobile markets. It also identifies key determinants for successful inter-firm collaboration in broader business areas across these countries. Therefore, this thesis focuses on two primary research questions:

Q1: What are the major types, benefits, and risks arising from inter-firm collaboration in the Australian and Chinese mobile telecommunication markets?

Q2: What are the key determinates of successful inter-firm collaboration in China and Australia and do these differ?

To provide more reliable results for the questions above both qualitative and quantitative research methods are adopted as complementary methodologies in this study. A qualitative case study is used to identify the characteristics of the mobile telecommunication markets in China and Australia and answer the first primary research question. The quantitative study is designed to examine the key determinants and measures the importance of these upon the final success rate of inter-firm collaborations and answer the second primary research question.

The first primary research question is answered by industry analysis and qualitative case studies conducted in both Australia and China. The aim of the first research question is to identify the major characteristics of inter-firm collaboration in the Chinese and Australian mobile markets and find whether these results are different from previous empirical studies in other traditional industries. The results are expected to give evidence of the significance of this study. The second primary research question is answered by means of a quantitative study. To examine the research results in a broader context, the quantitative study is designed to cover

more industries (e.g. manufacturing and services industries). A collaborating model is adopted and modified from previous literature. Five key determinants of a successful inter-firm collaboration identified from the literature are: trust, communication, cultural similarity, firm size and experience. The contribution of each of these determinants is examined in the hypotheses proposed in Chap. 4. The identified determinants have been examined separately for their influence and relationship with the performance and final success rate of inter-firm collaborations by using hypotheses tests.

Data are collected separately for the qualitative and quantitative studies. Face to face interviews are conducted in both Australia and China for the qualitative study. The selected interviewees are CEOs or senior managers who have a good understand of the firm's business partners and its collaborating strategies in the selected mobile telecommunication firms. The interview questions cover business information, collaborating information, partner information and suggestions. Qualitative research in this thesis provides industry evidence and rich information on inter-firm collaboration such as previous collaboration problems and solutions.

To examine the research results of the qualitative study in broader business areas, the quantitative study extends the research range to include other industries. The quantitative data are collected through an online survey system and saved in a database automatically. An econometric analysis is carried as the main tool in the quantitative analysis. The complementary research involving qualitative and quantitative methods is expected to provide more reliable results for this thesis (Newman and Benz 1998).

1.4 Structure of Thesis

The thesis is divided into eight chapters, which are now briefly outlined. The first chapter is the introduction of the research, which includes the background of this study, its contribution and significance, research questions and methodologies, structure of the thesis and expected results.

The second chapter discusses definitions and previews theories used in the inter-firm collaboration literature. It reviews different definitions and terms used in previous literature and compares advantages and limitations of each definition. It also reviews the development and contribution of primary economic, management, and business theories on inter-firm collaboration. It compares the advantages and disadvantages of transaction cost theory, the behavioural theory of the firm, property rights theory, agency theory and the resource based theory in analysing inter-firm collaboration. It also explains the major theories adopted in this thesis.

The third chapter focuses on the literature relating to specific problems such as major motives, types, benefits, risks, and determinants of inter-firm collaboration. It reviews the literature from economic, management and business theoretical and empirical studies and summarises the results. The differences between developed countries and developing countries are also discussed in this chapter. The general

collaboration motives, types, benefits, risks and determinants from existing literature guide the design of the questionnaires to be used in both the qualitative and quantitative parts of the thesis.

Chapter 4 focuses upon the research methodologies used in this study. It shows how this research has been conducted, what research methodologies have been adopted, and how the research questions, hypotheses, and questionnaire have been designed. To achieve a better and more reliable analysis on inter-firm collaboration, both qualitative face-to face interviews and quantitative research methods are conducted (Kendall 2008). There is a lack of comparative study on developed and emerging economies (Kuada 2002; Narteh 2008). There are even fewer empirical firm level studies focused on Australia and China as most of these studies focused on macroeconomic trade and international relationships (Sheng and Song 2008). This thesis compares the differences and characteristics of the Australian and Chinese mobile telecommunication industries and the inter-firm collaboration in both countries through both qualitative interviews and a quantitative analysis. The comparative results are expected to fill a gap and shed light on future research in comparative studies. The questionnaires are designed to relate to the research questions and hypotheses of this study.

Chapter 5 analyses the history, development, and economic contribution of the global telecommunication industry.[1] With the development of a new generation of telecommunication technologies, the market requirement, services and business model have changed rapidly. The types of collaboration in this industry have also varied over time. Telecom firms are separated into three groups in this thesis: mobile device providers, operators and service providers, and content providers and technical providers. The characteristics of representative firms for each group are examined in this chapter. The different strategies and collaborating cases for these firms are also analysed in this chapter.

Chapter 6 analyses the history, development, industry structure, and economic contribution of the Chinese mobile telecommunication market, and discusses the results of the Chinese qualitative case study. In this chapter, the Chinese market is separated into four groups: (1) hardware producers, (2) operators, (3) service providers, and (4) content and technical providers. Then, the major firms from each group are analysed. Finally, the typical collaborating types, major benefits from inter-firm collaboration, main barriers for local and global collaboration, and most important factors for successful collaboration in the Chinese mobile sector are discussed.

Chapter 7 analyses the history, development, industry structure, and economic contribution of the Australian mobile telecommunication market, and discusses the results of the Australian qualitative case study. In this chapter the Australian market is separated into four groups: (1) hardware producers, (2) carrier service providers

[1] Chapter 5 introduced the global telecommunication market and the reason why this industry is studied in this thesis. The following chapters six and seven studied the characteristics of the Chinese and Australian market and answered why these two markets are studied in the thesis.

and service providers (CSP/SP), (3) retailers, and (4) content and technical providers. Each group and their representatives are analysed. Finally, the results of the Australian case study are discussed. Differences between the Australian and Chinese telecommunication markets are summarised at the end of this chapter.

Chapter 8 presents the quantitative analysis, which discusses the process, results, and implications of the quantitative study. First, all the variables are tested for validity and reliability. It attempts to answer the second primary research question. An ordered probit analysis is adopted to test the hypotheses. The reliability and validity of the data are discussed in the data analysis section. The expected sign of the coefficients and hypotheses are tested in this chapter. The importance of each factor in inter-firm collaboration and their implications are discussed. At the end of this chapter, two different computer technologies are discussed as complementary methods to that of econometrics in the study of inter-firm collaboration. The possibility of using computer intelligence in inter-firm collaboration is discussed.

Chapter 9 summarises the major results and main findings of this thesis. It highlights the contribution of this thesis to the literature and further research on inter-firm collaboration. The limitations of this research and potential future research are also discussed in this chapter. It also outlines how business managers, industry associations, and policy makers could benefit from this research.

1.5 Summary

This chapter provides a general introduction to the main focus of this thesis. It highlights the significant contribution of this thesis to inter-firm collaboration and cross national studies. It also outlines the research objectives and research questions focused upon in this thesis.

Both qualitative and quantitative research methods are used to answer the primary research questions. Data are to be collected from both China and Australia to meet the existing gap in the literature. The mobile telecommunication market is selected as a typical new dynamic sector to verify the key ingredients for successful collaboration in the qualitative study. These qualitative results are then further examined and extended to other industries through quantitative studies of both Australia and China.

The expected outcome is to provide insights into actions needed to enhance inter-firm and international collaboration in the global marketplace. The implications of this thesis will shed light on business collaborating strategies for individual firms, industry assistance and support by industry associations, and policy making for government agencies.

In the next chapter the definition of inter-firm collaboration used in this thesis is discussed. The development of theories related to inter-firm collaboration are reviewed and compared. The theories adopted in this thesis are also discussed before research questions are proposed.

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Chapter 2
Definitions and Theories of Collaboration

2.1 Introduction

In recent years the process of globalisation and development of telecommunication technology has fostered an increase in various types of local and international inter-firm collaboration. Cooperation and competition are mutually applied in the business world. However, cooperation has been increasingly considered superior to competition both for individuals and firms (Contractor and Lorange 1988). This development derives from both intellectual and social concerns (Faulkner and Rond 2000).

Many researchers have studied inter-firm collaboration from different perspectives. However, it is surprising to find how diversely the term has been defined and used by researchers in the literature (e.g. cooperation, coordination, partnership, alliance, and coalition). Not surprisingly, therefore, the outcomes from previous research have resulted in diverse outcomes and implications. The links and differences between these definitions will be further discussed in the following section. By reviewing different definitions and terms used in the literature, inter-firm collaboration as used in this study is clearly defined.

Researchers have attempted to study the motives, forms, benefits, and performance of collaboration. Collaboration among firms can be fruitfully examined from a wide range of theoretical perspectives. These include transaction cost theory (Coase 1937), agency theory (Berle and Means 1932), network theory (Eccles and Crane 1987), behavioural theories (Barnard 1938), property rights theory (Barzel 1989), economic empirical studies (Heidl 2010), strategic management positioning and resource based complementary perspectives (Heidl 2010), dynamic capabilities theory (Winter and Zollo 1999), real option theory and institutional theories (Bellon and Niosi 2001). These theories cover most questions related to the existence of firms, motives and incentives for inter-firm collaboration and the dynamics of inter-firm collaboration. However, each theory focuses on only one or some types of inter-firm collaboration. Therefore, this thesis will adopt a combination of several key theories (two major economic theories – transaction

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cost theory and the resource based view, and some management and business theories) and conduct a literature review based on these theories. The relationship, difference, and contribution to inter-firm collaboration from each of these theories will be discussed further in this chapter.

2.2 Broad Discussion

The word cooperate derives from the Latin words co- and operate, which means working together (Fitzek and Katz 2006). Gray (1985) defined collaboration as a pooling of resources (e.g. capital, labour, knowledge) by two or more partners.[1] To Gray (1989, p. 6), collaboration is based on the simple adages that 'two heads are better than one' and 'each needs the others to advance their individual interests'. However, researchers have defined and used the term very differently in the economic and business literature (Kogut 1988; Williamson 1991; Burgers et al. 1993; Culpan 1993; Hagedoorn 1993; Parkhe 1993b; Osborn et al. 1998; Austin 2000). Intangible benefits (mostly non-financial) play a more important role in inter-firm collaboration in developing countries (Kuada 2002; Jia and Rutherford 2010). To clearly define collaboration for this study, it is important to analysis the basics of inter-firm collaboration and the differences between all these terms.

2.2.1 Terms and Variety of Definitions

Terms such as governance, hybrid, joint venture, coalition, franchises, collusion, hierarchy, vertical integration, and business agreements are widely used in the studies that relate to inter-firm collaboration. Which of these is collaboration? Which belongs to collaboration, and what are the differences? To answer these questions it is necessary to have an overview of collaboration and all of these definitions. Figure 2.1 summarises the different terms utilised and their relationship to each other which will be reviewed in more detail below. The big circle with collaboration shows the border of inter-firm collaborations, which is located between market contracts and hierarchies (Williamson 2002). Firm A may have collaborators, such as merger firm B, partner firm C, joint venture or angel capital firm D, franchisor firm E, competitor firm F, supplier firm G, customer or service provider firm H and potential partner firm I, which is in the business network. The terms (e.g. cooperation, alliances and partnership) used in the literature are based upon different relationships as described further below.

[1] According to Gray (1985) a partner is an individual or firm that makes a financial contribution to a project.

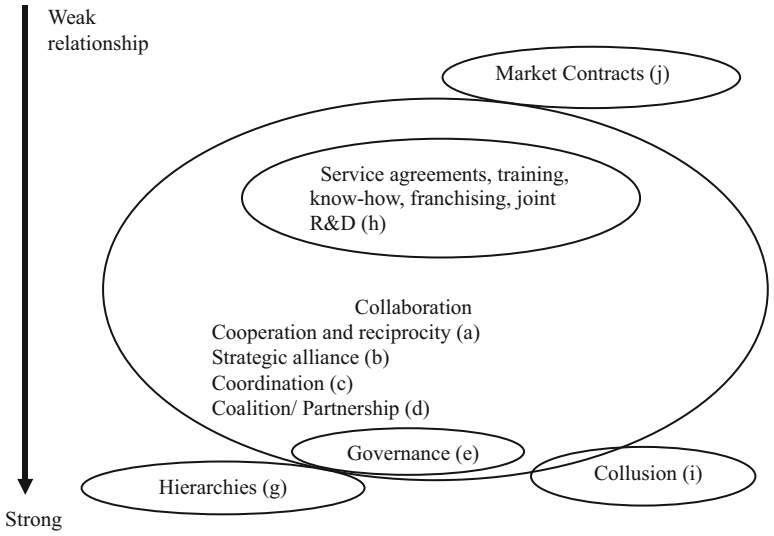

Fig. 2.1 Collaboration terms and their relationship (Source: Summarised from literature)

As shown in Fig. 2.1 and Table 2.1, the different terms (a–j) are used in very different types of business relationships. Some of them (e.g. cooperation, coordination, coalition, partnership, and hybrids – in the biggest circle) are referred to as examples of inter-firm collaboration in the literature. These kinds of relationships include most types of business transactions with different partners (suppliers, service providers, competitors, partners and other firms in existing business networks). Some of them (e.g. strategic alliances, joint activities, hierarchies, franchises, training, know-how licensing, governance, and service agreements) are used in one or several special collaborating types. Others (e.g. collusion and market contracts) are used differently from collaboration but may be transferred into inter-firm collaboration if the business environment changed. Each of these terms (a–j) will now be discussed in more detail.

a. Cooperation and reciprocity

Cooperation is one of the terms widely used in the literature when discussing collaboration. It is a term widely used in not only economics and business studies (Blair 1976; Parkhe 1993a), but also in managerial and sociology studies (Fitzek and Katz 2006). Cooperation is also regarded as an effective way to avoid competition (Roos 1994). However, it can bring problems such as collusion (i), which are illegal in most countries. Cooperation is the original form of inter-firm collaboration but it usually also refers to a broader range of cooperating activities between individuals and departments and not only firms. Many researchers have linked cooperation with reciprocity as one of the motives or benefits from inter-firm collaboration (Blair 1976; Withered 1980; Parkhe 1993a, b; Kashlak et al. 1998). However, reciprocity is usually linked with

Table 2.1 Different terms representing different relationships

Study firm	Terms used in the literature related to inter-firm collaboration	Partners and their differences
Firm A	a, b, c, d, e, f, g	Merger B (Acquisitions from the same or different field)
	a, b, c, d, f, h	Partner C (Co-founder or joint partners)
	b, d, e, f, g, h, i, j	Joint Venture D (Venture or angel capital firm)
	b, c, d, e, f, g, h, j	Franchisor E (e.g. McDonalds or 7–11)
	a, b, d, h, i, j	Competitor F (Usually in the same industry)
	a, b, c, d, e, h, i, j	Supplier G (Raw material or half product providers)
	a, b, c, d, e, h, i, j	Service/ Customer H (Refers here to business only)
	h	Potential partner in network (future collaborators)

political decisions from government or industry associations (Bendor 1987; Kogut 1989). The motives and benefits from inter-firm collaboration will be discussed further in the next chapter.

b. Strategic alliances

Inter-firm collaboration is also referred to as a strategic alliance in the literature (James 1985; Borys and Jemison 1989; Lorange and Roos 1992; Park and Russo 1996; Nooteboom et al. 1997; Osborn et al. 1998; Kuada 2002). Lewis (1990) defined a strategic alliance as a collaborative relationship between firms which generates more profits than solely by means of a market transaction. Porter (1990) and Hagedoorn (1993) linked the definition of alliance with long-term transactions. A strategic alliance involves sharing: goals, mutual benefits, co-production, technology, or services (Mohr and Spekman 1994; Gulati 1995). The definitions are very similar to inter-firm collaboration. Many empirical studies have also focused upon business strategic alliances (Lorange and Roos 1992; Yoshino and Rangan 1996; Gulati 1995, 1998; Park 1996; Osborn et al. 1998; Kuada 2002). The term strategic alliance is used to describe a partnership or inter-firm collaboration in some literature (Doz and Hamel 1998). However, when referring to business strategic alliances, it usually involves large or multinational firms, eliminating most micro and small sized firms (which may have no formal business strategies) from the study. This is an important gap in most empirical studies.

c. Coordination

Coordination is another term used to describe collaboration. For example, inter-firm coordination is a term used by Buckley and Casson (1988). They defined inter-firm coordination as an increase in the profits of some firms that is achieved without a reduction in the profits of others. They argue that coordination is not

always good for every firm in the market. A successful coordination may reduce profits for non-participating firms and a failed coordination may bring losses for participating firms. Both of which may generate a deadweight loss[2] (DWL). One of their contributions is separating the definition of inter-firm coordination from extra-firm coordination (firms on the one hand and households on the other) and intra-firm coordination (different people working together). However, their research focused mostly on tangible profits, which exclude some important factors (intangible benefits and incentives) from inter-firm collaboration. Therefore, coordination is used in the same way as cooperation and collaboration in the literature (Van de Ven and Walker 1984; Buckley and Casson 1988; Currall and Judge 1995; Grandori 1995).

d. Coalition and partnership

Coalitions and partnerships are terms used in some literature to describe inter-firm collaboration. For example, Porter and Fuller (1986) believe that coalitions are also the same as collaborations and partnerships. In the sense that more than one firm shares responsibilities, a partnership is also regarded as a collaboration (Hagedoorn and Schakenraad 1994; Hagedoorn 2006). However, some researchers have indicated that it is complicated and difficult to manage these relationships (Perlmutter and Hennan 1986; Anand and Khanna 2000; Chung et al. 2000). Both coalitions and partnerships are regarded as inter-firm collaboration, although a coalition and partnership usually only focus on certain types of inter-firm collaboration based on a deeper trust relationship; for example a joint venture.

e. Governance

Commons (1932, 1950) used the term governance to describe a form of partnership and alliance, which was then adopted in the early literature to describe inter-firm collaboration (Macneil 1978; Williamson 1979, 1988). Governance is distinct from markets or hierarchies, including supervision activities between partners[3] (Dyer and Singh 1998; Gulati 1998). It brings profits by reducing transaction costs and enhancing efficiency when human resources and knowledge are transferred through governance activities (North 1990; Dyer 1996). Many researchers have studied viable types of governance (Smith 1776; Barnard 1938; Hayek 1945; Arrow and Debrew 1954; Williamson 1979; Dixit 1996). However, governance is usually focused on issues within firms or on some special collaborating types (e.g. franchises and joint ventures) that need supervision (Macneil 1978; Heide and John 1992) and therefore only involves some types of inter-firm collaboration.

[2] A deadweight loss (DWL) is a net reduction in social welfare. When the total gain to society is less than it was before, a deadweight loss is generated. It is also referred to as a social loss, welfare loss, and efficiency loss.

[3] Williamson (2005) defined hierarchy as unified ownership, which is related to vertical integration and adaptation.

f. Hybrids

Williamson (1991, 1996, 2002) used the term *hybrid* to capture a broad group of inter-firm arrangements located between the market and hierarchy. Some researchers indicate that non-equity inter-firm collaborations are contractual hybrids and equity joint ventures are quasi-hierarchical business structures (Narula 2001; Contractor and Lorange 2002). Therefore, hybrids include most types of inter-firm collaborations. However, joint ventures and franchises, which are also important types of inter-firm collaboration, may be excluded from this definition. It also excludes some informal collaboration types, which are very common between micro and small firms, such as information sharing through informal discussions.

g. Hierarchies

Williamson (2005) defined hierarchy as being unified ownership, which is related to vertical integration and adaptation. Hierarchies are believed to be the most efficient in conducting transactions involving high uncertainties and which usually require additional investments (Williamson 1975, 1985). Some researchers believe that hierarchies are associated with higher transaction costs than market transactions because of greater asset specificity (Barnard 1938; Monteverde and Teece 1982; Walker and Weber 1984; Pisano 1989; Ring and Van de Ven 1992; Dyer 1997). Therefore, hierarchies seem to be different from inter-firm collaboration. However, any kind of hierarchy (e.g. vertical integration or acquisition) is associated with greater collaborating activities (e.g. information exchange, training, know-how licensing, or management services). In some cases, inter-firm collaboration can also be transformed into hierarchies when both collaborating firms find that the opportunity cost of conducting inter-firm collaboration is higher than integration. On the other hand, when the opportunity cost of integration is higher than inter-firm collaboration, a joint venture firm founded by both parent firms will be established (e.g. Sony-Ericsson).

h. Joint activities and other forms of collaboration

Franchises (Friedlander and Gurney 1981), strategic networks and network organisations (Eccles and Crane 1987; Jarillo 1988; Lincoln 1990; Powell 1990) and research consortia (Ouchi and Bolton 1988) are also forms of collaboration. Besides franchising, joint R&D, joint ventures, joint products, market sharing, training, know-how licensing, management and market service agreements are also different forms of collaboration (Pfeffer and Nowak 1976; Contractor and Lorange 1988). All of these forms will be discussed further in the next chapter. These concepts partly or fully belong to collaboration, because they are composed of different inter-firm transactions and coordination for ex ante[4]

[4] Ex ante refers to the state of the world before it is known.

negotiation, a period of implementation, and ex post co-supervision. Sometimes, long-term contracts or continuous agreements also need such transactions.

i. Collusion

Collusion is defined by OECD (2003) as "strategic collaboration among suppliers and anti-competitive behaviour. . ." Collusion is a kind of collaboration but has overall negative welfare effects (generates a dead weight loss) in the market. Collusion may cause a loss of total social welfare when both producer surplus and consumer surplus decrease (Landsburg 2005). Therefore, it is usually illegal in most countries under antitrust or competition laws (OECD 2003). Not all collaborations among firms are collusions, and in the real world most of them are not. Collusion is related to another significant area of research but is not the focus of this thesis. Inter-firm collaboration does not always improve social welfare either. A failed collaboration sometimes also threatens the survival of a firm. As Buckley and Casson (1988) argue, even for success collaborations, non-participating firms may lose as a result and a deadweight loss is then generated.

j. Contracts

Contracts are important for long-term collaboration where there are high uncertainties. Many researchers have studied the reasons, processes, contributions and limitations of contracts in inter-firm collaboration (Gundlach and Achrol 1993; Arrighetti et al. 1997; Harrison 2004; Harvey 2005; Jennejohn 2008). However, others argue that contracts contribute little to inter-firm collaboration and they could be enhanced by adding informal safeguards, such as trust (Heide and John 1990, 1992; Das and Teng 1998; Achrol and Gundlach 1999; Harrison 2004). Some researchers believe that formal contracts may signal distrust between the partners aimed at encouraging opportunistic behaviour[5] (Macaulay 1963; Ghoshal and Moran 1996; Fehr and Gachter 2000). Therefore, some researchers propose the use of formal contracts and relational governance as complements (Deakin et al. 1994; Lane and Bachmann 1995; Arrighetti et al. 1997; Burchell and Wilkinson 1997; Poppo and Zenger 2002; Harrison 2004; Jennejohn 2008).

Contracts and hierarchy need a lot of previous collaborating activities (e.g. regular meetings, information exchange, co-research or management services) if they are to be successful (Jennejohn 2008). In these cases, contracts and hierarchy may have interface with inter-firm collaboration. They can also transform from and into inter-firm collaboration with time and environmental changes. For example, when a firm needs to buy raw materials, it first negotiates with all potential suppliers (in meetings or emails). As a result, they may sign a one-time buy contract (contract) or long-term supplying agreement (collaboration). These two could be

[5] There is no perfect contract and the partner is expected to make use of the ambiguous terms if the trust level is low during collaboration.

Table 2.2 A summary of different terms related to collaboration

Terms	Characteristics	Focus
Cooperation	Original form of collaboration; involving more than one party; also used in managerial and sociology studies;	Involves a broader range of activities
Strategic alliance	Involves long-term transactions; sharing goals; mutual benefits; co-development	Large firm focus
Coordination	Used for business collaborations, organisational collaborations and individual collaborations. They are separated into inter-firm, intra-firm, and extra-firm coordination	Tangible benefit focus
Coalition/ partnership	Shared responsibilities in complicated and difficult relationships	Involves deeper trust relationships
Governance	Distinct from markets and hierarchies; emerge from values and agreed-upon processes	Supervising relationship focus
Hybrids	Located between markets and hierarchies	Formal collaborations
Hierarchies	Usually used as structured collaboration with supervision relationships. It is regarded as efficient transactions with uncertain outcomes and higher transaction costs	Unified ownership
Joint activities and other forms	Franchising, joint R&D, joint venture, joint products, market share, training, know-how licensing, management agreements	Different forms of collaboration
Collusion	Secret agreements target on market power and usually cause DWL	Illegal in most countries
Contracts	Formal collaborations with written documents and rules	Market transactions

transferred into each other with an increasing or decreasing trust level or environmental changes.

Table 2.2 summarises all the terms and definitions used in the literature relating to collaboration. Their contribution, limitations and relationship with collaboration as defined in this thesis are also compared in Table 2.2. Collaboration, in this way, exists at every stage in the development of a firm. It can be an informal oral agreement, documented contract, or information exchange via trust. Every activity of the company, manager, or employee may influence the process or performance of collaboration. A clear definition of collaboration can help us understand better what enterprises do with each other, and thus facilitate finding the real determinants of successful collaboration.

2.2.2 Definition of Collaboration as Used in This Thesis

Previous literature has defined collaboration as a transaction between two or more parties to achieve mutual benefits. However, most researchers have focused only on

the tangible benefits brought by inter-firm collaboration (Contractor and Lorange 1988; Park 1996; Gulati 1998; Kuada 2002). Tangible benefits are the benefits that can be foreseen or predicted before collaboration commences. These benefits have received considerable attention in the literature and include financial benefits, technical benefits, information and market benefits and product benefits. However, some intangible assets of a firm play an important role in both initiating and achieving beneficial outcomes from a inter-firm collaboration, such as trust (Becerra et al. 2008; Beckett and Jones 2010; Burgess and Jones 2010), reputation (Lavie 2007; Husted and Michailova 2009; Swaminathan 2009), and other information (Elg 2007; Papadopoulos et al. 2008). An increase in the level of trust during collaboration is an important outcome for a current collaboration as well as for future collaboration (Adler 2001; Lohrke et al. 2006). Intangible benefits such as trust generate future benefits that cannot be measured at the current stage. Although intangible benefits have a high degree of uncertainty it is sometimes one of the most important incentives for collaboration, especially in some developing countries such as China (Keane 2009; Jia and Rutherford 2010). Therefore, intangible benefits, such as an enhanced relationship with government agencies or extended business networks into new markets, are also included in this thesis.

In addition, previous empirical studies have only focused on large and multinational firms by studying special types of collaboration (e.g. joint ventures), using the databases of big firms only, or adopting only financial returns on investment (ROI) as indicators of collaboration performance (Anderson 1990; Wolf 1995; Indro and Richards 2007). The majority of firms, micro and small firms, have not received enough attention in the previous literature (Lee 2007; O'Dwyer et al. 2011). Some informal collaborating types, such as oral agreements and information sharing, are also excluded from existing studies. However, these activities are very important forms of collaboration between micro and small firms (Jaouen and Gundolf 2007). This thesis will expand the traditional definition of collaboration to cover all formal and informal collaboration types, and will be discussed separately in a later chapter.

Therefore, inter-firm collaboration is defined in this thesis as **"inter-firm activities that are aimed at generating tangible and/or intangible benefits for each firm involved"**. All formal and informal inter-firm activities, therefore, are included in this definition. Both tangible and intangible benefits are also included in this definition. Each firm involved in this collaboration is expected to benefit. With this clear definition, this thesis will study some basic questions such as why do firms collaborate? What are the key determinants of successful collaboration? How does this vary across developed and developing countries? How does it vary by firm size? Before answering these research questions it is important to review previous theories and related literature in the study of inter-firm collaboration.

2.3 Major Theories

The major theories related to inter-firm collaboration are: transaction cost theory, behavioural theory, agency theory, property rights theory, the resource based view, dynamic capabilities theory, the knowledge based view, and network perspective. Many researchers, from economics, managerial, and business studies, then contributed to the study of inter-firm collaboration from different perspectives. While this is not an exhaustive list of the diverse theories on inter-firm collaboration, it does include the important ones. There is no clear distinguish between economic studies and business studies and some of them have blurring boundaries.

From Fig. 2.2 it can be seen that transaction cost theory and the resource based view are very important theoretical contributions in the framework, linking many other theories. Transaction cost theory is one of the most important theories in the study of firms and provides the basis for many theories in business and management studies. Focused on the real costs of firms' operations and transactions, it explains the incentives for inter-firm collaboration as well as why firms exist. The resource based view, on the other hand, provides the foundation for recent or contemporary collaboration studies. It focuses on scarce resources that are inimitable or cannot be substituted to sustain and increase a firm's development and collaboration. Transaction cost theory has contributed to the resource combination issue[6] in the resource based view (Teece 1982). Many other theories have contributed significantly to the development of the resource based view and made it a core framework in the network of these theories as shown in Fig. 2.2. Papadopoulos et al. (2008) argued that transaction cost theory best explains "alliances in high asymmetry and low heterogeneity situations[7]" and the resource based view is "most appropriate for high

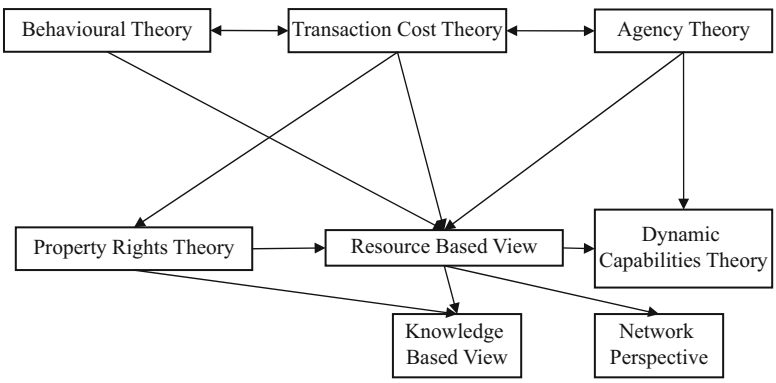

Fig. 2.2 Theories in economics and business studies

[6] Firms exist as they can organize resources more efficiently than others.

[7] Equity collaboration types such as equity joint ventures.

heterogeneity and low asymmetry alliances".[8] Both these theories have contributed to the development of many other theories and studies, some of which are discussed below.

Behavioural theory and agency theory, which share the same assumptions on bounded rationality[9] and opportunism[10] as transaction cost theory, also play an important role in collaborating studies. Although these latter theories are focused on different aspects of business activities, they are influenced by and also contribute greatly to transaction cost theory. Behavioural theory focuses on the effective operation of the decision making process. Behavioural theory and the resource based view both focus on the competitive advantages of a firm (Schoemaker 1990). Agency theory recognises the important principal agent relationship and distinguishes between the roles of business owners and managers. Property rights theory, on the other hand, focuses more on ownership, distribution and bargaining. Property rights make resources economically valuable by structure the ownership based on how the assignment of property rights will affect the surplus value generated (Mahoney 1995) and the resource based view evaluates the contribution of property rights as a type of resource for firms (Libecap 1989). Finally, agency theory has also influenced thinking on the deployment of resources and firm capabilities (Castanias and Helfat 1991).

The resource based view has also contributed to the development of many other business and management theories. Generated from the resource based view, the knowledge based view of the firm also provides promising insights to extend our understanding of cooperation capabilities (Porter 1990). The network approach, which is also developed from the resource based view, is "concerned with understanding and explaining the dynamics of developing, maintaining, and terminating inter-organisational exchange relationships" (Harrison 2004). Compared with the resource based view, these theories focus more on different aspects (such as the personalities of the entrepreneurs, managerial structures of medium or large sized firms, legal related aspects or special resources) of a firm and its collaboration with other firms. Table 2.3 summarises the contributions and limitations of the major theories.

As shown in Table 2.3, many managerial and business theories have contributed to the research and study of inter-firm collaboration. Most of the managerial and business theories contributed significantly to the empirical studies. They analysed and examined different aspects and types of business collaboration in industries and case studies. Transaction cost theory captures many of the elements present in other theories (such as bounded rationality of behavioural theory and opportunism of agency theory and property rights). On the other hand, the resource based view captures different aspects of resources (such as network capabilities from the network perspective, human capital of the knowledge based view and agency theory or intellectual property of property rights theory) that firms need for inter-firm collaborations. As shown in Fig. 2.2, these two economic theories are core

[8] Non-equity cooperation in exploration, research and co-production.

[9] Bounded rationality means the limited capacity and rationality of human beings to solve complex problems (Simon 1982).

[10] Opportunism is self interest seeking behaviour with guile (Williamson 1975).

Table 2.3 Summary of differences between the major theories of collaboration

	Contributions to the literature	Limitations, focus and difference	Major contributors
Transaction cost theory	Studies the basic transactions of firms, and answers the question "Make or buy?"	Focuses on transaction with a single partner; ignores the process of collaboration and role of trust	Coase 1937; Williamson 1971, 1975; Arrow 1974, 1969; Agarwal and Ramaswami 1992; Bellon and Niosi 2001; Rao 2003; Papadopoulos et al. 2008
Behavioural theory	Emphasises the role of firm goals in inter-firm collaboration and focuses on the supplier-customer relationship	Focuses on the decision making process, prices, and outputs, which are mostly determined within the firm	Barnard 1938; Simon 1947; March and Simon 1958; Cyert and March 1963; Simon 1982; Schoemaker 1990; Aulakh et al. 1996; Bazerman 2006
Agency theory	Studies the ex ante incentives of collaboration, focuses on incomplete contracting and efficient operation	Focuses only on the principal and agent relationship, does not explain some managerial problems	Berle and Means 1932; Jensen and Meckling 1976; Arrow 1985; Pratt and Zeckhauser 1985; Levinthal 1988; Castanias and Helfat 1991
Property rights theory	Applied neoclassical theory to industry cases and identified the role of property rights	Focuses on special types of resources of a firm, ignores some intangible assets	Barzel 1989; Libecap 1989; Eggertsson 1990; North 1990; Hart 1995; Hagedoorn et al. 2005; Teece 2005
Resource based view	Focuses on the advantages, which are basic for collaboration	Does not adequately account for alliance formation; phrases are used loosely (e.g. partnership)	Penrose 1959; Richardson 1972; Demsetz 1973; Rumelt 1984; Wernerfelt 1984; Barney 1991; Eisenhardt and Schoonhoven 1996; Das and Teng 1998; Barney 2001
Knowledge based view	Extends understanding of cooperation capabilities	Focuses on special types of collaboration	Zander and Kogut 1995; Conner and Prahalad 1996; Grant 1996; Kale 1999; Cricelli and Grimaldi 2009; Marsh 2010
Network perspective	Explains the dynamics of developing, maintaining, and terminating inter-firm relationships	Does not adequately account for alliance performance and results	Eccles and Crane 1987; Hakansson and Snehota 1995; Hakansson and Johanson 1998; Harrison 2004; Lu et al. 2006; Swaminathan 2009
Dynamic capabilities theory	Studies the new modern capabilities of firms and the influence of new technology	Focuses on the accumulation of rent in business operation	Teece 1994; Langlois and Robertson 1995; Foss 1997; Winter and Zollo 1999; Nelson and Winter 2002

theories that have contributed to the development of all the other theories. The two core theories have also contributed significantly to the modelling and development of theoretical frameworks of inter-firm collaboration. To construct the basic model of key determinants for successful inter-firm collaboration for this thesis, this chapter draws on these two basic economic theories: transaction cost theory and the resource based view. However, not all aspects of the other theories are captured by transaction cost theory and the resource based view. To capture the missing factors (such as the characteristics of entrepreneurs and the role of the contact person in business collaborations), managerial and business theories are adopted in the next chapter to study the different types, motives, benefits and risks of inter-firm collaboration to answer the first primary research question.

Beside these theories and studies, game theory is also a common tool usually used in analysing the conflicts and results of collaborating (Zagare 1984; Faulkner and Rond 2000). However, game theory focuses more on the decision making process, ignoring environmental change and the role of trust during collaboration. Game theory, therefore, cannot describe the situation and results of collaboration. Some researchers find that it is only suitable in analysing long-term or repeated games (Heide and Miner 1992; Gulati 1995). It is limited by many assumptions and cannot be applied in some real world cases (Buckley and Casson 1988; Gulati et al. 1994). Therefore, game theory is not adopted in this thesis.

Transaction cost theory and the resource based view are the original and basic theoretical studies, most relevant and referenced works, and most discussed topics in inter-firm studies. The two theories and their major contributors will be discussed in the following section. To study the basic perspective of inter-firm collaboration, this thesis will focus on the transaction cost theory and the resource based view. Some empirical studies from strategic management will also be reviewed as supplementary to these theories (Faulkner and Rond 2000) in the next chapter to study the motives, types, and risks from inter-firm collaboration.

2.3.1 Transaction Cost Theory

One of the most important and basic economic theories of inter-firm relationships is transaction cost theory. Transaction costs are "those costs incurred in arranging, managing, and monitoring transactions across markets" (Rindfleisch and Heide 1997, p. 31). Coase (1937) originated the concept of transaction costs. His paper "The Nature of the firm" sheds light on a firm's existence and behaviour. Coase (1988) also emphasized the important role of transaction costs in empirical studies. Arrow (1969, 1974, 1985) broadened the category of transaction costs and highlighted the importance of rationality in business operations and collaboration.

Transaction cost theory "regards the basic choice in organizing economic transactions as being between affecting transactions through market exchange and internalising them within a single firm, where they are governed by hierarchical relationships embedded in organisation structure (Faulkner and Rond 2000, p. 7)."

Poppo and Zenger (2002) and Harrison (2004) regard transaction cost economics (TCE) as the common framework for understanding governance arrangements. Williamson then opened another area of study on inter-firm collaboration, which contributed greatly to this study and is discussed further below.

Williamson (1975) highlighted the important influence of opportunism and bounded rationality on inter-firm collaboration. Williamson (1985) further decomposed transaction costs into search costs (the costs of gathering information on potential partners); contracting costs (costs associated with negotiating and writing an agreement); monitoring costs (costs associated with monitoring the agreement); and enforcement costs (costs associated with ex post bargaining and sanctioning). He categorised inter-firm transactions into competition (market transaction), governance (internal transaction), planning (contract), and promise (collaboration). Williamson (1991) noted that hybrid structures (e.g. licensing and franchising) are useful alternatives to both internal control and market control. However, Williamson has been criticised for ignoring the role of power in markets and hierarchy (Francis et al. 1983).

Transaction cost theory is also criticised as it ignores many factors important to inter-firm collaboration (Powell 1990; Doz and Prahalad 1991; Gulati 1998; Bellon and Niosi 2001). Researchers argued that it ignores the cost savings and new processes from repeated collaboration and prior communications (Dyer 1997; Nickerson and Silverman 1997), relational aspects over time (Parkhe 1993b), and the role of trust (Boisot and Child 1988; Hill 1990; Dyer 1997; Poppo and Zenger 2002). Zajac and Olsen (1993) argued that transaction costs focused on single-party cost minimisation while alliances are inherently dyadic exchanges and are concerned also with joint value maximisation.

Therefore, the important contributions of the resource based view on exploring other types of collaboration, the dynamics of business transactions, and the key roles of trust become good supplements to transaction cost theory.

2.3.2 Resource Based View

Although generated from the discipline of economics, the resource based view has also greatly contributed to the study of strategic management. Many researchers from economic studies (Penrose 1959; Richardson 1972; Rumelt 1984; Wernerfelt 1984) and business and management studies (Foss 1997; Tallman 2000; Teece 2000) have conducted research on the resource based view and contributed many profound results to this theory such as identifying the important role of trust in inter-firm collaboration. This contributed to closing the gaps in transaction cost theory.

Both approaches have contributed significantly to the theoretical and industrial study of firms. They also provide complimentary studies on inter-firm collaboration. To further study inter-firm collaboration, it is important to link the resource-based view with transaction cost theory.

Wernerfelt (1984) first focused on the importance of differences in resources. Barney (1991) focused on the specialised resources and assets possessed by different firms and developed the resource-based framework for strategic expectations. He argued that a firm may gain expected advantages by analysing information about the assets it already controls. The resource based view contributed to inter-firm collaboration by distinguishing between tangible and intangible resources (Barney 2001). Rumelt (1984) argues that profits are derived from *ex ante* uncertainty. Therefore, uncertainties are good to inter-firm collaboration. Resource based theories have examined the formation of collaboration (Pfeffer and Nowak 1976) and shed light on the dynamics of collaboration (Rumelt 1991; Das and Teng 1998; Heidl 2010). Tallman (2000) linked the resource-based view with transaction cost theory and argued collaboration provides firms with complementary capabilities. These works greatly contributed to the development of the resource-based view and inter-firm collaboration.

However, the resource based view has also received criticism. Gulati (1995) argued that the resource based view does not adequately account for alliance formation. Dyer and Singh (1998) also argued that according to the resource based view an individual firm should attempt to protect rather than share knowledge. On the other hand some phrases such as resources (Barney 1986), capabilities (Teece 1994) and competencies (Prahalad and Hamel 1990) are used loosely and are exchangeable in Resource Based studies (Kale 1999).

Existing empirical studies on the transaction cost and the resource based view are inadequate for a study of collaboration as most of them are focused on intra-firm transactions and resources (Gulati 1995). Therefore, some literature from management and business studies will also be reviewed as a supplement to these two theories in Chap. 3 to study the characteristics of inter-firm collaboration.

2.4 Conclusions and Approach Adopted in This Thesis

With the process of globalisation and the development of information and telecommunication technologies, inter-firm collaboration both intra-state and globally has attracted increased attention. However, a diversity of terms has been used by researchers in the literature. To describe the phenomenon, this chapter has discussed the links and differences between all these different definitions and then clearly identified the definition of inter-firm collaboration to be adopted in this thesis.

Inter-firm collaboration, as defined in this chapter, broadens the neoclassical notion of collaboration to cover both tangible and intangible benefits for the firms involved and highlights the important role of trust in collaborating relationships. It also opened the study to include micro and small firms, which have been ignored in most previous empirical studies.

Among the many theories that have been developed and studied in inter-firm collaboration, transaction cost theory and the resource based view are the two most

important theories, which are closely tied with all the other theories. Transaction cost theory is the original and basic theory dealing with firms and enterprises. The resource-based theory, however, has been widely used in recent research and is closely linked with many management and business studies. This thesis will focus on transaction cost theory and the resource-based view. They will assist in better understanding in detail the motives and benefits of collaboration.

To address some of the research gaps outlined above, this thesis attempts to categorise the basic motives, benefits, types, risks, and key determinants for inter-firm collaboration from the previous literature. The next chapter will address these concepts by analysing some empirical studies from the economic, management and business literature.

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Chapter 3
Literature Review

3.1 Introduction

Inter-firm collaboration has become a common feature of the international economy (Beamish and Delios 1997; Adobor 2006b) and the driver of value creation (Doz and Hamel 1998). Firms as well as nations have become more interested in collaboration to encourage business synergy, innovation, and economic development (Ireland et al. 2002; OECD 2004; Papadopoulos et al. 2008). Chapter 2 analysed the basic transaction cost theory, resource based view, and some management theories that are related to inter-firm collaboration. These theories helped in understanding inter-firm collaboration. Each of them has its own advantages and disadvantages in studying inter-firm collaboration as discussed in Chap. 2.

Inter-firm collaboration has been described as a dynamic cycle of actions and reactions between the firms involved (Lui and Ngo 2005; Adobor 2006b). It varies dramatically among industries in terms of types, risks and benefits coming from collaboration (Dussauge and Garrette 1995; Elg 2007; Krogt et al. 2007; Mazzola et al. 2008), and the telecommunication industry has its special characteristics in terms of collaboration (e.g. access to expensive equipment) (Hagedoorn 1993). Firms' capabilities, core businesses, or even the uses of some terms are quite different in different industries. Critical issues are how to select the "right" collaborator and how to make inter-firm collaboration successful. The answers to these are not straightforward or simple, but identifying the key characteristics of successful collaborations is a major objective of this thesis.

The objective of this chapter is to link the transaction cost theory and the resource based view with some empirical literature to address questions such as: Why do firms collaborate? How do firms collaborate? And what are the key determinants for a successful collaboration? This thesis will also examine previous results for one of the most dynamic industries – the mobile telecommunications sector in Australia and China.

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3.2 Inter-firm Collaboration: Key Questions

As shown in Fig. 3.1 the questions related to inter-firm collaboration are categorised into three stages: start, process, and result stages. The initial step focuses on the incentives for inter-firm collaboration, selection of business partner, and information exchange. During collaboration, firms need to choose the collaboration type, communicate with each other, build on trust relationships, and solve problems to increase collaboration performance or the final success rate. At the end each firm involved is expected to get tangible or intangible benefits and accumulate experience and knowledge, which will be used in the next round of collaboration with the same or other partners as an effect of learning by doing.

Therefore, to answer the previous questions, it is important to first review the literature on a firm's incentive for collaboration, the benefits from collaboration, the types of inter-firm collaboration, the risks from collaboration, and the performances or outcomes from collaboration. Some literature or empirical work contributes significantly to answering these questions. However, some may provide conflicting results, which will be compared and discussed in this chapter.

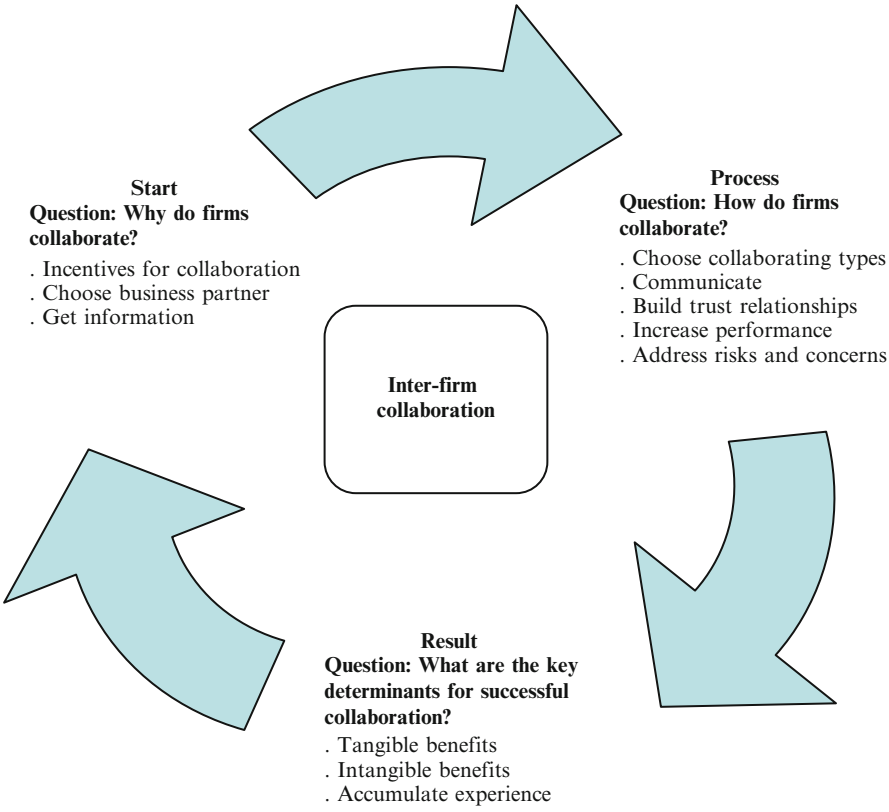

Fig. 3.1 Stages and components of inter-firm collaboration (Source: Author)

3.2.1 *Why Do Firms Collaborate?*

Coase (1937) answered the question "Why do firms exist?" by using transactions cost. However, many researchers argued that transaction cost theory itself is not sufficient to answer the question "Why do firms collaborate?" as many important factors in inter-firm collaboration are ignored (Powell 1990; Doz and Prahalad 1991; Gulati 1998; Bellon and Niosi 2001). Therefore, to answer this question it is necessary to analyse the reasons or motives for inter-firm collaboration. Motives are the *ex ante* concepts about why firms look for collaborators. They may be caused by different external or internal reasons and vary dramatically in different countries.

Rapid economic growth has increased international interactions and inter-firm collaboration. On the other hand rapid information and communication technology change has reduced communication costs, a factor which has limited inter-firm collaboration in the past. The development and spread of knowledge and its importance for innovation competitiveness on economic development and growth has helped emphasise to managers the opportunity cost[1] they are facing without engaging in collaboration. Gulati et al. (1994) and Nooteboom et al. (1997) highlight the importance of incentives to collaboration. Some researchers have separated the incentives for collaboration into market oriented (Hagedoorn 1993; Elg 2007) and technology oriented (Park and Russo 1996; Parker 2000). Market oriented incentives (e.g. entering a new market) usually have a stronger expression in traditional industries (e.g. agriculture and manufacturing) and technology oriented (e.g. access to new technology) usually have a stronger expression in high-technology industries (e.g. telecommunication).

There are many empirical studies that focus on the special incentives for collaboration such as: political economy (Berg and Zald 1978), institutional environment (Hall et al. 1977; Hamel et al. 1986), learning or knowledge sharing (Kogut 1988; Hagedoorn 1993), reduced product life cycles (Mariotti and Ricotta 1986; Allee and Taug 2006), improve services and quality (Harrigan 1985a; 1988) and technological gain (Parker 2000). To provide a better understanding of the motives for inter-firm collaboration, Table 3.1 summarises the major motives highlighted in the literature.

These include both external social dynamic causes and their consequences (e.g. rapid economic and technological change) and internal incentives caused by those external dynamics (e.g. lowering cost; accessing new markets; and knowledge transfer). Each of these reasons and incentives are now discussed in more detail.

[1] Opportunity cost here is the cost in terms of lost profits by maintaining existing practices and not collaborating.

Table 3.1 Motives for inter-firm collaboration

Motives	Literature
1. Rapid economic and technological change	Berg and Zald 1978; Porter 1985; Harrigan 1985a; 1988; Auster 1987; Contractor and Lorange 1988; Ring and Van de Ven 1992; Burgers et al. 1993; Hagedoorn 1993; Gulati 1998; Kale 1999; Parker 2000; Allee and Taug 2006; Adobor 2006b; Zacharia et al. 2011
2. Globalisation and increasing firm interdependence	Richardson 1972; Williamson 1983; Harrigan 1985a; Teece 1986; Harrigan 1988; Womack 1988; Mowery 1988b; Hamel 1991; Williamson 1991; Heide and Miner 1992; Gulati 1995a; Chen 1996; Park 1996; Nooteboom et al. 1997; Dyer and Singh 1998; Gulati 1998; Kale 1999; Tallman 2000; Harrison 2004; Lui and Ngo 2005; Singh and Mitchell 2005; Vilana and Monroy 2010
3. Overcome trade or investment barriers	Devlin and Bleakley 1988; Parkhe 1993b; Park 1996; Austin 2000; Kuada 2002; Gomez and Hsiao 2004; Whitford and Zeitlin 2004; Kuada and Sorensen 2005; Lu et al. 2006; Adobor 2006b; Luechaikajohnpan 2008
4. Increasing uncertainties and competitive pressures	Harrigan 1985a; Porter and Fuller 1986; Auster 1987; Contractor and Lorange 1988; Harrigan 1988; Kogut and Singh 1988; Pisano 1989; Williamson 1991; Hagedoorn 1993; Gulati 1995a; Park 1996; Nooteboom et al. 1997; Gulati 1998; Krogt et al. 2007; Richards and Yang 2007; Cricelli and Grimaldi 2009
5. New products and new markets	Harrigan 1985a; 1988; Porter and Fuller 1986; Child 1987; Contractor and Lorange 1988; Nooteboom et al. 1997; Andersen and Sorensen 1999; Krogt et al. 2007; Mazzola et al. 2008; Vilana and Monroy 2010
6. Access financial resources	Harrigan 1985a; Auster 1987; Harrigan 1988; Hagedoorn 1993; Ring and Van de Ven 1994; Nooteboom et al. 1997; Park and Ungson 1997; Kuada and Sorensen 2005; Krogt et al. 2007
7. Access to lower cost or skilled labour	Hallberg 2000; Krogt et al. 2007; Li et al. 2007; Schneider 2007; Keane 2009
8. Increase firm competitiveness	Rumelt 1984; Lewis 1990; Lorange and Roos 1992; Hartono 2004; Krogt et al. 2007
9. Learning new skills and knowledge transfer	Harrigan 1985a; Pisano et al. 1988; Hamel 1991; Teece 1992; Hagedoorn 1993; Powell et al. 1996; Dyer and Singh 1998; Kale 1999; Ireland et al. 2002; Whitford and Zeitlin 2004; Kuada and Sorensen 2005; Lin et al. 2011

Source: Author's compilation

1. External dynamics: Rapid economic and technological change

Over the past few decades the world has experienced dramatic economic and technology changes. Therefore, some researchers have argued that rapid business environmental changes (Allee and Taug 2006), new opportunities (Vilana and Monroy 2010), and increased complexity of new technologies (Bidault and Salgado 2001) are the most important reasons for inter-firm collaboration. New technology and products have also strengthened the motive for collaboration (Kent 1991).

Technological change also: reduces communication costs (Brakman and Garretsen 2005); enhances product performance; and increases interrelationships among industries (Porter 1985). Therefore, firms can more easily find partners that have complementary technology or resources. A climate of collaboration and value adding from this is then formed (Das and Teng 1998).

2. External dynamics: Globalisation and firm interdependence

The rapid change of the global economy and technology has pushed the process of globalisation and increased firm interdependence. Original equipment manufacturers (OEMs) now shift their production into global markets and increase global inter-firm collaboration (Whitford and Zeitlin 2004; Vilana and Monroy 2010). Each firm has its competitive advantage in producing its products according to Coase (1937), which makes collaboration more attractive with globalization. Therefore, some researchers have argued that globalisation, internationalisation, and entering into foreign markets or production networks have been motives to drive firms into collaboration (Harrigan 1988; Osborn et al. 1998; Kale 1999; Adobor 2006b).

On the other hand, almost all firms now rely on some resources or technologies from others (Lin et al. 2009; Heidl 2010). These interdependences increase the requirement for inter-firm collaboration (Aiken and Hage 1968; Park 1996; Lui and Ngo 2005). Some researchers agree that firms are more likely to collaborate if they are interdependent or have different resources (Chen 1996; Harrison 2004; Lee 2007). As Tallman (2000, p.97) said "Collaboration provides the firm with access to complementary capabilities which provide a potential for synergy in building competencies". Chen (1996) agrees that firms with similar resources are likely to have similar strategic capabilities and competitive vulnerabilities. However, Gulati (1998) argues that interdependency itself is not adequate to form inter-firm collaboration. Therefore, some researchers focus on environment changes and dynamics, which force firms into collaboration (Adobor 2006b; Zacharia et al. 2011).

3. External dynamics: Overcoming government-mandated trade or investment barriers

To participate in the global market firms have to overcome government-mandated trade or investment barriers, produce new products to fit different requirements from different countries, access different markets and information, adopt new technology, and access financial resources. These incentives have increased inter-firm collaboration locally and globally (Dyer and Singh 1998).

Although free trade is regarded as the best solution to maximise world output and resource allocation efficiency, restrictions and regulations on international trade and investment are still common in most countries (Salvatore 2005). Governments have increased their presence in business operations in order to protect domestic markets (Park 1996). Therefore, firms have to collaborate to bypass local political barriers (Devlin and Bleakley 1988; Parkhe 1993b; Austin 2000; Kuada and Sorensen 2005) and meet government requirements for local ownership

(Stopford and Wells 1972; Datta 1988; Kuada 2002). However, Luechaikajohnpan (2008) found that increased trade costs discourage collaboration, while reduced trade barriers encourages licensing. As more countries have adopted "open" policies on trade and investment (OECD 2004), this factor has become less important. However, regional industry protection still exists, which "forces" firms into alliances[2] (Whitford and Zeitlin 2004; Stimson et al. 2006; Adobor 2006b).

4. External dynamics: Increasing uncertainties and competitive pressures

Another consequence of rapid economic and technology change is increasing uncertainties and competitive pressures. Transactions cost economists highlight the important role of behavioural uncertainties (Pisano et al. 1988; Oxley 1997; Gulati 1998; Richards and Yang 2007), environmental uncertainties (Kogut and Singh 1988), and sales uncertainties (Postan et al. 1952) in inter-firm collaborations. A firm's competitive situation no longer depends solely on itself (Harrigan 1988; Hamel et al. 1989; Ohmae 1989; Park 1996). Firms have to collaborate to improve their strategic position and competitiveness (Porter and Fuller 1986; Kogut 1988), particularly in the collaboration of innovative, value adding, and knowledge transferring activities (Das and Teng 1998; Cricelli and Grimaldi 2009).

As a consequence, firms have to cooperate to access new knowledge or complementary technology (Freeman and Soete 1990; Tuchi 1995; Krogt et al. 2007), monitor the evolution of new technologies (Hagedoorn 2006), decrease product life cycles (Park 1996; Allee and Taug 2006; Zacharia et al. 2011), improve services and quality (Harrigan 1985a; 1988), and monitor environmental changes and opportunities (Hagedoorn 2006). Collaboration then becomes a better solution for firms to survive competition and grow faster (Lee et al. 2003b; Cricelli and Grimaldi 2009; O'Dwyer et al. 2011).

5. Internal incentives: Access new markets and developing new products

Different environments and cultures also provide different opportunities and risks. Firms need to consider the investment barriers, legal framework, intellectual property protection, tax structures, local regulations, labour costs, cultural difference, and infrastructure difference before considering entering a new market. From collaboration they can avoid some mistakes and learn from their partners (Contractor and Lorange 1988; Kuada and Sorensen 2005; Krogt et al. 2007). Collaboration, in this case, brings not only access to a new market, but also invaluable experience and skills.

People have more diverse and dynamic preferences nowadays, which increases the requirement for different products (Child 1987; Powell 1990; Park 1996; Mazzola et al. 2008; Vilana and Monroy 2010). Firms have to develop new

[2] For example, the Chinese telecommunication operator's licenses were only released to local firms or joint ventured firms (dominated by Chinese firms). Therefore, the foreign firms have to collaborate with local firms to enter the Chinese market.

products to suit different customer groups. Australia is an immigration country with many immigrants from different countries and cultures. Their cultures and living styles have brought new requirements into Australia. Their different needs and the connections with their original countries has also increased international inter-firm collaboration (Kuada 2002). As an immigration nation, the Australian market shows great variety in the needs for different goods and services.

6. Internal incentives: Accessing financial resources

Lack of access to finance may be a serious cause of other problems, including lack of access to human resources; information; new markets; new technologies; effective R&D; exports; training; and so on (OECD 2000). Financial problems impact upon most firms. Firms need large amounts of funds to grow as well as start-up (Hallberg 2000; Kuada and Sorensen 2005; Krogt et al. 2007). Lack of access to finance also pushes firms to seek collaborative venture capital and angel investors (Freeman and Soete 1990). Some researchers argue that firms have motives to collaborate to share the costs of R&D and spread risk (Hagedoorn 1993; Richards and Yang 2007; Husted and Michailova 2009; Heidl 2010).

7. Internal incentives: Access to lower cost or skilled labour

Labour is one of the most important factors in production and human capital plays a more important role in recent literature (Ferguson et al. 2005; Vilana and Monroy 2010). Labour costs even account for nearly eighty per cent of total costs in some businesses (Schneider 2007). Skilled labour is recognized as an important resource in the resource based view (Barney 1991; Jiang et al. 2010). Outsourcing companies with lower cost human resources (usually in developing countries) or relatively more skilled employees (usually in developed countries) have a comparative advantage in the global market (Beamish 1985; Kuada 2002). Many outsourcing firms in developing countries attract partners from developed countries as they have much lower labour cost (Whitford and Zeitlin 2004; Li et al. 2007; Mazzola et al. 2008; Keane 2009). On the other hand, many outsourcing firms in developed countries also attract partners from developing countries as they have skilled labour. Unskilled labour is important in developing countries with low wages where production costs are mostly made up of wage costs. At a more advanced stage in the production process knowledge and skilled workers become more important (developed economy). Collaboration usually generates synergy effects, which allow firms to share skilled labour as well as other resources (Krogt et al. 2007). Therefore, the differences in labour cost and skilled labour between developed and developing countries also increase global inter-firm collaboration.

8. Internal incentives: Increase firm competitiveness

As Rumelt (1984, p.557–8) indicated, a firm's competitiveness is "a bundle of unique resources and relationships, and that the task of general management is to adjust and renew these resources and relationships as time, competition, and change

erode their value". Global competitiveness has become more important as an indicator of a firm's capability, especially for multinational firms. With the development of globalisation, firms have to improve their global competitiveness to survive the fierce global competition. Hence the movement towards production network forms of value adding.

To increase their global competitiveness, large firms usually target increasing their market share, market power,[3] and productivity (Lewis 1990; Lorange and Roos 1992; Krogt et al. 2007). Furthermore, collaboration requires fewer resources and shorter time and less risk (Lorange and Roos 1992), which will also increase firm competitiveness both locally and globally (Hartono 2004). On the other hand, competitiveness is also related to some intangible benefits, such as expanding business networks, enhancing relationships with government (especially important in China), and accessing new markets (Su et al. 2009; Jia and Rutherford 2010).

9. Internal incentives: Learn new skills and knowledge transfer

Some researchers have suggested that many firms collaborate to learn new skills or acquire tacit knowledge (Nooteboom 2004; Narteh 2008; Jones and Burgess 2010; Lin et al. 2011). Today knowledge sharing is important to be "innovative" and "value adding" in organisational innovation (Freeman and Soete 1990; Cricelli and Grimaldi 2009). Collaborating partners, sometimes, are also one of the most important sources of new ideas and information (Dyer and Singh 1998; Whitford and Zeitlin 2004). The ability to learn is also important in inter-firm knowledge transfer (Cohen and Levinthal 1990; Khamseh and Jolly 2008; Zacharia et al. 2011). Large firms usually have R&D labs to develop new products. However, most small and medium-sized firms do not have sufficient financial support to do so. Collaboration is a faster and more convenient way for them to acquire useful technologies and skills (Ireland et al. 2002; Lin et al. 2011).

From the above literature it can be seen that the motives for inter-firm collaboration are very dynamic and show great variety in different countries and industries. A critical issue is to identify whether the benefits or outcomes from inter-firm collaboration are the same as those factors which motivated the collaboration. The benefits derived from inter-firm collaboration could be very different from what was expected at the beginning (Bidault and Salgado 2001). These benefits will be discussed further in the next section.

[3] Market power or monopoly power is the ability of a firm to affect market prices through its actions (Landsburg 2005).

3.2.2 *Outcomes or Performance from Inter-firm Collaboration*

Most theoretical and empirical research on inter-firm collaboration has focused on the motives and formation of collaboration. However, less attention has been given to the real benefits brought by collaboration (Gulati 1998; Kale 1999; Gulati and Zajac 2000). Some researchers have argued that the performance from an alliance has received less attention because it is hard to measure (Berg et al. 1982; Anderson and Narus 1990; Geringer and Hebert 1991; Baird and Lyles 1993; Saxton 1997). However, firms are believed to get many benefits from collaboration (Burt 1983; Williamson 1991; Dyer and Singh 1998; Zacharia et al. 2011). These benefits include reducing total costs, producing new products, expanding business networks or entering the global market, and these will now be discussed further in this section.

On the other hand inter-firm collaboration usually generates a combination of different tangible and intangible benefits (Su et al. 2009). The intangible benefits can be non-financial future returns such as: increased relationships with potential partners, increased business industry reputation or increased relationship with government departments (Lu et al. 2006). These intangible benefits play more important roles in inter-firm collaboration in emerging economies (e.g. China). Therefore, some researchers indicate that inter-firm collaboration contributes to different aspects of the development of a firm and brings both anticipated and unanticipated benefits for the firms involved (Arora and Gambardella 1990; Freeman and Soete 1990; Oliver 1990; Baum et al. 2000). Although uncertainties were regarded as a negative factor for business development in the early literature (Williamson 1975; Adobor 2005), they may generate unanticipated benefits for business. However, these uncertainties could also generate favourable benefits for inter-firm collaboration (Wehrung et al. 1986; Reus and Rotting 2009). A summary of the literature on the benefits of collaboration are listed in Table 3.2 and are discussed further below.

1. Assistance with basic R&D, reduction of innovation time, and access to new technologies

Innovation, research and development are very important to firms, especially to telecommunication firms. However, research and innovation may take a long period of time and require substantial funding. Furthermore, lags and delays are typical features of R&D activity (Williamson 1991; Kay 1999). Cricelli and Grimaldi (2009) argue that knowledge-based inter-firm collaboration can bypass many limitations on traditional collaboration and benefit all firms involved. Therefore, inter-firm collaboration can generate mutual benefits for basic R&D, innovation, and technological complementarities (Nooteboom 2004; Richards and Yang 2007; Lin et al. 2011; Zacharia et al. 2011).

With the development of new technologies, it is hard for one company to control all technology on its own (Lin et al. 2011). Some researchers have found that many firms collaborate to access new technologies or skills (Rumelt 1984; Cohen and

Table 3.2 Benefits from inter-firm collaboration

Benefits	Literature
1. Assistance with basic R&D, reduction of innovation time, and access to new technologies	Rumelt 1984; Cohen and Levinthal 1989; Gray 1989; Barney 1991; Nelson 1991; Williamson 1991; Lorange and Roos 1992; Wernerfelt 1995; Allen and Jarman 1999; Kay 1999; Hagedoorn and Duysters 2002; Hagedoorn et al. 2003; Nooteboom 2004; Teece 2005; Richards and Yang 2007; Cricelli and Grimaldi 2009; Lin et al. 2011; Zacharia et al. 2011
2. Lower costs	Williamson 1985; Ghoshal 1987; Hennart 1988; Kogut 1988; Levinthal and Fichman 1988; Ahuja 1996; Dyer 1996a; Allen and Jarman 1999; Kale 1999; Austin 2000; Whitford and Zeitlin 2004; Kuada and Sorensen 2005; Lin et al. 2011; Zacharia et al. 2011
3. Increase market share	Contractor and Lorange 1988; McGee and Dowling 1992; Kay 1993; Kurokawa 1994; Kale 1999; Elg 2007
4. Increase market influence and power	Pate 1969; Berg and Friedman 1981; Berg et al. 1982; Harrigan 1985a; Mytelka and Delapierre 1987; Chesnais 1988; Kogut 1988; Link and Bauer 1989; Hagedoorn 1995b; Gulati 1998; Elg 2007
5. Increase productivity, profitability, and product quality	Weiss 1971; Alchian and Demsetz 1972; Berg et al. 1982; Burt 1983; Williamson 1985; Contractor and Lorange 1988; Perry 1989; Blodgett 1992; Kay 1993; Parkhe 1993b; Hagedoorn and Schakenraad 1994; Mitchell 1994; Dyer 1996a; 1997; Kale 1999; Whitford and Zeitlin 2004; Singh and Mitchell 2005; Zacharia et al. 2011
6. Obtain information and access new markets	Granovetter 1985; Freeman and Soete 1990; Williamson 1991; Ayres and Gertner 1992; Williamson 1996; Andersen and Strandskov 1998; Dyer and Singh 1998; Allen and Jarman 1999; Kay 1999; Al-Rasheed and Al-Qwasmeh 2003; Whitford and Zeitlin 2004; Allee and Taug 2006; Zacharia et al. 2011

Source: Author's compilation

Levinthal 1989; Barney 1991; Nelson 1991; Wernerfelt 1995). These collaborations help to reduce the risk and cost involved in emerging technology investments, reducing the time needed to apply new technologies, gaining exposure to new ideas, gaining recognition and employee satisfaction, developing collaborative business team relationships, creating new businesses and business opportunities, accelerating technology adoption, protecting intellectual property rights and leveraging collaborative research and development costs (Allen and Jarman 1999; Hagedoorn et al. 2003; Nooteboom 2004; Teece 2005; Lin et al. 2011; Zacharia et al. 2011).

2. Lower production and management costs

Collaborations can lower the production and management costs of firms, thus lowering their total cost (Williamson 1985; Kogut 1988; Kuada and Sorensen 2005; Lin et al. 2011; Zacharia et al. 2011). Collaborations help eliminate duplicative costs and excess capacity through shared facilities, information, services, or activities (Austin 2000; Whitford and Zeitlin 2004). Firms can also access scarce resources, improve efficiency, and broaden services through collaboration, which lead to further cost reduction. Lower cost also increases the competitiveness of the company as a result of inter-firm collaboration.

3. Increase market share

Big companies often focus on strategies to increase their global market share. Collaboration is one of the most efficient ways to achieve this goal (Contractor and Lorange 1988; Kay 1993; Elg 2007). Market share can be measured using a number of very different methods. For example, the number of customers, annual productivity, exported quantity during a certain period, or sales within a certain market (McGee and Dowling 1992; Kurokawa 1994; Kale 1999). These different measurements have produced different research outcomes. However, increasing market share is usually one of the important benefits brought about by collaboration (Elg 2007).

4. Increase market influence and power

Market power means "the ability to influence prices and persistently enjoy higher profits than those enjoyed by rivals lacking market power" (OECD 2003). Landsburg (2005) defined market power (monopoly power) as the ability of a firm to affect market prices through its actions. For example, patenting is a source of monopoly power. Market influence is defined as "the ability to raise prices above the competitive level in that market for a non-transitory period without losing sales to such a degree as to make this unprofitable (OECD 2003)." Some researchers have argued that firms can enhance their market power by forming a collaboration (Berg et al. 1982; Chesnais 1988; Kogut 1988; Link and Bauer 1989; Elg 2007). However, significant market power can arise from cartels.[4] Although cartels are forbidden in most countries and are not stable relationships, high profits still drive firms into cartels (Landsburg 2005). Cartels harm competitive market rules and generate a dead-weight loss (DWL). To distinguish and protect good collaboration is a tough task for both developing and developed countries.

5. Increase productivity, profitability and product quality

Productivity is "the ability of a firm to produce output within a certain period of time" (Powell 1990). Profitability measures the ability of a firm to generate profit and returns to its owners or shareholders. Sales levels are regarded as a key performance indicator because higher sales can lead to higher profitability,

[4] A cartel is a group of firms engaged in collusion (Landsburg 2005).

although not profit maximisation (Weiss 1971; Mitchell 1994; Singh and Mitchell 2005). Product and service quality, on the other hand, have received more and more attention in global industries. OECD (2003) used profitability and quality of service as indicators of the behaviour of sellers and consumer benefits.

Collaboration is believed to have a positive effect on increasing product and service quality and reducing defect rates (Dyer 1996a; Kale 1999; Zacharia et al. 2011). Some researchers argue that collaboration can help to increase productivity, profitability, and product quality for each participant by reducing input costs (purchasing with lower price for group buy or through different channels provided by collaborators) and exchanging resources (Alchian and Demsetz 1972; Harrigan 1985a; Hagedoorn and Schakenraad 1994; Whitford and Zeitlin 2004).

6. Obtain information and access new markets

Information is "easily codifiable knowledge that can be transmitted without loss of integrity" (Dyer and Singh 1998, p. 665). Information is an intangible asset for firms. Information is an intangible asset and is important to all businesses (Allee and Taug 2006). The sharing of information brings more opportunities for firms. Collaboration, on the other hand, helps to reveal information, transfer tacit technologies, and guarantee performance (Kogut 1988; Park 1996; Dyer and Singh 1998; Al-Rasheed and Al-Qwasmeh 2003; Zacharia et al. 2011).

Similarly, to access a new market or expand business networks, firms need to understand the different culture, customs and regulations of that market, which may be very costly. However, with an experienced trade partner, it is possible to achieve the goal quickly with lower cost (Allen and Jarman 1999; Kuada and Sorensen 2005). Therefore, collaborating firms can make more profits, while firms that do not collaborate may be driven out of the current market (Freeman and Soete 1990) or be unable to enter a new market.

As a result, an increasing number of firms see collaboration as an important business strategy. The number of inter-firm collaborations has increased dramatically during the last decade, greatly increasing the process of globalisation. However, different firms have very different types of collaborations. It also varies from different industries and countries. To answer the question "How do firms collaborate", it is important to study the different types of inter-firm collaboration first.

3.2.3 Structure or Types of Inter-firm Collaboration in General

It is generally agreed that inter-firm collaboration is important and sometimes vital to the development and growth of a firm (Adobor 2006b; Zacharia et al. 2011). However, the types of inter-firm collaboration show a great variety (Contractor and Lorange 1988). As the process of globalisation expands and multinational enterprises develop further, the various types of inter-firm collaboration has changed dramatically (Williamson 1975; O'Dwyer et al. 2011).

Table 3.3 Types of inter-firm collaboration

Types	Literature
1. Technical training/start-up assistance agreements	Buckley and Casson 1988; Contractor and Lorange 1988; Auster 1992; Hagedoorn 1993; Osborn et al. 1998; Harrison 2004; Teece 2008
2. Production/assembly/buyback agreements	Buckley and Casson 1988; Contractor and Lorange 1988; Hagedoorn 1995a; Whitford and Zeitlin 2004; Vilana and Monroy 2010
3. Patent licensing	Porter 1985; Contractor and Lorange 1988; Foray and Freeman 1993; Hagedoorn et al. 2003; Teece 2005; Krogt et al. 2007; Luechaikajohnpan 2008; Lin et al. 2011
4. Franchising	Klein 1980; Contractor and Lorange 1988; Hadfield 1990; Williamson 1991; Williamson and Winter 1993
5. Know-how licensing	Nelson and Winter 1982; Teece 1986; Contractor and Lorange 1988; Park and Ungson 1997; Dyer and Singh 1998; Kale 1999; Hartono 2004; Augier and Teece 2006; Teece 2008; Lin et al. 2011
6. Management/marketing service agreement	Contractor and Lorange 1988; Li et al. 2007; Mazzola et al. 2008; Lin et al. 2011
7. Non-equity cooperation in exploration, research, and co-production	Williamson 1985; Contractor and Lorange 1988; Harrigan 1988; Killing 1988; Mowery 1988a; Hagedoorn 1990; Williamson 1991; Lorange and Roos 1992; Hagedoorn 1993; Wolf 1995; Hagedoorn 1995a; Hagedoorn 1996; Park and Ungson 1997; Gulati 1998; Hagedoorn et al. 2003; Hagedoorn et al. 2005; Krogt et al. 2007; Richards and Yang 2007; Das and Rahman 2009; Husted and Michailova 2009; Lin et al. 2011
8. Equity joint venture	Harrigan 1985a; 1985b; Porter 1987; Contractor and Lorange 1988; Harrigan 1988; Kogut 1988; Pisano 1989; Lewis 1990; Osborn and Baughn 1990; Geringer 1991; Lorange and Roos 1992; Hagedoorn 1993; Parkhe 1993a; Gulati 1995a; Osborn et al. 1998; Krogt et al. 2007; Richards and Yang 2007; Mazzola et al. 2008; Das and Rahman 2009

Source: Author's compilation

Many researchers have studied various types of inter-firm collaboration (Kale 1999; Marsh 2010) and separated them into different categories (Auster 1987; Buckley and Casson 1988; Contractor and Lorange 1988; Hagedoorn 1993; Gulati 1995a). Some researchers have argued that the types of inter-firm collaboration (e.g. R&D collaboration, joint ventures, or co-production) play an important role in the inter-firm collaboration, which may influence the expected outcomes and efforts from each participating firm in this collaboration (Mariti and Smiley 1983; Ghemawat et al. 1986; Osborn and Baughn 1990; Oster 1992; Dyer and Singh 1998).

The major types of collaboration in this thesis has been adopted from Pfeffer and Nowak (1976) and the later contribution of Contractor and Lorange (1988). The collaborating types are shown in Table 3.3 and discussed in detail below.

1. Technical training/start-up assistance agreement

Collaboration involving technical training or start-up agreements is formed when one firm has an advanced technology that the other firm may need. The firm with the more advanced technology provides technical training for the other one. Technical training and start-up assistance agreements are usually of a short duration (Contractor and Lorange 1988), but they may provide long-term benefits from knowledge sharing or learning by doing in some cases (Osborn et al. 1998). Therefore, technical training and assistance can bring both short-term and long-term benefits for the trainee company.

A technical training agreement is often associated with the motives of skills learning and knowledge transferring and is common in technology intensive industries, such as the telecommunication industry. Firms in these industries use alliances to develop new products or processes and build reciprocal networks jointly (Contractor and Lorange 1988; Auster 1992; Hagedoorn 1993). The company supplying the technology and training is typically compensated with a lump-sum service fee (Contractor and Lorange 1988). A good case for technical training cooperation is in relation to outsourcing companies and their partners (Whitford and Zeitlin 2004). To achieve close group work and management, the training may include working process, software usage, hardware training, product function, problem solving, business email writing, inter-departmental team work, document formatting, system analysis, company structure and responsibility.

On the other hand, start-up assistance includes not only technical training, but also management instructions, financial and asset investment (Harrison 2004). Management instruction and investment are sometimes the most urgent needs for new start-ups and play an important role in the early period of a firm. Transfer of knowledge may be impossible in the absence of people transfer. In some instances the transfer can be affected through a one-time contract providing for a consulting team to assist in the start-up (Buckley and Casson 1988; Oviatt and McDougall 1994; Teece 2008).

2. Production, assembly, or buyback agreements

Production, assembly, or buyback agreements usually exist between firms in a customer-supplier relationship. These customer-supplier relationships include co-maker relationships, co-production contracts, and R&D research contracts (Hagedoorn 1995a; Whitford and Zeitlin 2004; Vilana and Monroy 2010). With such agreements the principal form of compensation for both partners is the mark-up on the goods supplied.[5] The extent of inter-firm dependence is very low between such firms (Contractor and Lorange 1988).

A production or assembly agreement is likely to happen between firms with different competitive advantages. Each firm will focus on the production or

[5] Markup is the increase in the price of goods to create a profit margin for a business.

assembly where it has lower cost or better quality, thus decreasing the total cost and price of the final products. Cooperation between these firms brings clear profits if successful.

Buyback agreements are usually between supplier and customer firms. The supplier firm (e.g. mobile phone producer) will provide the intermediate products or final products to the customer firm (e.g. mobile phone retailers). Normally, both firms have already had a long period of collaboration or a deep trust relationship (Whitford and Zeitlin 2004). The supplier firm agrees to buy back the surplus products from a customer firm to avoid any unexpected risks in their sales and production (Buckley and Casson 1988).

3. Patent licensing

Patents not only encourage investment in innovation but also allow firms to specialise in what they are good at (Teece 2005). Patent licensing involves a one-time transfer of the invention, artifact or a new technology as a patent (Hagedoorn et al. 2003). However, it often targets a long-term collaboration relationship and is also based on trust (Porter 1985; Contractor and Lorange 1988; Krogt et al. 2007). A good example of patent licensing is joint patenting (Hagedoorn et al. 2003). Joint patenting refers to the situation where two or more patent-holders hold property rights at the same time. Joint patenting expresses a mutual trust relationship between separate companies. At the firm level, patents will continue to be employed along with other traditional strategies of appropriation such as lead time and trademarks (Foray and Freeman 1993). A recent study by Luechaikajohnpan (2008) found that fixed fee arrangements are not often used in international licensing. Lin et al. (2011) also found IP sharing is usually adopted in high technology industries and contributes positively to new product development.

4. Franchises

Franchising is a right granted (by the franchisor) to a business or individual (the franchisee) to do business in a certain location or territory (IFA 2008). It requires not only a franchising contract but also support and managerial services such as organising, training, merchandising and management (Klein 1980; Hadfield 1990; Williamson 1991).

The interdependence between the partners is greater with a franchise than for other collaborating types, because of delivery, quality control, and transfer-pricing issues associated with the supply of materials, as well as due to the global brand recognition in franchising (Contractor and Lorange 1988; Williamson and Winter 1993).

With the increasing depth of collaboration in franchising, the firms may have special rights in accessing the resources of the partner firm. For example, the firm can grant free restriction or less limitation, price discounts, selling or distribution of its goods or services in a certain area to its partner (Franchising Forum 2008). However, franchising collaborations usually exist in the food and services sectors, where the technology and equipment are easier to copy or transfer.

5. Know-how licensing

Know-how licensing assumes a closer degree of continuing assistance and organisational links between firms (Hartono 2004). It is not simply a matter of transferring patent rights or providing start-up training. It involves extended links between two firms and ongoing interaction on technical or administrative issues (Lin et al. 2011). Know-how often involves knowledge that is difficult to imitate and transfer, because it is tacit, "sticky", complex, and difficult to codify (Nelson and Winter 1982; Dyer and Singh 1998). Payment in these cases will typically be in the form of a lump-sum fee plus running royalties (Contractor and Lorange 1988).

Contractor (1983) found that most know-how licensing involves the transfer of proprietary (unpatented) information. The free exchange and learning of the new technology helps both firms and keeps them on the edge of new technology, which maintains their competitive position (Teece 2008; Lin et al. 2011).

However, some researchers argue that know-how licensing is more vulnerable than other forms of collaboration, because the transfer of technology normally leads to asymmetric possession of information, and there are significant costs associated with such a transfer (Teece 1986; Kogut and Zander 1992; Park and Ungson 1997; Kale 1999; Augier and Teece 2006). Therefore, the transferring firm must have an incentive to transfer knowledge. The success of know-how transfer also depends on whether personnel from the two firms have correct and suitable communications (Daft and Lengl 1986; Marsden 1990; Badaraco 1991; Dyer and Singh 1998; Krogt et al. 2007).

6. Management/marketing service agreement

A management/marketing service agreement, like know-how licensing, assumes a closer degree of continuing assistance and organisational links. The extent of inter-organisational dependence is relatively high for these agreements (Contractor and Lorange 1988). It involves deep cooperation on the production process or organisational structure.

A management agreement requires different levels of management skill on the nature of the working process. A software outsourcing company is a good example (Whitford and Zeitlin 2004; Li et al. 2007; Mazzola et al. 2008; Vilana and Monroy 2010). Some projects need special support and supervision. To keep confidential data, technology, and the business working process safe, the outsourced company sometimes supervises the project directly or provides consulting services. The collaborators also benefit by sharing market information and avoiding some policy barriers in developing countries (Zhang et al. 2009).

Although not many studies have focused on management and marketing service agreements in the literature, it is a very important collaboration type in real world collaborating cases. It is usually accompanied by other collaborating types.

7. Non-equity cooperative agreements in exploration, research partnership, development/co-production

Non-equity based collaborations developed rapidly from the late 1980s (Hagedoorn 1996; Hagedoorn and Duysters 2002; Das and Rahman 2009). To Williamson (1985), non-equity partnerships are 'pure hybrid forms'. These collaborations frequently happen between large and small firms and often consist of technology transfer (Hagedoorn and Duysters 2002; Krogt et al. 2007; Husted and Michailova 2009). They vary in their organisational management, control mechanisms, compensation systems, and goals (Park and Ungson 1997). Typical forms of non-equity collaboration include co-innovation, joint R&D, software sourcing, and co-production (Contractor and Lorange 1988).

Technology collaboration usually involves long-term collaboration between companies (Hagedoorn and Duysters 2002). The reasons for certain collaborations include operational considerations, cost minimising, and long-term strategic perspectives for business positions.

Some researchers have found that joint R&D is usually the reason for inter-firm collaboration in high technology industries (Mowery 1988a; Mytelka 1991; Lorange and Roos 1992; Hagedoorn et al. 2005; Richards and Yang 2007). An R&D joint venture refers to the combination of the economic interest of at least two distinct companies in a jointly owned organisation (Hagedoorn et al. 2003). Profits and losses are often shared on the basis of share of investments (Hagedoorn et al. 2003; Hagedoorn et al. 2005; Husted and Michailova 2009), such as human resources, technologies, and equipment (Krogt et al. 2007).

8. Equity joint venture

Equity joint ventures (EJV) or joint ventures (JV) are new ventures created and controlled by two or more parent companies (Kogut and Singh 1988; Gulati 1995a). "The contracts for the equity joint ventures indicate a common ownership structure (shareholdings) and income, profits and losses are allocated accordingly" (Hagedoorn and Hesen 2007, p. 352). Some researchers have argued that such equity sharing will align the motivation of the partners, creating mutual interests, which reduces transaction costs, market inefficiency, and the possibilities for opportunistic behaviour (Harrigan 1988; Kogut 1988; Yip 1992; Bleeke and Ernst 1993; Slocum and Lei 1993; Oxley 1997). In recent years, international joint ventures have become a prevalent mode of entry into the global market (Harrigan 1985b; Park and Ungson 1997; Lee et al. 2003b; Richards and Yang 2007; Mazzola et al. 2008).

However, other researchers have argued that joint ventures are sometimes risky and not stable (Porter 1987; Root 1988; Blodgett 1992; Parkhe 1993a), which is consistent with a high rate of failure (Harrigan 1988; Kogut 1988), involuntary loss of potential revenue (i.e., economic rents), uncompensated transfers of technology (Levine and Byrne 1986), and operational problems (Lee et al. 2003b), disagreements, and anxieties over the loss of proprietary information (Gomes-Casseres 1987; Das and Rahman 2009).

Previous literature on joint ventures have focused on administrative issues of control (Geringer and Hebert 1991), the actions of the general manager (Geringer 1991), and the division of ownership shares (Killing 1983; Osborn et al. 1998). There is a legitimate rationale for a more mature, long-term, win-win emphasis (Lewis 1990; Lorange and Roos 1992).

If collaboration can bring such significant tangible and intangible benefits, why are firms so cautious in selecting partners and joining collaborations? The reason is that there are some risks associated with all types of collaboration, which may threaten the development and even survival of the collaborating firms (Garvis 2000). Therefore, to understand better the concerns and risks for inter-firm collaboration, the literature on risk in relation to collaborations is reviewed.

3.2.4 Risks in Collaboration

Collaboration brings not only good results but also possible losses to non-collaborating firms (Gulati et al. 1994). On the other hand, an unsuccessful collaboration may also bring high risks to the firms involved (Harrigan 1988; Kuada and Sorensen 2005; Krogt et al. 2007). Financial and time costs also increase with collaboration, which bring more risks (Augier and Teece 2006). Other potential costs from collaboration include asymmetric information, negligence of partner's activities, and irresponsibility (Kuada and Sorensen 2005). All kinds of collaborations face relational and performance risks (Singh and Mitchell 2005; Krogt et al. 2007).

Many researchers have studied risk in the context of inter-firm collaboration. Some of them have focused on different forms of risk (Hamel et al. 1989; Williamson 1991; Lorange and Roos 1992; Nooteboom et al. 1997; Singh and Mitchell 2005; Krogt et al. 2007). Others have studied the main causes of risk (Lewis 1990; Roos 1994; Parker 2000). Risk influences not only the success of collaboration, but also the success of a firm itself. Managers usually weight the potential risks heavier than it should be (Singh and Mitchell 2005) and therefore attempt to avoid them.

As shown in Table 3.4, risk in inter-firm collaboration can be categorised as: internal risk (e.g. lack of trust, technical complexity and uncertainty, and benefit distribution) and external risk (e.g. societal-level dynamics; historical and cultural barriers; government constraints). Each of these forms of risk will be discussed further below.

1. Internal risk: Lack of trust

Most researchers agree that trust is the basic element of inter-firm collaboration (McMaster and Sawkins 1996; Olkkonen et al. 2000; Woolthuis et al. 2010). Collaboration usually requires a deeper trust relationship to ensure that both collaborators do what they have promised to do (Bradach and Eccles 1989; Casson

Table 3.4 Risks facing inter-firm collaboration

	Risks	Literature
Internal risks	1. Lack of trust	Bradach and Eccles 1989; Hamel et al. 1989; Kogut 1989; Lewis 1990; Lorange and Roos 1992; Gulati 1995a; Casson 1995b; Nooteboom et al. 1997; Kay 1999; Parker 2000; Kuada and Sorensen 2005; Singh and Mitchell 2005; Williamson 2005; Nooteboom 2010
	2. Technical complexity and uncertainty	Coase 1937; Axelrod 1984; Teece 1986; Anderson and Tushman 1990; Auster 1992; Heide and Miner 1992; Hagedoorn 1993; Williamson 1996; Osborn et al. 1998; Hagedoorn et al. 2005; Khamseh and Jolly 2008
	3. Benefit distribution	Devlin and Bleakley 1988; Ohmae 1989; Heide and Miner 1992; Parker 2000; Krogt et al. 2007; Das and Rahman 2009
External risks	4. Societal-level dynamics	Olkkonen et al. 2000; Landsburg 2005; Krogt et al. 2007; Richards and Yang 2007; Das and Rahman 2009; Jia and Rutherford 2010
	5. Historical and cultural barriers	Lange 1938; Contractor and Lorange 1988; Casson 1995a; Kuada 2002; Kuada and Sorensen 2005; Das and Rahman 2009; Jia and Rutherford 2010; Vilana and Monroy 2010
	6. Government constraints	Kuada 2002; Nie and Zeng 2003; Hagedoorn et al. 2005; Kuada and Sorensen 2005; Qiu 2005; Luechaikajohnpan 2008; Keane 2009

Source: Author's compilation

1995b; Kay 1999). However, trust is a broad concept. There are a number of legal definitions of trust. Trust in this thesis refers to firm level trust only. The factors related to firm-level trust will be discussed further in Sect. 3.4.1.

Lack of trust is the major risk facing most inter-firm collaboration. Some researchers have focused on these problems in their empirical studies and argued the causes for this problem include: misallocation of resources; reluctance to give up autonomy; skill and knowledge leakage; the problem of spillovers; different opinions on management and processes, and opportunistic behaviour (Ohmae 1989; Gulati 1995a; Nooteboom et al. 1997; Parker 2000; Williamson 2005; Brunetto and Rod 2007). To build and maintain trust requires a great amount of time, effort, and financial support (Lewis 1990; Lorange and Roos 1992; Singh and Mitchell 2005). Therefore, to keep a good trust relationship with each other, a simple and useful method is to maintain effective communication during collaboration.

2. Internal risk: Technical complexity and uncertainty

Collaboration in industries with rapid technology changes, such as the telecommunication industry, is very common. Firm may find it hard to understand and make good use of the technology provided by its partner. Furthermore, there is no certainty that the new particular technology will bring with it certain profits. Technology change and complexity (Auster 1992; Osborn et al. 1998; Khamseh

and Jolly 2008), technological discontinuities (Anderson and Tushman 1990), commercial complementarities and commercial inseparabilities (Teece 1986) add uncertainty to inter-firm collaboration. Therefore, the profits generated by the new technology are not clear in the short-run. Even in technically stable industries, there may still be considerable uncertainty in forming an alliance across national boundaries (Williamson 1991; Osborn et al. 1998). Therefore, unexpected disturbances may place considerable strain on inter-firm collaboration and lead to disappointing profits (Williamson 1991; Hagedoorn et al. 2005).

Just like "buy or make" decisions by producers (Walker and Weber 1984), high technology companies need to decide what technologies are in their best interest to buy, and what they should develop by themselves. Uncertainty associated with high technology very often destabilizes the equilibrium of the firm (Coase 1937). If there is uncertainty, it is generally more difficult to sustain cooperative outcomes (Axelrod 1984). Through collaboration, firms can lower their developing costs as well as sharing the risks.

3. Internal risk: Benefit distribution

Another element that makes collaboration inherently risky is benefit distribution (Heide and Miner 1992; Das and Rahman 2009). Most collaborating agreements have clearly defined benefit distribution before commencing the collaboration. However, problems occur when new unexpected profits or losses are generated through collaboration. Performance ambiguity occurs when it is hard for a player to evaluate the outcomes or products received from another party. The influence of this risk is not as serious as others, but it threatens trust and future collaboration between collaborators.

Firms collaborate because of the benefits received from such activities. The global market is a dynamic one. There are numerous potential changes every day. To remain in the market, some firms may need a cautious long-run strategy and an ability to control real-time risk (Krogt et al. 2007; Pricewaterhouse Coopers 2007). Therefore, an agreed benefit distribution is important to the result of inter-firm collaboration (Devlin and Bleakley 1988; Ohmae 1989; Parker 2000; Das and Rahman 2009).

4. External risk: Societal-level dynamics

Societal-level dynamics refer to complex processes of interactions between heterogeneous agents in society that often produces unpredictable outcomes (Durlauf and Yong 2001). Societal-level dynamics can come from many causes: a change of government policy, of the legal system, or exchange rate of the country in which the business is conducted; global financial crisis; flow of skilled employees; and new material or technology development. It also increases the relational risks for mergers or collaborating firms (Krogt et al. 2007; Richards and Yang 2007; Das and Rahman 2009; Jia and Rutherford 2010). The risk of societal-level (e.g. economic, business continuity) dynamics is hard to predict and avoid.

Although hard to predict the influence of societal-level dynamics can be reduced by defining substitute strategies to control risks. Collaboration can not only provide real-time information and news (Olkkonen et al. 2000), but also immediate assistance when one collaborator experiences difficulties (e.g. during the global financial crisis). The support and trust built during these difficult times may lead to success of the business afterward.

5. External risk: Historical and cultural barriers

Risk may be associated with a firm's historical (e.g., previous owner or manager's experiences) and cultural barriers (Kuada 2002; Das and Rahman 2009; Jia and Rutherford 2010). Risk can cause misunderstanding, wasting of time and resources and a loss of profit. The problem may cause an unstable business environment, which may also cause a sharp decline in private investment from the parent firms (Contractor and Lorange 1988). However, less attention has been devoted to these issues in the literature.

Cultural differences between different countries affect the negotiation process and outcomes of inter-firm collaborations (Eiteman 1990; Jia and Rutherford 2010; Vilana and Monroy 2010). Different cultures may have very different views on communication, trust, and business profits (Kuada 2002). Vilana and Monroy (2010) argue that the similarities of firm culture also influenced the performance of inter-firm collaboration. Therefore, it is important to identify differences in cross cultural inter-firm collaboration.

When deciding to collaborate, firms should assess their anticipated ease of working with the other partner; possible language difficulties, cultural differences, style incompatibilities, differences in values and norms, and the presence of a sufficiently strong 'mentor' who will help the collaboration (Contractor and Lorange 1988). As each firm has its own special situation, history and cultural background, there is no single solution for every firm.

6. External risk: Government constraints

Government constraints are the most common barriers in the telecommunications market (Keane 2009). Most countries have state-imposed constraints in their local telecommunications markets that have generated market power. For example, the Chinese telecom markets are dominated by several big firms. China Mobile, China Telecom, China Netcom and China Unicom occupied 98.6 % of the Chinese telecom market in 2002 (Qiu 2005). There are high entrance barriers for other competitors (Kuada 2002; Nie and Zeng 2003; Kuada and Sorensen 2005; Luechaikajohnpan 2008). "Too much regulation can distort market performance while too little regulation exposes new entrants and consumers to risks of abuse by a firm with market power" (OECD 2003, p. 28). Firms sometimes collaborate with other local firms to bypass special government constraints. On the other hand, bureaucratization is also a political barrier to inter-firm collaboration (Lange 1938).

A different intellectual property protection level is another problem that threatens international inter-firm collaboration. With less secure protection, firms

are reluctant to transfer their technology and knowledge (Lin et al. 2011). Technological changes sometimes have adverse effects on the performance of international collaboration. With less intellectual property rights protection in the current environment, firms tend to choose equity-based R&D joint ventures rather than contractual partnerships (Hagedoorn et al. 2005).

Besides these risks, collaboration also faces many other risks in specific circumstances. These risks should be analysed in different cases. One of the biggest risks for inter-firm collaboration is cross-national inter-firm collaboration, which usually has a higher failure rate. However, most of the previous literature has focused on collaboration in the U.S., Japan, or some developed countries in Europe. Less attention has been put on developing countries (e.g. Hamel et al. 1989; Hagedoorn 1993; Gulati 1995a; Hagedoorn 1995b; Kale 1999; Hagedoorn and Duysters 2002). Therefore, to study differences in the Australian and Chinese markets, it is also important to review the literature on developing countries.

3.3 Collaboration in Developing Countries

3.3.1 Differences Between Developed and Developing Countries

As defined by the World Bank, low-income (USD 1,025 or less in terms of GNI per capita) and middle-income (USD 1,026–4,035 in terms of GNI per capita) economies are developing countries. The upper-middle and high income (USD 4,036 or more in terms of GNI per capita) economies are developed countries (World Bank 2012). The differences between developing countries and developed countries also influence the pattern and characteristics of inter-firm collaborations in different countries. With the development of new technology and globalisation, the "distance" between these firms has decreased. And the motives, types and benefits of inter-firm collaboration in both developing and developed countries have become similar. However, some special characteristics of collaboration in developing countries should be noticed.

The first difference is the role of government (Kuada 2002). Governments usually play a more important role in developing countries, which significantly influences a firm's strategies and development. In some industries, government policies exert a significant influence on business performance and orientation (Keane 2009). As a consequence, the relationship with government is an important indicator of a firm's competitiveness in some developing countries (Lu et al. 2006).

The second difference between developing and developed countries is in terms of competitive resources, which affects the major types of collaboration by firms. Most multinational firms have established R&D centres in developing countries (Zhang and Dodgson 2007) to access lower-cost labour resources. Firms in developing countries also seek collaborating partners in high-tech developed countries.

Therefore, inter-firm collaborations are usually between larger firms from developed countries and smaller firms from developing countries (Narteh 2008).

The third difference between developed and developing countries is the different stages of development in policy and law. For example, intellectual property protection problems in developing countries are often mentioned by multinational firms (Indro and Richards 2007), and this is expected to be a barrier for inter-firm collaboration between firms from developed and developing countries. Without a shared socioeconomic history, "one firm may attempt to impose its system on the other" (Osborn et al. 1998).

Finally, managers from developing and developed countries have different propensities towards risk. Kuada (2002) found Ghanaian partners perceived their Danish partners as risk-averse.[6] It can be argued that firms from developing countries are more willing to take risks. Different cultures may have different attitudes to trust (Park and Ungson 1997; Kuada and Sorensen 2005; Vilana and Monroy 2010). Trust is believed to play a more important role in business dealings in East Asia (Boisot and Child 1988). China is a good example of a developing country (Boisot and Child 1999). The high growth rate of China in recent years has attracted considerable attention in the world. Therefore, many researchers now focus on the Chinese economy and the causes of its high growth rate.

3.3.2 Australia and China

The existing literature review does not sufficiently study the cultural differences between Australia and China. Australia, as an immigration nation, has a large proportion of migrants in its population. They have very different culture backgrounds, birthplaces, religions and languages. From the latest 2011 Census data, over a quarter of the Australian population was born overseas and the source of migration has changed from Europe to Asia and other countries (ABS 2012). The special mixed cultural background benefited Australian business in global inter-firm collaboration as they have more language skills, have better understanding of different cultures and religions and have more experience of cross-culture communications.

China is a fast developing country with the world's biggest population, making it the biggest market in terms of population and human resource base in the world. Another notable characteristic of China is its high GDP growth rate. Chinese GDP increased at an average annual rate of 9.7 from 1978 to 1997 (Harvie 2000; Garnaut et al. 2001; Wu 2001), and reached 40 trillion Yuan (about 6 trillion AUD) in 2010 (NBSC 2012). Many researchers have studied the fast development of China (Boisot and Child 1988, 1999; Eiteman 1990; Lee et al. 2003a; Chen and Shih

[6] Risk-averse people always preferring the least risky among baskets with the same expected value (Landsburg 2005).

2005; Zhang and Dodgson 2007). To improve market share; bypass policy barriers; access the Chinese domestic market; or access low-cost R&D resources, many foreign firms collaborate or invest in China (Chen and Shih 2005; Li et al. 2007; Karim 2009).

China has a very special cultural legacy which has implications for the way in which business is conducted, for example a preference for personal relationships and connections (Boisot and Child 1999; Vipraio and Pauluzzo 2007; Lau and Rowlinson 2009; Jia and Rutherford 2010). Gomez and Hsiao (2004) defined the Guan Xi[7] network as one of the most enduring and definitive features of Chinese business culture. Lu et al. (2006) indicated that the Chinese practice of Guan Xi plays an elaborate and important role in supply chains in China. Inter-firm collaboration in China focuses more on building relationships with the government and state-owned firms, which brings more intangible future benefits for collaborators. Hofstede (1980) found that work-related values vary between China and the West. Although many researchers argue that cultural differences brought negative effects on inter-firm collaboration, Jia and Rutherford (2010) found that the cultural differences between China and the West can mitigate the relational risk in some supply chain relationships. A case study is needed to study the Chinese market (Boisot and Child 1999; Zhang and Dodgson 2007).

3.3.3 Collaboration Between Developing and Developed Countries

Most empirical studies have focused on developed countries and especially Japanese, U.S. and European firms (Ouchi 1980; Kogut and Singh 1988; Hamel et al. 1989; Shane 1994; Gulati 1995a; Hagedoorn 1995b; Park and Ungson 1997; Osborn et al. 1998; Kale 1999; Hagedoorn and Duysters 2002). Collaboration between developed and developing country firms has not received much discussion in the literature (Kuada 2002).

New waves of innovation and technology are driving forces in Western economies, but the low cost and highly skilled workforce in East Asia have become mainstream players in the knowledge game (Allee and Taug 2006). Firms from developing countries are likely to possess high learning intent when collaborating with firms from developed countries (Lee et al. 2003a; Li et al. 2007; Zhang and Dodgson 2007; Narteh 2008; Jia and Rutherford 2010).

From collaboration, firms can lower costs or achieve higher profits. However, experience in developed countries may be less useful when applied to that of developing countries, and vice versa (Lane and Beamish 1990; Kuada 2002; Lee et al. 2003a). The effect of cultural distance is also significant for international

[7] Guan Xi, personal and business relationship in China, is one of the major dynamics in Chinese society (Lu et al. 2006).

joint ventures (Barkema et al. 1997; Kuada 2002). International differences in intellectual property rights protection is another issue for firms when they collaborate with others (Harrigan 1985a; Dixit 2004; Williamson 2005).

This thesis focuses on the study of both developed and developing countries through real industry cases and tries to answer the question "What are the key determinants for successful inter-firm collaboration?" To answer this question, it is important to review the major factors from previous literature and empirical studies first.

3.4 Key Determinants to Successful Collaboration

Early researchers paid much attention to the governance of collaboration (Nooteboom et al. 1997) and little has been done to identify the factors that influence the success and failure of such ventures. This is a remarkable omission in the literature (Barkema et al. 1997; Saxton 1997; Kale 1999). Some researchers have found that inter-firm collaboration has experienced a very high failure rate in their empirical studies (Levine and Byrne 1986; Buono and Bowditch 1989; Chowdhury 1992; Bleeke and Ernst 1993; Hill and Hellriegel 1994; Dyer and Singh 1998). However, there is still no consensus among researchers on the factors that may determine the success or failure rate of inter-firm collaborations.

To study the key determinants of successful inter-firm collaboration, the primary task is to determine a "successful" collaboration. The direct and indirect means that scholars use to estimate the effect of individual alliances on firm performances can be separated into two categories (Gulati and Zajac 2000). The first method used by Koh and Venkatraman (1991), Balakrishnan and Koza (1993) is event-study analysis on the stock market effects of alliance announcements. However, the majority of small and medium sized private firms are left out of the model. For some firms in special industries (e.g. aerospace and defence), stock market data is also usually unavailable (Dussauge and Garrette 1995).

The second method was used by Baum and Oliver (1991, 1992), and Mitchell and Singh (1996) to examine the relationship between firms in alliances and the likelihood of their survival. Some researchers use survival, termination or duration of the alliance as an indicator of success or failure (Beamish 1985; Harrigan 1986; Kogut 1988; Levinthal and Fichman 1988; Blodgett 1992; Uzzi 1997; Singh and Mitchell 2005). However, it is not appropriate to equate the failure of an alliance with alliance termination (Dussauge and Garrette 1995; Saxton 1997; Gulati 1998; Kale 1999). Many inter-firm collaborations terminate when the parent firms decide to do so (Gomes-Casseres 1987; Kogut 1991). This is also supported by empirical studies conducted by Gulati (1998), Kale (1999), and Saxton (1997).

The reason why there is no single formula for evaluating success is that it is hard to measure (Anderson 1990). The criterion may be very different for each industry and even for each firm (Dussauge and Garrette 1995; Gulati 1998). Managerial researchers assign performance in terms of overall satisfaction as another method

used to study alliance results (Anderson and Narus 1990; Mohr and Spekman 1994; Tuchi 1995; Hebert and Beamish 1997; Inkpen 1997; Kale 1999). However, they are criticised as being not reliable as objective measurements (Dussauge and Garrette 1995). Therefore, success will be measured by using both objective performance and subjective methods as supplementary to each other in this thesis. Garvis (2000) built a model of business outcomes based upon trust, entrepreneurial collaboration, firm age, firm size, collaborative experience, and entrepreneurial orientation. He suggested that researchers should use both objective measures and subjective measures to evaluate the outcomes of inter-firm collaboration. He also found that risk as one factor of entrepreneurial collaboration, makes a negative contribution to the performance of collaboration. These will be adopted in this thesis. However, he used both firm age and experience in his model. It could be argued that firm age and experience are closely correlated.

What, therefore, are the core ingredients of a successful inter-firm collaboration? Some researchers believe that partially shared ownership (Kale 1999; Parker 2000), useful information (Datta 1988; Kuada 2002), effective communication (Parker 2000; Stallkamp 2005), similar firm size and processes (Barley et al. 1992; Gulati 1998), building trust (Kogut 1991; Parker 2000), taking a long-term viewpoint (Lorange and Roos 1992), product diversity (Gulati 1998), systematic partner search (Kuada 2002), or continuity of interface personnel (Bleeke and Ernst 1991; Kay 1993) are the important predictors of successful inter-firm collaboration. These elements are very important to collaboration in real world cases. However, each of them alone is not sufficient for successful inter-firm collaboration. The most important determinants of successful collaborations are summarised in Table 3.5.

Figure 3.2 shows the framework and relationships between these factors. Each of these factors will be discussed further below.

3.4.1 Trust

Trust is mentioned by many researchers (from economics, psychology, sociology, and cognitive science) as one of the most important elements to a successful collaboration (Williamson 1985; Kay 1993; Gulati 1998; Lewis 2000; Parker 2000; Kuada 2002; Lui and Ngo 2005; Narteh 2008). Trust is an expression of confidence in inter-firm collaboration. Empirical studies on inter-firm collaboration have also shown that the process and performance of collaboration is closely associated with the establishment of trust (Buckley and Casson 1988; Heide and John 1990; Nooteboom et al. 1997; Saxton 1997; Zaheer et al. 1998; Poppo and Zenger 2002). Trust can benefit inter-firm collaboration and vertical integration by increasing efficiency and reducing cost (Zaheer and Venkatraman 1995; Park and Ungson 1997; Dyer and Singh 1998; Kale 1999; Nooteboom 2004). It also reduces uncertainty and conflicts (Hill 1990; Zaheer et al. 1998). Trust is developed through collaboration and communication (Ragatz et al. 1997; Zaheer and Zaheer 1997;

Table 3.5 Key determinants of inter-firm collaboration

Key determinants	Literature
1. Trust	Hall et al. 1977; Laumann et al. 1978; Williamson 1985; Zucker 1986; Itami and Roehl 1987; Boisot and Child 1988; Levinthal and Fichman 1988; Williamson 1988; Powell 1990; Fichman and Levinthal 1991; Larson 1992; Barney and Hansen 1994; Borch 1994; Gomes-Casseres 1994; Ring and Van de Ven 1994; Zaheer and Venkatraman 1995; Gulati 1995b; Cummings and Bromiley 1996; Park and Ungson 1997; Ragatz et al. 1997; Walker et al. 1997; Zaheer and Zaheer 1997; Blois 1998; Das and Teng 1998; Dyer and Singh 1998; Gulati 1998; Humphrey and Schmitz 1998; Jones and George 1998; Zaheer et al. 1998; Kale 1999; Garvis 2000; Lewis 2000; Parker 2000; Adler 2001; Bellon and Niosi 2001; Kuada 2002; Poppo and Zenger 2002; Harrison 2004; Hartono 2004; Nooteboom 2004; Adobor 2005; Lui and Ngo 2005; Howells 2006; Adobor 2006a; 2006b; Elg 2007; Becerra et al. 2008; Papadopoulos et al. 2008; Husted and Michailova 2009; Lau and Rowlinson 2009; Nooteboom 2010; Zacharia et al. 2011
2. Size and process	Chandler 1962; Rumelt 1974; Berg et al. 1982; Porter 1987; Westney 1988; Mowery 1988a; Lane and Beamish 1990; Burgers et al. 1993; Gulati 1995a; Gulati 1995b; Oxley 1997; Park and Ungson 1997; Garvis 2000; Singh and Mitchell 2005; Felzensztein and Gimmon 2007
3. Communication	Axelrod 1984; Daft and Lengl 1986; Anderson and Narus 1990; Clegg 1990; Badaraco 1991; Heide and Miner 1992; Kay 1993; Nyberg 1997; Park and Ungson 1997; Olkkonen et al. 2000; Parker 2000; Kuada 2002; Reinig 2003; Elg 2007; Wilson 2007; Keane 2009; Zacharia et al. 2011
4. Experience and histories	Nelson and Winter 1982; Harrigan 1985a; Harrigan 1986; Amburgey and Miner 1992; Fiol and Huff 1992; Kogut et al. 1992; Gulati 1995a; Park and Ungson 1997; Saxton 1997; Dyer and Singh 1998; Anand and Khanna 2000; Garvis 2000; Kuada 2002; Hagedoorn et al. 2003; Harrison 2004; Singh and Mitchell 2005; Zacharia et al. 2011
5. Culture similarity	Buckley and Casson 1976; Ouchi 1980; Tung 1984; Anderson and Gatignon 1986; Kogut and Singh 1988; Hamel et al. 1989; Lane and Beamish 1990; Parkhe 1991; Child et al. 1992; Shane 1994; Dyer 1996b; Dyer 1997; Park and Ungson 1997; Parker 2000; Kim and Park 2002; Kuada 2002; Taylor and Osland 2003; Harrison 2004; Felzensztein and Gimmon 2007; Das and Rahman 2009; Reus and Rotting 2009; Vilana and Monroy 2010

Source: Author's compilation

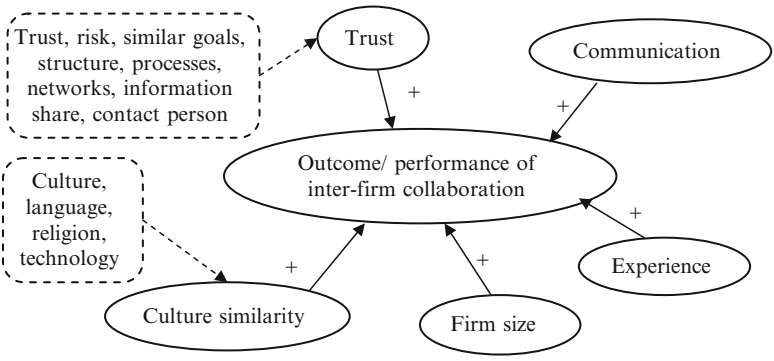

Fig. 3.2 Framework of key determinants for successful inter-firm collaboration

Parker 2000). It is an invisible asset (Itami and Roehl 1987), which makes future cooperation easier to implement (Nooteboom et al. 1997).

Trust is related to interpersonal trust (Zaheer et al. 1998; Adobor 2006a; Lau and Rowlinson 2009), behavioural intention (Cummings and Bromiley 1996; Hartono 2004), similarity of firms' structures and backgrounds (Powell 1990; Fukuyama 1995; Chen 1996; Gulati 1998; Lui and Ngo 2005), information sharing (Parker 2000; Elg 2007; Papadopoulos et al. 2008), and similar goals (Blois 1998; Bellon and Niosi 2001; Zacharia et al. 2011). Furthermore, trust is highly correlated with network positions (Harrison 2004), reputation levels (Hartono 2004; Lui and Ngo 2005; Husted and Michailova 2009), and the risk/uncertainty level (Ring and Van de Ven 1992; Adobor 2005) during the inter-firm collaboration. Therefore, these factors will be used as components of the overall trust level in this study.

Many researchers have studied the effect of trust in inter-firm collaborations (Granovetter 1985; Borch 1994; Brunetto and Rod 2007). However, trust building may require substantial time (Dyer and Singh 1998), which is hard for most SME managers (Brunetto and Rod 2007). Although trust itself is not sufficient as a basis for collaboration (Williamson 1988), it is very important for inter-firm collaboration (Ring and Van de Ven 1994; Nooteboom et al. 1997).

Building and maintaining partnerships requires significant costs (Larson 1992; Gulati 1995a). Therefore, the quality of inter-firm collaboration is more important than quantity (Uzzi 1997; Parker 2000). Risk is also influenced by the trust level in inter-firm collaboration (Adobor 2005). On the other hand, the better the interpersonal communication between firms the greater will be the relationship developed (Ring and Van de Ven 1989, 1994; Hagedoorn 2006).

One important factor for trust that has been omitted in the literature is the contact person (so called gatekeeper in the managerial literature and third party in some recent business studies). In a review of more than 150 papers on alliances by Ireland et al. (2002) the important role of the contact person or third party is not mentioned. It has not received enough attention until recently (Nooteboom 2004; Howells 2006; Husted and Michailova 2009; Lau and Rowlinson 2009; Zacharia et al. 2011). Adobor (2006a) found that personal relationships are more important in the initial phase of an alliance. However, the third party could be an employee or an individual that has no financial relationship with any firm involved. This is found to be important in China where "Guan Xi" plays an especially important role (Gomez and Hsiao 2004; Lu et al. 2006). As this thesis also includes small and micro firms in the empirical study, the contact person is used to replace the "third party" in the questions.

3.4.2 Firm Size

Most researchers define the size of a firm in terms of a firm's assets, sales, revenue, turnover, or average worldwide employee number and conducted empirical research based on this definition (Harrigan 1988; Levinthal and Fichman 1988;

Park and Ungson 1997; Kale 1999; Hagedoorn and Duysters 2002; Singh and Mitchell 2005). However, the definition of firm size is different in each country and even in different industries. For example, the definition of firm size in Australia is different in the agriculture and service sectors (ABS 2012). Although both Australia and China define firm size on the basis of number of employees, in general the defined number is still different for small sized enterprises (see also Chaps. 6 and 7).

Data collected by prior empirical research is mostly based on a research data base or a firm's annual report, which are only available for most big and international firms in developed countries. Such studies consequently exclude developing countries and most small and medium sized enterprises. The size of a company may affect its capability, scope, process, structure, regulations, behaviour, and decision making. Large firms are more likely to possess more specialized assets, business networks, patents and skilled labour (Teece 1986).

Some researchers have found that firm size or size difference between collaborating firms play an important role in the partnership formation process and collaborating behaviour. It also affected the performance and success of collaboration (Chandler 1962; Rumelt 1974; Berg et al. 1982; Porter 1987; Shan and Hamilton 1991; Burgers et al. 1993). Some researchers believe that the formation of inter-firm collaboration increases with the size of a company because of the broader basis for potential collaboration, lower barriers to entry, higher network density, lower costs, and internationalization (Burt 1983; Ghemawat et al. 1986; Duysters and Hagedoorn 1995; Hagedoorn 1995b; Dussauge et al. 2000). Some have argued that different sized firms are more likely to form alliances (Gulati 1995a; Saxton 1997). However, other researchers have argued that firm size does little to contribute to the performance of inter-firm collaboration (Oxley 1997; Park and Ungson 1997). Felzensztein and Gimmon (2007) argued that small firms are even more active in building inter-firm collaboration. These conflicting results may be due to different datasets. It can be argued that the key determinants could vary between different countries, industries, and sample groups.

3.4.3 Communication

Communication is "the sharing of meaningful and timely information between firms" (Parker 2000). As more corporations expand globally and more employees work from diverse sites, maintaining real-time communications becomes more important to inter-firm collaboration (Elg 2007; Wilson 2007; Zacharia et al. 2011). Poor communication can increase the cost of transferring skills and technologies (Park and Ungson 1997) and result in misunderstanding. Greater frequency of communication between partners can affect not only the success of collaboration, but also the performance of firms entering into them (Kay 1993; Indro and Richards 2007; Keane 2009; Zacharia et al. 2011).

Most empirical work shows that communication influences the trust relationship, network stability, risk reduction, and is vital for inter-firm collaboration (Olkkonen et al. 2000; Reinig 2003; Elg 2007; Zacharia et al. 2011). Communications are through formal business negotiations or industry forums (Nyberg and Strandvik 1999; Keane 2009), telephone discussions (Nyberg 1997), informal conversations and through e-mail or fax (Olkkonen et al. 2000; Reinig 2003). However, there is no clear definition on the frequency and types of proper communication (Parker 2000).

On the other hand communication processes "encompass not only expressions via language, but also a wide range of symbolic expressions" (Kuada 2002). Furthermore, different cultures or managers have different preferences in terms of communication (Sharma 1998; Kuada 2002). To improve communication with collaborators firms must invest enough time, resources, and suitable personnel as well as having the willingness to build long-term relationships with their partners (Zacharia et al. 2011).

3.4.4 Experience and History

Some researchers have found that the success of inter-firm collaboration is due to a large extent to a firm's previous experience and history (Harrigan 1986; Parkhe 1993b; Saxton 1997; Dyer and Singh 1998; Kay 1999; Hagedoorn et al. 2003). The more experience a company has in formal alliances, the more opportunities there are for further linkages (Ring and Van de Ven 1992), to enter into future partnerships (Harrison 2004; Zacharia et al. 2011) and to avoid pitfalls.

Empirical work has also supported that past success yields greater success in present and future inter-firm collaboration (Miller and Friesen 1980; Nelson and Winter 1982; Amburgey and Miner 1992; Poppo and Zenger 2002; Zacharia et al. 2011). Repeat collaboration between firms occurs frequently and increases trust between partners (Gulati 1995a). The experience and history of firms with their collaborators influences the formation, performance and success of new collaborations. Some interviewees in this study also supported this argument.

International joint venture experience has been found to increase a firms' propensity to set up new ventures (Madhok 1997), to improve their understanding of this vehicle (Lyles 1987), to enhance the performance of the investing firms (Mitchell et al. 1994) and to increase the longevity[8] of the venture itself (Barkema et al. 1997). However, the influence of prior experience will vanish over a period of time as the new collaborating types and trust relationships are developed during collaboration (Saxton 1997; Winter and Zollo 1999). Furthermore, Kay (1999) argued that past experience of a specific kind will only lead to success of the same type but will not contribute to other types of collaboration. On the other hand, Harrigan (1985a) and Weick (1979) found that past collaboration may also

[8] Longevity was defined as the number of years a venture persisted (Barkema et al. 1997).

limit the firm's ability to adapt and grow as previous failure experience may increase their assessment for new collaboration risks, and therefore, have a negative influence on new collaboration.

Each partner is unique and, in most cases, managers do not have enough time to become familiar with the partner before collaboration (Yelle 1979). Therefore, the results are full of positive or negative uncertainties. A risk averse strategy may avoid future risks but also limit the potential development on new inter-firm collaboration or business development.

3.4.5 Cultural Difference and Distance

Cultural difference and distance brings more risk to inter-firm collaboration (Das and Rahman 2009; Vilana and Monroy 2010). National differences may affect the legal, political and social environments of firms (Ronen and Shenkar 1985). However, nationality alone cannot fully capture cultural values (Park and Ungson 1997). Vilana and Monroy (2010) argue that collaborators with similar firm cultures reach high assessments of satisfaction, learning, and collaboration efficiency. However, in some empirical studies (Kim and Park 2002; Reus and Rotting 2009) cultural similarity showed a weak negative effect on collaboration performance or value creation.

Some researchers have argued that culture is a complex phenomenon composed of different beliefs, values, and norms, which are difficult to measure (Luostarinen 1980; Barkema et al. 1996; Taylor and Osland 2003; Narteh 2008). It affects managerial behaviour and moderates the relationships between partners (Parkhe 1991; Hofstede 1994). Park and Ungson (1997) measured cultural distance using four dimensions: cultural difference, language difference, religion difference, and different technology levels, which will also be adopted in this thesis. The results from some empirical studies have shown that cultural difference between partners significantly affects the process and result of inter-firm collaboration (Vachani 1991; Woodcock and Geringer 1991; Dyer 1997; Kuada 2002; Felzensztein and Gimmon 2007).

Although some cultures are complementary, differences between cultures may still increase the uncertainties and problems in international or cross-regional collaboration (Hofstede 1980; Park and Ungson 1997; Felzensztein and Gimmon 2007). However, the degrees of cultural distance may be mitigated over time as foreign partners continue to work together in telecom provision (Kashlak et al. 1998).

This thesis will focus on this gap and study real cases of inter-firm collaboration for both Australia and China. The study will assist in better understanding the cultural difference between Australia and China, as well as between developed and developing countries.

3.5 Conclusions

Collaboration is not only a way to generate more profits but is also a vital strategy for most firms to withstand the fierce competition associated with growth of new technology and globalisation. More and more firms now realize the importance of inter-firm collaboration.

"Why do firms collaborate?" "How do firms collaborate?" and "What are the key determinants for successful collaboration?" To answer these questions this chapter reviewed the literature from economics, management and business empirical works on incentives, types, risks, benefits, and key determinants of inter-firm collaboration.

The previous literature on collaborating benefits focused on tangible benefits, such as helping with basic R&D (research and development), accessing new and complementary technologies, reducing innovation time, lowering costs, increasing market share, increasing market influence and power, increasing productivity, profitability and product quality, and increasing firm competitiveness. The focus of this thesis is on the study of both the Australian and Chinese markets. Also included are some intangible benefits, such as accessing non-closure information, expanding business networks, enhancing relationships with government, accessing new markets.

On the other hand, most empirical work has focused on one or two collaborating types in one transaction. However, firms usually adopt combined types of collaboration with one partner or with different firms. Inter-firm collaborations are more complex in the real world. Therefore, the forms of collaboration identified in this thesis are multiple combinations of technical training, production agreement, patent licensing, franchising, know-how licensing, management service, non-equity agreement and equity joint venture.

To study inter-firm collaboration, another important concern is the risks and barriers for inter-firm collaboration. This chapter has also reviewed the major internal risks (e.g. lack of trust, technical complexity and uncertainty, and benefit distribution) and external risks (e.g. societal-level dynamics; historical and cultural barriers; government constraints).

There is a lack of research about the primary determinants of successful collaboration. This chapter has reviewed the collaboration literature and categorised the most important factors: trust, firm size, communication, previous experience, and culture similarity. Some highly correlated factors are put into these categories.

Another gap in the previous literature is that most studies have focused only on big U.S., European, and Japanese firms. However, most developing countries and small firms have not received systematic investigation in the literature. This thesis tries to address the gap by studying both the Australian and Chinese markets, and collecting data from all firm sizes.

In the following Chap. 4 the research methodology and proposed major research questions that are related to collaborating motives, types, benefits, risks, and key determinants for inter-firm collaboration will be explained. The results obtained from this chapter will assist in providing better solutions for future inter-firm collaboration in global markets.

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Chapter 4
Methodology

4.1 Introduction

The previous two chapters reviewed the literature and empirical work on inter-firm collaboration, and structured the framework of key determinants for successful collaborations. This chapter will propose the major research questions and hypotheses to be focused upon in this study. The previous literature suggests that both qualitative and quantitative studies are important methods. However, there has been a fierce debate around which one is superior since the early 1980s (Newman and Benz 1998). After reviewing the literature and comparing the advantages and criticisms of each of them, this chapter explains the importance of using both qualitative and quantitative research methods in this study to verify the major collaborating types, benefits, and risks in cross-national industrial cases. It also examines the key determinants of successful inter-firm collaboration in different countries.

The research process and design, including sample selection, data collection, and methods of data analysis, are discussed further in later sections of this chapter. Following the research process the design of the questionnaire is discussed. Measurements of the key determinants of successful collaboration as described in Chap. 3 and the linkages between these measurements and designed questions in the questionnaires are also discussed.

4.2 Primary Research Questions

As discussed in Chap. 3, there are many collaborating types, motives, benefits, and risks identified in the literature. However, a critical issue is whether these categories suit all industries and all countries, or have new types of collaboration emerged due to new technological advances or global industry changes. It can be argued that firms in different countries may have different resources, policy support, business

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environments and cultural backgrounds. Therefore, they may face different problems when undertaking local and international inter-firm collaborations. Special attention should also be paid to different countries and industries that have their own characteristics. Therefore, by focusing on one of the most dynamic markets – mobile telecommunication market, this thesis will verify the previous literature and empirical results on inter-firm collaborations in both Australia and China. The primary purpose of this thesis is to find the major types of collaboration and the benefits and risks associated with inter-firm collaboration in the Australian and Chinese mobile telecommunication markets.

The first primary research question addressed in this thesis is:

Primary Question 1: What are the major types of collaboration, benefits and risks associated with inter-firm collaboration in the Australian and Chinese mobile telecommunication markets?

To answer this research question, and based on previous research on the telecommunications market, some sub-questions are relevant.

- Question 1: Is cultural difference still important when firms choose business collaborators in the telecommunications market?

Transaction cost theory claimed that it is easier for firms to form strategic alliances with partners that have comparative advantages in producing different products or parts (Williamson and Winter 1993). This view is also supported by some management research (Contractor and Lorange 1988; Lewis 1990). The resource based view also argues that firms with complementary resources usually collaborate to reduce costs. Therefore, it is assumed that firms select business partners based upon their different resources or capabilities. In other words, the more the other firm is different from the searching firm the more likely it will become its partner.

However, in the mobile telecommunication market, firms usually have higher communicating technologies (e.g. video conferences). Do cultural or distance problems still matter in this industry? Have the new technologies solved the old problems in global inter-firm collaborations?

- Question 2: Does size matter when firms choose business collaborators?

Does firm size influence the selection of a business partner? As discussed in Chap. 3, results from the literature and empirical studies are not consistent. Some believe that the formation of inter-firm collaboration is closely related with firm size. Larger firms usually have more resources, experience, and better skills in collaboration. However, others argue that the contribution of firm size to alliance formation is very limited (Oxley 1997; Park and Ungson 1997). However, there are many examples of successful inter-firm collaboration between small and large firms (Gulati 1995a). Large firms may collaborate in order to obtain specialized capabilities or learn from their partners (Khanna et al. 1998; Dussauge et al. 2000), rather than achieve immediate sales (Singh and Mitchell 2005).

To examine whether firm size influences the selection of business partners in the Australian and Chinese mobile telecommunication market, this question is

proposed and designed for inclusion in the qualitative interviews. The results from this will provide useful implications for further studies.

- Question 3: Do firms prefer deep and long-term collaboration relationships?

Long-term collaboration can help reduce costs, build trust among the collaborating firms and increase learning by doing (Porter 1990; Hagedoorn 1993; Gulati 1995a; Harrison 2004). On the other hand, the building of a trusting relationship in a current collaboration will help firms form new collaboration projects or expand collaborating types (Harrison 2004). In the resource based view firms need less resources and therefore reduce costs, by repeating or extending current collaborations with their partners rather than starting a new one (Gulati 1995a).

Therefore, firms may prefer long-term collaboration relationships in inter-firm collaboration. This question will be examined via interview questions.

- Question 4: Do collaborating types (such as training and franchising in Chap. 3) in the previous literature suit fast developing and dynamic industries such as the mobile telecommunication industry?

The mobile telecommunication market has its own characteristics, compared with traditional manufacturing or services industries. Most telecom firms rely heavily on new technologies and intellectual property rights (such as patents). Such firms need to catch up with rapid technological change and increase their global competitiveness.

Therefore, previous collaborating types may not be applicable in this market. In other words, new types of inter-firm collaboration may emerge in this market as new technologies, market requirements, and business models change very rapidly.

- Question 5: What are the main benefits from inter-firm collaboration in the mobile telecommunication market?

Unlike most traditional manufacturing sectors, entry fees (licence fees or cost of networks and base stations) are relatively high in the mobile telecommunication market (Allee and Taug 2006; Access Economics 2010). As a fast developing and dynamic industry, technology and innovation are vital to telecommunication firms and business cycles are usually shorter for these firms (Access Economics 2010). These characteristics have influenced the main benefits for this industry.

On the other hand, profits are usually generated from operators (carriage service provider) and/or device providers due to total subscribers and number of services, and then transferred to service providers, content providers, and technical providers. As discussed in Chap. 5, the structure of this industry is quite different from other industries. Therefore, the major collaborating benefits may be different from other industries.

- Question 6: What are the major risks towards local inter-firm collaboration in the Australian and Chinese mobile telecommunication markets?

Cooperation with other firms carries with it a number of concerns, especially for small and medium sized enterprises. As discussed in Chap. 3, obstacles to inter-firm

collaboration include technology adoption, financial problems, policy restrictions, and lack of trust. However, due to the special characteristics of the mobile telecommunication market, the firms in this industry may face other risks when considering inter-firm collaboration.

As a fast developing and technically oriented industry, telecommunication relies heavily on new technology and innovation. Technology complexity may be an obstacle for most telecom firms. Nevertheless, government mandated barriers are common features for the telecommunication market in most countries, either by policy constraints (such as licenses) or adoption of different standards. To overcome these barriers firms sometimes have to collaborate to reach another market. However, policy change or government constraints also bring high risks to inter-firm collaboration in this market.

- Question 7: What are the major obstacles for international telecommunication collaboration in Australia and China?

For international collaboration, the relationship is more volatile. When considering entering the global market the obstacles towards inter-firm collaboration are quite different in different countries due to different culture, different international situation, and different policy constraints. Therefore, it can be argued that firms in different countries may have very different concerns when considering global inter-firm collaboration. Therefore, the obstacles for international collaboration are separated from local collaborating risks as identified in previous chapters. They will be examined in the context of the Australian and Chinese mobile telecommunication market.

The purpose of the first primary research question is to verify the previous literature and empirical research results in the context of both the Australian and Chinese mobile telecommunication market. The mobile telecommunication sector is a relatively new and dynamic industry (compared with traditional industries such as agriculture or mining). However, this sector is important in the sense of increasing living standards and increasing the efficiency of all the other industries (Access Economic 2008). Therefore, the qualitative study of this thesis focuses on the inter-firm collaborations in this sector. Part of the research interview also examines the key determinants for successful inter-firm collaboration, which will be examined in a wider range of industries.

The second primary research question is:

Primary Question 2: What are the key determinants of successful inter-firm collaboration?

There are many factors that affect the outcome or performance of inter-firm collaboration. It is important to find out what are the key determinants for successful collaboration to increase the performance of inter-firm collaboration, as well as reduce risks. This thesis will empirically test for the important factors in successful inter-firm collaboration through industry case studies and examine them in a broader business context. To answer this research question, and based on the literature on inter-firm collaboration, seven hypotheses are proposed:

- Hypothesis 1: Trust plays a vital role in inter-firm collaboration and has a positive influence on the performance of inter-firm collaboration.

As discussed in Chap. 3, trust is vital for inter-firm collaboration (Ring and Van de Ven 1994; Gulati 1995b). Trust is affected by many factors in collaboration, for example, openness on information, quality of communication, similar experience of both firms, and even the first impression of the contact person. Although difficult to be measured, trust is expected to play a major and positive role in inter-firm collaboration.

- Hypothesis 2: Similar experiences (e.g. same type or with the same partner) have a positive relationship with the results of inter-firm collaboration.

As in Chap. 3, some researchers argue that previous collaboration experiences exert a positive influence on current collaboration. It increased the trust level (Gulati 1995b), understanding (Lyles 1987), and, therefore, the performance (Mitchell et al. 1994) of the current inter-firm collaboration. However, some researchers have found that previous experiences even have a negative influence on new collaboration because of the limited time[1] of managers and the uniqueness of the partners (Yelle 1979; Kuada 2002; Singh and Mitchell 2005). Previous experience is expected to have a positive relationship with the results of inter-firm collaboration in this thesis. This hypothesis will be examined in Chap. 8.

- Hypothesis 3: Effective communication plays an important role in inter-firm collaboration and has a positive relationship with the performance of inter-firm collaboration.

Communication is important not only for inter-firm collaboration, but also for the performance of any firm (Zacharia et al. 2011). It is highlighted in most management and business literature (Olkkonen et al. 2000; Reinig 2003; Elg 2007; Zacharia et al. 2011). As discussed in Chap. 3, there are different types of communication during inter-firm collaboration, whether via face-to-face or other technical methods (Nyberg and Strandvik 1999; Keane 2009). Timely and appropriate communications are vital for inter-firm collaboration (Olkkonen et al. 2000; Reinig 2003). Insufficient communication can lead to misunderstanding and failure in inter-firm collaboration. Therefore, it is postulated to have a positive relationship with the performance and results of inter-firm collaboration (Zacharia et al. 2011). The quality of communication will be examined by frequency of communication, understanding of communication, and efficiency of communication, which will be discussed further in a later section.

[1] Time is a scarce resource for managers. The higher the position of the manager, the higher are their opportunity costs for each hour spent on building or maintaining inter-firm collaboration. If they use the same time in managing production or expanding the market, it may bring more profits for the firm.

- Hypothesis 4: Cultural similarity has a positive effect on the performance and result of collaboration.

Cultural and language differences may bring misunderstanding and increase both costs and risks for inter-firm collaboration. Therefore, a similar cultural background and language may enhance the trust level, quality of communication, and performance of the inter-firm collaboration. Cultural similarity is postulated to have a positive influence on the performance and result of collaboration.

- Hypothesis 5: Firm size has a positive influence on the outcomes from inter-firm collaboration.

Size matters when firms select their partners. Collaboration with peer-sized or larger-sized partners will help the firm to enhance its production process, product quality, and market position (Burt 1983; Ghemawat et al. 1986; Duysters and Hagedoorn 1995; Hagedoorn 1995b; Dussauge et al. 2000). The structure and working process of a firm are expected to influence the collaboration performance and results. Large firms are more likely to possess specialized assets, business networks, patents, and skilled labour (Teece 1986). Therefore, the size of firms plays an important role in the partnership formation process and collaborating behaviour. The size of a firm is postulated to have a positive influence on inter-firm collaboration. This thesis adopted the official definition of firm size used in Australia and China.

- Hypothesis 6: Size difference between collaborating firms has a positive influence on the outcomes from inter-firm collaboration. It can be used to replace firm size in collaboration model.

Firms with different sizes are more likely to form inter-firm collaboration (Gulati 1995a; Saxton 1997). As measured by employment or fixed assets, size difference is the difference in firm size between collaborating firms, which is also important to the performance of inter-firm collaboration (Harrigan 1985a). As this thesis studies the Australian and Chinese markets, it extends the research on size difference and develops a new measurement (as discussed later in this chapter) to calculate size difference between firms. This thesis also explores the alternative of using size difference to replace size in the collaboration model when the number of studied countries (as well as definitions for firm size) increases. As size difference is calculated from the sizes of interviewed firms and its partner, it is expected to be highly correlated with firm size. Therefore, size difference will be used to replace firm size in collaboration model.

- Hypothesis 7: The success rate of inter-firm collaboration may be influenced by different factors in different countries.

Different countries may have different cultural backgrounds, views on inter-firm collaboration, ways in which business is conducted, different resources in collaboration, and very different views on successful outcomes from the inter-firm collaboration (Kuada 2002). Therefore, it is expected that inter-firm collaboration

is influenced by different factors in different countries. The data will also be tested separately because the significance level of each independent variable may be different in each country.

After having proposed the major research questions and hypotheses, it is now important to design the research methodologies and process in order to verify and examine these questions. Therefore, the qualitative and quantitative research methods to be used are now discussed and compared.

4.3 Methodologies

Research methodology refers to "the procedural framework in which the research is conducted" (Remenyi et al. 1998). However, any research method has its own strengths and weaknesses. There is no perfect method (Kale 1999). Davis and Parker (1997) argued that the research method should fit the research problems, research aims and theories.

Quantitative and qualitative methods are the two most frequently used methods in research. Each of them fits well in some dimensions. In most management and business studies, a qualitative method is adopted and emphasized. However, in most economic research a quantitative research method is used as the main method. There has been increasing debate on which one is superior since the early 1980s. However, the boundaries between these two methods are not clearly defined in most literature, and each of them has received criticisms by researchers. Qualitative research and quantitative research, to some extent, are complimentary to each other. The advantages and disadvantages of each method will be discussed further below.

Table 4.1 shows the different dimensions, definitions, and literature on qualitative research and quantitative research. The advantages and major criticisms of qualitative and quantitative research methods are also identified in Table 4.1.

As shown in Table 4.1, both qualitative and quantitative research methods have their disadvantages and advantages. To provide more reliable results they should not be put in an either-or selection (Newman and Benz 1998). Qualitative techniques such as interviews can gather contextualizing data to help inform prior quantitative research (Kendall 2008) and quantitative results can be used to provide better support for the qualitative results.

Therefore, in this thesis, a qualitative case study is first adopted to verify the previous literature results in the mobile telecommunication markets and answer the first primary research question. Comments are also collected through the qualitative study. The results of the qualitative research are used to design and modify the research process and questionnaire for the quantitative study. A quantitative analysis is then designed to examine the hypotheses for the second primary research question. The results of the quantitative study and the qualitative research are also used as complementary evidence to explain and examine each other at the end of this thesis. As far as data collection is concerned, interviews and an online

Table 4.1 Differences between qualitative and quantitative research methods

Dimensions	Qualitative	Quantitative	Literature
Objective/ purpose/ aim	Understanding or developing a theory to explain what was experienced	Seeking a cause or testing a theory/ hypothesis to predict future trends	Firestone 1987; Newman and Benz 1998
Assumptions	Reality socially constructed through an individual	Objective reality apart from the beliefs of individuals	Firestone 1987
Approach	A form of ethnography, better in explaining the phenomenon; inductive	Experimental designs to reduce errors; deductive	Firestone 1987; Anderson and Narus 1990; Kendall 2008
Data and source	Detailed descriptions of situations, events, people... by interviews or case study	Numerical, measurable data by survey or financial/ economic reports	Patton 1990; Newman and Benz 1998; Kale 1999
The process of analysis	Investigation and observing the reality (e.g. case study)	Using statistics or econometric techniques (e.g. regression and factor analysis)	Yin 1982; Howe and Eisenhart 1990; Richards 1993; Strauss and Corbin 1998
Research role	Immersed in phenomenon	Detached to avoid bias	Firestone 1987
Advantages	Rich information; better understanding of any phenomenon, of which little is yet known	Provides confidence results and can be used to measure relationships and make predictions	Patton 1990; Hoepfl 1997; Newman and Benz 1998; Kale 1999; Anderson 2008
Criticism	No confidence in results; the conclusions are only hypotheses; cannot be used to predict future trends	Not "real", provides less information; relies too much on data and may be misleading	Yin 1982; Anderson and Narus 1990; Newman and Benz 1998; Kendall 2008

survey are both adopted in this thesis. The research process for this study is depicted as in Fig. 4.1.

As in Fig. 4.1 both a qualitative case study and quantitative data analysis are utilised in this thesis. The qualitative study provides industry evidence for this study, rich information on inter-firm collaboration and useful suggestions and modification of the quantitative questionnaire and survey design. The quantitative study examines the key determinants in Chap. 3 and measures the relationship of these factors with the final success rate of inter-firm collaborations. These complementary research methods are expected to provide more reliable results and useful implications for business managers and government decision makers.

Firstly, some selected managers (from the researcher's business network) are contacted before the formal interviews. As the terms used in the previous literature may not be widely used in the telecommunication market and some norms used in the telecommunication industry may be different from other industries, the drafted questionnaire is reviewed by these managers. The translations of these terms into

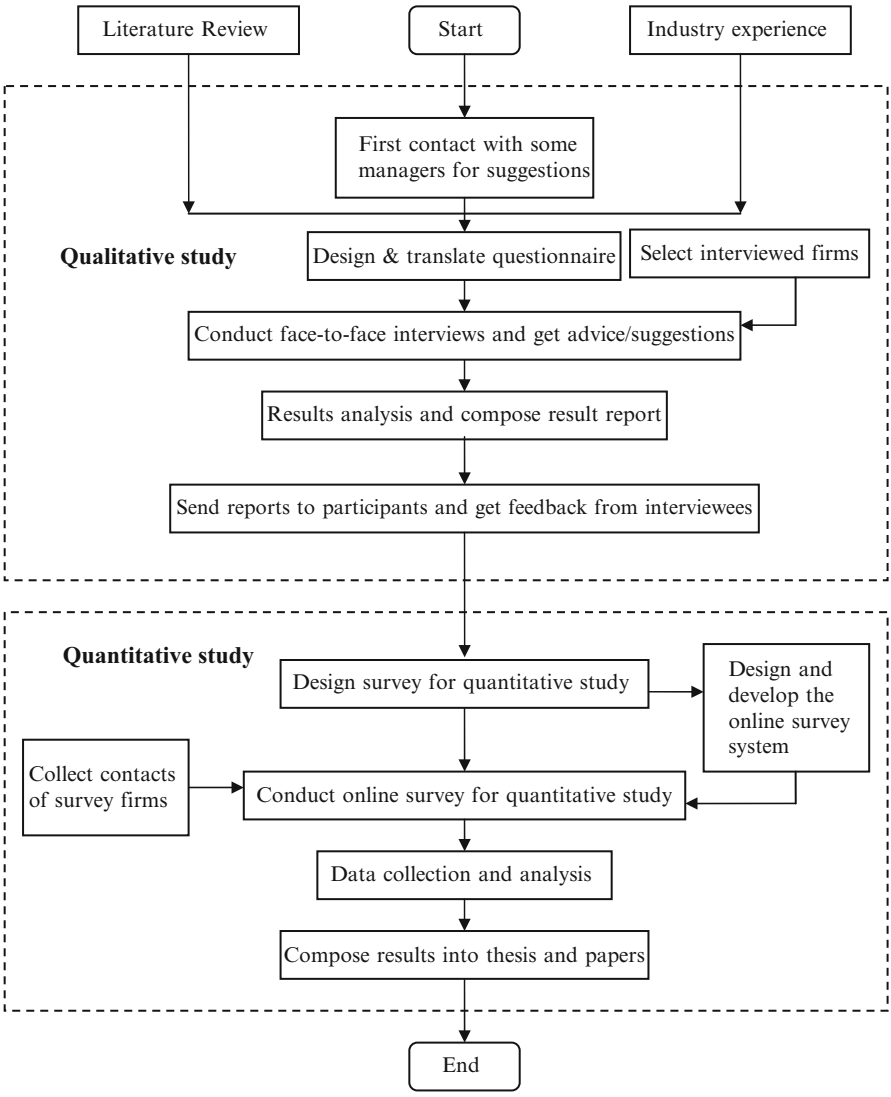

Fig. 4.1 Research process flow chart

Chinese are also discussed with the interviewed managers for some possible misunderstanding or confusion it may have brought. Some questions are dropped or modified due to their suggestions. The qualitative questionnaire is designed based on a review of the literature, suggestions from these managers and from industry participants, and previous industry experience of the researcher.

Secondly, qualitative case studies are conducted in both Australia and China via face-to-face interviews. The results will be used to verify the literature on inter-firm

collaboration and the theoretical framework presented in Chaps. 2 and 3. The probe questions in the last section collect rich information for further research. The results are used to answer the first primary research question and its related questions. A results report is sent to all participants after the interviews. Their feedback and suggestions are then collected to enhance the quantitative study, which will be discussed further in a later section. The selection of sample firms, design of the questionnaire, and process of interviews will be discussed further in this chapter.

Thirdly, with the suggestions from the qualitative study, the questionnaire for the quantitative research is enhanced. It is designed to answer the second research question. An online survey system based on this questionnaire is developed. A broader range of businesses are selected to examine the collaborating framework. Firms from many industries are selected and invited to attend the online survey. Data are collected automatically through the designed database. After the data are collected and translated into examined factors, an ordered probit model is employed to measure the relationships between the factors and the success rate of inter-firm collaboration.

All the data for this study are primary data from Australian and Chinese businesses. After the data are collected and analysed, a final results report is composed and sent to all interviewees online. Feedback and suggestions are collected for further research and study.

4.4 Qualitative Case Study

The literature review in Chap. 3 provided sound background knowledge for the design of the qualitative case study. A questionnaire is drafted from the previous literature on inter-firm collaboration. However, it can be argued that these questions may not suit the mobile telecommunication market as this is a new and dynamic market. On the other hand, some terms used in the previous literature may not be appropriate in the telecommunication industry. Therefore, some managers from mobile telecommunication firms were contacted first to give suggestions on the design of the questionnaire. Their advice and industry experience also provided useful knowledge for enhancement of the questionnaire. Some terms and questions are modified due to their suggestions to make it more related to the telecommunication industry and easier to be understood by interviewees.

The selection of cases is purposeful, including all different types of firms in terms of their nationalities, sizes, and industry sectors to provide as much rich information as possible (Patton 1990; Perry 1998). The selection is also largely dependent on the business network of the researcher to increase the response rates. The design of the questionnaire, selection of interviewed firms and interview case study is discussed in detail in the following sections.

4.4.1 Questionnaire Design for Interviews

The design of the questionnaire for the qualitative study was based on literature reviews, industry experience of the researcher, and some prior suggestions from potential interviewees. To increase the efficiency of the interview, some of the questions are designed in multiple choice selections. However, each of these questions are explained and discussed by the interviewer during the interviews. Appendix-1 contains the final version of the questionnaire designed for the qualitative study.

4.4.1.1 Part 1: General Questions

Part 1 of the questionnaire has five general questions relating to the business sector, nationality and firm size.

- The first question in part 1 of the questionnaire is designed to identify the business sector of the interviewed firm according to the telecommunication market structure in Chap. 5. The answers to this question are used in the study of the business collaborating types and benefits generated from collaboration in this market. Firms in the different sectors are expected to have more comparative advantages and different resources. The answer to this question will answer the first question of primary research question 1.
- The aim of question 2 is to identify whether the firm is a public or private firm. This question is proposed by an industry manager in China during the pilot interview, who indicated that this factor is important for inter-firm collaboration in China. Firms in the public sector are expected to have more resources and business networks. This factor is only expected to play an important role in the Chinese market.
- Local, foreign and joint venture companies are identified in the third question. The aim of this question is to identify the business type. Multinational firms are expected to have different comparative advantages to that of local firms. Therefore, the types, benefits, and risks should be different for different types of firms. The answer to this question provides evidence for questions 1 and 7 in primary research question 1.
- The fourth question identifies the size of the interviewed company. The definition of small and medium-sized enterprises is quite different for Australia and China, which will be discussed further in Chap. 8. Firm size is measured by the number of total employees in the global market. Therefore, to compare the results for both Australia and China, firm size in the questionnaire is designated in categorises: less than 5, 5–9, 10–19, 20–49, 50–99, 100–199, 200–499, and 500 or more. The answer provides evidence for question 2 of the first primary question.
- The fifth question is to identify whether the firm has collaborations with other firms. If the answer is no the collaborating questions in part 2 will be bypassed.

4.4.1.2 Part 2: Collaboration Questions

Some researchers have argued that collaboration could be among multiple players, which increases the complexity of inter-firm collaboration (Bidault and Salgado 2001). To study the performance and outcome of each collaboration part 2 of the questionnaire is designed as a repeated part for the interviewed firm. Managers are asked to select one to five collaborating cases from their top five business partners to answer this part. Therefore, part 2 collects data based on collaborating cases rather than firms. The benefit of this design is it increases the study cases for this study and the managers have flexibilities in their selection of studied cases for this study.

Part 2 of the questionnaire is designed to get information on inter-firm collaborations. Interviewed managers are asked to select one or more collaborating cases (from the top five important collaborations for the firm) and answer part 2 for each case. It is aimed at identifying the factors and characters of inter-firm collaboration. Other factors, such as geography, background, comparative advantage reasons, are also taken into account in this part.

- The first question identifies the partner's business sector. It is similar to question 1 in part 1, which will provide evidence for question 1 of the first primary research question.
- The second question identifies the size of the partner firm. This question, combined with question 2 in part 1, will answer question 2 of the first primary research question.
- The third question identifies the collaborating type, which answers question 4 of the primary research question. Ten multiple choice types are listed in this question, which are adopted from the literature and reviewed by industry managers. However, new technology and a new business model may require new types of collaboration. Therefore, another option is added to collect new collaborating types in the mobile telecommunication market.
- The fourth question identifies the main benefits from inter-firm collaboration. This question also helps answer question 4 of the primary research question. Suggested by some managers, motives are combined into collaborating benefits as some motives are easily confused with benefits in the telecommunication industry. As a result, 12 questions are designed to capture: access to new technology, increase in market share, increase in global competition, increase in profitability, increase in productivity, increase in product quality, increase in joint R&D, increase in innovation, link with government schemes and policies, reduce business costs, and/or participate in the global market. The results from this question will answer question 5 of the first primary question.
- The fifth and sixth questions identify international collaboration and location of the partner. As discussed in Chap. 2, transaction costs are expected to be higher between firms with larger distance differences in location. However, as most technologies used in the telecommunication industry reduce the costs of communication and make collaboration easier, the influence of location distance on

performance of the collaboration will be verified in this market via this question. As this case study only focuses on Australia and China, the questionnaire is designed separately for the Australian and Chinese markets.

- Question 7 is designed to get the subjective opinion of the interviewee on the performance and results from this collaboration. Empirical results show that both subjective and objective assessments are significant in measuring an alliance's performance and results (Heide and Miner 1992; Parkhe 1993b). Therefore, both subjective assessments and objective performance are adopted in this research.

4.4.1.3 Part 3: Main Concerns and Barriers for Local and International collaboration

The aim of part 3 is to identify the main concerns and barriers for local and international collaboration. The result of this question is expected to help in reducing business barriers for local and international inter-firm collaboration in the Australian and Chinese mobile telecommunication markets.

Question 1 and 2 are designed to identify the risks and barriers from local and international collaboration. Firms from different countries are expected to have different concerns or obstacles when engaged in local and international inter-firm collaboration. To get further information, another option for other specified barriers are added. Answers to this question answer questions 6 and 7 for the first primary research question.

4.4.1.4 Part 4: Probe Questions and Suggestions

The aim of part 4 is to get richer information on inter-firm collaboration and prepare for the quantitative study.

- The first question is to collect the interviewees' attitude on key determinants of a successful collaboration. Different interviewees may have different experience and knowledge on collaboration. Therefore, the answers are expected to vary due to their own experience. However, the answers provide empirical evidence for the collaborating framework developed in Chap. 3, which will be further examined in Chap. 8. The good or bad experience in collaboration is also asked in this question as supplementary to the key determinants.
- The second question is designed to collect the managers' opinions and expectations on government support. The results provide suggestions for government agencies, policy makers, and industry associations on how to improve and enhance local and global inter-firm collaboration for their country, industry or region.
- The third question is designed to get suggestions for further research beyond the scope of the present study. The answers are expected to contribute to further enhancement of research on inter-firm collaboration.

4.4.2 Selection of Sample Firms in Australia and China

All the previous empirical studies on inter-firm collaboration have relied upon a single sample (Osborn et al. 1998). Some were restricted to certain types of alliances (Geringer 1991; Park and Ungson 1997), some concentrated on only developed countries (Hagedoorn 1993; Osborn et al. 1998), and some focused only on large firms (Gulati 1995a). Some firms are excluded from these studies. Therefore, to provide more reliable results, this study covers all firm sizes, in both a developing country (China) and developed country (Australia), and all industry sectors in the mobile telecommunication market (as in Chap. 5). Face-to-face interviews were held for each selected company. The expected interviewee is either the CEO or a senior manager, who is familiar with the development and collaboration strategy of the firm.

The selected companies are taken from three sources: (1) a list of companies provided by the Australian Telecommunications Industry Ombudsman (TIO), (2) a list of monthly service providers' ranking list by China Mobile and China Unicom, and (3) the researcher's previous contact lists during 5 years working experience in the telecommunication industry. The (1) and (2) lists include most of the formal population of mobile service providers in Australia and China. Because of the difficulty and high costs of conducting a nationwide interview in Australia and China (amongst the largest markets in the respective countries), only firms located in Beijing and around Sydney are selected for convenience and cost saving reasons. The interviews also support that most of the telecommunication firms have offices in these cities. Some other firms are selected as backups beside the final selection lists for interviews.

4.4.2.1 Australian Cases

It is compulsory for all mobile service providers to register as a member of TIO by ACMA (Australian Communications and Media Authority) (TIO 2012). There are three types of service providers on the TIO member list (with and without carrier license): telephone service providers, Internet service providers, and telephone and Internet service providers. This research focuses on the mobile telecommunication market, so sole Internet service providers are excluded from this research. The total number of listed firms was 710 firms on 18 September 2007, the access date (TIO 2007).

All the registered information and contact information of these 710 firms are reviewed. They include 14 telephone service providers with carrier licenses, 289 telephone service providers without carrier licenses, 33 telephone and internet service providers with carrier licenses, and 367 telephone and internet service providers without carrier licenses.

Firstly, firms without a website and contact email are excluded from this research. Therefore, 562 email addresses are collected, which will be reserved for

the quantitative analysis. Secondly, as this research focused on the mobile market, firms without mobile services are dropped out from the selected list. Therefore, the majority of internet telephone card dealers are excluded from the list. Thirdly, only firms located around Sydney are selected. The selected firms are also balanced to cover all firm sizes, different nationalities, and different sectors (mobile device provider, service provider, retailers, and content provider as in Chap. 7). In the end, 19 firms were selected and invited for interviews.

These firms were contacted through three methods. Firstly, all selected firms were contacted through email (based on the email address registered on the TIO website). Secondly, some firms are contacted by telephone if they did not reply to the invitation email within 7 days. Thirdly, firms in the researcher's business network were contacted through the contact persons in that company.

4.4.2.2 Chinese Cases

The Chinese firms are selected from China Mobile and China Unicom's monthly service providers (SPs) ranking lists, and the business network of the researcher. Bian (1994) found that Guan Xi (business networks) plays a vital role in China and Lu et al (2006) found that firms only do business with friends. Therefore, the selection of Chinese cases in this research greatly relies on the researcher's business network to reduce research costs and increase the response rate.

Firstly, 17 companies were selected from the released ranking list and the researcher's business network. These firms include carrier service providers/operators, service providers and content providers; foreign companies, Chinese companies and joint venture firms; state-owned and privately-owned firms; service providers using the China Mobile network, China Unicom network and the author's business network; firms with and without international collaboration experiences; and different sized firms. However, limited by research time and costs, only firms located in or which had branch offices in Beijing were selected.

These firms were contacted through email, telephone and contact persons. The research questionnaire for the interview is translated into Chinese and modified to suit the Chinese mobile telecommunication market as required. Some questions and terms are also modified due to suggestions from the first contacted managers.

4.4.3 Interviews

Face-to-face interviews were adopted in both Australia and China. The data collection was structured into interview questions. The purpose of this phase is to obtain a general picture of inter-firm collaboration and collect opinions and cases on inter-firm collaborations. The interviewees include CEOs and senior managers who have a good knowledge of the firm's collaboration and development strategies.

The interviews were conducted separately in Beijing, China in late 2008 and Sydney, Australia in early 2009.

The response rate of the Australian firms was relatively low (under 10 %) compared with the Chinese firms. Only firms contacted through the researcher's business network replied and accepted the research invitation. Finally, seven managers accepted an interview in Australia. The results are analysed in Chap. 7.

On the other hand the Chinese interviewees showed great interest in this study. The participants also invited their business partners to participate in this research, which increased the final number of interviews to 24. They also provided some useful information on inter-firm collaboration and suggestions for further study. The results will be discussed further in Chap. 6.

In sum, 31 interviews were conducted in both Australia and China for the qualitative case study. However, as part 2 of the questionnaire (collaborating cases with different partners) is a repeated part for each firm, the actual number of studied cases is more than the number of interviewed firms. Some managers answered two or three collaborating cases for their firms. Therefore, the total collaborating cases are 55 from the 31 interviewed firms. The results provided ample, useful and comparable information for this research and further studies, which will be discussed further in Chaps. 6 and 7.

4.4.4 Suggestions and Feedback

After the final reports were sent to the interviewed managers, suggestions from the managers were also collected to enhance the process and questionnaire for the quantitative survey. Some important advice and changes are discussed below.

Firstly, due to the advice from some network device providers, the device provider should be separated into mobile device providers and basic network device providers. Mobile device providers only provide mobile handsets and products. However, the basic equipment of the telecommunication market requires a huge amount of base devices and equipment.

Another suggestion is the inclusion of telecom retailers in the Australian market. As shown in Chap. 7 the Australian telecom components include the hardware sector, service providers, content providers and retailers. However, retailers are separated from the telecom market in the Chinese market. Therefore, the business sectors in the same industry would be very different in different countries. This result also provides useful information for the quantitative study.

As the quantitative analysis will expand the studied industry into other services and manufacturing industries that are related to the telecommunication industry, the business sector question will be removed from the questionnaire as it is designed from the structure of the mobile telecommunication sector. It would be less useful to compare different sectors in all different industries.

Secondly, sharing testing devices and presales service were proposed by some Australian interviewees as two new collaborating types in the telecommunication

industry. However, franchising is not adopted in both the Australian and Chinese mobile telecommunication markets. With the development of new technology, the types of collaboration are also changing rapidly. The questionnaire was adapted due to this suggestion and results will be discussed further in Chap. 7.

Thirdly, some interviewees suggested that the results of collaboration are sometimes hard to be categorised into successful or failed. Therefore, a scaled option is added to identify the successful level for inter-firm collaboration instead of using a yes/no selection. The answer will be used to analyse the collaborating model in Chap. 8.

4.5 Quantitative Study

The results from the qualitative study provided valuable information for the study on performance and results of inter-firm collaboration. However, the selected interviewed firms are all from the telecommunication industry, which is a very narrow area in the global market. Can these findings and results be applied to other industries or broader business areas? What are the secret "ingredients" for successful collaboration in the general business area? These questions are addressed and analysed from the quantitative study. The quantitative study will expand upon the studied industries from the mobile telecommunication market to all the other related industries (e.g. finance, service and manufacturing industries) to examine the collaborating model in a more general business area and provide a more reliable result.

4.5.1 Questionnaire Design

4.5.1.1 Independent Variables and Their Measures

Based on the previous literature review and conceptual framework, key determinants for successful collaboration are: trust, collaborating experience, effective communication, cultural difference, and firm size. The measurement of these determinants and the method of collecting this data through designed questions are discussed in the following.

- ***Trust***

As discussed in Chap. 3, trust is vital for inter-firm collaboration. It is regarded as one of the most important determinants of inter-firm collaboration in the literature and empirical studies. However, trust is a very complex concept. Individual trust can be influenced by personal relationships, first impression, experience of each person, and even one's favourite colour or style. Trust, as used in this thesis, only refers to that between firms which affected the selection and performance of

inter-firm collaboration. The questions for trust developed by Cummings and Bromiley (1996) were widely adopted in the literature. They argued that the word "trust" should not be used in the questions to measure trust. However, "trust" is used in Chinese also in the words of trustworthiness, reputation, reliability level, and others that are related to trust (Lau and Rowlinson 2009). Therefore, as this study focuses on the Australian and Chinese markets, this approach to measuring trust will not be adopted.

Firm level trust is measured using both objective measures and subjective assessments from the managers in this thesis as discussed in Chap. 3. The objective measures include the firm's industry background (Question 2.6 as in Appendix 2), business networks (Question 1.4 and 2.4), openness of information (Question 2.2, 2.3, 2.4, 3.1), and similarity of the firm and its partners on their collaborating goals, business structures, and working process (Question 3.1). The subjective assessments include the reliability level of the contact person (Question 2.5), the industry reputation level of the partner firm (Question 2.6), overall subjective trust level during this collaboration (Question 3.3), and risk level (Question 3.4) during the collaborating case. The measuring and weighting of each of these is discussed further in Chap. 8.

- ***Size and size difference***

Large firms are more likely to possess more resources (Teece 1986). Therefore, firm size and size difference are expected to be key determinants for successful inter-firm collaboration. Most previous research uses the same definition of firm size for all studied countries, and uses financial reporting data for firm size. However, the definition of firm size is very different in different countries.

Firms even categorised into the same size group by the World Bank may have different access to government support programs, industry associations, human resources, market information, bank loans, and even pay different tax rates in different countries. It can be argued that it is not appropriate to adopt the same definition of firm size in a cross-national study. Focusing on the Australian and Chinese markets the definition adopted in this thesis is from the official definition of firm size (for the services, manufacturing and telecommunication sectors due to the sample range) in both Australia and China.

On the other hand, most small firms do not produce annual reports and they are reluctant to give the actual sales amount or turnover. Furthermore, these measures are significantly influenced by the performance of the inter-firm collaboration. There is an expected strong interaction between such defined firm size and the performance of a inter-firm collaboration. As firm size is defined by global employee numbers in both Australia and China the problem is not an issue in this study. Questions 1.2 and 2.2 in the attached questionnaire B collected the size categories for the surveyed firms and its partners.

- ***Previous collaborating experience***

The results of previous empirical studies found that past experience of a specific kind can only lead to success of the same type of collaboration (Kale 1999). On the

other hand, the influence of prior experience will diminish over time (Gulati 1995a). Therefore, only the similar experiences (similar to current collaborating type) within the past 10 year period are collected in this study.

The experience is collected through questions 1.3 and 2.3 for the surveyed firm and its partners. As this study collected collaborating data from one side of the partnership,[2] there is likely to be expected missing data in this question. Therefore, this question is designed to be used for two variables. If the surveyed firm selected the "not sure" option in these questions, it will be used to calculate the openness of information between firms in the trust variable. The more partners' information the interviewed firm has, the higher the openness of the information level during this inter-firm collaboration.

- ***Effective communication***

Effective communication is vital to any collaboration, which is supported by most of the previous literature as discussed in Chaps. 2 and 3 (Zacharia et al. 2011). Only with effective communication can a firm get good knowledge of its partner, control potential risk, and increase collaborating performance (Olkkonen et al. 2000; Reinig 2003; Elg 2007; Zacharia et al. 2011). In this thesis the quality of communication is measured by three different assessments: appropriate frequency of communication, understanding of communication, and satisfactory communicating efficiency (in question 3.2 of Appendix 2). This will also help study the different contribution of these factors to the performance of inter-firm collaborations in different countries.

- ***Cultural similarity between partners***

Cultural similarity influences collaborating performance and results. Prior research has developed different methods to measure the cultural difference (Park and Ungson 1997; Narteh 2008). However, China is excluded in most of these categories, which is an obvious omission. As this thesis focuses on Australia and China, the countries are categorised due to geographic and cultural distance from China and Australia. On the other hand, as more and more employees work and study globally, managers gain experiences from different cultures and countries. It can be argued that the cultural difference should not only be measured by the registered nation of the firm, but also the cultural background and experiences of the manager or contact person.

Therefore, culture similarity is measured by both subjective cultural similarity (in question 3.1) and country difference (examined through a calculation from questions 1.1 and 2.1). The measuring and weighting of culture similarity are discussed further in Chap. 8.

[2] Although many researchers have argued that collaborating studies should be based on information from both collaborators, it is usually very hard to collect data from both sides in real business cases (Kale 1999). There are always tradeoffs between the quantity of cases and data with the quality of data. As the quantitative study needs more samples to reduce the bias and increase reliability, a one sided study is adopted in this thesis.

4.5.1.2 Part 4: Measure of Collaborating Performance and Outcomes

It is commonly agreed that the performance of collaboration is hard to measure (Dussauge and Garrette 1995; Gulati 1998). Sometimes, it is difficult to distinguish it from success or failure. It may vary from different managers' viewpoints. In some research areas such as in training evaluation or agricultural studies, there are 'natural' requirements for ordinal measurement as subjective assessments are important in evaluating the results (Groot and Brink 2003; Wes et al. 2005). Hartono (2004) adopted Ordinary Least Square (OLS) in subjective satisfactory (five point Likert-type scale questions) analysis. However, it should be argued that the use of OLS regression is not appropriate in a five level satisfactory regression as the range of the dependent variable is limited (linear function is unlimited). Therefore, an ordered probit (OP) model is adopted in this thesis. OP models are widely adopted in agriculture conjoint analysis, training tracks, and customer satisfaction related studies. Empirical results, as discussed in Chap. 3, showed that both subjective and objective assessments are significant in measuring an alliances' performance and results (Parkhe 1993b; Reinig 2003; Hartono 2004). Wes et al. (2005) discussed the difference between cardinal and ordinal assumptions in agricultural conjoint analysis. They argued that rank-order and interval rating scales are two commonly used methods in agriculture studies to collect respondent preferences. The performance variables are also ordinal in this model. Therefore, an ordered probit model is adopted.

Furthermore, the outcome of collaboration is measured by both subjective assessments and objective performance (Parkhe 1993b) in this thesis as discussed in Chap. 3. Part 4 of the questionnaire in Appendix-2 collects data for collaborating performance and outcomes. Question 4.1 identifies the benefits of the collaboration via multi-scale items, which will provide objective evidence for the performance of inter-firm collaboration (access to new technology, improved global competitiveness, increased market share, cost-saving, assist R&D, increased market influence, improved profitability, improved productivity, improved product quality, increased innovation, access to government programs, allow participation in the global market, and other specific benefits). The designed questions for collaborating benefits came from the qualitative case study, which are examined by the managers. Question 4.2 and 4.3 are designed to collect the subjective assessment for the fulfilling expectation level and final success rate of the inter-firm collaboration (Reinig 2003; Hartono 2004). Both subjective and objective results will be used in the measurement of the performance for the collaborating model in Chap. 8.

4.5.2 Selection of Sample Firms and Data Collection

The empirical study results show that the response rate is different in different countries and may be much higher through business networks than randomly

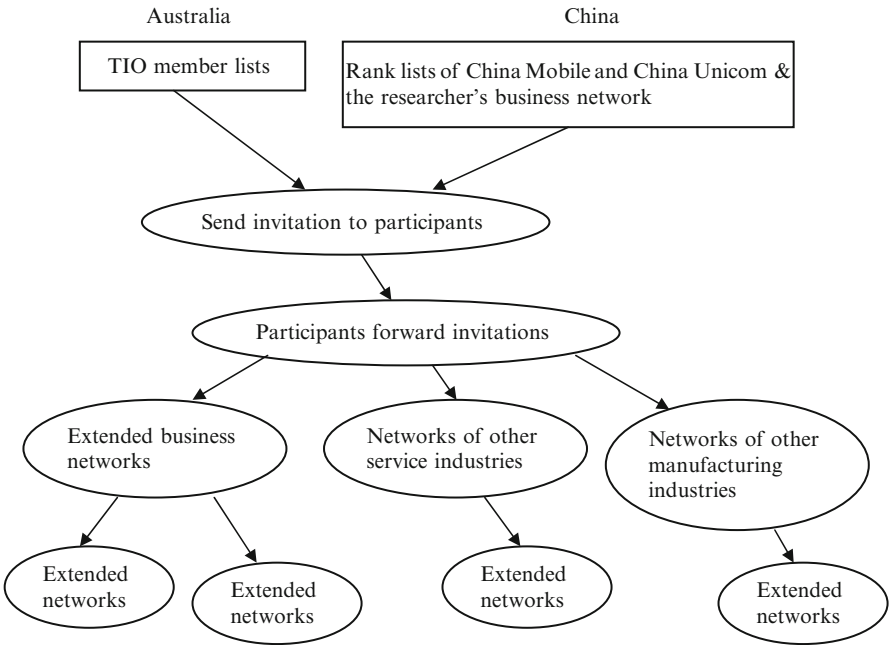

Fig. 4.2 Selected participants in the quantitative study

selected participants (Lohrke et al. 2006; Zhang et al. 2009). Therefore, the quantitative study is modified and greatly relies on business networks (and extended business networks). As the quantitative study is designed as an online survey, it breaks the geographic limitation contained in the qualitative study. Firms from every city or region in both Australia and China can participate in this survey. This will reduce the regional bias and industry bias in this research as more industries are included in the quantitative study.[3]

All the selected participants are contactable via e-mail, online short messages, and telephone. Figure 4.2 summarises the selected participants from the different sources.

The selected participants are taken from four sources: (1) Australian Telecommunications Industry Ombudsman (TIO) lists, (2) rank lists of China Mobile and China Unicom, (3) the researcher's business networks, and (4) extensions of the researcher's business networks (e.g. the participants of both the qualitative study and quantitative study are encouraged to send this survey link to their business partners). To increase the number of participants, all the collected member lists in (1) and (2) with a valid email address are invited to participate in this study. Firms

[3] The firms filling in the online survey are expected to be representative of a wider range of industries and sectors, which may come from any states or cities.

from other related industries (manufacturing and services) are also included in this study.

An online survey system (designed only for the quantitative study of this thesis) was developed to conduct the survey and collect data for this study. The interviewees were expected to access the questionnaire through the web link and finish the survey simply by ticking the options or input in a blank box in the electronic questionnaire. The results are saved in a database automatically as the interviewee clicks on the submit button. All the research data is saved and analysed. The results of the quantitative study help in examining the second primary research question and hypotheses and provide more reliable results for this research.

4.5.3 Methods and Process of the Quantitative Data Analysis

It is important to verify the data before any quantitative study. Therefore, all the collected variables are tested for validity and reliability. An ordered Probit analysis is adopted to test the key hypotheses. Then the model is examined for normality, stability and specification errors. The method and analysis process is discussed in detail in Chap. 8.

Table 4.2 below summarises the research questions, sub-questions/hypotheses, measuring instruments and question numbers in the designed questionnaires. It also outlines the relationships of these questions with the collaboration framework proposed in Chap. 3. The questionnaire, designed for a qualitative face-to-face interview, is used to answer the first primary question and the seven sub-questions discussed in the previous section of this chapter. The questionnaire designed for the quantitative online survey is used to answer the second primary research question and seven hypotheses discussed in the previous section of this chapter. The results are discussed and analysed in Chaps. 6, 7, and 8.

4.6 Potential Bias in Data Collection

This thesis included firms of different sizes, and from different sectors, industries, and countries. However, there are still some biases inherent in the qualitative study. One important bias in the interview is the cognitive bias (Granovetter 1985). "Interviews are subject to the common problem of interviewees' bias, poor recall, and poor or inaccurate articulation" (Yin 1994). The problems are remedied by explaining some questions in detail during the interviews.

Furthermore, cultural bias (Williamson 2005) is always inevitable in cross-cultural studies, which is expected to have an influence on this study. Therefore, the questionnaires are designed based on industry experience to suit the different countries and are also modified and enhanced by the interviewed managers. The bias is expected to be reduced through these methods. One the other hand, the bias

Table 4.2 Research questions and measurement instruments

Major research question	Sub-questions or hypotheses	Measurement instruments	Questionnaire questions	Relationship with the framework
1. What are the major types, benefits and risks for telecommunication inter-firm collaborations in China and Australia?	Q1: Culture	Qualitative face-to-face interviews	1.1, 1.2, 1.3, 2.1, 2.6	Examine the previous empirical results in the mobile telecommunication markets in Australia and China
	Q2: Firm size		1.4, 2.1	
	Q3: Deep/long		2.3, 2.7, 4.1	
	Q4: Types		2.3	
	Q5: Benefits		2.4	
	Q6: Risks		3.1, 4.2, 4.3	
	Q7: International		2.5, 3.2	
2. What are the key determinants of successful inter-firm collaboration?	H1: Trust	Quantitative online survey for an ordered probit collaboration model	1.4, 2.4, 2.5, 2.6, 3.1, 3.3, 3.4, 4.1, 4.2, 4.3	Examine the collaboration framework/ model in Chap. 3 and test the difference between Australia and China
	H2: Experience		1.3, 2.3, 4.1, 4.2, 4.3	
	H3: Communication		3.2, 4.1, 4.2, 4.3	
	H4: Culture		1.1, 2.1, 3.1, 4.1, 4.2, 4.3	
	H5: Size		1.2, 4.1, 4.2, 4.3	
	H6: Size difference		1.2, 2.2, 4.1, 4.2, 4.3	
	H7: Country difference		1.1, 4.1, 4.2, 4.3	

can also be reduced as the survey population increases. Actually, all of the biases in the quantitative research are expected to be reduced as the population increases. The quantitative online survey also broke the geographic and industrial limitations and further reduced the bias in data collection.

4.7 Conclusions

This chapter discussed the research methodologies adopted in this thesis. Qualitative research and quantitative research are complementary to each other, although there has been a fierce debate on which research method is superior. This chapter analyses the advantages and disadvantages of each of them and adopted both methods in this study. The process of this study is defined in this chapter. The selection of sample firms in the qualitative interviews and quantitative study are specific for this study to answer the first and second primary research questions. The

questions designed for both qualitative and quantitative studies have been discussed in this chapter.

The qualitative research is based on the mobile telecommunication sector, which is the most dynamic and fastest growing sector of global industries. The characteristics, market statues, major players, and inter-firm collaboration inside this sector will be analysed during the qualitative study. The results of the qualitative study will answer the first primary research question and the related sub-questions. Chaps. 6 and 7 show the results of the qualitative study. However, to understand the characteristics of the telecommunication industry and inter-firm collaboration in this industry, it is important to have an overview of the development and structure of the global telecommunication industry and the major firms in each section. Therefore, the following Chap. 5 provides an overview of this industry.

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Chapter 5
Telecommunications and Inter-firm Collaborations

5.1 Introduction

It has long been recognized that there is a close link between the development of a country's telecommunications capability and its economic growth (Carr 1989; Stimson et al. 2006). The percentage of the world's population covered by a mobile cellular signal has increased from 61 % in 2003 to 90 % in 2009, and nearly 80 % of inhabitants were mobile subscribers in 2010 (ITU 2011). However, only a small number of studies (Pisano 1989; More and McGrath 1999; Qiu 2005; Peng 2007) have focused upon collaborations in the telecommunication market, which has grown very rapidly and contributed dramatically to economic growth. As for the mobile telecommunication (wireless) market the number of research studies on collaborations is even less.

As discussed in previous chapters, this thesis focuses on collaboration in the telecommunication industry. The previous literature and empirical results will be examined in the context of the mobile telecommunication market through the use of cases studies. Therefore, it is important to identify the important direct (to GDP, employment, and exports) and indirect (to firms' efficiency, productivity, reputation, and extension of business networks) contributions of this industry and its major collaborators.

Focusing upon the big picture of the global mobile telecommunication market, this chapter will firstly explain the characteristics of the mobile telecommunication market and its contributions to economic growth in Sect. 5.1. In Sect. 5.2, firms are separated into three major sectors in this thesis to study inter-firm collaborations among these sectors. In Sects. 5.3, 5.4, and 5.5, cases in each sector are discussed and compared, providing a better understanding of the different motives, types, benefits and concerns for inter-firm collaboration in the mobile telecommunication market. In Sect. 5.6 results for the mobile telecommunication market studies are emphasised. It also links to the Australian and Chinese mobile markets analysis and collaboration case studies discussed in Chaps. 6 and 7.

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5.2 Characteristics of the Mobile Telecommunication Market

Mobile telecommunications are the networks (such as analogue cellular system, digital cellular systems, mobile broadband systems via modems or satellite systems) that do not rely on physical connections (ITU 2011). The telecommunications mobile industry has evolved rapidly from 1997 to 2012. There were 1.8 billion wireless handset users globally in 2005 (Vodafone 2010) and 5.3 billion users by 2011 (Mobithinking 2011) with growth of around 20 % per annum. Wireless network is a pervasive technology that is changing the way in which people work and play. The network nature of the mobile telecommunication market require inter-firm collaboration as each simple service for the end-user involves contributions from different sectors (as described in Fig. 5.1 below).

Another significant characteristic of the mobile telecommunications market is its direct and indirect contributions to economic growth, employment, and society as a whole (Access Economics 2008). Furthermore, advanced telecommunication technologies and markets also increase local and global inter-firm collaboration (Kim and Park 2002), which contributes greatly to the sustainable growth of regional and national economies. Each of these characteristics will be discussed in more detail below.

5.2.1 Market Structure and Government Influenced Industry

The telecommunications mobile market is a very dynamic market, with rapidly changing technologies, standards, infrastructure, products, market requirements

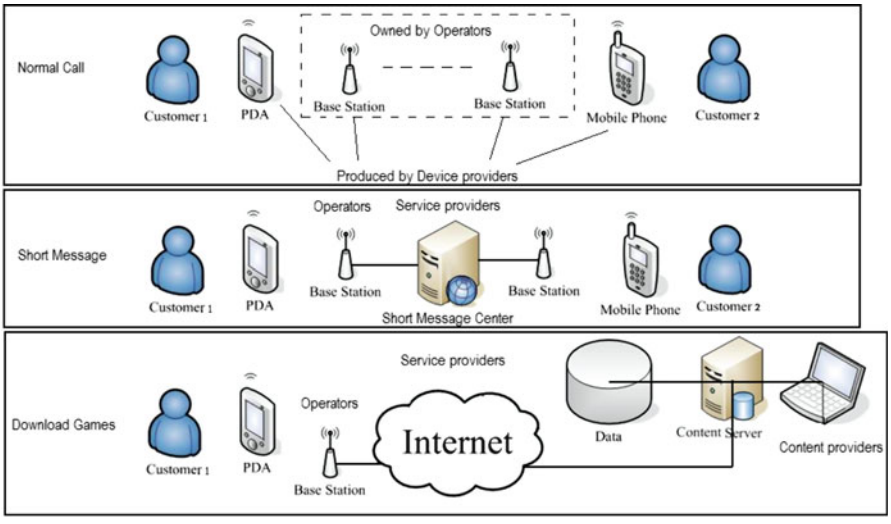

Fig. 5.1 Typical scenarios of mobile usage (Source: Author)

and business models. On the other hand, strong market power is an important characteristic of this industry (in the operators sector) in most countries (Hagedoorn 1993; Funk and Methe 2000). One cause of the market power in this market is the high fixed costs (OECD 2003). These high costs form an entry barrier to potential new firms into this market. Another characteristic of the mobile telecommunication industry is government influence and licences. Funk and Methe (2000) have argued that the mobile telecommunication industry usually has standards and policies with strong government influences. For national security reasons the telecommunication industry is usually protected by government via licences and regulations (OECD 2003). Even for the largest companies, market access to particular foreign markets is only possible through collaboration.

As discussed in Chap. 3, to reduce the high costs of research and development, access new technologies, obtain market information, and access the global market, inter-firm collaboration is vital in this industry. Today, thousands of firms provide technical support, content, and services support in this market. The types and quantity of inter-firm collaboration has also changed dramatically with the development and use of new telecommunication technologies. For example, m-commerce (mobile commerce) has increased business opportunities and collaboration opportunities for many industries. All of these factors have led to a greater need for local and global inter-firm collaboration (More and McGrath 1999).

5.2.2 Technology-Driven Industry

Each technology advance has changed global market share as well as promoted new sectors, products and services in this market. Therefore, to study the contribution of mobile telecommunication, it is important to study the development of technologies and the change of services in this market. The development stages are categorised by five generations: 1G, 2G, 2.5G, 3G, and 4G. The major characteristics, technology /protocols, capabilities, and sample of new services in each stage are summarised in Table 5.1.

The first mobile system was introduced as hexagonal cells in 1947 by engineers at AT&T and was further developed by Bell Labs during the 1960s (Access Economics 2007). As shown in Table 5.1, fully automatic cellular networks (1G) were first introduced in the 1980s (AMTA 2007). The technology was based on Frequency Division Multiple Access (FDMA) and only had voice functionality. The first 1G system was the 1981 Nordic Mobile Telephone (NMT) system (AMTA 2007).

The second generation (2G) services provided limited data transfer functionality. It was usually provided by two networks: Global System for Mobiles (GSM) and Code Division Multiple Access (CDMA) (AMTA 2007). GSM was first introduced in Europe and was a Time Division Multiple Access (TDMA) technology. It supports data, voice, message, and roaming between different networks. CDMA technology is also a wireless technology using spread spectrum

Table 5.1 Technological development in the mobile telecommunication market

Generations	Major characters	Major standards and protocols	Capability	Sample services
1G (1980s–1990s)	Analog communication	AMPS	Simple communication	Mobile call
2G (1990s–current)	Digital communication	TDMA, GSM, PDC, CDMA one, Wi-Fi 802.11b	Limited data services	Fax, short message, social network
2.5G (1990s–current)	Wideband and medium speed data	CDMA one, GPRS, WiFi 802.11g	Medium speed data transfer	WAP, MMS, file sharing
3G (2000s–current)	Broadband and high speed data	CDMA 2000, WCDMA, HSDPA, WiFi 802.11n, WiMax	144 Kbps (in car), 384 Kbps (walking), 2 Mbps (indoor)	Video conference, streaming video, application shops
4G (future)	Global roaming and higher speed	802.16m, LTE, developing standards	Objective: 1 Gbps	Future innovations

Source: Access Economics (2008), ACMA (2007), AMTA (2007), Ashiho (2003), Kumar et al. (2010)

communication. After the 2G technology there has been the so called 2.5G technology period, which offered enhanced data services such as Wireless Application Protocol (WAP) and Multimedia Message Service (MMS). It is regarded as a period between the 2G and 3G technologies (AMTA 2007).

3G (third-generation networks) technologies offer mobile broadband, music and video services, and other data-rich services. 3G mobile network technology has been combined with other innovations, such as Bluetooth (rapid access to Local Area Networks (LANs) and PCs) and Worldwide Interoperability for Microwave Access (WiMax). The information, communication and entertainment services that can be provided over 3G networks includes: video calling, video messaging, full-track music download, games, mobile TV, news and sport, local guides, and mobile business management. There is also a term '3.5G', which refers to enhanced 3G services.

The goal of so-called 4G (next-generation cellular wireless access standards) technology is to support transmission speeds of up to 1 Gbps (Access Economics 2008). However, such speeds will be able to support some new applications and services that require high transfer speed. 4G is promoted as being always connected everywhere and anytime (Fitzek and Katz 2006).

The growth of telecommunications not only provides users with a way to communicate but also brings significant profits for value-adding services based on wireless communications. The development of 3G and 4G creates new markets in the telecommunication field. At the end of 2010 there were 940 million 3G subscriptions (ITU 2011). One-fifth of mobile subscribers had access to 3G or better

services. 3G networks were available in 143 countries in 2011 and some countries such as Sweden, Norway, Ukraine and the United States are already moving to 4G (Mobithinking 2011).

5.2.3 Nature of Inter-firm Collaboration

The mobile telecommunication market is a market with opportunities for various forms of inter-firm collaboration. Figure 5.1 below shows three typical scenarios of mobile usage, where even a simple phone call involves interaction between various types of firms, some of which can be considered to be inter-firm collaborations. Each of these collaborations will be discussed in detail below.

All the hardware in the three typical scenarios in Fig. 5.1 (including the mobile devices owned by the end-users and base station or fibre lines owned by operators) are produced by device producers. Therefore, device providers are involved in all mobile telecommunication services. They collaborate with operators to provide device-service packages (post-paid program) to end-users. They also provide long-term device (e.g. base station or server) supply and maintenance services for different operators. When the customer needs higher level services (e.g. short message in the second scenario in Fig. 5.1) it usually involves services from a service provider, who provides diversified services to special users. Service providers usually collaborate with operators to access end-users and share incomes from operators. Therefore, they have strong collaborating relationships with operators. If content is downloaded by a customer (e.g. games, ringtone, music or news), content providers need to provide such content (as described in the third scenario in Fig. 5.1). Content providers have to collaborate with operators or device providers (e.g. through Apple Store) to access end-users and share income from them. From the typical scenarios above, each mobile usage involves inter-firm collaboration from different firms from different sectors. Therefore, there is a natural requirement for inter-firm collaboration in the mobile telecommunication market.

As discussed in a previous section, new technologies bring new and high quality services (OECD 2003) and more opportunities for inter-firm collaboration. The rapid change of technology has shifted communication services and usages quickly, generating new business opportunities and collaboration opportunities. For example, the top telecommunication services have shifted in communications usages due to the changes from voice and data networks to digital transport of voice, video, and data signals on the same network. There have been many new protocols generated during the last decade, which has greatly extended broadband and the mobility of Internet access by mobile users (WRG 2006). It is important to identify these usages in different sectors to discuss the direct and indirect contributions of this industry. Therefore, the most important mobile services and usages are discussed in Table 5.2. Some scenarios and examples of these usages are also discussed below.

Table 5.2 Mobile usages and services

Mobile usages	Mobile services	Examples
E-commerce	Business/work	Financial services (e.g. mobile wallet, stock market), security (e.g. wireless camera), VOIP (Voice over IP), mobile e-mail access, mobile search engine, and online order services
Private life (home/free-time)	Personal manager/ assistant	News, weather, sports information, yellow pages, advertisements, home manager/assistant, short message services, multimedia download, and mobile shopping
Entertainment	Entertainment	Mobile games, mobile rings, and IPTV (Television programs through a mobile phone)
Vehicular	Travel	Travel agent, mobile tourist guide, positioning-related services
Public	Education	News and weather report delivery
	Health-care	Health information, in time services and suggestions
Others	Other services	Voice services, advertisements, surf on Internet, and so on

Source: ACMA (2007), AMTA (2007), Fitzek and Katz (2006), and WRG (2006)

While the majority usage of mobile devices is still voice communication, people now use mobile handsets more frequently, taking and sending pictures and videos, surfing the Internet, listening to music, playing games, watching TV, checking email, managing their schedules, and so on. Nonetheless, a survey of mobile phone users showed that consumers view the benefits of mobile service provision as saving money, saving time and providing useful information (Friedman 2007).

Firms have a range of business networks as well as remote workers. E-commerce helps these firms provide better services to customers, suppliers, and other collaborators. Remote workers can work at home or anywhere that has Internet connections. Health care services or applications include transferring medical imaging to specialists or other doctors. Firms across all sectors rely on collaborative tools and services (e.g. electronic messaging and online meetings). These activities greatly reduce the transaction costs of both firms and individuals. They provide not only direct contributions to GDP and employment growth, but also many indirect contributions to society as a whole which will be further discussed in the following section.

Telecommunication services are an important resource for both domestic and international benefits. In the context of domestic policy objectives, the role of telecoms is essential to the facilitation of economic development and the enrichment of people's lives in both developed and developing countries (Peng 2007). With telecom prices decreasing, it provides more benefits to customers and generates more benefits for all participants (Access Economics 2008). It also contributes to the development of remote and poor regions. The indirect contributions provided by the mobile telecommunication industry has greatly improved business development and economic growth in Australia (Access Economics 2010) and China (MII 2007).

5.2.4 Direct and Indirect Contributions

The economic contribution of the telecom industry includes macroeconomic and microeconomic contributions, and indirect impacts on the development of other industries as well as social welfare.

1. Direct contributions on the macroeconomic scale
   On the macroeconomic scale, it has long been recognized that there is a close link between a country's telecommunications development and its economic development (Carr 1989; Access Economics 2010). The telecommunication industry has also provided many employment opportunities every year, which distribute the benefits to individuals and families. The sector has contributed significantly to government tax revenue. It has also improved imports and exports. In the context of international trade, telecom services provide key infrastructure for the economic development of virtually all other sectors (Peng 2007). The convergence of different technologies increases the substitution for services. Mobile telecommunications is a close and effective substitute for traditional fixed telephone services (OECD 2003). 3G now provides more possibilities for new services and content for the development of the mobile market.
2. Direct contributions on the microeconomic scale
   On the microeconomic scale, firms use telecommunication technologies to improve their efficiency, productivity, profitability, and to reach new global markets (Access Economics 2010). Information on market news, prices, costs, and customers are shared by firms and individuals anywhere and anytime. It increases the openness of information and decreases risks for individual firms.
3. Indirect contributions to economic growth and social welfare
   However, the indirect contribution of the mobile telecommunication industry far outweighs its direct contribution (Access Economics 2008). Telecommunication technologies have helped improve the efficiency and productivity of most firms in other industries, which has indirectly improved economic growth (Access Economics 2010). On the other hand, telecommunication technologies have also helped information distribution, maintaining relationships, and increasing the happiness of individuals by communicating regularly with their family and friends. The fast information transfer in health care, disaster alarm and many other fields have contributed to community services and welfare. Real-time information transfers also help reduce crime and solve some environmental problems. As a result, it has contributed to societal welfare as a whole.

Additionally, compared with other industries, they attract more investors (Nie and Zeng 2003). The sector facilitates increased efficiencies, reduced costs, and as a consequence, increased the productivity of businesses in all other industries (Access Economics 2008); increases the mental health of people through more accessible communications; emergency calls, which saves lives or prevents crimes;

and increased happiness by regular communication with family members in different countries which is missed in the evaluation of only economic indicators.

Telecommunications contributes directly and indirectly to economic growth (Access Economics 2010). Nonetheless, telecommunications has also changed the way people work and live (Apple 2010). It increases both local and global inter-firm collaboration in telecommunications as well as in other industries. The major types of collaborations between firms in these sectors are discussed in the next section.

5.2.5 *Mobile Telecommunication Market Structure*

To study inter-firm collaboration in the mobile telecommunication market, firms in global mobile markets are separated into three groups or sectors: (1) mobile device providers (DP), (2) operators (CSP) and service providers (SP), and (3) content providers (CP) and technical providers (TP) in this thesis, as shown in Fig. 5.2 below. However, these groups or sectors may vary in different countries due to their policies, business environment and cultural background.

In Fig. 5.2, firms in the mobile market are separated into three sectors. Each sector plays an important role in the mobile market. There is no typical vertical or horizontal collaboration in this market as in other traditional manufacturing industries. Supplier and consumer roles could be changed in different collaborations. For example, if a customer buys a mobile phone (e.g. iPhone or Nokia N8) first and then chooses a carrier service provider (e.g. Telstra or China Mobile), services are inputs for the handset device. On the other hand, if a customer chooses a service package from a carrier service provider, the mobile phone is then a part of this package. In this scenario the final package for the customer is composed of inputs from a carrier service provider, a device provider, content providers, technical providers, and usually through other service providers. There are many inter-firm collaborations between these firms. Each of these collaborations adds value to the final product.

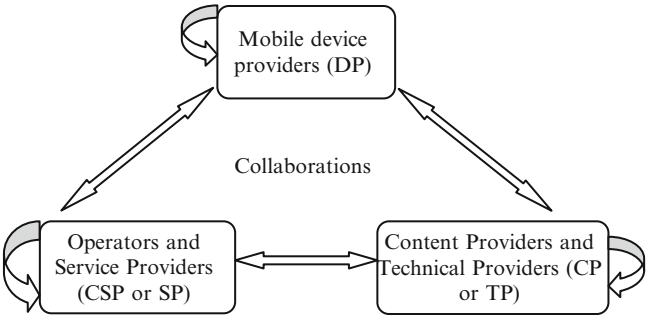

Fig. 5.2 Major sectors in mobile telecommunication collaborations (Source: Derived by the author)

The characteristics of each sector and their motives, types, benefits, and concerns for collaborations with other firms inside or outside its sector are discussed via real collaboration cases below.

5.3 Device Providers (DP)

Device providers, as discussed in the previous scenarios, including mobile device providers and basic telecom device providers, offer the basic devices (e.g. base station, mobile phones, and mobile handset devices) to operators and individuals. Mobile devices are the most important basis of mobile services. Without these devices, no mobile services could be provided to the final customers. Mobile phone providers are used as examples to explain the collaboration scenarios of different sectors. The biggest mobile phone providers in 2011 were Nokia and Samsung. They will be discussed further in the following section. The ranking changed dramatically from 2006 to 2011, and this will be discussed further below.

In 2011 the number of mobile subscribers surpassed 5.3 billion worldwide (Mobithinking 2011). The trends in future mobile phones are towards smaller, easier to control, and more functional devices. As the cost to produce a mobile phone becomes lower, the more popular will be their global usage. With the rapid development of new technologies and increased requirements by customers, most device providers have to collaborate with other firms to improve the technologies of their hardware and software to keep their competitiveness in the global market. On the other hand, to reduce costs of production and research, firms have a great incentive to work with other partners that have a comparative advantage in producing some parts of the final products.

DPs usually collaborate with content providers to install initial contents inside their devices. For example, some games, ringtones, and background pictures are sold with the new mobile phones. DPs also need to develop new technologies by collaborating with some technical providers (e.g. using matured mobile phone operating systems). DPs collaborate with carrier service providers or service providers to develop packages of services for customers. Special services must be combined with other resource providers, for example Nokia's online shop (Nokia 2007), weather forecast services, or news services. DPs also collaborate with other Original Equipment Manufacturers (OEMs), which are also DPs, to get access to new technologies or lower costs as each firm has its own comparative advantages (Whitford and Zeitlin 2004; Vilana and Monroy 2010).

Device providers adopt the latest technology provided by technical providers and cooperate with some famous content providers and service providers to embed their contents or services into their products to attract more customers. Therefore, DPs have a great need to collaborate with all other firms to keep their competitiveness and rank in the global market.

The characteristics of the collaborations of the major firms in each sector are discussed and compared in the next section, which will provide a better

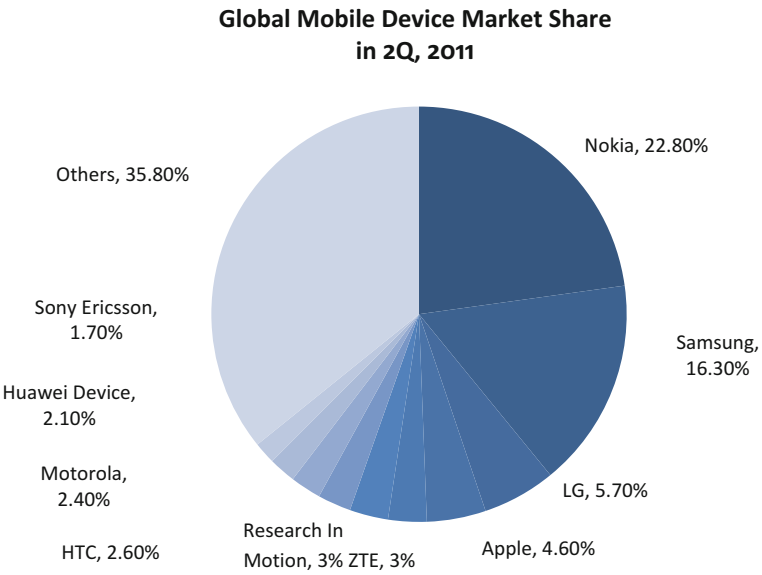

Fig. 5.3 Global mobile device market share in Q2, 2011 (Source: Gartner (2011))

understanding of their collaborating trends and strategies. Such data is useful in identifying the differences of each sector in terms of their motives and perceived benefits from inter-firm collaboration.

5.3.1 Major Global Mobile Device Providers

As this chapter focuses on the global mobile market, this section will mainly discuss mobile handset (e.g. mobile phone) providers. The biggest mobile handset provider in terms of mobile device sales to end users in 2011 was Nokia (Gartner 2011). Other big mobile phone providers (by ranking) are Samsung, LG, Apple, ZTE, Research In Motion, HTC, Motorola, Huawei Device, and Sony Ericsson. This market is a dynamic and competitive one. Ranking and market share have changed quickly in the last 5 years. In 2006, the biggest two were Nokia (with a 36 % market share) and Motorola (with a 21.5 % market share) (Gartner 2007). However, new competitors such as Apple and LG have seen their market shares increase quickly, pushing the market share of Nokia and Motorola down to 22.8 % and 2.4 % respectively (Gartner 2011).

As shown in Fig. 5.3, Nokia occupied 22.8 % of the global market in 2011, which was still the biggest market share. The global share for Samsung was 16.3 % in 2011. Others, such as LG, Apple, ZTE, accounted for the other 60.9 % of the global mobile handset market. With the first iPhone (by Apple Inc.) released in

2007 the market share of iPhone increased dramatically during 2008–2010 (Apple 2010), accounting for 25 % of the U.S. smart phone market in 2010. As a result, the market share (in terms of sales to end users) of Symbian Operating System (mostly used in Nokia mobile devices) in the global smart phone market has decreased dramatically from 40.9 % in the second quarter of 2010 to 22.1 % in the second quarter of 2011. On the other hand, the market share of the Android operating system (used in Samsung, Motorola, and HTC mobile devices) in the smart phone market increased from 17.2 % to 43.4 % during the same period. Another notable change in this market is Motorola. It was the second biggest mobile phone provider with 21.5 % of the total global market share in 2006 (Motorola 2006). However, its market share was only 2.4 % in 2011. What are the reasons for this significant decreased market share during these 5 years, and what implications are there from this for other firms?

To answer these questions, Nokia and Motorola are selected as the two studied cases as examples of device providers. Their inter-firm collaborations are expected to show the trends and motivations for inter-firm collaboration strategies of device providers.

The following sections will discuss the history, development and inter-firm collaborations of Nokia and Motorola as cases of device providers. These cases depict the different incentives, types and benefits from inter-firm collaboration for device providers in the market. Furthermore, the reason for the significant decreasing market share of Motorola is also discussed.

5.3.2 Business Collaborating Case: Nokia

5.3.2.1 Background

Established in 1865 in Finland, Nokia has become the largest mobile handset provider in the world. Nokia built its first international mobile phone network in 1981, which led to the beginning of the mobile era. However, with technology changes, Nokia kept on changing its products: the digital telephone switch was launched in 1982, Global System for Mobile Communications (GSM) standard opened up in 1991 with Nokia as one of the developers of the system (Sadowski et al. 2003), Nokia tune was launched in 1994, with the world's first satellite call made in 1994, Nokia's first mobile game – snake was launched in 1997, Internet went mobile in 1999, Nokia launched its first 3G phone in 2002 and mobile gaming went multiplayer in 2003 (Nokia 2007). Nokia has been the top provider of mobile handsets in the global market since 1998 (Gartner 2011). Although its market share decreased dramatically from 2006 to 2011, it is still the top mobile device provider in the global market.

Beside mobile handsets, Nokia also provides network infrastructure and enterprise solutions. Collaboration is a key strategy in Nokia's growth path (Nokia 2011). It works with research institutions, local government, industry organisations,

and other firms to increase its competitiveness in the global market (Nokia 2007). Nokia has a vision to operate in the global market and this also influences its collaboration strategies. The top 10 markets in term of sales amount for Nokia in 2010 were: China, India, Germany, Russia, the United States, Brazil, the United Kingdom, Spain, Italy, and Indonesia, together representing 52 % of total net sales in 2010 (Nokia 2011). Nokia also had five manufacturing facilities in China, producing mobile devices and systems (Nokia 2010). To keep its leading position in the mobile device market, Nokia focused on its R&D investment and inter-firm collaboration in new product and technology R&D, which is also supported by the following collaboration cases.

5.3.2.2 Current Status of R&D

Research and development (R&D) expenses were 13.8 % of its net sales in 2010 (Nokia 2010). However, the cost of R&D is very high with high risks. As discussed in Chap. 3, firms in high technology industries (e.g. the telecommunication industry) usually collaborate with others to share risk and lower costs (Mowery 1988; Mytelka 1991; Lorange and Roos 1992; Hagedoorn et al. 2005; Richards and Yang 2007). Both Nokia and Nokia Siemens Network (jointly owned by Nokia and Siemens) had an R&D centre to access the lower cost skilled labour and collaborators in China on new products and new technologies (Nokia 2010).

5.3.2.3 Inter-firm Collaborations with Other Firms

Located in Finland, Nokia found that its local production networks in Finland were not sufficient for its growth and development. Therefore, Nokia had to collaborate with international partners to lower costs and keep its leading position in innovation (Sadowski et al. 2003).

Since the mid 1990s, 95 % of Nokia's strategic alliances have been in the global market. The majority of international alliances are in manufacturing and technology. However, with changing market share and pressure from new competitors (e.g. Apple), Nokia has had to seek collaboration with other big companies that have complementary resources (e.g. operation system from Microsoft) to keep its leading position in the global market and lower its development cost. Therefore, global competition encouraged firms into collaboration. As the top mobile phone provider in global market, Nokia usually selects the top firms in other areas (e.g. Microsoft as the top software provider and China Mobile as a top operator) as their collaborators. These collaborations will be discussed in detail in the following collaboration cases for Nokia.

As shown in Fig. 5.4 the majority of Nokia's international alliances involve large IT companies and operators in different countries, like Motorola, IBM, Lucent Technologies, AT&T, 3Com, Intel NTT, Deutsche Telekom, British Telecom (Quadrant Consortium), France Telecom (Orange), Dutch KPN, Ericsson, Telenor,

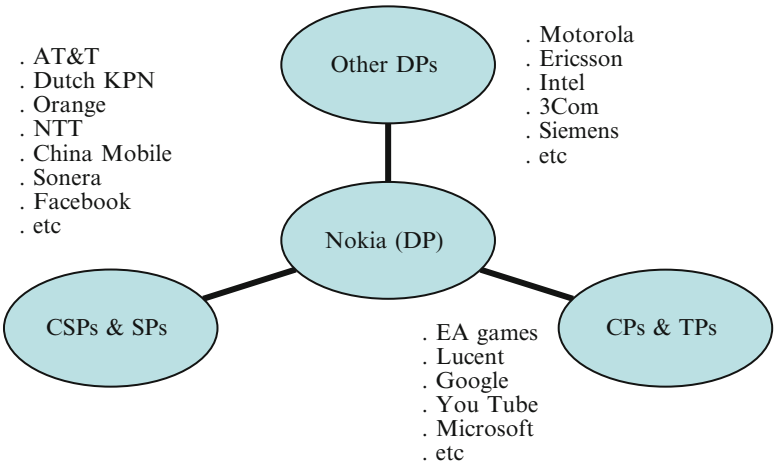

Fig. 5.4 Inter-firm collaborations – Nokia (Source: Nokia (2006, 2010))

Telia, TeleDanmark, Sonera (Telecom Finland), Twitter, You Tube, Facebook, Google, and Microsoft (Nokia 2011). These companies are categorized into three groups for further analysis.

Nokia collaborates with CSPs to provide value added services (e.g. location based services, maps, mobile advertising and gaming) to end users. For example, Nokia collaborates with Orange (France Telecom) and T-Mobile on faster and better customer services. China Mobile, Orange, T-Mobile and AT&T are the number one operators in their respective national markets. From these cases, Nokia has the vision to enter the global market through inter-firm collaboration with the leading operators in different countries. Furthermore, Nokia selected the biggest operator in each country to increase its market share in each market. The forms of this collaboration include co-production, management services, and marketing. By combining CSPs' markets, customers, services and Nokia's strength in device development and integration, they can extend the way in which their customers use and consume their mobile handsets.

Nokia also collaborates with other DPs to provide higher quality and lower cost devices. This kind of collaboration involves co-production, buy-back agreements, joint venture, and joint research. A good example of an equity agreement in manufacturing is Symbian, a joint venture involving Psion, Nokia, Motorola and Ericsson, established in 1998 (Telecom Worldwire1 2008). Nokia also established an equity joint venture (Nokia Siemens Networks) with Siemens (Nokia 2011). This kind of agreement covers future network research, new device development, assembly of current devices, new technology development and other types of co-research and development. As most DPs are competitors in the global market, these kinds of collaboration are usually through joint venture or merger to avoid any potential risk of sensitive information release or skilled labour movement.

Nokia collaborates with other CPs and TPs to provide special services for its customers, such as Google's search engine and YouTube video. Nokia opened the OVI store after Apple's successes with its Apple store (Nokia 2011), which provided CPs with another platform for direct sales to customers. On the other hand, Nokia signed an exclusive agreement with EA games in 2011, which required this top game developing firm to provide booked mobile games for Nokia's new products (Spforum 2011). This collaboration involves service providers, co-products, and information share. In 2011, Nokia completely transferred its Symbian software development and support activities to Accenture (Nokia 2011) and focused on its R&D based on Windows phone 7 (an operating system developed by Microsoft). The results from the Nokia case will be compared with another case – Motorola in the next section to find common collaboration strategies for device providers.

5.3.3 Business Collaborating Case: Motorola

5.3.3.1 Background

Established in 1928, Motorola Inc is an American multinational communications company. Motorola was the second largest mobile phone provider in 2006. It provides not only mobile devices and wireless communications systems, but services on mobile devices, such as voice service, text message, image messaging, multimedia, and other entertainment. Motorola also provides home solutions, such as Internet video and voice products (Motorola 2007). Motorola had sales of US $42.9 billion in 2006. However, its market share has decreased since 2007. It had net losses from 2007 to 2010 (Motorola 2010). Its global mobile handset market share decreased from 21.5 % in 2006 to 2.4 % in 2011 (Gartner 2011). These significant decreases were driven by fierce global competition (from Apple and Samsung) and the business development and collaboration strategies adopted by Motorola itself. Motorola Mobility faced great competition from Nokia, Samsung, LG, Sony-Ericsson, Apple, RIM, and HTC in the mobile phone market. As a consequence, it drew back from the global market to focus on a limited number of phones for specific customers or applications in North America (Motorola 2010). This limited its development and potential inter-firm collaboration in the global market. Another reason for this decrease is the significant reduction in its R&D investment.

5.3.3.2 Current Status and R&D

The R&D funds of Motorola continuously decreased from $2.4 billion in 2008 to $1.5 billion (13 % of its revenue) in 2010. Investment in R&D is vital for high technology firms such as mobile telecommunication firms. Therefore, it influences

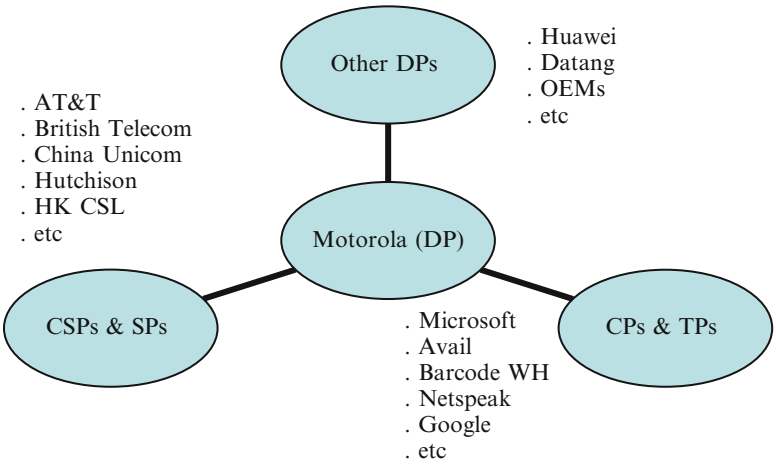

Fig. 5.5 Inter-firm collaborations – Motorola (Source: Motorola (2006, 2010))

the competitiveness and market power of firms. On the other hand, high cost R&D is also associated with high risks. If the R&D strategy fails to meet its expectation, it also has a negative influence on the development of the firm.

5.3.3.3 Inter-firm Collaborations with Other Firms

Based in the U.S.A., Motorola was the top mobile device provider in the American market. Working closely with the GSM Association (GSMA), Motorola also obtained access to many developing markets such as that of India, the Philippines, Indonesia, China, and Africa. On the other hand, its products are manufactured primarily in China, Taiwan and Brazil (Motorola 2010). However, weak intellectual property rights protection in China and reliability on these developing bases are regarded as high risk for the future development of Motorola Mobility (Motorola 2010). The changed market focus strategy of Motorola after the net loss years also influenced its collaboration strategies. Figure 5.5 shows Motorola's inter-firm collaborations with other firms in different sectors.

Motorola collaborated with many DPs on information sharing, co-research and development. One good example is with Huawei Technologies (China) to develop the UMTS (Universal Mobile Telecommunications System) and HSDPA (high speed downlink packet access)/ HSUPA (high speed uplink packet access) infrastructure equipment. Motorola also collaborates with some original design manufacturer (ODMs) partners to lower costs on new product design and research (Motorola 2010). However, these collaborations did not bring positive revenue as expected and caused losses on investment in 2009 (Motorola 2010).

Motorola collaborates with many CPs and TPs to provide better and more services, especially on video technologies, for its customers. For example, Avail

Media collaborated with Motorola to deliver MWAVE (MPEG-4 Wide Area Video Entertainment). Motorola also offers 'pre-packaged' video hub offices for service providers (Telecom Worldwire2 2008). Google and Motorola Mobility announced in August, 2011 that Google Inc. acquired Motorola Mobility Holdings, Inc. for a total of US$12.5 billion. This agreement is highlighted by both companies as an important collaboration for them, which is expected to close in early 2012 (Google 2011). However, this acquisition did not bring positive profits as expected.

Motorola has collaborated with many Operators or CSPs on value added services (e.g. China Unicom and China Mobile). The incentive for this collaboration was entering a new market and providing better customer services. As part of the contract, Motorola will provide servers, network equipment and customized software (Worldwide Telecom 2008).

Motorola had similar collaborating strategies with Nokia as a device provider, which will be further summarized and discussed in the next section. However, the new strategy focus only on the domestic US market has limited its development and collaboration opportunities in the global market. This is the major cause of its continuous decrease in market share. Fierce competition from the global market (e.g. Apple and Samsung), reduction in R&D investment, and losses on its investment and collaboration activities have also contributed.

5.3.3.4 Collaboration Strategies for DPs

Both Nokia and Motorola are facing intense global competition (e.g. from Apple and Samsung). Therefore, they have a strong need to collaborate with other firms to develop access to new technologies, access other markets, and increase market share. In other words, fierce competition has increased global collaborations between firms (e.g. Motorola with Google and Nokia with Microsoft).

DPs are very keen to collaborate with almost all the CSPs in the global market as they provide very complimentary products (mobile handsets from DPs) and services (direct customer contact and services from CSPs). CSPs need to attract new customers through new products from DPs. DPs have to collaborate with CSPs to access end-users in each market. On the other hand, new services provided through CSPs and various new products from DPs (e.g. iPhone 4) help attract new customers, as well as increase the satisfaction levels of current customers of both collaborating parties. Therefore, this kind of collaboration exists in every mobile service scenario as discussed in relation to Fig. 5.1.

Most of the major DPs have indicated that CPs or mobile developers are key to their development and future success (Apple 2011; Nokia 2011). Therefore, for DPs, collaboration with CPs and developers are the most important collaborating strategy. To attract high quality mobile content developers in the global market, they usually provide free development tools and environment, free training, and worldwide awards for best developers. They have different strategies to attract mobile developers to provide mobile games and applications for their own products. For example, the Apple store gave more profits for developers and simplified

the benefit distribution model for the CPs (from the previous Operator-SP-CP model) and Nokia has signed an exclusive agreement with EA games to serve high quality and unique mobile content to its customers (Apple 2010; Nokia 2011). These strategies have increased both the quality and the quantity of mobile contents for their products and, as a consequence, increased and maintained their customers.

However, DPs are very cautious in collaborating with other DPs as they have similar resources and produce similar products. When market or product information is released to a potential competitor, it will give them more chance to win the competition in the market by developing superior products. Therefore, some firms have a strict non disclosure agreement (NDA) with all its partners (e.g. Motorola) to avoid such problems. The most common collaboration between DPs is joint ventures. For example, Sony-Ericsson is a joint venture company invested in by Sony and Ericsson. Nokia Siemens Networks was invested in by Nokia and Siemens. These independent organizations can operate without increasing the above problems.

5.4 Operators and Service Providers (SP)

Operators or carrier service providers (CSPs) are those who own basic telecommunication devices or networks, such as base stations, wire lines or channels. This market is relatively stable as most operators and CSPs have a strong market power[1] and are protected by governments. Telecommunication operators create value by linking customers to their networks and services (Allee and Taug 2006). In the telecommunications sector, a particular operator usually has a strong presence and market power, and influences the downstream part of that market. Operators themselves also provide basic services, such as voice communication and short message services (Communications Alliance 2007). In this sense, they are also called service providers (SPs). Therefore, CSPs are combined with SPs in this market structure.

Service providers include the Telephone Service Provider (TSP), Internet Service Provider (ISP), and Telephone and Internet Service Provider (TISP) (TIO 2007). In some countries there are other categorises, such as Application Service Provider (ASP), Managed Service Provider (MSP), and Managed Internet Service Provider (MISP). The number of SPs has grown substantially in recent years (ACMA 2007; MII 2007). They usually rent the broadband from operators and provide value-added services to other companies and individuals (Communications Alliance 2007).

SPs have a natural need to cooperate with CSPs to provide services for end users. They also need to cooperate with content providers (CPs) as they have comparative

[1] Entry fees are very high and duplicate basic infrastructure which would represent a waste of resources. Therefore, it is limited in most countries by licenses and regulation policies.

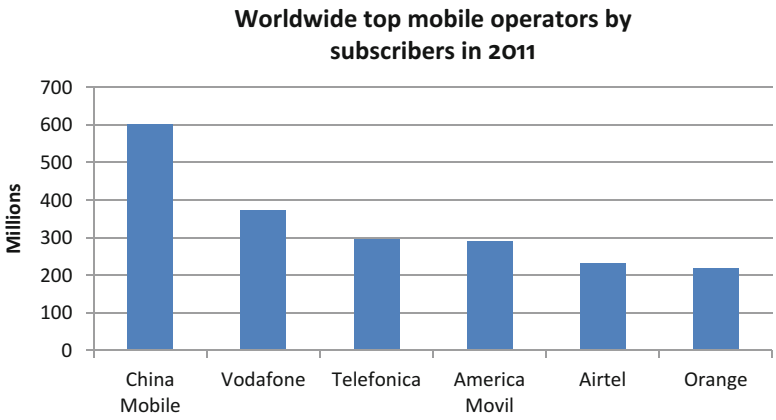

Fig. 5.6 Worldwide top mobile operators (by subscribers) in 2011 (Source: 2011 annual report of China Mobile, Vodafone Group Plc, Telefónica, América Móvil, France Telecom, and Airtel) Note: (1) China Mobile, Vodafone, and Orange annual report was based on data for March, 2011. (2) Others ended in June, 2011

advantage in producing higher quality content. Some special information (such as sports news or weather forecasts) is provided by special CPs. SPs sometimes need to cooperate with DPs to get special information or support from their devices to develop new services for their customers.

SPs need to adjust their services due to different mobile phone users and provide various and imperative content to end users. CSPs also have incentives to collaborate with each other to get more market power, share market information, reduce operational costs, and reach overseas markets. Therefore, SPs and CSPs have a great need to collaborate with all the other firms in the market to provide services to their customers.

5.4.1 Major Global Operators and Service Providers

The major global operators (based upon number of subscribers) are China Mobile (China), Vodafone Group Plc (UK), Telefónica, América Móvil, Airtel, and Orange (France Telecom). Most industry reports adopt subscriber (user) numbers as ranking criteria for mobile operators as revenues are difficult to measure (with different currencies, changing exchange rate and different time of released annual report by different operators).

Figure 5.6 shows the number of subscribers of major global mobile operators (service providers) in 2010 and 2011. With the largest population in the world, China is one of the biggest telecommunication markets. China Mobile was the largest operator in terms of subscribers, with 627.63 million in August 2011 (China Mobile 2011). In second place is Vodafone Group Plc. It had 370.9 million

subscribers in 2011. In terms of mobile network subscribers, China Mobile and China Unicom ranked one and two of all the mobile network operators (Mobithinking 2011).

As some local mobile operators (e.g. Telstra and China Mobile) have a strong market power (due to first entry and high fixed costs for building all the base stations) in its domestic market, they usually dominate their own market (Vodafone 2011). Therefore, the number of subscribers is influenced by the population of different countries. For example, although they have high numbers of users both China Mobile and China Unicom only operate in the Chinese market, which is already enough to make them the top mobile operators in the world but restricts their global market influence. As China Mobile and China Unicom are studied in Chap. 6, Vodafone and Orange (France Telecom) will be discussed as representatives of global mobile operators. They are not only in the top six mobile operators in the global market but also operate in different countries and regions, which gives them great influence in the global market.

5.4.2 Business Collaborating Case: Vodafone (UK)

5.4.2.1 Background

Located in Europe, the Vodafone Group is one of the world's biggest mobile telecommunications companies. Vodafone provides voice and data mobile telecommunications services and other services to its customers.

Vodafone has mobile subsidiaries and joint ventures in Germany, Spain, UK, Albania, Australia, Egypt, Greece, Hungary, Ireland, Malta Netherlands, New Zealand, Portugal, Romania, Fiji, Italy, and South Africa. Its partner markets include: Austria, Bahrain, Croatia, Cyprus, Denmark, Estonia, Finland, Hong Kong, Iceland, Kuwait, Luxembourg, Singapore, Slovenia, and Sweden (Vodafone 2006). On this measure it is the second largest mobile telecom group in the world behind China Mobile (Vodafone 2007).

As shown in Fig. 5.7 below Vodafone's major markets are based in the Asia Pacific region, with 36 % of its customers coming from the Indian market. Therefore, Vodafone has a very open and global strategy in terms of inter-firm collaboration, which will be discussed further below.

5.4.2.2 Current Status and R&D

The revenue of Vodafone was £45.9 billion (about US$75 billion) for the financial year 2011 (Vodafone 2011) with 370.9 million customers (most of the 14.5 % increase in customers from 2010 was contributed to by increasing numbers from India). As shown in Fig. 5.7 below, its customers were separated into different countries and regions. Vodafone is very active in global markets with investments

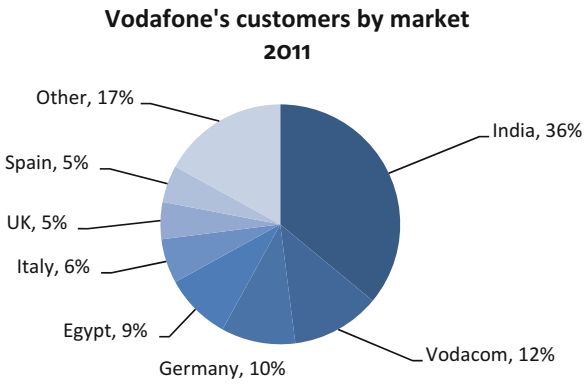

Fig. 5.7 Customers by markets – Vodafone 2011 (percentage) (Source: Vodafone (2011))

in different countries (e.g. Verizon Wireless in U.S., China Mobile in China, SoftBank in Japan, and SFR in France) (Vodafone 2011).

As discussed in the previous section, DPs focus on R&D related to new products and new technology using mobile devices. CSPs, on the other hand, focus on new technology to improve the speed and quality of basic network infrastructure and standards (such as 4G, which was mentioned 16 times in Vodafone's 2011 annual report). Vodafone spent £287 million (about 1 % of its revenue) on R&D in 2010–2011. CSPs invested less in R&D compared with DPs because R&D will not generate direct profit for them. They focus more on customer service and satisfaction.

5.4.2.3 Inter-firm Collaboration with Other Firms

Located in Europe, Vodafone targets and operates in global markets. It operates in Europe, the Middle East, Africa, Asia-Pacific and the United States through subsidiary undertakings, joint ventures, and investments. As shown in Fig. 5.8, Vodafone collaborates with other CSPs, SPs, CPs, and DPs to keep its leading global position. These collaborations are categorized into three groups and discussed in more detail below.

Vodafone has many joint-research laboratories with other CPs and TPs (e.g. Softbank Corporation) in different countries. It is usually aimed at developing new mobile technology, applications, and services. Investments in these laboratories are usually for long-run business strategies (Sinocase 2008). CSPs usually have negotiating power when collaborating with CPs and TPs as they usually have strong market power in each country.

On the other hand, Vodafone collaborates with DPs to provide specialized packages of products and services (e.g. combined service for phone call, internet download quota, and short message) for its customers. For example, the post-paid package of iPhone, calling services, and broadband download services package in the Australian market (Vodafone 2011). As most DPs involved in collaboration are top firms in the global market, CSPs and DPs are usually in a peer collaboration position.

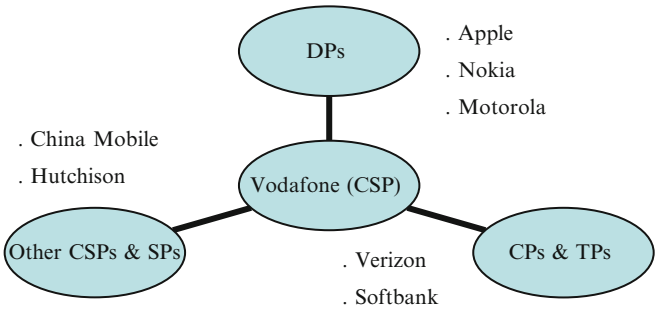

Fig. 5.8 Inter-firm collaborations – Vodafone (Source: Vodafone (2006))

Vodafone collaborates with other operators or CSPs to access new markets or increase its market share. For example, to create a stronger and more competitive company, Vodafone and Hutchison (3) merged in 2009 in Australia. This merger made Vodafone the third largest mobile operator in the Australian market, which will be further discussed in a later chapter. However, collaboration between operators in the same competitive market usually carries with it higher risks. Therefore, the type of collaboration between big operators usually focuses on mergers (e. g. Vodafone and Hutchison) or share holdings (e.g. Vodafone in China mobile). Vodafone also collaborates with some small local service providers (SPs) as these SPs know better local customers' requirements and can provide better services to its customers. Vodafone has to pay rental fees to Telstra as it provides services to its customers via Telstra's basic network facilities. Telstra has a much higher service price in Australia than for all the other CSPs (Vodafone 2011), which supports its market power in the Australian market.

The developing strategy of Vodafone is focused on the global market and global collaborations, which also increase its global competitiveness. To access different markets in different countries it usually collaborates with local firms to reduce transaction costs and access complementary resources. As one of the largest operators or CSPs, Vodafone is inclined to cooperate with large global firms (e.g. Apple, China Mobile and Verizon) to keep its leading position. Another global mobile operator that has a presence in many countries and interests in international inter-firm collaboration is France Telecom (Orange is the mobile service brand of France Telecom in many countries). The results from both Vodafone and Orange will be summarized and discussed in Sect. 5.5.4.

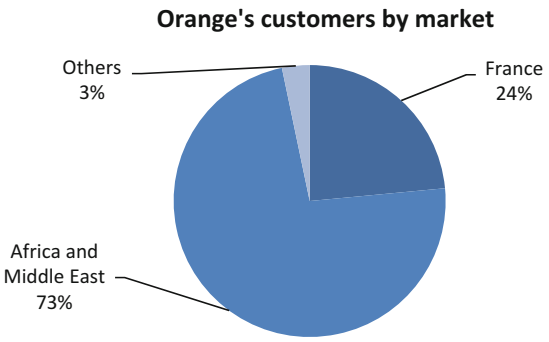

Fig. 5.9 Customer by regions – Orange 2011 (Source: Orange (2010))

5.4.3 Business Collaborating Case: France Telecom (Orange)

5.4.3.1 Background

The France Telecom group offers fixed-line and mobile services as well as value adding services in Europe and other countries. Orange is a mobile telecommunication brand of France Telecom. Started in 1994, Orange initially served only business customers, and in 2011 it served 217 million customers (France Telecom 2011). It provided access to an IP VPN network in 220 countries, converged voice, data and mobile services as well as IT expertise and managed services (Orange 2007).

5.4.3.2 Current Status

By the end of June 2011, France Telecom Orange Group had approximately 217 million customers (of which 158 million are mobile customers) around the world (France Telecom 2011). The 7 % increase in customers compared with 2010 was led by a 25 % growth in mobile customers in Africa and the Middle East (France Telecom 2011). It had €45.5 billion in sales at the end of 2010 and €22.57 billion at the end of June, 2011 (France Telecom 2011). Figure 5.9 shows the mobile customer distribution of Orange in 2011. Its biggest market was in Africa and the Middle East, which had changed dramatically from 2006 when 83 % of its customers came from Europe (Orange 2007).

5.4.3.3 Inter-firm Collaborations with Other Firms

In order to offer third-generation services, France Telecom participated in several Universal Mobile Telecommunications System (UMTS) licensing award

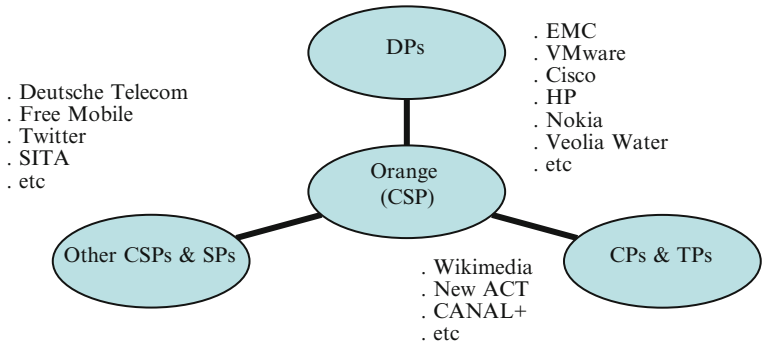

Fig. 5.10 Inter-firm collaborations – Orange (Source: France Telecom (Orange) (2006))

procedures in Europe. France Telecom has focused on third generation technologies (Orange 2007). The collaborations involving Orange can be categorized into three groups for analysis as shown in Fig. 5.10 below.

Orange has many inter-firm collaborations with different DPs. For example, collaboration on location based services, maps, mobile advertising with Nokia (PR Newswire1 2008), collaboration on new products with HP, collaboration on cloud computing with EMC, VMware, SITA, and Cisco (Orange 2010; France Telecom 2011), and collaboration on m2o city, a smart metering operator, with Veolia Water. These collaborations include co-production, joint research, information sharing, and management services. In accord with the Vodafone case, Orange usually collaborates with DPs to share their markets and services/products. Therefore, they are in a peer collaborating position.

To provide better and more services for its customers, Orange also collaborates with CPs and TPs, for example news services with NewACT and Wikimedia (PR Newswire4 2008) and Orange Cinema Series TV package with CANAL + in July 2011 (France Telecom 2011). The collaboration between Orange and these firms included information sharing, co-research, technical training, and patent licensing. As discussed in the previous section, CSPs usually have negotiating power when they collaborate with CPs.

Orange also collaborated with other SPs to provide special or booked services for its customers. For example, it collaborated with Partner Communications on 'Orange forever', which allows subscribers to synchronize their contacts, pictures, videos, calendars, and messages (as of December 31, 2007) and formed joint venture firms with Deutsche Telekom (France Telecom 2011). Same as for DPs, CSPs are very cautious when they collaborate with another CSP (a potential competitor). They usually collaborate with another CSP in a different country on international services to lower the cost or overcome political barriers (as discussed in Chap. 3 as a motive for inter-firm collaboration).

With less global market power, France Telecom has focused more on its local or near markets. With a geographic and cultural background in France, most of its collaborators are in the EU. From the Vodafone and Orange cases (Orange is also

selected as a case study in Chap. 6), CSPs have a strong incentive to collaborate with most DPs and some high technology TPs to access new products and technologies to keep their leading position. However, they usually collaborate with other CSPs only by share holdings or mergers to access a new market or increase their global market share or influence.

5.4.4 Collaboration Strategies for CSPs and SPs

From the annual reports of Orange and Vodafone, the markets for global mobile operators have changed from developed countries to fast growth developing countries (e.g. India and Africa). This is also supported by an ITU statistics report, which indicated that global mobile subscribers in the developing countries increased from 1.2 billion in 2005 to 4 billion in 2010, and global mobile subscribers in developed countries only increased from 0.99 billion to 1.4 billion for the same period (ITU 2011). Another notable figure is the percentage of mobile subscribers for all inhabitants which was 114.2 % (101 % in Australia) in developed countries but only 70.1 % (only 64 % in China) in developing countries (ITU 2011), which makes the mobile telecommunication markets in developing countries a potentially much faster growth market. That could be one of the reasons why most of the top global mobile operators have moved their core markets to the emerging and developing economies.

As most mobile telecommunication markets are protected by national governments (through entry requirements, regulations, licences or high tax rates), it is difficult to compete with a local telecommunication firm that owns the basic network infrastructure (e.g. Telstra in Australia and China Mobile in China). CSPs have to collaborate with other firms to access new markets or reduce their communication costs (e.g. for international short messages or calls).

As discussed above, CSPs are also inclined to collaborate with CPs and TPs on new mobile network technology and products. The aim of such collaborations with CPs is to keep their leading position with a new generation of technology change, and increase their customer satisfaction levels by providing various new products and services.

On the other hand, services and products provided by different service providers also help CSPs attract new customers and maintain current customers. SPs have to collaborate with CSPs to access the end-users and share the revenues from end-users. Therefore, CSPs and SPs have a natural collaborating relationship in the market. However, CSPs usually collaborate with other CSPs only on international services (such as international calls) or as joint venture firms.

5.5 Content Providers and Technical Providers (CP/TP)

Content providers (CPs) are firms that develop new content for mobile phones or own special content, such as sports news, TV programs, music resources, mobile games, etc. Technical providers (TP) are firms who provide technology for hardware or software solutions for mobile phones, such as MontaVista (provides a mobile operating system), new video accelerating chip providers, or new mobile engine providers. TPs provide core technologies or patent products (e.g. the engine, operating system, or chips) to other companies. They are the most important components in this market to add value and drive the high growth rate requirement for new services and content.

Content providers that offer famous or popular content (e.g. TV programs or weather forecasts) can easily cooperate with CSPs, SPs, or DPs. Mobile service advertisements were rare several years ago, but can be found almost everywhere in TV programs, radio programs and even newspapers now. The other content on mobile phones, such as sports news, electronic tickets, mobile movie download, mobile e-mail, mobile games, etc., have grown dramatically in the global market (Communications Alliance 2007).

5.5.1 Major Global Content Providers and Technical Providers

There are many content providers and technical providers in the world. However, most of them are small and medium sized firms or big firms in other industries (such as Time Warner or the BBC). They usually have unique resources (e.g. news or weather forecasts) or irreplaceable new technology advantages. These scarce resources make them very important in the telecommunication market. This market is very dynamic with new entry firms and free exit. As there is no leading firm in this market, Gameloft (the famous mobile games provider) and MontaVista Software, Inc. (one of the famous TPs in the global mobile device market) will be discussed as examples of this sector.

5.5.2 Business Collaborating Case: Gameloft

5.5.2.1 Background

Founded in 1999, Gameloft is an international mobile games developer. Headquartered in France, Gameloft also operates in New York, San Francisco, Kansas City, Seattle, Montreal, Mexico, Buenos Aires, Paris, London, Düsseldorf, Copenhagen, Milan, Madrid, New Delhi, Seoul, Hong Kong, Beijing, Tokyo and

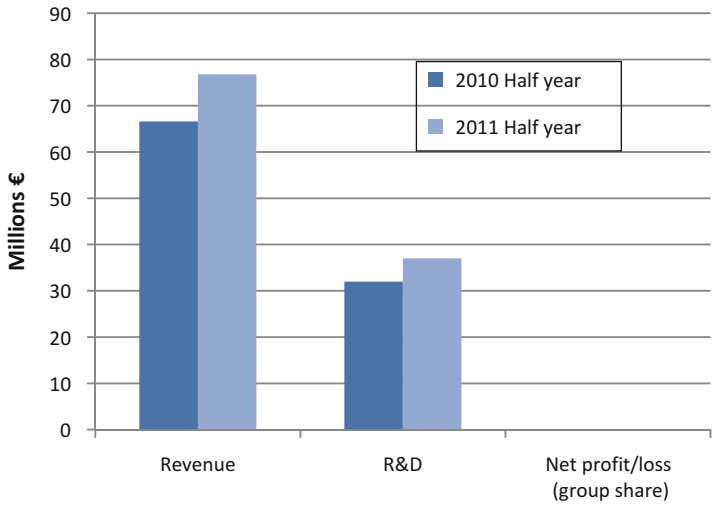

Fig. 5.11 Revenue, R&D expenditure and net profit of Gameloft in 2010–2011 (Source: Gameloft half year annual report (2011))

Sydney. The company creates games for mobile handsets with different technologies (Gameloft 2010).

5.5.2.2 Current Status and R&D

Figure 5.11 displays the growth of revenue, net profit and R&D cost of Gameloft from 2010 to 2011. Compared with DPs and CSPs, CPs invest heavily into R&D, which is vital for their competitiveness in the market. For example, the R&D investment of Gameloft was above 30 % of its revenue in 2010 and 2011.

Gameloft had €76.8 million (about US$112.4 million) revenues in 2011, which had increased by 15.3 % compared with 2010. Its net profit remained stable from 2010 to 2011. R&D expenditure occupied a large proportion of its revenue, which was €37 million (nearly half of its total revenue) in 2011 (Gameloft 2011). For a content provider such as Gameloft, R&D is vital for its competitiveness and development. Its intangible assets far outweigh its tangible assets (Gameloft 2011). Therefore, the proportion of its R&D expenditure to its total revenue is far more than that of operators and service providers. This also influenced its collaboration strategies, which are also focused on R&D and high technology adoption.

5.5.2.3 Inter-firm Collaborations with Other Firms

As a game development company, Gameloft focuses on its new products (games) and research and development. Therefore, it had established R&D centres in many

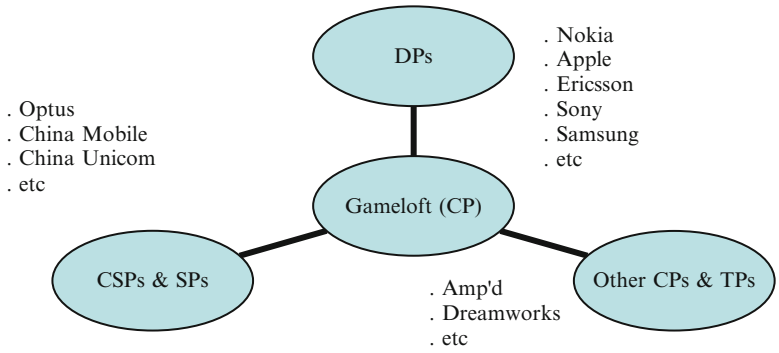

Fig. 5.12 Inter-firm collaborations – Gameloft (Source: Gameloft (2011))

countries to develop new products, conduct research on leading technology, and access local markets. More importantly, it also increased the extension of its collaboration with other firms in that country (Fig. 5.12).

Gameloft collaborates with other CPs and TPs on new product development, sharing information, and engaging in joint research and development. For example, it collaborates with DreamWorks on animation and movies (Wireless News 2007) and Amp'd Mobile on 3G technologies (Business Wire 2005).

Gameloft is very active in collaborating with DPs on pre-installed mobile games and special booked applications. For example, its collaboration with Nokia (PR Newswire 2006), Apple, Samsung, Sony, and Ericsson (Gameloft 2011) on its new games for different devices. These relationships will ensure timely support for new handsets and the distribution of games. This type of collaboration usually involves sharing markets or information.

Mobile games are available for download in every CSP's website or online shop, and the collaboration between CPs and CSPs are usually via packages. CSPs will distribute revenues to SPs and CPs afterward. However, this business model has been changed by the Apple Application Store (Apple 2010), which increased the revenue share for CPs. The Apple Store provides a direct sale and buy channel for consumers and content providers, which reduces the role of service providers and operators but increases the revenue share of content providers and Apple. Therefore, it was initially difficult to be introduced into the market (e.g. in Europe and China). Apple had a long-run discussion with China Mobile and China Unicom before it entered the Chinese market (Apple 2010) because of the new benefit from this distribution model.

As one of the biggest mobile game providers, Gameloft seeks collaborating opportunities with other DPs, CPs, and operators. It also collaborates with other CPs on sharing content, net technologies, and information. Another case of CPs is Monta Vista, one of the mobile operating system providers.

5.5.3 *Business Collaborating Case: MontaVista*

5.5.3.1 Background and Current Development

MontaVista Software, Inc. invented embedded Linux commercialization in 1999. It is a typical TP that provides a core embedded mobile system, developing environment and tools for developers. Because of the free price advantage, embedded Linux has become the most frequently selected platform for mobile devices (Montavista 2008). However, as an open source (freely used) platform provider, it is relatively small and can only provide limited support for its customers. There is no annual report or financial status for an open sourced company (such as MontaVista) because most of its revenues are obtained by donation and there is no formal paid employee in that company. After the release of new products by Nokia, Apple, Motorola, the market share of the Linux system on mobile devices declined dramatically from 2009 to 2011.

5.5.3.2 Inter-firm Collaborations with Other Firms

MontaVista collaborates with P.A semi (a U.S. semiconductor company which was invented by Apple in 2008) to provide energy saving equipment (Montavista 2008). This type of collaboration is in terms of co-production and joint research. The incentive for this collaboration is to increase performance and competitiveness, reduce research costs and achieve greater market share. It also provides support for other companies. As an open source platform, MontaVista is widely used in many mobile devices. Many users have benefited from it.

5.5.4 *Collaborating Strategies for CPs and TPs*

Gameloft and MontaVista cannot represent the majority of TPs or CPs as the products and services vary greatly among different TPs or CPs. However, most TPs and CPs are relatively small firms compared with CSPs and DPs. Based on high technologies or special resources, CPs and TPs play a very important role in the mobile telecommunication market. They usually collaborate with other CPs or TPs on new technologies. They also collaborate with DPs and CSPs on special content or information.

TPs are the most important partner for the operators as well as the DPs. With the growth of globalisation, most operators and DPs are facing pressure from global competition. To avoid being driven out of the market, they need to keep up with the growth of the new technologies. However, investment in R&D is huge and usually associated with high risk (the new generation of the technical cycle is hard to predict). The best way to keep a leading position is to cooperate with some technical providers that have comparative advantages in this field.

Content providers need to develop suitable content for each mobile device system and time to make sure they can run them properly and get real time customer's requirement from service providers. Therefore, CPs and TPs have a great need to collaborate with all the other firms in this market to generate better content for end users.

In conclusion, in a mature telecommunications market, different sectors have different responsibilities. Each mobile usage or service includes many inter-firm collaborations that are unseen but experienced by the end-users. New technologies and innovations are vital for this market. The incentives that are more likely to encourage collaboration in the telecommunications market are technology changes (more dynamic market), increased global competitiveness, exploration of new markets, reducing costs, increasing R&D, and achieving more global market power. Location is still important for most firms (Barro 1976). Most firms prefer to collaborate with partners from other sectors as they usually have different resources and customer bases, so that they complement each other.

5.6 Conclusions

The telecommunications mobile industry has experienced rapid growth in recent years. It is characterised by strong market power, government influenced and a technology driven industry. It has natural requirements for inter-firm collaboration as each usage or service involves many inter-firm collaboration opportunities. It has contributed directly and indirectly to both macroeconomic and microeconomic growth. Telecommunications development has had a profound influence on standards of living and economic welfare.

To study inter-firm collaboration between different firms, firms in the mobile sector have been separated into three categories in this thesis: DP, CSP/SP, and CP/TP. To survive global competition and increase market power, firms in each sector have to collaborate with other firms. Firms tend to collaborate with partners from other sectors who have different resources, markets and complementary skills and capabilities, but are very cautious in collaborating with partners in the same sector, who are potential competitors. The collaborating cases from the major companies in the global telecommunication markets shows that collaborating strategies have been vital for the development and growth of these leading companies. Successful collaboration contributed directly and indirectly to these firms as well as the development of the industry as a whole.

To address a gap in the literature, this study focuses on the Australian and Chinese markets. Chap. 6 and 7 will analyse the histories, characteristics, development processes, structures, major players, and inter-firm collaborations in and between the Chinese and Australian mobile telecommunication markets. Qualitative study results for both Australia and China are discussed, which will answer the first primary research question in Chap. 4. The results from surveys of Australian and Chinese firms are also compared and discussed at the end of Chap. 7.

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Chapter 6
A Case Study on Collaboration in the Chinese Mobile Telecommunication Market

6.1 Introduction

Collaboration is influenced by many factors, some of which are country specific such as the regulatory system and industry structure. The Chinese mobile telecommunication market is one of the most rapidly developing and dynamic markets in the world, and is also the world's largest telecom mobile market in terms of subscribers. The potential growth in the near future is still large (ITU 2011).

This chapter provides an overview of the Chinese mobile telecommunication market's history and development, industry structure, contributions to economic growth, and government regulatory system. To study inter-firm collaboration types, benefits, and barriers, a set of face-to-face interviews was adopted. The aim of this case study is to answer the first primary research question proposed in Chap. 4.

The background and structure for the case study are discussed in Sect. 6.2–6.3. The results and implications from the case study are discussed in Sect. 6.4.

6.2 History and Development of the Chinese Telecommunications Market

The history and development of the Chinese telecommunications market is associated with the development and reform of the Chinese economy. When the People's Republic of China was established in 1949, China had only 260,000 telephones with 310,000 lines of switchboard capacity in all of its cities (Qiu 2005). There was no mobile service in China until the 1990s. The industry has undertaken a growth path from monopoly to competition and from government control to separate autonomous enterprises (GOVCN 2009).

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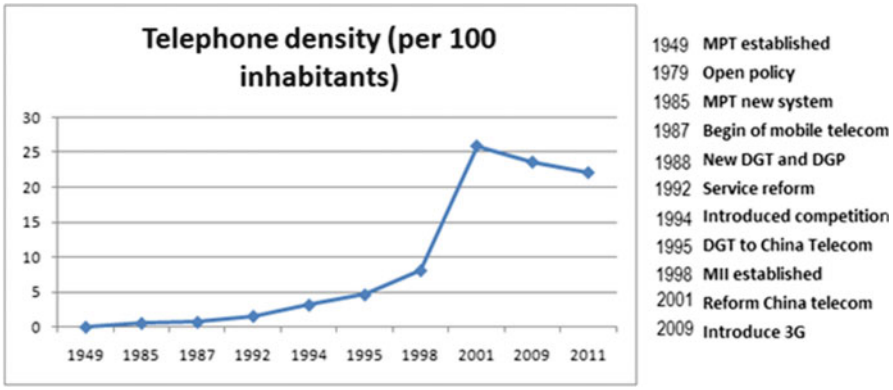

Fig. 6.1 Major events and telephone density per 100 inhabitants in China from 1949 to 2011 (Source: Ministry of Information Industry (2011))

6.2.1 Fiscal Expansion in the Chinese Telecommunication Market

Figure 6.1 shows the telephone density change from 1949 to 2011 in the Chinese telecommunication market. Telephone density (telephones per 100 persons) in the Chinese telecommunication market was only 0.05 in 1949 and grew to 4.66 in 1995. It then grew to 8.11 in 1998 and increased dramatically to 25.9 in 2001 (MII 2011). These fast growth periods are significantly influenced by policy and technology changes in the Chinese and global telecommunication markets. Each of the key periods will be further discussed in the following section.

Figure 6.2 shows the growth of mobile subscribers in the Chinese telecommunication market from only 20,000 in 1987 (the beginning of the mobile communication service in China) to 0.89 billion in March, 2011 (which makes it the biggest mobile market in the world). The significant increase of the Chinese mobile sector arose from establishment of the Ministry of Information Industry (MII) in 1998, and from a series of reforms that took place in the Chinese telecommunication market after that. The surprising increase in the growth rate generated many new business and market opportunities.

Another important result from Figs. 6.1 and 6.2 is the replacement of fixed line phones by mobile phones after 2001. From 2001 to 2007 the total revenue of the Chinese telecom industry increased from 371.9 billion Yuan (approximately US $46.5 billion) to 728 billion Yuan (approximately US$91 billion), with an overall 11 % annual growth rate. The total number of subscribers also tripled (GOVCN 2009). However, there was a significant decrease in telephone density (fixed line) from 2001 in the Chinese telecommunication market as shown in Fig. 6.1. During the same period mobile subscribers increased dramatically in China as shown in Fig. 6.2. Therefore, there has been a substitution effect between mobile phones and

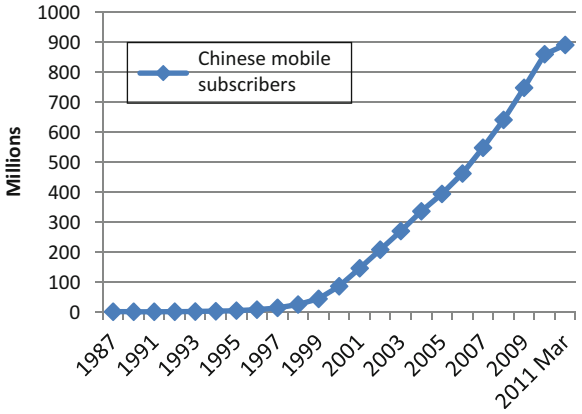

Fig. 6.2 Chinese mobile subscribers from 1987 to 2011 (Source: MII (2011))

fixed line phones (MII 2011) during this period. All of these changes are due to a set of policy and technology changes, which are discussed in the following section.

6.2.2 Institutional and Regulatory Changes

1. 1949–1979: Monopoly market

In 1949 the central government set up the Ministry of Posts and Telecommunications (MPT). The MPT was responsible for setting up networks, making policies, developing technical standards, conducting research, providing services, and manufacturing equipment (MII 2011). All enterprises were affiliates under the administration of MPT. The MPT also protected domestic telecom firms from foreign competitors. During China's First 5-Year Plan (1953 to 1957), all private telecom businesses became state-owned companies. From the 1950s to 1970s the telecom sector grew slowly in China. One major reason was the low priority given to the telecom industry by government (Qiu 2005). Telecom services were used mainly by the state administrative agencies and investment in the telecom sector grew very slowly during this period.

2. 1979–1985: Open door policy

In 1979, China began its economic reforms and adopted an open door policy. The prices and fees of most telecom services were very low before the reform to support other industries. In 1979, MPT increased the rates for its many services. The salaries of the managers and employees in local post and telecom enterprises (PTEs) were also linked to the firm's sales revenue. These reforms raised local PTEs' performance and revenues dramatically (Qiu 2005). The MPT launched a new accounting system in 1985 to provide incentives to local PTEs. All local PTAs were put under the dual leadership of local governments and the MPT (Qiu 2005).

3. 1987–1992: Separate functions and diversified services

In 1987, an analog mobile phone service was first introduced in Guangzhou and Shanghai, which is regarded as the beginning of mobile telecommunications in China (MII 1999). In 1988 MPT established the Directorate General of Telecommunications (DGT) and the Directorate General of Posts (DGP) (Qiu 2005). In 1992 MPT allowed domestic companies to enter the value-added telecommunications services (usually non-voice services and products provided by SPs and CPs) market, which is regarded as the beginning of the new reform in the Chinese telecommunications industry (Zhang and Dodgson 2007).

4. 1994–1995: Introduction of competition

China Unicom was established in 1994 to provide competition into the Chinese telecom market (GOVCN 2009). The Chinese government found that competition was an effective method to achieve sustainable development in the telecommunications industry. In 1995 DGT was registered as a corporate group called China Telecom.

5. 1998–2001: Oligopoly and fast growth period

The Ministry of Information Industry of the People's Republic of China (MII) was established to replace MPT in 1998. MII is a ministry of the central government. It manages all industries, industry policies, investments, network infrastructure, wireless channels, and international cooperation. MII also supervises and guides development of the telecommunication industry. In 1998, MII separated the role of government and enterprises by reforming China Telecom into four groups. As a result, six oligopoly telecom operators were formed: China Telecom, China Mobile, China Unicom, China Netcom, China Railcom (China Railway Communications Corp) and China Satcom (China Satellite Communications Corporation) (GOVCN 2009). In 1998, mobile subscribers reached 20 million, which made the national Global System of Mobile Communications (GSM) network the biggest in the world (MII 1999).

By October 2001, the number of fixed line subscribers reached 173 million, and the number of mobile phone users reached 136 million. Before China joined the WTO, foreign firms were not allowed to operate in China's telecommunication services market (Chen 2000). In November 2001, China was formally admitted into the WTO. Some of the major changes arising from its membership included lower tariffs for imported IT products, elimination of non-tariff barriers, and the opening-up of the service sector (Mobile phone services) (Nie and Zeng 2003).

6. 2001–2007: Mobiles replace fixed line phones

As discussed before there was fast growth in the mobile phone market in China during 2001–2007, and the development of mobile phones had a substitution effect on fixed line density during the same period. In 2007, the domestic sales of cell phones in China reached 190 million and sales volume reached US$23 billion.

In the regulatory system the China Communications Standards Association (CCSA) was officially established in 2002. CCSA established an enterprise-based and market-oriented working system that incorporated industry, universities and R&D institutes. It also contributed to the development of the ICT industry and mobile market in China (CCSA 2007).

7. 2008–2009: Combine and reform

As a pre-requirement of releasing the 3rd generation (3G) license from the government, the Chinese telecommunication market undertook further reform in 2008. China Telecom purchased the CDMA assets and subscribers of China Unicom. China Unicom and China Netcom merged to become the new China Unicom. China Telecom combined the basic telecom services of China Satcom, and China Railcom merged into China Mobile (GOVCN 2009). After successful combination of these CSPs the Chinese government released three 3G licenses to the reformed operators on 7th January, 2009. There are three 3G standards in the global telecom market: TD-SCDMA, CDMA2000, and W-CDMA. China will support all of the three 3G standards. A TD-SCDMA license was released to China Mobile. A W-CDMA license was released to China Unicom, and a CDMA2000 license was released to China Telecom (MII 2011).

8. 2009–2011: Introduction of 3G and fast development of mobile services

The release of 3G licenses further pushed telecommunications and economic growth in China. The fixed telephone density in the Chinese telecommunication market was 23.6 in 2009 but decreased to 22.1 in March 2011. However, mobile telephone density increased from 56.3 in 2009 to 64.4 in 2011 (MII 2011). Given the huge user base, Chinese telephone subscribers reached 1.18 billion and mobile subscribers reached 0.89 billion in March 2011 (MII 2011). The rapidly developing network infrastructure and services also benefited businesses and individuals. In 2011, Beijing opened free wireless network access in six public regions to encourage the usage of the wireless network (CNII 2011).

The mobile telecommunication industry provided a direct contribution to China's GDP growth, employment, and tax revenue. It also provided an indirect contribution to support the growth of other sectors and benefit the overall society, which is discussed in detail in the following section.

6.2.3 Contribution of the Chinese Telecommunication Market to the Economy

Over the past decade the Chinese mobile telecommunication industry experienced rapid growth, which contributed to the high growth rate of the Chinese economy. Qiu (2005) examined the relationship of the Chinese telecommunication growth

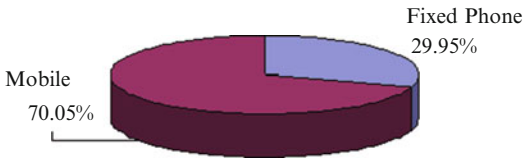

Fig. 6.3 Major revenue components of China's telecom services in Mar, 2011 (Source: From MII (2011))

and GDP growth rate from 1992 to 2002, and found there is a strong positive relationship between the two.

Total telecommunication market revenue in March, 2011 was 265 billion Yuan (approximately US$38 billion). As shown in Fig. 6.3 above, more than 70 % of total telecommunication revenue was generated by the mobile sector and less than 30 % of it was generated by the fixed phone sector (MII 2011). The highly developed value-added services available for mobile devices in China greatly contributed to the high growth in the mobile sector. Value-added services have helped promote innovation, employment and income.

The total number of mobile subscribers in China reached 940 million in August 2011, with 94 million 3G users (MII 2011). Both the total number of subscribers and revenue of the Chinese telecom market increased dramatically from 2001 to 2011 (MII 2011), contributing directly to China's annual GDP growth rate.

The great number of mobile subscribers also represented the considerable demand for mobile phone devices and services. With lower cost labour and rapid development in technologies, China has also become the biggest mobile phone producing base. The total number of exported mobile phones reached 1 billion in 2010, accounting for 71 % of the total global shipment (MII 2011). Export revenue generated by mobile phones and devices reached US$46.7 billion in 2010 (NBSC 2011).

On the other hand telecommunication prices decreased dramatically in 2007 (MII 2007). It greatly reduced business operating costs and communication costs, which increased business profits, access to information, inter-firm collaboration, and regional development. It also helped information transfer in all the other industries and markets. In terms of social aspects, it also helped reduce the crime rate (such as new applications in Apple Store[1]: Police Scanner, Scanner 911 Australia and 5–0 Radio Pro Police Scanner, which provide real-time information share on the police and fire radios); increased emergency rescue efficiency (such as new applications in Apple Store: First Aid, Drugs and Medications, Pregnancy and Symptoms Checker by Medibank, which provide self-check or rescue techniques and one-button call to emergency rescue); increase working efficiency (such as new applications in Apple Store: Australia Post Mobile, JotNot Scanner and CareerOne, which provide useful functions and information more efficiently; and increased community and family communications (such as famous applications in Apple

[1] Apple Store is an application store for Apple mobile devices. The applications used in this study were listed in Apple Store by 27th March 2012.

Store: Skype, Facebook, Twitter, Bump and Heytell, which provide free international calls and video calls). All of these applications and products help increase social welfare and happiness. Furthermore, new applications are developed and released every day, bringing invaluable benefits to all individuals and firms.

The next section analyses the structure of the Chinese mobile telecommunication market, different sectors in this market and their characteristics, the major firms in each sector, and inter-firm collaborations between them.

6.3 Current Structure of the Chinese Mobile Telecommunication Market

6.3.1 Overview

As discussed in Chap. 5, the majority of firms are separated into three groups: Device providers (including network infrastructure producers and mobile handset producers), Service Providers, and Content Providers. However, operators (carrier service providers) in the Chinese mobile market play a very special role in the Chinese telecommunications market.

Firstly, because of historical reasons, operators in China were separated from government departments, with all the high level managers assigned by government. Secondly, operator licenses are strictly controlled and managed by the government due to its development strategies and policies. Thirdly, the operators in China have strong market power in the telecommunication market so that all the device producers, service providers, and content providers have to collaborate with them to provide services to end users. The revenues are usually initially collected by operators before it is distributed to other service providers and content providers. Therefore, the operators group is separated from service providers in China, and there are four components making up the structure of the Chinese mobile telecommunication market (See Fig. 6.4). Inter-firm collaborations are close between them. Each of these components is discussed in detail later.

6.3.2 Device Producers

Device producers provide the basic infrastructure for telecom services: base station, optical fiber, exchange centre, server, handset device, and so on. All the software, data, information, and services are installed, maintained, and transferred through the hardware. A detailed analysis of the characteristics and major global producers of this sector were discussed in Chap. 5.

As shown in Fig. 6.5, by 2010 65 % of the mobile equipment market was lead by: Nokia, Research in Motion (Blackberry), and Apple (IDC 2011). However, Apple,

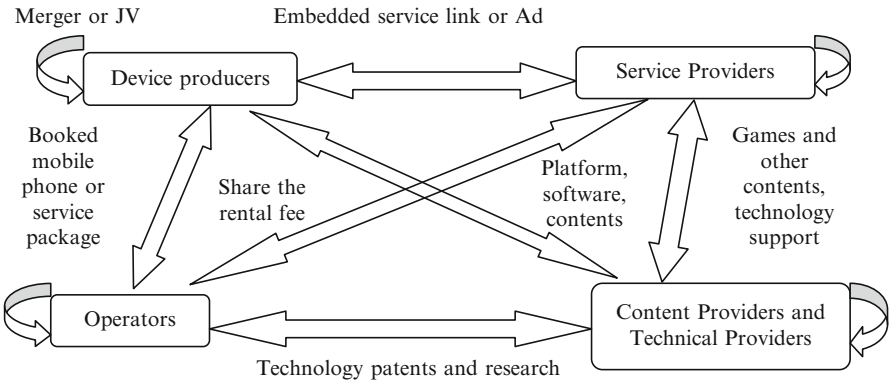

Fig. 6.4 Chinese mobile market collaboration (Source: Derived by the author)

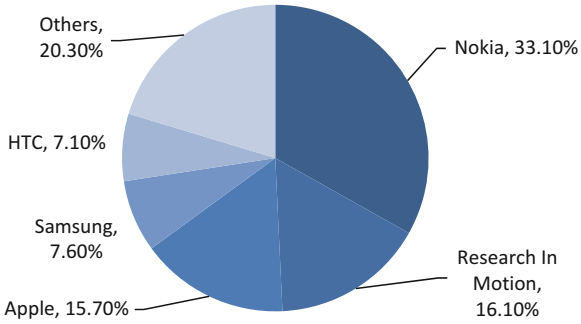

Fig. 6.5 Global mobile handset market shares in 2010 (Source: IDC (2011))

TCL, and HTC dramatically increased their market share during 2010 with growth margins of over 100 %. The sales of iPhone increased by 6 times from September 2010 to September 2011, reaching US$8.8 billion and was an "unexpected" and "amazing" growth to Apple (Apple 2011).

The mobile device market is a highly competitive market with rapidly changing companies in the top positions. Technological development and innovations are keys to rapid development and market share. To keep their top ranking, these firms need to keep up with the latest technology and collaborate with each other to capture new information and innovations in this dynamic market. Therefore, the requirement for inter-firm collaboration is extremely high in this sector. Some Chinese domestic equipment manufacturers also grew and developed steadily, such as Da Tang, Jin Peng, Zhong Xin and Hua Wei, which produced 47.5 % of total global mobile handsets in 2008 (RIC 2006).

On the other hand, China has developed its own mobile standard (TD-SCDMA). ITU's (International Telecommunications Union) telecom division also approved TD-SCDMA as one of the international 3G standards (Steinbock 2006). In 2008, China Mobile released 3G connect licenses to eight domestic mobile phone providers, including Ku Pai, Panda, Hua Wei, Zhong Xing, Lenovo, Hai Xin, Xin You Tong, and Hua Li (MII 2011).

As shown in Fig. 6.4, device producers need to collaborate with operators to access the end users as no mobile phones can be used without a licensed SIM card and operators in China. They either developed special mobile phones for each operator or provided special packages (mobile phone and services) with operators to sell their products in China. They collaborate with content providers and service providers to embed some pre-installed applications, games, wall paper, music, or web links or advertisements of special services in their devices. Users get access to these contents or links when they purchase the devices. They also collaborate with technical producers on the operating system (platform), managing software, and research and development. They usually collaborate with other device producers on research, information share, and new patent licensing.

6.3.3 Operators

Operators are the companies that own the basic telecommunication infrastructure or hardware, such as optical lines, base station, data centre, and channels. They link customers and provide basic services. In most countries, like Australia, operators are also service providers. As discussed before, operators are separated from service providers in China because of their special roles. In 2009, the Chinese government further reformed the operators in China and released three 3G licenses to new China Mobile, new China Unicom, and new China Telecom, thereby forming oligopoly competition in China's operators' market. To register as a telecommunication operator covering all provinces in China, the required registered capital is one trillion RMB (approximately US$143 billion), and for a local operator in one province the required registered capital is 100 million RMB (approximately US $14 million) (MII 2011). However, without huge initial investments in basic mobile networks (e.g. base stations) or a 3G license, it is not possible for other competitors to compete with the current operators in the market.

As shown in Fig. 6.6, China Mobile has the largest share (69 %), with total 616.79 million mobile subscribers in June 2011 (China Mobile 2011). China Unicom and China Telecom have 181 million and 108 million mobile subscribers separately in June 2011 (China Telecom 2011; China Unicom 2011). The total revenue of China Mobile in 2010 reached 485 billion RMB (approximately US$69 billion) (China Mobile 2010), which is more than twice[2] the total revenue of China Unicom (101.4 billion RMB in 2011, approximately US$14 billion) and China Telecom (120.2 billion RMB in 2011, approximately US$17 billion) (China Telecom 2011; China Unicom 2011). The 3G subscribers were 32 million for China Mobile, 22 million for China Unicom, and 20 million for China Telecom at the end of May, 2011 (MII 2011).

[2] The annual report of China Mobile was released at the end of 2010, which is in a different period to the data collected for China Unicom and China Telecom in June 2011. However, the number of mobile subscribers and revenues are expected to be higher in 2011.

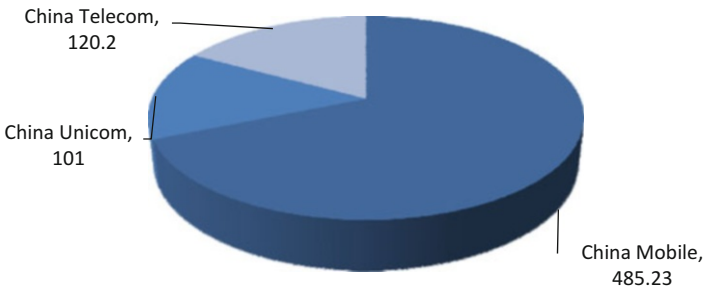

Fig. 6.6 Operator's market shares in the first quarter of 2011 (subscribers) (Source: China Mobile (2011), China Unicom (2011), and China Telecom (2011))

Operators have market power in the Chinese telecommunication market as there were only three licensed operators in China in 2010 (there were more operators from 1998 to 2008 as discussed in an earlier section). Therefore, all the device producers, service providers, and some content providers need to collaborate with these three operators to access the end users. Unlike other countries, device providers usually provide a special type of mobile device for each operator in China. The special ordered or booked device cannot be used in another operator's network or in another country. The services and content also need to be produced separately with each type of mobile device, which has increased development costs dramatically.

However, the introduction of iPhone (by Apple) in the Chinese market broke this situation. China Mobile failed to reach a collaboration agreement with Apple after 2 years of discussion (Apple 2011), which significantly influenced its market share in the 3G market after China Unicom signed a collaboration agreement with Apple to first introduce the iPhone into the Chinese market in 2009. As discussed in Chap. 5 the reason for the long-run discussion with Apple was the new business model brought by Apple Store, which reduced the profit share of operators and service providers. China Unicom and China Telecom had higher growth in mobile subscriber (15.7 % and 19.7 % respectively) compared with China Mobile (11.8 %) from 2010 to 2011 (China Mobile 2011; China Telecom 2011; China Unicom 2011). One of the major drivers for this high increase for China Unicom and China Telecom was the collaboration with Apple on iPhone. China Mobile is now discussing with Apple a potential collaboration opportunity on 4G products (Spforum 2011).

6.3.4 Service Providers

Until the 1990s mobile services were driven by text messaging and voice services. New technologies and broadband has enabled new services and opportunities. The new mobile services can be represented in four groups: "rich voice and data

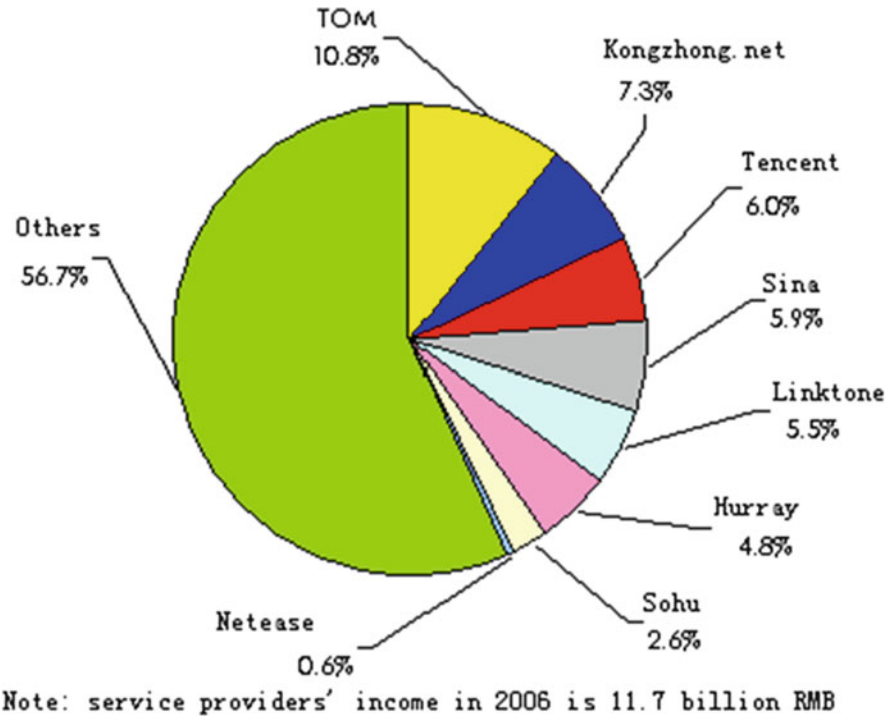

Fig. 6.7 Chinese service providers market share in 2006 (Source: IResearch (2007))

(associated with other electronic contents such as pictures and music), the Internet (mobile Internet, mobile intranet/extranet), messaging (location-based services, people communications, such as SMS, MMS), and personalized content (including information, entertainment, transactions, and data bases)" (Steinbock 2006).

As of December 2007 there were total 22,240 service providers in China, including 95 % none-state owned firms (MII 2007). Most of the service providers do not have their own mobile hardware infrastructure (base stations or lines). They provide services to users via operator mobile networks and share profits with operators and content providers.

Figure 6.7 summarizes the market share of Chinese mobile service providers in 2006. The top seven service providers had 67 % of the market share (Iresearch 2007). Before 2008, CPs had to collaborate with operators through SPs in China. This business model has changed since operators started to collaborate directly with CPs from 2008. As a consequence, the role of SPs in this market had been reduced and many SPs acquired or merged with CPs after 2008. The introduction of Apple Store further reformed the market by including new business models for the market. Therefore, many SPs and CPs focused on producing mobile applications and games for Apple Store as it brought more revenues than collaborating with the operators, and helped them reach global mobile subscribers directly (Spforum 2011).

A license for service providers is a barrier to entry. To apply for a SP license for all provinces, a firm must have more than 100 million RMB (approximately US$14 million) registered capital (including 1/3 in cash), more than 10 technical staff (which excludes micro firms), the personal details and contacts of the management and related staff, a list of firm locations and equipment, and many other registered and certified documents (MII 2011). The requirement for a local region value added SP license is that the firm must have more than 10 million RMB registered capital (MII 2011). If the firm is jointly owned by a foreign parent (outside China), the foreign investor must have less than a 50 % share in the joint venture SP firm. In other words, foreign firms must collaborate with local firms to access the Chinese telecommunication market.

To get a telecommunication licence, it takes 60 days for value-added services and 180 days for basic telecommunication services (MII 2011). Nevertheless, to collaborate with different operators (e.g. China Mobile or China Unicom), a SP needs to apply and sign agreements with different operators and local operators. From interviews with some managers from SPs in this study, the costs of maintaining a business relationship with different operators is very high in China. Therefore, SPs in China are usually medium and large sized firms.

Service providers must collaborate with operators to provide services to end users in China. They also collaborate with content providers to provide special content (e.g. games or music) to users. Some service providers buy content from content providers and ask for technical support during testing by operators on different mobile devices. The small service providers prefer collaborating with content providers and then share revenue afterwards. They sometimes collaborate with device providers to embed their service link or special advertisement in the pre-installed mobile devices. Service providers have less bargaining power when collaborating with operators. Therefore, a lower revenue share and a lag in payment are common problems facing most service providers in China. The mobile service market is largely unregulated and has many problems in China (e.g. phishing[3] messages and forced service packages). These have been seen from the monthly penalty announcement of China Mobile on its website (China Mobile 2011).

6.3.5 Content Providers

Content providers (e.g. software developers, music creators, and arts designers) are the companies that develop all the content for end-users. They provide mobile games, mobile software, mobile music, mobile pictures, video, news, weather forecasts, real-time sports information, and all the other mobile applications. They sell or share the products and revenues with operators and service providers.

[3] Phishing is a cheating method through electronic communication (such as emails or phone calls) to obtain their usernames, password or personal information.

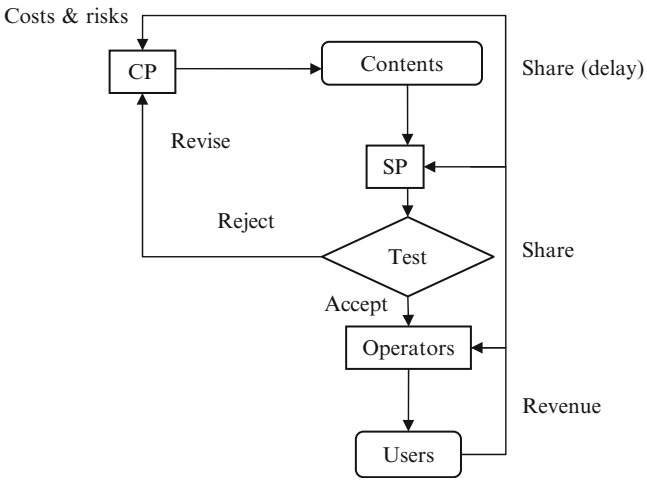

Fig. 6.8 Flowchart of inter-firm collaboration among CP, SP and operators in the Chinese telecom market (Source: Derived by the author)

A (ICP) license for content providers acts as a barrier to entry. To apply for an ICP license, firms must have more than 10 million RMB (approximately US$1.4 million) registered capital and more than five technical staff (MII 2011). As a consequence, many micro and small sized CPs remain informal in this market.

There are numerous content providers in China. Most of the biggest content providers are also service providers themselves, such as SOHU and SINA. Keane (2009) has identified five characteristics of the Chinese animation industry (which consist of mostly small CPs): low-cost production, imitation, co-production and formatting, focused on East Asian markets, and based on industrial clusters. He has argued that the Chinese market is driven by government policies.

As shown in Fig. 6.8 the general business model among Operators, SPs, and CPs can be shown in the form of a flowchart. This model came from the author's observations during 5 years industry experience and the qualitative interview results obtained from this study. Usually operators test the content before they accept and release it to the end users. These tests are very subjective in China and the criteria are normally unclear. It largely depends on the industry reputation level of the CP or relationships of the SP with the operator. If the content is rejected by the examiners the content will have to be given up by the SP or be revised by the CP. Therefore, most development costs and risks are allocated to the CP.

However, the revenue share for CPs in this model is the smallest. In the Chinese mobile games market the revenue share of SPs is 47.1 %, operators 35.7 %, and CPs only receive 13.3 % (Iresearch 2007). Keane (2009) found that even the high performing animation companies in China receive less than 15 % of total revenue (of the production budget) obtained from selling animation within China. The gaps are usually offset by local government incentive bonuses. Results from the interviews showed that the small CPs suffer more from the unfair benefit distribution. Unfair benefit distribution is very common in every case study in China for CPs.

One CP did not receive its share for more than 2 years, and another CP was told that their content generated only a small revenue (without showing the real revenue evidence) and, therefore, their part was "negligible". Besides the low share in revenue, delay in payment is a problem facing most small content providers in the mobile market. As operators have strong market power in deciding services and content (e.g. games) for users, it also increases collusion and opaque processes in the evaluation process.

This situation and the benefit distribution model in China changed when China Mobile announced a new collaboration strategy in 2008 to collaborate directly with CPs. Many SPs merged or acquired CPs after 2008 to increase their competitiveness. Another change was the introduction of the iPhone into the Chinese market in 2009. Apple collaborates directly with CPs in its Apple stores and iTune shop. CPs that produced iPhone applications in China admitted that the collaboration with Apple and revenue generated in Apple stores was much easier and greater than through operators or SPs in China (Spforum 2011). However, Apple also experienced 2 years of discussion with the operators before iPhone was formally introduced into the Chinese market (Apple 2011), as this business model significantly reduced the operators' benefits. It failed to reach an agreement with China Mobile (China Unicom 2011) and turned to the second largest operator in China, China Unicom. In September 2009, iPhone was finally released into the Chinese market by China Unicom (2011). Although it brought many new 3G subscribers, the release of iPhone did not bring significant profits to China Unicom (2011) because of several concessions in its discussion with Apple. The direct collaboration with operators and DPs helped CPs and TPs to increase their revenue share in this market. However, without proper intellectual property rights protection (IPP), CPs and TPs are still in an unfavourable position in China. A good example from our interviews is that one of the top download games in the China Mobile games box, was copied and put on internet for free downloading just 2 days after it was released.

To study further the Chinese market, face-to-face interviews were conducted in China in late 2008 to answer the key research questions identified in Chaps. 3 and 4. The data and results are explained in detail in the next section.

6.4 Case Study

The selection of Chinese sample firms was from the mobile telecommunication market, supplemented by the researcher's previous business networks from 5 years working in this industry. This strategy was aimed at increasing the response rate to interview invitations. The results supported this strategy as all of the invited firms agreed to be interviewed and provide feedback, including seven firms who introduced their business partners to participate in this interview. As a consequence 24 firms were interviewed. Among the 24 interviewed firms, 12 firms provided 1 collaborating case, 5 firms provided 2 collaborating cases, 3 firms provided 3 collaborating cases, 2 firms provided 4 collaborating cases, and

Table 6.1 Basic descriptive statistics of firms interviewed in China

Basic descriptive results (China)	Total interviews: 24		Total collaborating cases: 45	
Type				
Firm type	**Public**		**Private**	
(* based on firm)	6		18	
Nationality	**China**		**Foreign**	
(* based on firm)	15		9	
Sectors	**DP**	**Operator**	**SP**	**CP/TP**
(* Multiple selections)	6	5	15	17
Size				
Firm Size	**Small**		**Medium**	**Large**
(* based on firm)	9		5	10
Size difference	**Smaller partner**		**Peer partner**	**Larger partner**
(* based on case)	5		13	27

Source: Interview results from this study

2 firms provided 5 collaborating cases. As a result, a total of 45 collaborating cases were collected during the interviews. The average interview time for each interview was 1 h (which was much longer than expected).

6.4.1 Descriptive Statistics

Table 6.1 showed the basic descriptive results of the interviewed firms in China. The selected firms included micro, small, medium, and large sized firms. They also included local firms, foreign firms, and multinational firms. To study in detail cases of inter-firm collaboration between DPs, operators, SPs and CPs in the Chinese mobile market, face to face interviews were conducted in China in 2008. As a result, 24 interviews (involving 45 cases of collaboration) were completed from 4th August 2008 to October 17th 2008 in China. The interviewed firms included China Telecom, China Unicom, China Mobile, France Telecom (Beijing), Motorola, and many other small and medium sized firms in the Chinese mobile telecom sector.

6.4.1.1 Studied Firms

As shown in Table 6.1 above, the Chinese cases included firms from all sectors: DPs (device providers), operators, SPs (service providers), ISPs (internet service providers), CPs (content providers), and TPs (technical providers, include consulting firms, outsourcing development firms, platform providers, and data service providers). However, the sector question in the questionnaire was a multiple-choice question. For example, one company could be a 70 % device provider and 30 % service provider, which contributed to both DPs and SPs. As shown in Table 6.1, the interviews included 6 DPs, 5 Operators, 15 SPs and ISPs, 17 CPs and TPs. The

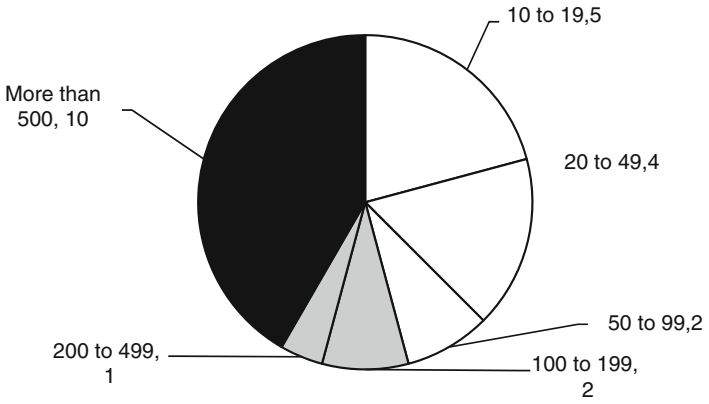

Fig. 6.9 Size of interviewed firms based on employees (by no. of firms) (Source: Interview results from this study)

interviewed firms also vary in nationality. The study contains 15 Chinese firms, 4 U.S.A firms, 1 Hong Kong firm, 2 French firms, 1 Spanish firm, and 1 Japanese firm. In this study, 6 interviewed firms are from the public sector and 18 interviewed firms are from the private sector.

6.4.1.2 Size of Studied Firms

In China, firm size was generally measured by the number of employees. The definition for small and micro enterprises was less than 100 employees. The definition for medium sized enterprises was between 100 and 500 employees. Large enterprises were defined as enterprises with more than 500 employees (Harvie and Lee 2003).

In general, all operators in China were large firms. All of the 3 Chinese operators were large firms. The other 2 foreign operators (without an operator's license in China) were small and medium sized firms. Most DPs in China were large firms. Half of the DPs in the studied cases were large firms, and the two small DPs were also TPs in this study. The size of SPs varied. Most (8 out of 15) CPs and/or TPs in China were small firms. The 7 large CPs and/or TPs in this study included 5 foreign firms (that are also CSPs or TPs in other countries). The other 2 large local CPs and/or TPs were also SPs, ISPs, or DPs.

Figure 6.9 showed the sizes of the studied firms based upon number of employees. Due to the official definition, 45.8 % (in the three white pie slices) of the interviewed firms were small and micro sized enterprises, 12.5 % (in the three grey pie slices) of the interviewed firms are medium sized enterprises, and 41.7 % (in the black pie slice) of the interviewed firms were large enterprises. Different sized firms were separated in this research to study the importance of firm size in terms of their strategies and behaviour in inter-firm collaboration.

6.4.2 *Is Cultural Difference Still Important for Collaboration?*

The results answered the first sub-question in Chap. 4: Is cultural difference still important when firms choose business collaborators in the telecommunication market? Results from the interviews are consistent with findings from the previous literature (Das and Rahman 2009; Vilana and Monroy 2010) and suggests that cultural difference between collaborating firms still matter in the Chinese telecommunication market.[4]

Although the number is very small, the partners of foreign firms in China show a trend in their selection criteria. The top collaborators of the interviewed American firms (three firms) came 42.9 % from North America, 28.6 % from Europe, 14.3 % from Asia, and 14.3 % from the Middle East. American mobile firms find it easier to collaborate with partners from North America as it requires lower transaction and communication costs and reduces risk. The collaborators of French firms (two firms) came 40 % from Europe, 40 % from Asia, and 20 % from North America. The collaborators of the Spanish firm came 100 % from South America. Cultural similarities contributed to this collaboration in the studied cases, which will be further examined in a quantitative study in Chap. 8. The collaborators of Japanese firms came 100 % from Asia. The collaborators of the Hong Kong firm came 14.3 % from Australia, 14.3 % from North America, 14.3 % from South America, 14.3 % from Europe, 14.3 % from Africa, 14.3 % from Asia, and 14.3 % from the Middle East. Hong Kong has a traditional Chinese culture and is located very close to mainland China. However, the management structure and business system were inherited from Europe, which makes it more open and easier to connect with all the other countries of the world. Hong Kong's special historical and political background contributed greatly to these successful and diversified inter-firm collaborations. These cases show a trend of business partner selection – similar cultural backgrounds or closer geographic distance (local firms dominated). The results will be examined in the Australian cases and further verified in a quantitative study.

From the cases studied, geographical and cultural reasons are still important when foreign firms choose business collaborators. Reasonable economic explanations for these barriers are transaction costs and risk (Ronen and Shenkar 1985). Country distance increase business costs in terms of transportation, communication, and information updating (Hofstede 1980; Park and Ungson 1997; Felzensztein and Gimmon 2007). Cultural difference also adds to communication costs and may increase the risks of misunderstanding, which may lead to failure in the inter-firm collaboration. However, as these interviews were conducted in China, all of the interviewed foreign firms have a subsidiary or department in China which may introduce bias to this results.

[4] This is from a descriptive qualitative analysis, which is consistent with the findings from previous management and business studies.

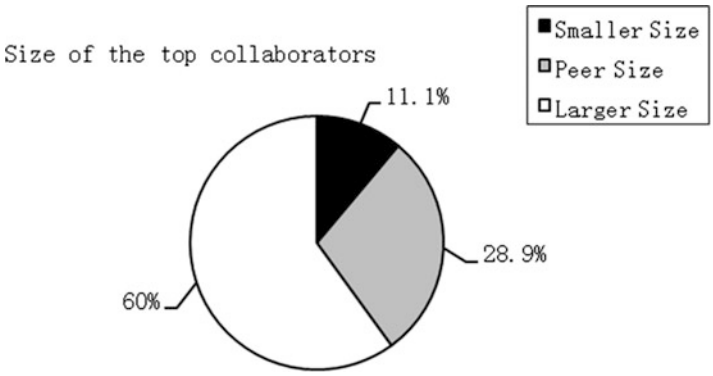

Fig. 6.10 Size of top collaborators (by collaborating cases) (Source: Interview results from this study)

6.4.3 Does Size Matter When Firms Choose Business Collaborators?

The outcome of the study answered the second part of the first primary research question in Chap. 4: size still matters when firms choose business collaborators. The interviewed managers were asked to select their top five important business partners and answer part two of the questionnaire for each collaboration case. This is supported by an interviewed manager: "...size is still a problem. Who is bigger, who has more resources and power in the market." A peer-sized or larger-sized partner is usually preferred. Firms choose peer-sized or larger-sized firms to keep their position, market share, and competitiveness. This is also supported by an interviewed manager: "We only select the top 10 firms in each field to collaborate with to keep our leading position in the world (interviewee)."

As shown in Fig. 6.10, 60 % of our studied collaborating cases (in the white pie slice) selected larger-sized firms as their top five important[5] collaborators, and 28.8 % of the studied collaboration cases (in the grey pie slice) selected peer-sized firms as their top five collaborators. Only 11.1 % (five cases) of the studied collaborating cases (in the black pie slice) selected smaller sized firms as their top five collaborator, including 60 % international collaborations. In all of these five cases the partners are content providers who have unique or original resources, technology, or products. Bigger firms usually have more resources, assets, research investment, business networks, and bargaining power.

When separated by sector, 67 % of DPs, 60 % of Operators, 82 % of SPs, and 68 % of CP/TPs chose large firms as their top five partners. When separated by firm

[5] The measurement of the top important collaborator is based on the subjective views from the interviewed managers.

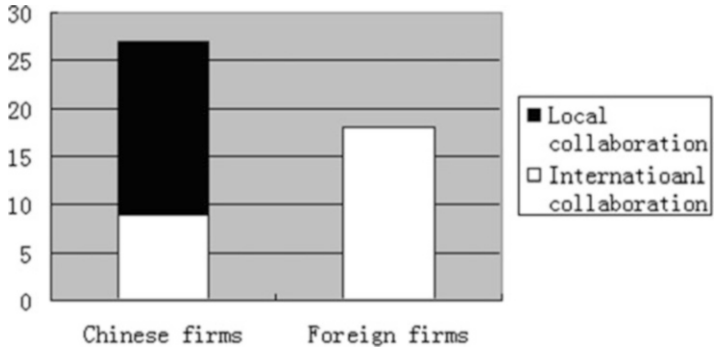

Fig. 6.11 International and local collaboration (by collaboration cases) (Source: Interview results from this study)

size, 54 % of small sized firms, 88 % of medium sized firms, and 78 % of large firms chose large firms as their top five partners, which also contributed to the average positive size difference in this study.

The results show that firms prefer larger or peer sized collaborators. They only choose smaller partners when the partners have specific advanced technology, unique resources, or products that are hard to copy. Therefore, in this research, the only smaller partners selected by the interviewed firms are that of CPs and TPs. A possible reason for this result is that bigger firms possess more resources, capital, and experience. Firms usually obtain more revenues by collaborating with large firms. However, it can also be argued that more profits are usually associated with more risk.

To study the different selections of collaborations by local and foreign firms, the results are separated into two groups: local and foreign firms. Figure 6.11 shows the difference in choosing collaborators by Chinese firms and foreign firms. All of the studied foreign firms (firms coming from outside Mainland China) chose international collaborators as their most important partners. From the 45 cases of collaboration, 27 cases (60 % of total) were international collaboration cases. However, only 9 cases (33.3 %) involved Chinese firms.

In other words, all the foreign firms from the U.S.A, France, Spain, Japan, and Hong Kong collaborated with global partners, which also made them more competitive in the global market (no failures were reported from these cases as Chinese interviewed firms tend to tell only the positive aspect of a story). There is no clear evidence that international collaboration is related to the size or sector of the interviewed firm when results are separated into size/sector groups. Chinese firms usually choose local partners because of language requirements and the cultural need for understanding to collaborate with foreign partners increased costs, which is a barrier to some micro and small firms.

6.4.4 *Do Firms Prefer Deep Collaboration and Can Traditional Forms of Collaboration be Applied in the Chinese Mobile Telecommunication Market?*

The results from the survey answer the third question of the first primary research question. Firms prefer deep and long-term collaboration (e.g. co-production) in the mobile telecommunication market. This result is also supported by one interviewed manager:

> We prefer long-term collaboration than short-term ones because it saves time and cost of searching and rebuilding business relationships with others.

To find a suitable collaborator, firms need to justify the technology, employees, structure, history, financial status, research capability, strategies, and market share of its potential collaborators. An evaluation of the partner is usually conducted by large firms (e.g. Motorola) before the collaboration.

Long-term collaboration can reduce transaction costs and strengthen the relationship and understanding between the collaborating firms as time goes by. On the other hand, risks are also generated with collaboration. Our case study showed that a failed inter-firm collaboration may threaten the development or even existence of a firm. Long-term collaboration can provide more stable support for both firms and greatly reduce the risks accompanied with collaboration.

The research results also answer the fourth part of the first primary research question. Previous collaboration types are not applied in new industries. Franchising did not appear in the sample of China mobile collaboration cases. On the other hand, the interviewees proposed new collaboration types in this market. Results show that co-production is the most usual collaboration type in the Chinese telecom sector. The second collaboration type in the Chinese market is management and service agreements, which indicate that value-added services have developed rapidly in China. However, joint R&D and joint ventures are not in the top three types. The business and product life cycle for Chinese firms is much shorter than that of foreign firms.

This result is also supported by an interviewed manager:

> The survival of the firm in a developed country may be dependent on the strategy or plan for the next year or next 3 years. But for Chinese firms, it is dependent on next week or even tomorrow.

Even one of the world's biggest firms during the interview indicated:

> No firm will invest in a project that will payback after more than 10 years even if it can produce great amount of returns.

Within the broad array of theoretical collaboration types used to study inter-firm collaboration (Contractor and Lorange 1988), co-production service (68.9 % in all collaboration cases), management and service agreements (46.7 %) and market share service (44.4 %) have tended to dominate, alongside know how licensing (24.4 %), joint R&D service (22.2 %), joint venture service (15.6 %), technical

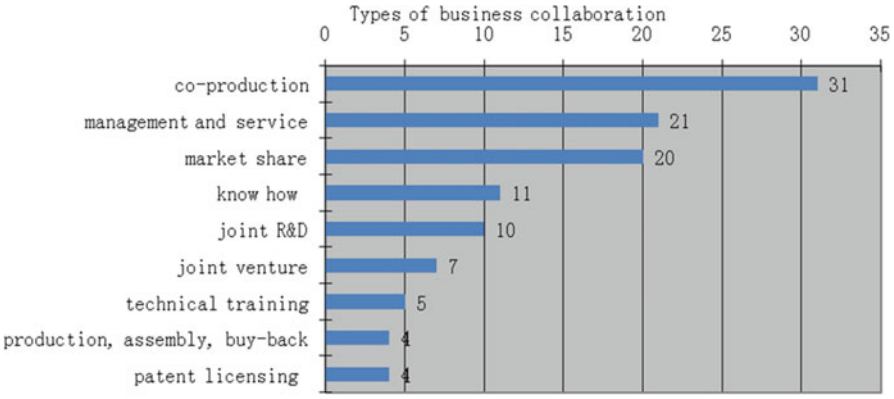

Fig. 6.12 Types of inter-firm collaboration (by collaborating cases) (Source: Interview results from this study)

training and start-up assistance service (11.1 %), production, assembly, and buy-back agreement (8.9 %), and patent licensing (8.9 %) (see Fig. 6.12). Franchising did not appear in the studied Chinese collaboration cases. High selection of the co-production type is contributed to by operators (25 %), SPs (32 %) and CP/TPs (25 %). However, the top selected collaboration type for DPs is joint R&D (30 %), followed by co-production (25 %) and market share (20 %).[6] The types of collaboration are obtained by means of a multiple choice question that allowed for more than one response to the question. In other words, there could be more than one type of collaboration in one collaboration case.

Another notable result is that a joint venture is usually adopted by SPs (23 %), CP/TPs (18 %), and DPs (15 %) in their inter-firm collaboration. Only 3 % of operators had joint venture collaboration with their partners. Soft policy barriers (e.g. regional protection laws, different registration fees or application processes to foreign firms) added barriers to this kind of collaboration in many countries.

6.4.5 What Are the Major Benefits From Collaboration?

This result answers the fifth question of the first primary research question. What are the major benefits from inter-firm collaboration? As shown in Fig. 6.13 the top three perceived benefits coming from inter-firm collaboration are increasing market share (80 %), increasing profitability, and increasing innovation (77.8 %). Improved productivity (68.9 %), improved product quality (66.7 %), access to new technology (62.2 %), greater participation in the global market (62.2 %),

[6] There is no evidence that different sectors of firms (e.g. SPs) have an influence on the selection of types of inter-firm collaboration in the Chinese mobile telecommunication market.

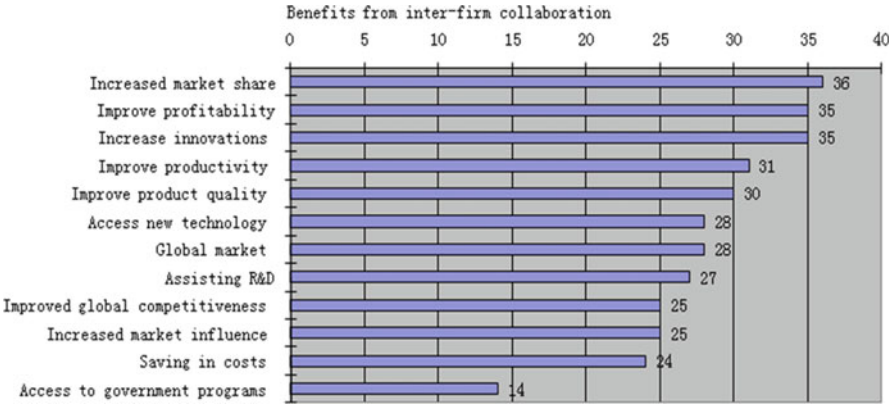

Fig. 6.13 Benefits from inter-firm collaboration (by collaborating cases) (Source: Interview results from this study)

assisting research and development (60 %), improved global competitiveness/market influence (55.6 % each), saving in costs (53.3 %) and access to government programs (31.1 %) are the remaining benefits received by firms.

Because of the different histories, experience, environments, cultural backgrounds, social environment, technologies, and relationships of firms, they have very different needs and benefits from collaboration. The benefits brought by different collaboration, even for the same firm, are different. However, the benefits are not significantly related to the size or sector of the interviewed firm. When focusing only upon foreign firms, the top benefits are improved global competitiveness and increased market share (88.9 %). Hence, for both international firms and domestic firms, increasing market share, increasing profit, and increasing innovation are the most important benefits from mobile inter-firm collaboration.

6.4.6 What Are the Major Risks From Inter-firm Collaboration?

The results answer the sixth and seventh questions of the first primary research question. What are the major risks towards inter-firm collaboration in China? The results also supported previous empirical studies (Lewis 1990; Roos 1994; Parker 2000). Benefit distribution is vital to inter-firm collaboration, which is agreed by interviewed managers:

> no firm will enter a win-lose or lose-lose cooperation with others.

As shown in Fig. 6.14 the first risk threatening inter-firm collaboration in the Chinese mobile market is unfair benefit distribution, which was selected by 58.3 % of interviewed firms (in 14 collaborating cases). The second barrier is lack of trust,

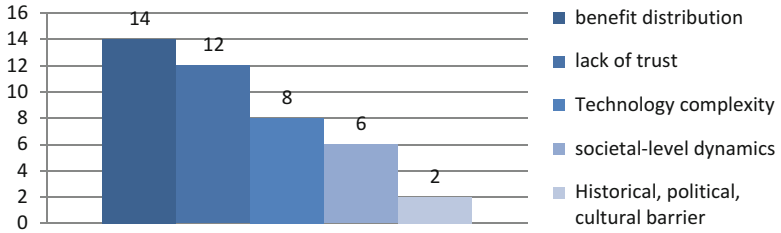

Fig. 6.14 Barriers for inter-firm collaboration (by no. of firms) (Source: Interview results from this study)

which was selected by 50 % of firms. Technology complexity, societal-level dynamics, historical, political, or cultural barriers are the key remaining barriers towards inter-firm collaboration.

The dominant barriers for SPs and CPs in China are unfair benefit distribution and trust problems. They are also dominant barriers for inter-firm collaboration for SMEs. However, there is no dominant barrier for DPs and operators as they usually have strong market power in the market. This is influenced by the regulatory system in China as discussed in a previous section of this chapter. Furthermore, the results show that large firms have fewer barriers in inter-firm collaboration compared with SMEs. This is because large firms are more likely to possess more specialized assets, business networks, patents, and skilled labour (Teece 1986).

As for the seventh question in Chap. 4, risk is different when international collaboration is involved (Eiteman 1990; Jia and Rutherford 2010; Vilana and Monroy 2010). As shown in Fig. 6.15 the first barrier to international collaboration (in 13 out of 24 international collaboration cases) is language, cultural, or communication barriers. The second is lack of international business experience (in 12 cases). The third risk is not enough access to finance and lack of trust in international business (in five cases each). Regulatory or government constraint is the fifth risk (in 4 cases). The sixth risk is lack of global competitiveness (in three cases). The last is lack of access to advanced technology (in one case).

Language and cultural differences are still the biggest barriers for most Chinese firms. They do not feel confident when communicating with foreign firms. Possible misunderstandings due to poor language or cultural differences also increase risks from inter-firm collaboration. The experiences of the general manager or business manager are also important for a firm to engage in international collaboration. If the manager has studied or lived abroad, it is more likely that the firm will engage in international collaboration. However, international firms have fewer barriers than Chinese firms when they engage in international collaboration (Kuada 2002). Copyright and intellectual property protection is also pointed out by foreign companies as the issue of most concern when collaborating in China. Firms are reluctant to transfer their technology and knowledge to less protected countries (Lin et al. 2011).

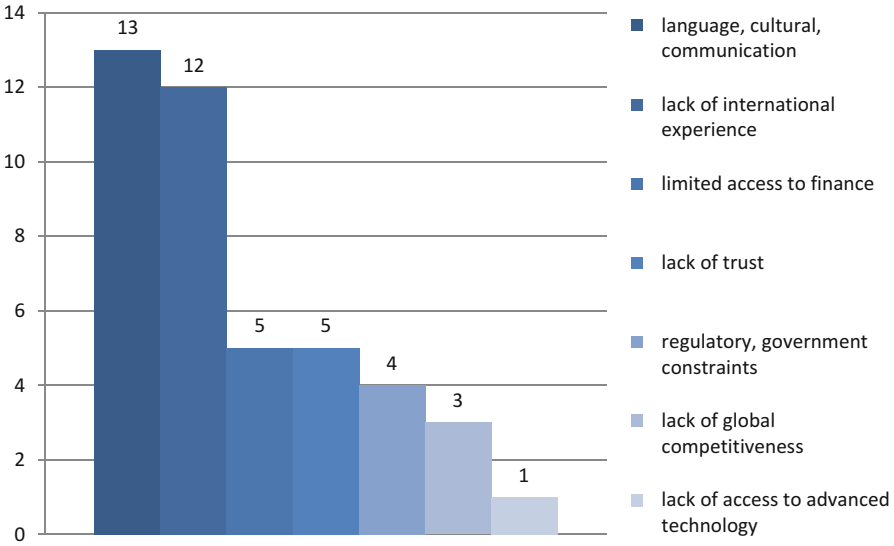

Fig. 6.15 Barriers to international collaboration (by no. of firms) (Source: Interview results from this study (by no. of firms))

6.4.7 Key Determinants of a Successful Collaboration

To collect data to support the quantitative study, one probe question was added to the questionnaire for the interviewees as follows "what do you think are the key determinants for a successful collaboration". Table 6.2 showed the answers from the Chinese interviewees.

Most of the managers highlighted the importance of understanding each other in terms of (i) the goals and requirements of collaboration; (ii) compliance with each other on negotiated process and policy; (iii) keeping effective communications; and (iv) having a fast and open information exchange. The social environment or policy risk was also mentioned by one interviewee. Several managers indicated that the contact person is vital for inter-firm collaboration. One of the interviewed managers said:

> When the contact person changed the collaboration results could be totally different.

Interviewees focused on their real business experience rather than theoretical knowledge when proposing the key determinants of a successful collaboration. Therefore, the answers are different from those identified from literature review in Chap. 3.

Table 6.2 Proposed key determinants for successful inter-firm collaboration in China

Proposed key determinants	No. of times proposed by interviewees
Profit distribution	3
Copyright protection	3
Effective communication	2
Fast information transfer	2
Same objective	1
Good understanding	1
Working process	1
Clear requirement	1
Policy support	1
Good understanding	1

Source: Interview results from this study

Table 6.3 Expected government roles in inter-firm collaboration

Expected roles	No. of times proposed by interviewees
Provide fair playing field	4
Fast and simple services	3
Openness of market	3
Provide funds support	2
Reduce monopoly	2
Access to land	1
Adopt global standard	1

Source: Interview results from this study

6.4.8 Role of Government

To collect suggestions on good policies and supporting services from the government, another question "the role of government" was asked at the end of the interviews. Some interviewees expected that some general government policies will help with business or industry development. Ensuring a level playing field was emphasized four times during the interviews. Openness of the market was emphasized three times, and was proposed by both foreign and international firms. Table 6.3 shows the expected government roles in supporting inter-firm collaboration by Chinese interviewees.

Foreign firms usually have a higher expectation of government policy. They believe that new policies will help them engage in inter-firm collaboration as well as business development. Domestic firms, especially SMEs, have lower expectations of policy support. Most of them believe that policies will benefit more large firms and SOEs, and have a lesser impact on small private firms. It is more important to adopt a good business strategy or find good collaborators by themselves.

This is supported by the following comments from the interviewees:

. . .government should provide an equal and open environment for all firms in the telecommunications market.

We need more support from the government for both funds and regulation.

The government should simplify its working process.

. . .policy should be flexible and change with market change.

It is impossible for a small company like ours to get a subsidy from the government, even if I know when and how to apply for it.

The playing field in the Chinese telecom market is not even. One operator has most of the government policy support than all the others, which makes for an uneven revenue structure.

In summary, the interview results answered all seven questions of the first primary research question, and the comments from the interviewees provided ample and useful information for the following study. The research results were organized and compiled into a report. Some interviewees also showed interest in participating in further research.

6.5 Global Financial Crisis and Its Influence on Collaborative Strategy

The global financial crisis from 2008 influenced almost all industries and nations. Although the telecommunication industry is more stable than other industries, most firms still faced difficulties and needed new strategies to respond to it. Short of financial support, facing a shrinking market with tough international competition, a reduced number of projects is the key problem facing most firms, especially SMEs.

During the 2008 global financial crisis, firms relying on international business were influenced more than others firms. Reduced projects and requirements from the global market brought them into difficulty. A general manager from a local small private firm said: "The global financial crisis brought us great trouble. All of our projects and orders from foreign markets have been cancelled or withdrawn, which made us change to the local market. Fortunately, we have got two projects in China now. Although the project and products are new to us, we have great confidence in completing them on time." Another manager from a big foreign company said: "We have not had any project for several months. Our company has combined some departments and raised some small projects inside our company for us to do."

To understand better the influence of the global financial crisis and the collaborative strategies firms adopted in response to it, an additional interview was conducted from April 2009 to June 2009 in Beijing. As a result, 12 firms participated in this additional interview, including foreign companies (with headquarters located outside mainland China) and local companies, big firms and small firms, state-owned firms and private firms. Most of the interviewees were general managers or senior managers that participated in the first interview round. Their

participations and answers provided invaluable contributions to this thesis. The responses are categorized into three groups:

6.5.1 Small Private Firms

Small private firms are regarded as vulnerable to financial crises and policy changes. However, the speed of making and adopting new policies for Chinese small firms is very fast according to this research. As most of their global business partners are influenced by the financial crisis, many small firms turned to the local market and changed their business partner within 1 month. Some even grasped a chance (for example, a local policy support opportunity) to start a new business and collaborate with government instead of global partners. The new collaborative strategies took effect very quickly and relieved the problem of the sudden broken financial chain (closure of international orders).

A manager from a local small telecom firm said: "During the financial crisis the (Chinese) government announced and implemented many new policies to support the high technology and telecommunication industry, which provided us with many opportunities. We have now applied an exclusive license that will provide us with great profit. We will start a new firm for this project and are now discussing with investors. This project has taken us one month and is expected to be conducted within the next month." A general manager from another small private firm said: "The crisis caused a tight financial plan for us. However, I have changed my business also to the investment market, which will help our high technology business from another side." The answers show that small businesses during the financial crisis not only changed their collaborating strategies, but also markets and investing strategies to reduce the potential risks.

6.5.2 Foreign Firms

Although foreign companies were more influenced by reduced international market demand, and short of financial support from their original country, they have plenty of experience in dealing with such a situation. The formal strategies adopted by foreign companies are reduced production and managing costs, delaying new recruitment (actually, from the start of the financial crisis some firms stopped new enrolment programs for nearly half a year), reducing outsourcing projects, and combining departments. These strategies helped foreign firms during the financial crisis. The collaborative strategies were not influenced in the short-term as it is usually defined as a long-term strategy and not easily changed.

The effects take a longer time to implement in big firms than in small firms. A manager from a big foreign company said: "All of our outsourcing teams have been retrenched now because of reduced requirements and projects. Even permanent

employees now have no work to do. We have moved some employees from departments without projects to other departments with projects. The company has announced the first lay-off plan in its local area, which has not influenced us yet. However, it will announce a second lay-off plan very soon, which may affect us." Another manager from a big telecom company said: "We are facing a reduction of executive and management fees. However, the Chinese telecom market is still quite stable now."

6.5.3 State-Owned Firms

State-owned companies, on the other hand, were less influenced than other firms as most of their customers are Chinese firms or government departments. But they still faced reduced demand and projects, which may influence their current business partners. The strategy they adopted in the short run also involved reducing salaries or laying-off employees. A manager from a big state-owned company said: "We have already laid-off some staff since the financial crisis. Although it has less of an influence on us, projects are still reducing now."

The interview results show that different firms adopted different strategies during the global financial crisis. Inter-firm collaboration relationships were influenced and changed during the global financial crisis. As a result, small firms showed more flexibility in their strategies during the crisis. Foreign firms had more experience and could adjust quickly in their developing and collaborating strategies. State firms were influenced less than other firms as most of their customers are Chinese firms and departments. However, these changes provide new opportunities for new collaborating relationships locally and globally.

6.6 Conclusions

China's telecommunications industry was a typical socially planned one, which has undergone many reforms. The domestic industry had been highly protected before the 1990s. China Telecom was the monopolist in this market for a long time. The Chinese mobile market was controlled by China Mobile and China Unicom.

The rapid development of the Chinese mobile market brought many opportunities for new investment and attracted global telecom firms. The most important component of telecom revenue during that period was mobile telephony. An open policy, telecom reform, and international collaborations greatly contributed to the entire telecom industry in China. The mobile sector has significantly contributed to Chinese economic growth.

The Chinese telecom market is composed of four sectors as highlighted in this thesis. They are DPs, operators, SPs and CPs/TPs. Inter-firm collaborations among them brought high-technology, advanced management systems, and matured

products and more value added services, which have contributed greatly to rapid mobile development in China. With further international collaborations, the development of the Chinese mobile market is expected to lead and push the growth of the global telecom market.

Results from the case studies in China have answered all questions related to the first primary research question in Chap. 4. Size, country, and cultural similarity are important when firms select collaborators. Firms prefer larger-sized or peer-sized (same-sized) firms as their collaborators. Foreign firms tend to search for collaborators in the global market and have fewer barriers than domestic firms when engaging in international collaboration.

The major types of inter-firm collaboration in China are co-production, market sharing and management and service collaboration. Franchising does not appear in the Chinese mobile market and there are new types of inter-firm collaboration in the Chinese mobile market. For all the interviewed firms the most important benefits of collaboration are increasing market share, increasing profit, and increasing innovation. The benefits generated from inter-firm collaborations show great variety.

The main risks towards local inter-firm collaboration in the Chinese mobile markets are benefit distribution and lack of trust. The main barriers for international collaborations are language, cultural, or communication barriers and lack of experience in international business.

Most of the interviewees took understanding, communication, and fast information exchange as the most important key to a successful inter-firm collaboration. Most interviewees agreed that the government should provide an open and fair playing field for all competitors.

The study of Chinese mobile cases shows, in this dynamic developing market, firms are very active in inter-firm collaboration. However, size, country, and cultural differences are still important in inter-firm collaboration. International firms have fewer barriers in global collaboration than domestic firms. Most interviewed firms emphasized that trust and benefit distribution are key determinants for successful collaboration. This result will be compared to the Australian case study in the next chapter and the qualitative research results will be further examined in the quantitative study.

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Chapter 7
A Case Study on Collaboration in the Australian Mobile Telecommunication Market

7.1 Introduction

The Australian mobile telecommunications market is a mature market in terms of industry structure and content integration. The Australian mobile telecommunication market, like most mobile telecommunicate markets in the world, has moved from monopoly to limited competition, from state owned to market driven and from monopoly to competitive. This chapter provides an overview of the Australian mobile telecommunication market in terms of its development, industry structure, contribution to the economy, major firms by market share in each sector and government agencies involved in its regulation and supervision.

To answer the first primary research question in Chap. 4 '***What are the major types of collaboration, benefits and risks associated with inter-firm collaboration in the Australian and Chinese mobile telecommunication markets?***' a qualitative interview was conducted to collect real industry data from different sectors. The background and structure for the case study are discussed in Sects. 7.2 to 7.3. The results and implications from the case study are discussed in Sect. 7.4. At the end of this chapter the results from the Australian cases are also compared with the Chinese research results, to provide a better understanding of the key issues towards inter-firm collaboration in these countries.

7.2 History and Development of the Australian Telecommunications Market

For the financial year 2006–2007 the total number of mobile phone subscribers reached 21.1 million in Australia (Access Economics 2008). However, development of the Australian mobile telecom market is uneven in terms of geographic coverage. Figure 7.1 shows the uneven mobile telecommunications coverage by different states in Australia. NSW had 34.4 % of total mobile subscriptions in

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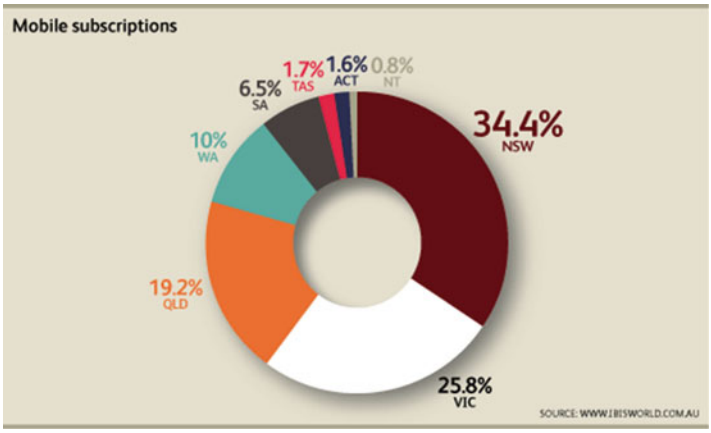

Fig. 7.1 Percentage of total mobile subscriptions by state in Australia (Source: IBIS (2011))

Australia in 2011. The top three states (NSW, VIC and QLD) had 80 % of total mobile subscriptions and the other five states had only 20 %. This is caused by the uneven population, economic growth and demand in the different states.

7.2.1 Development of the Australian Telecommunications Market

Figure 7.2 shows the development of various mobile telecommunications networks in Australia since 1981 (AMTA 2007). Australia's first mobile phone system commenced operation in Melbourne in August 1981. In 1987 the first Analogue Mobile Phone Service (AMPS) was launched. However, the majority of the analogue network (about 80 %) closed on December 31, 2000. The remaining analogue network was progressively closed during 2000. The digital global system for mobile communication (GSM) networks was launched in 1993. It developed very rapidly and is still widely adopted in mobile networks today. Code Division Multiple Access (CDMA) technologies were introduced in Australia in 1999. Telstra and Hutchison were the first operators for CDMA services (Access Economics 2007). Then, 3G networks were offered by Hutchison in April 2003. The new technology was adopted quickly globally and many mobile device providers started to produce 3G devices for operators in the global market. It is now offered by all mobile network carriers in Australia.

Like most other countries, the history of the Australian telecommunications market involves development from monopoly to competition, from state-owned to private, from simple services to multiple diversified services. The key characteristics and events for each development period are now discussed.

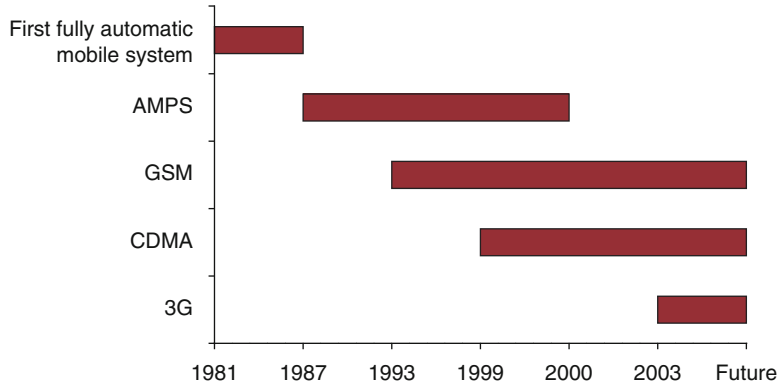

Fig. 7.2 Development of mobile telecommunications networks in Australia (Source: AMTA (2007), Australian mobile telecom industry, statistics link file.1)

7.2.2 Institutional and Regulatory Changes

1. 1901–1988: Monopoly period

The Australian telecommunication market was initially a state monopoly. In 1901, the Postmaster-General's Department was established to manage all domestic telephone, telegraph and postal services. In 1946, the Overseas Telecommunications Commission (OTC) was established to manage telecommunications services with other countries (DCITA 1997).

Australian Telecom was named the Australian Telecommunications Commission in July 1975 and the Australian Telecommunications Corporation in January 1989 (which later became Telstra). Until the late 1980s the Australian telecom market was a monopoly controlled by state owned enterprises only.

2. 1989–1996: Beginning of competition

To introduce competition into the Australian telecom market the first regulatory reform began in 1989. The Australian Telecommunications Authority (AUSTEL) was established in 1989 to regulate the industry. The *Telecommunications Act 1989* was a remarkable milestone for this period. It was the start of the introduction of private competition in telecommunication services (Farago 2001), and also the end of monopoly in the telecommunications market.

The government further reformed the market by announcing the *Telecommunications Act 1991*. Telecom Australia and the OTC were merged and became the Australian and Overseas Telecommunications Corporation Limited in February 1992, and the name was further changed to Telstra Corporation Limited in April 1993. At the same time, Optus and Vodafone started to operate in the Australian telecom market in 1992 and 1993 respectively.

On the other hand, the new second generation (2G) digital global system for mobile communications (GSM) networks was launched in 1993. Three carriers, Telstra, Optus and Vodafone launched GSM services in that year.

The Telecommunications Industry Ombudsman (TIO) was established in 1993 by the Australian government. It is independent of industry, government and consumer organisations. The TIO is authorized to investigate complaints about the provision or supply of telephone or Internet services. The role and powers of the TIO are included in the *Telecommunications (Consumer Protection and Service Standards) Act 1999* (ACMA 2007). The objective of TIO is to establish a fair, objective and non-bureaucratic telecom market (TIO 2012).

The Australian Competition and Consumer Commission (ACCC) was established in 1995 (ACMA 2007). The objective of ACCC is to promote competition and fair trade in the market place (ACCC 2009). ACCC also help the market to develop and grow into a more competitive one.

3. 1997–2002: Open competition and privatization

The Australian telecommunications market was opened to full competition on July 1, 1997 (DCITA 1997). The release of the *Telecommunications Act 1997* and related legislation package are remarkable for this period. They eliminated the limit on the number of carriers that own transmission infrastructure and that are able to enter the Australian market. Under the new reform scheme Telstra became partially privatized in 1997, with one third of its shares sold to the public. In September 1999, the Commonwealth government sold a further 16.6 % of its shares to the global market (Telstra 2009). In August 2001 Optus became a 100 % owned subsidiary of SingTel (Optus 2009). Hutchison also entered the Australian telecommunications market in 2002 (Access Economics 2007).

In 1999, Code Division Multiple Access (CDMA) technologies were introduced in Australia. Telstra and Hutchison operate CDMA services (Access Economics 2007) In 2001–2002, 93 % of Australian mobile telecommunications services were provided on GSM networks (Access Economics 2007). The carriers also developed General Packet Radio Service (GPRS) (‘2.5G’) networks that deliver multimedia services.

From 1997 to 2002 the average price of mobile telephony fell by approximately 27 % in Australia (Access Economics 2007). The fall in price created economic benefits for consumers, which increased consumer surplus. Aside from the consumption of mobile services, mobile phones also exert a positive impact on productivity in other industries (Access Economics 2007), by increasing their work and production efficiency, information sharing and off-work contacts. As a consequence of the new reform and policies attracting investment, new investment in this sector reached AUD $19.7 billion in 2002 and more than 80 new carriers and over 850 service providers had entered the market (DBCDE 2002).

4. 2003–2006: Self regulation

3G networks were introduced to Australia first by Hutchison in April 2003. They are now offered by all mobile network carriers in Australia. Initial 3G networks were primarily in urban areas. To build the new 3G networks the big four carrier service providers collaborated with each other to share the high hardware costs and reduce potential risks (e.g. Hutchison with Telstra and Vodafone with Optus).

The Australian Communications Authority (ACA) and the Australian Broadcasting Authority (ABA) merged and became known as the Australian Communications and Media Authority (ACMA) on 1 July 2005. ACMA is responsible for issuing carrier licenses, regulation of service providers, registration of industry codes, and other supervisions. ACMA also supervises international activities and contributes to the whole society on anti-spam, child protection, and spectrum usage (ACMA 2007).

Communications Alliance (CA) was formed in 2006 from the merger of the Australian Communications Industry Forum (ACIF) and the Service Providers Association Inc (SPAN). The objective of CA is to promote the growth of the Australian communications industry and the protection of consumer interests through industry self governance (Communications Alliance 2007).

In November 2006 the Commonwealth government sold its remaining stake in Telstra and its residual 17 % shareholding was transferred to the Future Fund in February 2007 (Telstra 2009). Therefore, Telstra, Optus, Vodafone, and Hutchison became the four biggest carrier service providers, together having a 99.7 % market share in Australia in 2007 (Access Economics 2008).

5. 2007–Current: New generation technologies

The Department of Broadband, Communications and the Digital Economy (DBCDE) was established by the government to govern all policies and regulations in 2007 (DBCDE 2009). The responsibility was transferred from the Department of Communications, Information Technology and the Arts (DCITA).

3G networks developed very fast in Australia from 2007. As shown in Fig. 7.3, from 2006 to 2010 the 3G density (as measured by subscriptions per capita) increased dramatically from nearly 0.1 to over 0.6 per capita and the forecast subscriptions per capita is 0.9 by 2014 (Access Economics 2010). The faster and more data transferring abilities provide the possibility for more advanced mobile applications (e.g. video conference and online shopping), which are expected to bring more tangible and intangible benefits to firms and individuals.

According to ACMA the number of 3G services in operation was 4.56 million at 30 June 2007 (Access Economics 2007). Surveys conducted by Telstra have shown that the Next G network has had a positive influence on its commercial users' business productivity (Telstra 2009). It has been suggested that so-called 4G technology will further boost mobile services and economic growth in the telecommunications mobile market (AMTA 2007). The advantages and new applications of 4G technology was discussed in Chap. 5.

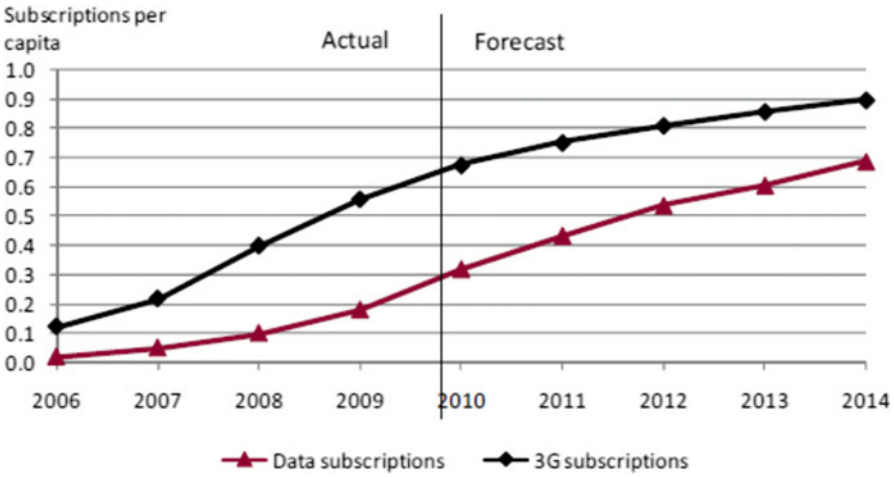

Fig. 7.3 Forecast data subscriptions per head of population (Source: Access Economics(2010) based on data from AMTA members, p. ii)

New technologies have also changed mobile handsets and services for users. More than eight million mobile phone handsets were sold in 2005 in Australia, highlighting the continued growth of the industry (AMTA 2007). Based upon industry statistics (AMTA 2007) the shipment of CDMA mobile handsets became zero from April 2007. Table 7.1 shows the change of handset shipments into Australia. It clearly shows that CDMA mobile handsets were replaced by 3G mobile handsets gradually, which was first introduced to Australia from 2004.

Development of the mobile telecommunications industry has contributed directly and indirectly to Australian economic growth. These contributions will be discussed in detail in the following section.

7.2.3 Contributions of the Australian Telecommunication Market to the Economy

The telecommunications industry has made both tangible and intangible contributions to the Australian economy (Access Economics 2010), and the mobile telecommunications industry is one of the fastest growing telecommunications markets in Australia (AMTA 2007). It contributes directly to employment, GDP, industry revenue, and industry value added. Mobile telecommunications also impact the business and economy indirectly through its influence on labour productivity and price declines (Access Economics 2007). The fast development of mobile technologies leads to lower prices of telecommunications services and higher efficiency in

Table 7.1 Handset shipment into Australia from 2002 to 2010 (in units)

	2002 (from Jul)	2003	2004	2005	2006	2007	2008	2009	2010 (by Oct)
CDMA	443,927	529,688	784,075	1,133,490	369,819	19,757			
GSM	3,554,191	5,437,596							
3G			7,237,649	6,874,929	8,365,271	9,263,245	8,832,755	9,086,162	6,610,687

Source: Data collected from AMTA (2011)

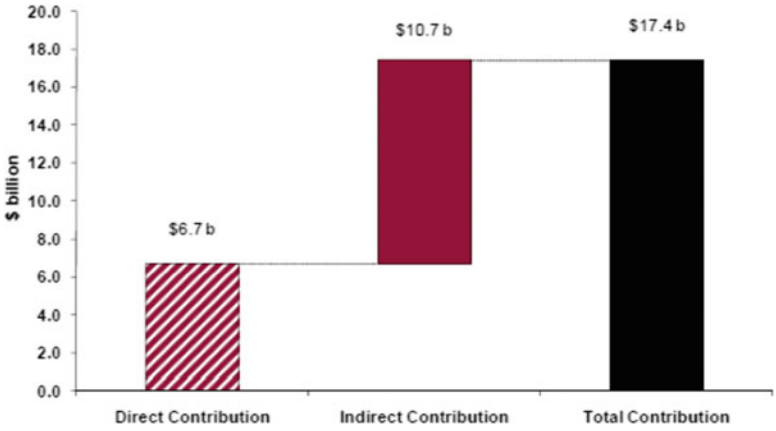

Fig. 7.4 Total economic contributions of mobile telecommunications, 2008–2009 (Source: Access Economics (2010))

production. Therefore, the mobile industry can also help increase productivity in other industries (Access Economics 2010).

As shown in Fig. 7.4, the Australian mobile telecommunications industry made a direct contribution of AUD 17.4 billion to total GDP in 2008–2009. The direct contribution to the overall economy was measured by industry value added or Industry Gross Product (IGP). In 2008–2009, the mobile telecommunications sector increased Australian real Gross Domestic Product (GDP) by AUD 6.7 billion and increased employment (Access Economics 2010). The indirect contribution, or spill-over effect, on the Australian economy was estimated at AUD 10.7 billion in 2008–2009, which is far more than its direct contribution to the total economy (Access Economics 2010).

7.2.3.1 Direct Contributions

Table 7.2 shows the latest key statistics of the direct contribution of the mobile telecommunications sector in Australia. In 2008–2009 the mobile industry employed 20,790 full-time equivalents (FTE) and paid $1.4 billion (nominal) in wages (Access Economics 2010). This number decreased a little compared with the previous year 2007–2008. This may have been caused by the substitution effect of new technologies and the merger of Vodafone and Hutchison in 2009. However, IBISWorld estimated that telecommunications will achieve an average revenue growth of 4.6 % over the next 5 years through 2016–2017 in Australia based on the current growth rate of mobile phones (IBIS 2011).

On the other hand, industry revenue was AUD 17.8 billion and industry value added was over AUD 6.7 billion in 2008–2009. Industry output grew stably in 2008–2009 and increased by 24.2 % from 2003 to 2004 (Access Economics 2010).

Table 7.2 Industry revenue and value added 2004–2005 to 2008–2009 (These are the latest key statistics released by April 2012)

	2004–2005	2005–2006	2006–2007	2007–2008	2008–2009
Industry revenue (millions AUD)	14,322.0	14,654.5	15,518.7	16,391.9	17,788.3
Industry value added (millions AUD)	6,503.7	5,986.8	6,476.0	6,753.6	6,702.5
Gross operating surplus (millions AUD)	4,785.5	4,351.6	4,944.1	5,284.3	5,257.7
Earnings to employees (millions AUD)	1,718.2	1,635.2	1,531.9	1,469.3	1,437.0
Employment (No)	23,893	22,117	21,964	21,170	20,790

Source: Access Economics (2010), Australian Mobile Telecommunication Industry, p. ii

This was driven substantially by mobile telecommunication subscriptions. Total mobile subscriptions in Australia were worth AUD 24.22 million at 30 June, 2009, and were only AUD 18.4 million at the end of 2004–2005 (AMTA 2010). However, employment and earnings to employees decreased from 2004–2005 to 2008–2009. As the mobile telecommunication industry is capital intensive, more than three quarters of value added flows as earnings to capital rather than earnings to employees (Access Economics 2010). On the other hand, the new technologies and equipment have a significant substitution effect on the demand for labour in this industry.

Figure 7.5 shows the growth of industry value added of mobile carriers and resellers in Australia from 2004–2005 to 2008–2009. The combined industry value added of mobile network carriers and resellers was under 1 % of total communications GDP from 2004 to 2009 in Australia. The majority of value added was contributed by carriers, similar to that for China. There was a decline in the contribution to GDP from 2004 to 2006, with most of the decline attributable to lower earnings to employees than returns to capital. The share of total communications in GDP increased from 2005 to 2009.

7.2.3.2 Indirect Contributions

The indirect contribution of the mobile telecommunications sector to the economy has been measured in terms of its impact on lowering communication prices and in improving productivity. ACMA (2010) data indicated that the costs of average mobile voice calls fell by 4.8 % in 2008–2009. With an increasing average price level for all goods and services, the new technology helped decrease the price of communications and costs for business. Consumers got more benefits from the

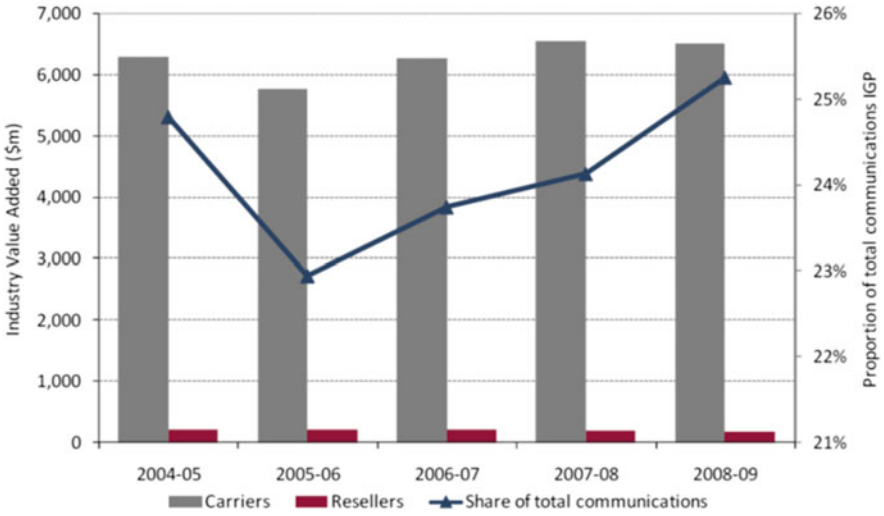

Fig. 7.5 Mobile carriers sector, real and expected share of GDP from 2004 to 2009 (Source: Access Economics (2010), p. 30)

decline of service prices. Decreasing mobile communication prices also added pressure to fixed-line prices in Australia, as mobile phones have become a substitute for fixed phones in recent years (Access Economics 2010).

Besides the contribution of price declines, the development of mobile telecommunication technologies also benefited many other sectors and industries in the economy via productivity improvements, as discussed in previous chapters and sections. Mobile technologies can improve workers' ability to remain productive through the use of voice or data applications when they are away from the work place (Access Economics 2010).

However, laptop and M2M applications were excluded in the aggregate results for mobile contributions from the Access Economics report (Access Economics 2010), which is expected to have large value adding services. Other spill-over effects (e.g. increased community connections, increased happiness and mental health by connecting family members anytime and anywhere and decreased business failure rates due to misunderstanding and a lack of communication) were not included in the model. Therefore, the calculated contribution can be expected to be undervalued.

With the development of new technologies and products in the telecommunications industry, the Australian mobile industry is expected to contribute more to economic growth in the future. The robust and stable growth of the Australian mobile industry was based on its mature industry structure, which will be further discussed in the following section.

7.3 Current Structure of the Australian Mobile Telecommunications Market

7.3.1 Overview

The mobile telecommunications industry comprises the hardware sector, carriage service providers, retailers, as well as content providers, content aggregators and program developers. Figure 7.6 provides an overview of the Australian mobile telecommunications industry. The current industry involves a number of sectors: hardware providers (including network infrastructure producers and mobile handset producers), service providers (including internet service providers and mobile service providers), content providers (including aggregators, content producers, and technical providers), and retailers (including mobile phone retailers, card retailers, and end-user service providers).

The hardware sector is responsible for building and maintaining the network infrastructure and providing end-user handsets. Carrier service providers provide carrier network infrastructure to other resellers and service providers (AMTA 2007). Resellers in the Australian telecom market are similar to service providers in the Chinese market. However, as carriers also provide services to end users and service providers can apply to become carriers, these components are combined in service providers. Therefore, the sectors are changed into four major components in the structure of the Australian mobile market.

As shown in Fig. 7.7, the structure of the Australian mobile market is divided into four components: hardware producers, service providers (including carrier service providers, mobile service providers, internet service providers, resellers,

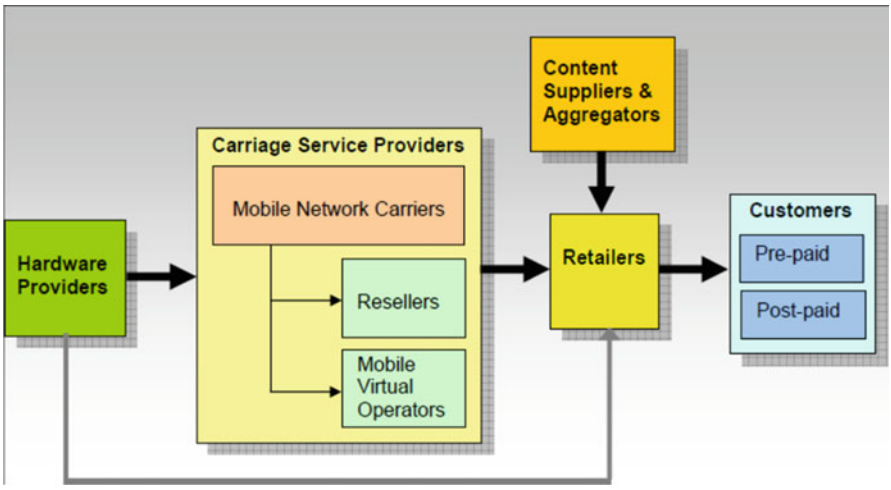

Fig. 7.6 Australian mobile telecommunications industry (Source: Access Economics (2008), Australian Mobile Telecommunication Industry, p. 8)

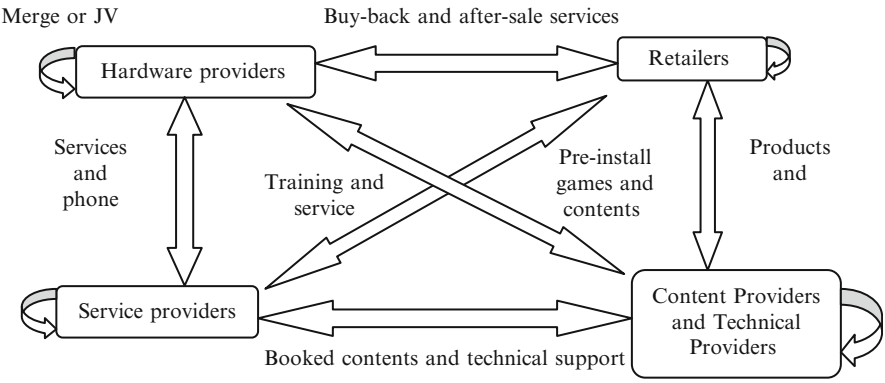

Fig. 7.7 Structure of Australian mobile collaboration (Source: Derived by the author)

and mobile virtual operators), content providers, and retailers. Figure 7.7 also shows the collaborations between different sectors. Each of these sectors is discussed in more detail and will be discussed in the interview case study in later sections.

Compared with the Chinese market competition in the Australian mobile telecommunications market is high amongst established firms, both in terms of price and service. Resellers are limited in their ability to compete on price due to the price they have to pay in order to procure network services from the four major carriers. There is also some scope for those firms which offer other telecommunications to provide price advantages through bundling, including Telstra and Optus, as well as some resellers such as AAPT (Access Economics 2007).

7.3.2 Device Producers

The mobile telecommunications hardware sector includes "infrastructure facilities that support the volume of mobile telecommunications services and the end-users' hardware that provides individuals with usage of mobile telecommunications services" (AMTA 2007).

It requires the use of a substantial amount of infrastructure to make or receive a mobile call. The infrastructure hardware includes: base stations, antennas, switching equipment, and towers. Installing the network requires substantial investment, which is an entry barrier for small firms. The mobile network operators own the infrastructure and usually rent the broadband to other service providers. In Australia the major infrastructure hardware producers are Ericsson Australia, Alcatel-Lucent, Huawei and Nokia (IBIS 2011).

The end-user hardware includes motor vehicle hands-free kits, earpieces and other mobile handsets. In Australia the majority of end-user handsets are imported and supplied by Nokia, Apple, Motorola, Samsung, LG, SonyEricsson, i-Mate,

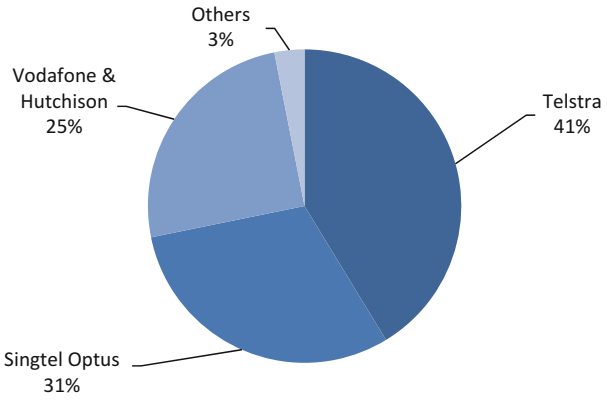

Fig. 7.8 Market shares of mobile network carriers by revenue (Source: IBIS (2011), J7122)

HTC, ZTE, and RIM (IBIS 2011). As most of these handsets are produced overseas and shipped to Australia for sale, the device producers for the Australian market are the same global competitors as discussed in Chap. 6.

7.3.3 Service Providers

Carriage Service Providers (CSPs) are defined as suppliers of mobile services to households and businesses using carrier network infrastructure. Carriers are generally required to hold a carrier license. This includes three mobile network carriers Telstra, Optus, and Vodafone & Hutchison (merged in 2009), who operate their own mobile networks, and nine resellers (e.g. AAPT, Austar, B, Boost and Primus). Virtual Mobile Network Operators (VMNOs) are also regarded as CSPs and offer mobile services to customers using a third party's network (ACMA 2007).

Figure 7.8 shows the market share of Australian mobile network carriers by revenue in 2007. Similar to the Chinese market the biggest three carriers: Telstra, Optus, Vodafone and Hutchison together occupied nearly 99.7 % of the total Australian market (IBIS 2011).

Resellers and mobile virtual network operators (MVNOs) are also considered CSPs. Examples of resellers in Australia include AAPT, AUSTAR, B, Boost and Primus. There is no dominant firm in the resellers market in Australia in 2011. MVNOs offer mobile services to customers using a third party's network (ACMA 2007). Examples of MVNOs in Australia include B Digital, Revolution, Boost Mobile, Primus Telecom, People Telecom, and Macquarie Telecom (IBIS 2011).

7.3.4 Retailers

Retailers offer mobile services to end-users on behalf of CSPs. Customers can purchase mobile telecommunications hardware and services. Most CSPs have their own retail shops where customers can purchase the hardware and access services. The exclusive retail outlets of mobile network carriers are: Hutchison – '3' Shops; Telstra – Telstra Shops; Optus – Optus World; and Vodafone – Vodafone (AMTA 2007). Other retail outlets, such as convenience stores, petrol stations, supermarkets, Australia Post, and online stores, also offer hardware and services to end-users.

7.3.5 Content Providers and Technical Providers

Content providers deliver information and entertainment content. Mobile premium content can include: sports scores; music clips; sports highlights; mobile wallpaper; games and other downloads; age-restricted content; chat services; news; financial data; weather information; horoscopes; and mobile ring tones (SPAN 2007). Program developers, who create new and innovative applications on mobile handsets, are also regarded as content providers.

Content aggregators manage multiple content providers and provide services through content linked to these providers' products. Aggregators also add value by negotiating complex and time-consuming distribution deals with the individual network carriers, resulting in wider content distribution. Examples of Australian content aggregators are Legion Interactive, Infospace and iTouch (Access Economics 2007).

Value is added to the mobile entertainment value chain through the delivery of useful content. The advent of 3G mobile services has increased the importance of the role played by content providers. The Australian mobile content market experienced rapid growth, driven by increasing consumer requirements and new technologies.

The Australian mobile market maintained a stable and robust growth from 1981 to 2010. Market size is not very large due to a limited total population. Collaboration between different telecom sectors has greatly contributed to its stable development. To further study Australian inter-firm collaboration in the mobile telecommunication market, face-to-face interviews were conducted in Australia in early 2009 to answer the key research questions identified in Chaps. 3 and 4. The data and results are explained in detail in the next section.

7.4 Case Study

A qualitative case study was conducted in Australia to answer the first primary research question in Chap. 4: What are the reasons, types, benefits, and risks from inter-firm collaboration? During this case study, face to face interviews were

Table 7.3 Qualitative interviews in Australia

Basic descriptive results (Australia)	Total interviews: 7		Total collaborating cases: 8	
Type				
Firm type	**Public**		**Private**	
(*number of firms)	0		7	
Nationality	**Australian**		**Foreign**	
(*number of firms)	4		3	
Sectors	**DP**	**CSP/SP**	**CP/TP**	**Retailer**
(*multiple choice[a])	2	5	4	1
Size				
Firm Size [a]	**Small**		**Medium**	**Large**
(*number of firms)	1		2	4
Size difference	**Smaller partner**		**Peer partner**	**Larger partner**
(*number of collaboration cases)	0		5	3

Source: Interview results from this study

[a]Note: Sectors are multiple choices for firms as one firm could be partly DP and SP at the same time

Firm size is as defined by Australian Bureau of Statistics, a small sized firm is a firm with less than 20 employees, a medium sized firm is a firm with 20–199 employees, and a large sized firm is a firm with 200 and above employees

employed. A questionnaire was used to collect data on inter-firm collaboration in the Australian telecom market. A difference from the Chinese case study is that only two firms from the 19 selected Australian firms replied to email invitations. Therefore, to further this study, the Chinese case study strategy was adopted and firms were contacted through the business networks of the author. The selected firms are DP, CSP, SP, and retailers in the Australian mobile telecommunication market located in Sydney or Wollongong. As a result, seven firms attended the interview. Each firm provided only one collaboration case and the average interview time was 15 min for each firm (exactly as expected). The results are very different from the Chinese cases, indicating that Australian firms are very reluctant to take risks (by attending an interview and changing their working plan) and are very punctual (understanding the opportunity cost involved in participating in the interview). Table 7.3 shows the basic descriptive results from the interviews.

7.4.1 Descriptive Statistics

7.4.1.1 Studied Firms

As shown in Table 7.3 above, seven interviews were conducted and eight collaborating cases were collected (one interviewed firm answered two questionnaires on inter-firm collaborations with different partners) during January 2009. The case studies include all sectors in the telecommunication market: device providers

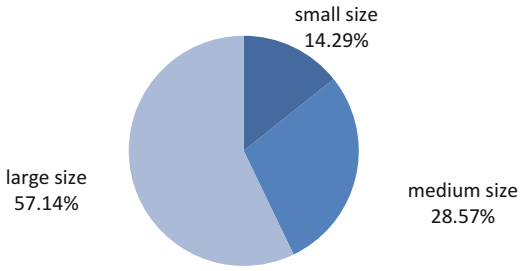

Fig. 7.9 Size of interviewed firms (as a % of total firms interviewed) (Source: Interview results from this study)

(mobile handset providers, base station and network device providers), CSP/SP (service providers), retailer, and CP/TP (content providers). As in the Chinese cases, a multiple-choice questionnaire was used.

The interviewees include CEOs and senior managers who have a good knowledge of the firm's collaboration and development strategies. The study included three overseas owned firms (from New Zealand, Sweden, and the U.S.A.) and four Australian firms. The reason why fewer interviews were conducted in Australia is the smaller market size and lower response rate. The number of registered service providers in the Australian telecom market is only about 3 % of that in China.

7.4.1.2 Size of Studied Firms

Figure 7.9 shows the sizes of the interviewed firms. In Australia, firm size is usually measured by the number of employees. The definition of small sized enterprises is below 20 employees (micro sized enterprises are defined as employing less than 5 employees). The definition of medium sized enterprises is between 20 and 199 employees (for the telecommunication and services industry). Large enterprises are defined as those with 200 or more employees (Harvie and Lee 2003). In this research, one interviewed firm (14.29 %) is small sized (and also a micro sized firm with less than five employees), two firms (28.57 %) are medium sized enterprises (had 20 to 99 employees), and the other four firms (57.14 %) are large enterprises (had more than 500 employees).

7.4.2 Is Cultural Difference Still Important?

The results from the data analysis answer the first question of the primary research question in Chap. 4 Is cultural difference still important when firms choose business collaborators in the telecommunication market? The results support the previous literature in Chap 3 (Das and Rahman 2009; Vilana and Monroy 2010) and is in accord with that for China. Australia has a similar culture and background with that of Europe, New Zealand, and North America. Most of the interviewed firms chose

Table 7.4 Nationality of the collaborating firms and their partners

Interviewed firm	Firm 1	Firm 2	Firm 3	Firm 4	Firm 5	Firm 6	Firm 7
Nationality	Sweden	New Zealand	Australia	Australia	Australia	Australia	USA
Partner firm	Australia	Australia	North America	Australia	Australia	Australia	Asia and North America

Source: Interview results from this study

their top collaborators to be from Australia and North America, indicating that culture similarity is important for firms in choosing their collaborators.

As shown in the following Table 7.4, in the seven collaborations six firms chose Australian and U.S. partners. Only one firm (from U.S.A.) chose an Asian firm as one of their top collaborators.

Weber (1909) argued that the location of a firm is important for collaboration as it helps minimise production and transport costs. However, Brakman and Garretsen (2005) argued that new technologies have reduced the importance of transportation cost, which makes location less essential. The result of this study supports the position that location is still important for businesses in choosing their partners. Besides transportation costs, cultural differences also increased communication cost and risks arising from misunderstanding. Therefore, the country and cultural background of the firm remain important for the selection of business partners.

7.4.3 Does Size Matter When Firms Choose Business Collaborators?

The interviewed managers were asked to select their top five important business partners and provide up to five collaboration cases in part two of the questionnaire. The results are used to answer question two of the first primary research question in Chap. 4: Does size matters when firms choose their business collaborators? In accord with the results for China, the results from the qualitative interviews in Australia also gave a positive answer to this question.

As shown in Fig. 7.10, nearly 38 % of the interviewed firms chose larger-sized firms as their top collaborator, 62 % of firms chose peer-sized firms as their top collaborator, and none of the firms chose smaller-sized firms as their top collaborator in the Australian collaborating cases. All of the studied collaborating cases selected peer or larger sized firms as their most important collaborator. The results suggest that firms prefer peer-sized or larger-sized firms as their top collaborators to keep their position and market share as indicated by interviewees. These results will be further tested in the quantitative study in Chap. 8.

As shown in Fig. 7.11, 50 % of all the collaboration cases are international collaborations (as one of the interviewed firms provided two collaboration cases,

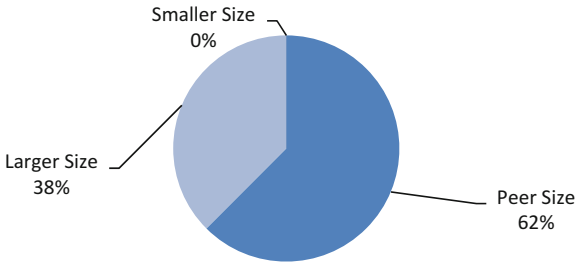

Fig. 7.10 Size of top collaborating partners (as a % of all collaboration cases) (Source: Interview results from this study)

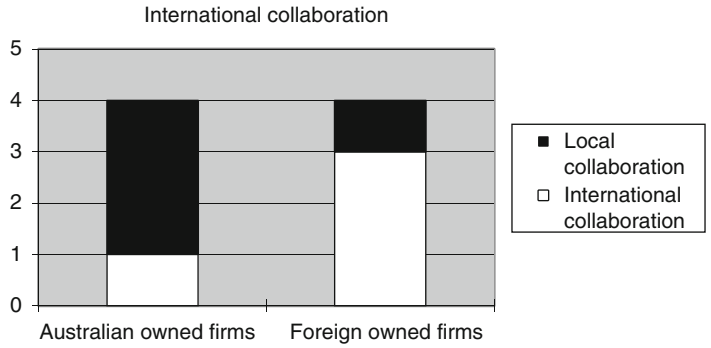

Fig. 7.11 International and local collaboration (by collaboration cases) (Source: Interview results from this study)

there are 8 cases in this study). In this study, most local firms only conducted business with Australian firms. A manager from one of the biggest multinational carrier service providers said: "We only focus on the local market and partners within Australia, the international market and collaboration is the responsibility of the head office (located in another country) of the company." Compared with Australian firms, Chinese firms have more positive views in seeking international collaborators and taking risks. However, they face barriers such as language and cultural differences.

7.4.4 Do Firms Prefer Deep Collaboration and Is There Any New Collaboration Type Evolving in the Mobile Telecommunication Market?

The results from the interviews answer the third question of the first primary research question "Do firms prefer deep collaboration?" Although focused on different aspects, both Australian and Chinese firms prefer long-term and deep collaborating relationships. This is also supported by the interviewed managers:

> We seek long term relationships (Swedish firm manager).

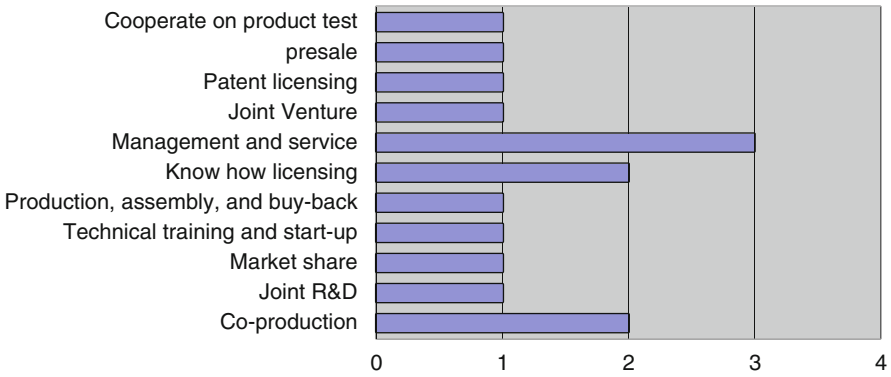

Fig. 7.12 Types of collaboration (by collaborating cases) (Source: Interview results from this study)

As shown in Fig. 7.12, management and service agreements (in three cases), co-production service (in two cases), and know-how licensing (in two cases) have tended to dominate collaboration, alongside joint R&D service, joint venture service, technical training and start-up assistance service, production, assembly, and buy-back agreement, and market share. Franchising did not appear as a type of collaboration in the sample of Australian telecommunication collaborating cases.

The results also answer question four of the first primary research question in Chap. 4 "Is there any new collaborating type in the mobile telecommunication market?" Previous collaborating types in the literature cannot be applied in the telecommunication industry. The results show that franchising is not a collaboration type in the telecommunication market, which accords with the results for China. On the other hand, two new collaboration types were raised by the interviewees. The first one is providing a test device to make sure new products work (cooperation in product testing). The second one is presale service. These will be explained further below.

7.4.4.1 New Type: Providing a Test Device

One Australian manager indicated that mobile device providers sometimes provide test and demonstration machines to operators, content providers, or technical providers to develop new supported software, get user feedback or test new networks. Device providers also provide some sub-products for mobile phone providers to implement integration and system tests. On the other hand, operators sometimes cooperate with service providers to get customers' feedback on new programs or services before releasing a new function. This kind of collaboration is very common in the mobile telecommunication sector. However, it is not similar to any collaborating type in the previous literature as discussed in Chap. 3.

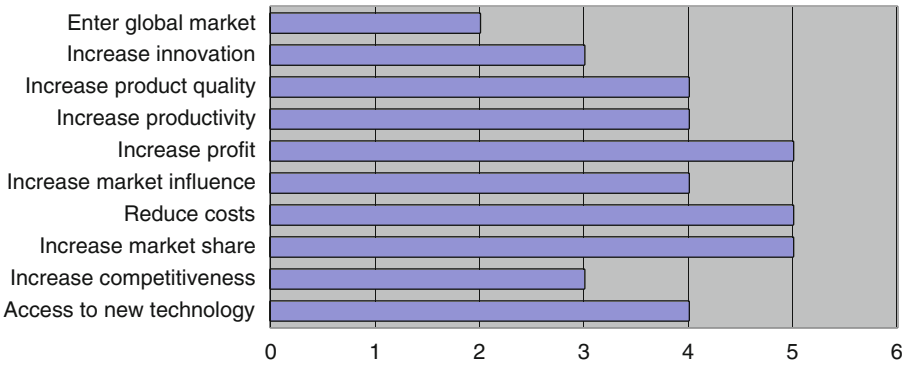

Fig. 7.13 Benefits from collaboration (by collaborating cases) (Source: Interview results from this study)

7.4.4.2 New Type: Presale Service

Presale service includes all services provided before sales to increase the sales amount, such as consulting, customer relationship building, market and customers' requirement analysis. Presales support help both firms understand better each other's requirements, which will save on cost, increase efficiency, reduce risks, and, as a result, bring higher profits in the future (as indicated by the interviewed managers in this study).

The results support that collaborating types change in different industries and new collaborating types are generated from the adoption of new technologies, new business models and new market requirements. Previous empirical results are not suitable for some dynamic and fast growth industries such as the telecommunication market. The quantitative research of this study will expand the interviewed industry to include manufacturing and services industries that are related to the telecommunication industry.

7.4.5 What Are the Major Benefits from Collaboration?

Results obtained from the interviews answer the fifth question of the first primary research question "What are the major benefits from inter-firm collaboration?" As shown in Fig. 7.13, no single benefit from inter-firm collaboration dominates in the Australian market. The top three benefits coming through inter-firm collaboration are: increasing market share, increasing profit, and reduced costs. As the number of case studies is very small, it did not show a strong relationship between firm size and type of benefit.

The collaboration benefits are very similar to the results obtained from the Chinese market study, which answers question five of the first primary research question

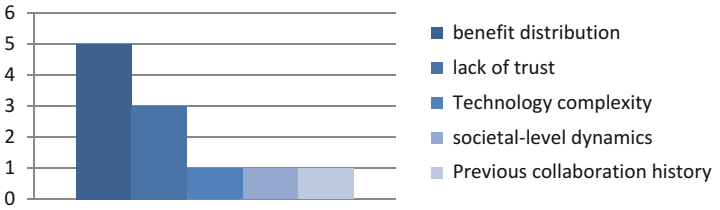

Fig. 7.14 Barriers towards collaboration (by number of responses) (Source: Interview results from this study)

'What are the major benefits from collaboration?' However, no firm selected access to government programs as a benefit from inter-firm collaboration in Australia. In China, nearly one third of collaborating firms chose this option, which shows a stronger requirement for government relationships in the Chinese market.

7.4.6 What Are the Major Risks from Inter-firm Collaboration?

The results answer the sixth and seventh questions of the first primary research question 'What are the major risks towards local and international inter-firm collaborations in Australia?' The results are in accord with the results from the Chinese case study. Figure 7.14 shows the barriers facing inter-firm collaboration in the Australian samples. The first barrier chosen by five interviewed firms is benefit distribution. The second barrier chosen by three interviewed firms is lack of trust. The results are in accord with the Chinese results, which answers question six of the first primary research question: "What are the major risks towards inter-firm collaboration?" Benefit distribution and lack of trust problems are the top barriers for inter-firm collaboration in the mobile telecom sector in both Australia and China.

In regard to international collaboration, five Australian firms think there are no barriers, while only two firms selected lack of trust and language or culture as barriers towards international collaboration. Compared with the results from the Chinese cases, Australian firms have more confidence and ability to engage in international collaboration. A possible reason for these differences is that Australia, with its large immigrant population, has a combination of cultures, languages and groups of people, which provide more opportunities for Australian firms to collaborate with firms and individuals from all different backgrounds.

7.4.7 Key Determinants of a Successful Collaboration

Most interviewees indicated that trust and/or profits distribution are the most important determinants for a successful collaboration. The interview results are in

Table 7.5 Proposed key determinants for successful inter-firm collaboration in Australia

Proposed key determinants	No. of times proposed by interviewees
Trust relationship	3
Benefit distribution	2
Price of products	2
Increase profits	2
Contact person	1
Communication	1
Information share	1

Source: Interview results from this study

accord with the literature (Williamson 1985; Kay 1993; Gulati 1998; Lewis 2000; Parker 2000; Kuada 2002; Lui and Ngo 2005; Narteh 2008). One interviewee pointed out that the contact person is vital to the success of inter-firm collaboration. Other managers also agreed that the contact person sometimes is vital to a successful collaboration. These factors are emphasized by the interviewees as below:

Firms prefer deep and long-term collaboration in the telecommunications market. As one interviewed manager said:

> We need to create an environment of trust between partners through long term alignment of goals.

Three managers indicated that trust plays a very important role in inter-firm collaboration. They also mentioned that trust can only be built and tested over time in response to the probe questions.

This is supported by the following comments from the interviewees:

> The benefit or value perceived as mutually beneficially is very important in collaborations.
>
> It is important the collaboration can help in increasing revenue or our customer base.
>
> It is important to create an environment of trust between partners through long term alignment of goals.
>
> The key points for inter-firm collaboration are trust, open discussion, and forming a good relationship.
>
> People sometimes select collaborators because of the contact person and not how good your product is.

Table 7.5 shows the proposed key determinants by Australian interviewees for successful inter-firm collaboration. The results show that benefit and trust are still the most important factors for a successful collaboration between firms.

7.4.8 Role of Government

When discussing the role of government in promoting or supporting inter-firm collaboration, most firms suggest that it should assist in helping to form and provide a better environment, build a better (next generation) network infrastructure, and adopt international standards for inter-firm collaboration. One interviewed manager

Table 7.6 Expected government roles in inter-firm collaboration

Expected roles	No. of times proposed by interviewees
Upgrade the networks	4
Provide funds/reduce tax	2
Help in developing a partnership	2
Provide a level playing field	1
Better services (training)	1
Visa for skilled persons	1
Regulations on price	1
Help access global markets	1
Adopt global standard	1

Source: Interview results from this study

also pointed out that government should encourage more skilled employee movement or immigration to help in new technology development and inter-firm collaboration. This is also supported by the fact that lack of skilled labour is a barrier for business development (Chung et al. 2006). Therefore, a tight migration policy could be a barrier to foreign investment and global inter-firm collaboration.

All of the firms have high expectations of government policies to support their business development and inter-firm collaboration. They believe that government policies and support will help to improve the environment for the telecommunications market and the development of individual firms. Table 7.6 shows expected government roles in supporting inter-firm collaboration by the Australian interviewees.

Compared with the results from the Australian interviews, Chinese firms have little expectations regarding government policies, especially for small and medium-sized private enterprises. Most managers prefer to rely on the capability of the firm itself. One possible reason is the long period of time it takes to generate a policy change and for the policy to take effect in China. The other possible reason is the unclear rules and ambiguous regulations in the Chinese market.

Results from the Australian case study show that inter-firm collaboration is important in the mobile telecom market. Australian firms prefer partners from Australia, New Zealand, Europe, and the U.S.A. Size, country, and culture similarities still matters when firms choose their collaborators. The results are similar to the Chinese case study. Collaborating with foreign firms, local firms can obtain support in terms of capital, technology, management or exporting knowledge.

7.5 A Comparison of the Chinese and Australian Markets

According to the case studies conducted in this study, there are many differences in the Australian and Chinese telecom markets. The main differences include: market structure, mobile services, government policies and attitudes to collaboration. These differences in terms of China and Australia are discussed below. In China,

Table 7.7 A summary of the differences in the mobile telecommunications market in Australia and China

Differences	Australia	China
Market structure	Open competition	Half way on its reform to an open competitive market
Mobile services	Driven by customer needs	Driven by price of services
Regulations and laws	Self-regulation	Unclear and ambiguous
Attitudes to collaboration	Reluctant to change	Very active and positive

Source: Interview results from this study

'Guan Xi'[1] plays a vital role in business relationships (Gomez and Hsiao 2004; Lu et al. 2006; Sahakijpicharn 2007; Vipraio and Pauluzzo 2007), which has influenced its market structure and inter-firm collaborations. Table 7.7 compares differences in the Australian and Chinese mobile telecommunications markets.

7.5.1 Differences in Market Structure

The first difference between the Chinese and Australian markets is structure. The Australian market is a very competitive market with most firms privately owned. Entrance into the Australian telecom market (for example, applying for a carrier license) is much easier. However, in China all operators are still state-owned enterprises. The operators' licenses are released and managed by government with a requirement of high entry barriers (as discussed in Chap. 3). Therefore, it is very difficult for small sized firms or foreign firms to become an operator in China. The market is still under the oligopoly power of the three operators and more reforms are needed for it to become an open competitive market. The density of mobile subscribers per 100 inhabitants is still low compared with the Australian market. Therefore, more reforms such as access to open operator licences for foreign firms and lowering entry barriers are expected in the Chinese market.

Because of the special position of all operators in the Chinese market, operators are separated from common service providers. On the other hand, retailers are included in the Australian mobile telecommunications market. However, most shops and supermarkets play the role of retailers in China. As shown in Fig. 6.4 the Chinese telecom market is composed of device providers, operators, service providers, and content providers. However, the Australian telecom market is composed of device providers, service providers, content providers and retailers, as shown in Fig. 7.7.

[1] Guan Xi is one of the major resources in Chinese business, which has a positive influence on business performance (Lu et al. 2006) (e.g. reducing cost, enhancing networks or forming new collaborations).

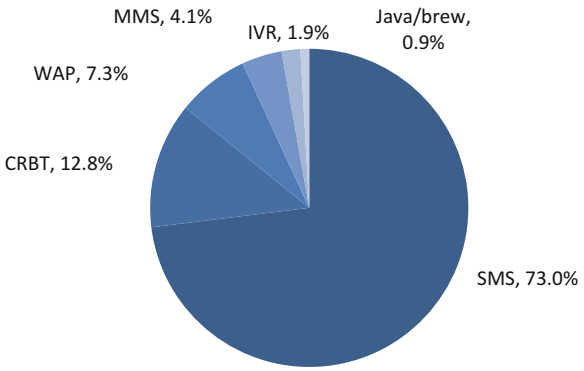

Fig. 7.15 Chinese mobile value-added services market share in 2009 (Source: Data collected from IResearch (2009))

On the other hand the market size is larger and growth rates are relatively high in China. The Chinese telecom market is regarded as one of the fastest developing markets in the world. The costs and prices of new content and services are higher in Australia because of higher labour and operating costs. However, the quality of content and services are also higher in Australia. These differences provide potential collaboration possibilities for firms from both countries.

7.5.2 Mobile Services

The second difference between the Chinese and Australian market is the preference for mobile services. Mobile services are divided into two kinds: basic and value-added services. Basic services include local or long distance calls, data transfer and reselling services. Customer preferences for price and quality of service are different in Australia and China, but popular services and content in each country are identical although the quality of these is different.

Figure 7.15 shows the market share of Chinese mobile value-added services in 2008. Short Message Service (SMS) was still the dominant service in the Chinese market. This was followed by CRBT (colourful ring back tone), WAP (Wireless Application Protocol), MMS (Multimedia Message Service), IVR (Interactive Voice Response) and Java/brew content (e.g. Java games). SMS is the most popular mobile service in the Chinese market because of its low cost, efficiency and recordable function. This is a very special characteristic of the Chinese mobile service market as price is still the driver for mobile content and services. Most of the Java applications and IVR services are higher cost services in China and, therefore, the selections of these services are lower. Therefore, the usage of value-added mobile services in China is driven by price.

The costs and prices of new content and services are still relatively high in Australia compared with China. The services Australians identified as the top three most interesting were positioning services, like GPS, followed by email and browsing the Internet (Access Economics 2007). On the other hand, there has

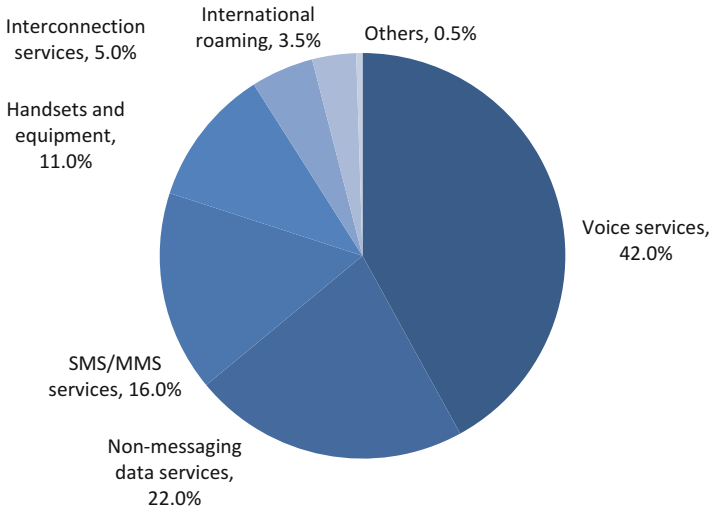

Fig. 7.16 Australian products and services segmentation in 2011 (Source: Data collected from IBIS (2011))

been a move towards post-paid mobile contracts from pre-paid services in Australia in the past 2 years (IBIS 2011) as customers can have better control over their total expenditures (AMTA 2010).

Figure 7.16 shows the Australian mobile products and services in 2011. Voice services are dominant in the products and services segmentation, which was 42 % of the market share. This was followed by non-messaging data services (e.g. game download), SMS/MMS services (which was the biggest share in the Chinese market), handsets and equipment, interconnection services, international roaming and others. Voice service is more expensive in Australia than in other countries (such as China). Therefore, mobile services usage in Australia is driven by market requirements.

Compared with the Chinese market Australian mobile content and services are driven by market needs. As the adoption of new technologies in Australia is relatively slow, the content and services on mobile devices are mainly limited by the turnover of new devices and handsets. Kelly Services (2009) found that more than 80 % of Australians believe that mobile communications technology has increased their personal productivity. The Chinese market, on the other hand, is oriented or significantly influenced by policies and regulations (Keane 2009).

From the interview results (in Chap. 6) the life cycle of mobile content in China is relatively short. Usually it can only exist for several weeks in the Chinese market. Compared with China, Australian mobile products and content have higher quality and longer life cycles. The rapid development of the Chinese market is good for business development. However, the short product life cycle and fierce competition have limited any long-run research and development plans. Therefore, most of the mature mobile products and content in China are imported from other countries.

Another notable change in both Australia and China is the high growth rate of 3G technology in the mobile market. This has increased the capacity of data transferring and processing dramatically, which provide opportunities for more mobile services and content in the market. As described in Chap. 6 and previous sections of this chapter, 3G mobile phones have increased dramatically in both Australia and China in the last 3 years.

Complementary resources (low development cost and a huge customer base in China and high quality products and high price of mobile contents in Australia) in different countries will encourage inter-firm collaboration (Deakins and Freel 2003). It also provides more opportunities for inter-firm collaboration between both countries. Content providers in China, during our interviews, showed great interest in providing content for the Australian mobile market. However, they are facing language and translation (culture and regulatory difference) problems, which are barriers for them to enter the Australian market. If the government provides suitable support services and programs targeting these problems, it may increase inter-firm collaboration and international transactions between both countries.

7.5.3 Regulations and Laws

A key difference between the Australian and Chinese market is that market entry in the Australian telecom sector is free to all foreign competitors. However, Telstra, Optus, and Vodafone & Hutchison still have significant market power in the carriers sector. They together occupied more than 99 % of the total Australian market in 2010. The Australian mobile market is also regulated by industry associations and private enterprises. The Australian government has provided strong policy support to the telecom industry to form a fair market for all firms and customers.

Compared with the Australian telecommunications market the Chinese market is relatively closed. Government policies are inclined to protect the industry instead. All operators in the Chinese telecom market are governed and protected by the Chinese government. There are no clear criteria on the application procedure and time for review, and, therefore, there is no guarantee of licenses being granted even if a company satisfies all requirements (Qiu 2005). Therefore, most foreign firms choose to cooperate with Chinese telecom firms to enter this market.

Intellectual property protection is also a problem in China. The IPP problem has also affected most content providers in China. Chinese content providers suffer from low revenue share as discussed in Chap. 6. Three interviewed managers in Australia and all of the managers from foreign firms in China pointed out the intellectual protection concern when talking about potential collaboration with Chinese firms. Foreign firms agreed that the poor intellectual protection status in China is a barrier for them to collaborate with Chinese firms. The problem is vital for most high technology industries where the products are easy to copy. Inter-firm collaboration can be greatly encouraged in China if the IPP problem is improved.

7.5.4 Attitudes to Collaboration

Although facing more barriers in international inter-firm collaboration (e.g. language and cultural barriers), Chinese firms are more active and positive in seeking international collaborations. However, Australian firms are reluctant to change or are usually more cautious in forming a new collaboration. This is in accord with previous empirical studies (Kuada 2002). The response rate of the interviews in this study from Australia (below 10 %) and China (100 %) also provide evidence to this result. The advantage of Australian firms' collaborating strategy is stability. It reduces most risks that may influence their development. However, the disadvantage of Australian firms' collaborating strategy is that a complex and long process in choosing a partner reduces business opportunities and potential profits. This is extremely important for high technology industries and products, where time and efficiency are vital.

7.6 Conclusions

Australian mobile markets have experienced remarkable growth over the past 20 years. The indirect contribution has overtaken the direct contribution of the mobile telecommunications industry to the Australian economy from 2006 to 2009 (Access Economics 2010). It is a competitive market, which is open to foreign competitors. Most of the Australian telecom firms are private firms. However, there is still oligopoly power in the carriers (CSP) sector.

The results from both the Australian and Chinese case studies have answered the primary research question in Chap. 4 '***What are the major types of collaboration, benefits and risks associated with inter-firm collaboration in the Australian and Chinese mobile telecommunication markets?***' Although the history and development of the mobile telecommunication markets are similar in Australia and China, there are still many remarkable differences between them. Some of these differences provide opportunities for inter-firm collaboration between both countries. For example, differences in price and the quality of mobile content. Other differences may be an obstacle to inter-firm collaboration (e.g. the IPP problem). Inter-firm collaboration could be significantly increased between both countries if the Australian and Chinese governments can provide suitable supporting services and programs.

To study the general problems facing inter-firm collaboration in a wider industrial range, a quantitative survey is conducted in the next chapter for both Australia and China covering the telecommunications, manufacturing and related services industries. The results provided in this chapter will be further examined in the quantitative study in Chap. 8.

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Chapter 8
A Quantitative Study of Collaboration

8.1 Introduction

Results from the qualitative study in Chaps. 6 and 7 provided valuable insights and data for the study of inter-firm collaboration in the Australian and Chinese Mobile Telecom market. However, the qualitative case study is limited by number of cases and location of the interviewed firms. To complement the findings from the qualitative study, a quantitative analysis is carried out based on primary data from an online survey.

To answer the second primary research question proposed in Chap. 4 "***What are the key determinants of successful inter-firm collaboration?***" this chapter provides a quantitative analysis of online survey data collected for China and Australia. As discussed in Chap. 3, a conceptual framework was structured from the previous literature and empirical studies. This framework is adopted in this chapter and linked with the data collected through the survey designed in Chap. 4. The reliability and validity of the data is discussed in this chapter. Statistical tests are conducted to test the hypotheses presented in Chap. 4. Data are then separated into subgroups for Australia and China for separate regression analyses. The implications from the quantitative results are discussed at the end of this chapter.

The structure of this chapter is as follows. First, the framework and variables are defined and discussed. Second, the econometric collaboration models are defined. Third, data sources and statistics of the collected data are described. Fourth, the results of data analysis and implications are discussed. At the end of this chapter, the results from the quantitative study are summarized and linked to the next and concluding chapter.

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8.2 Framework and Variables

Most of the existing research has focused on only the objective returns and benefits from inter-firm collaboration. However, Heide and Minor (1992) indicated that both subjective assessments and objective performance are significant in measuring a collaboration's outcomes and results. Therefore, the outcomes of a collaboration is measured by both subjective assessments and objective performance in this study, which includes a combination of 12 objective benefits and the participants' subjective assessment on the success level and fulfilling-expectations level of the collaboration (Reinig 2003; Hartono 2004). As discussed in Chap. 4, the variables are designed in an ordinal format (Groot and Brink 2003; Wes et al. 2005). The measurement of each variable is also discussed in the following section.

As discussed in Chap. 3, a framework of key determinants for successful inter-firm collaboration was derived from the literature and adopted in this chapter as a collaboration model. Figure 8.1 shows the key determinants for successful inter-firm collaboration, which are trust (Granovetter 1985; Borch 1994; Brunetto and Rod 2007), firm size (Berg et al. 1982; Harrigan 1988; Hagedoorn and Schakenraad 1994), previous experience (Anand and Khanna 2000), communication (Heide and Miner 1992; Kay 1993; Gulati 1998) and culture similarity or difference (Kuada 2002). All of them are expected to have a positive influence on the performance or outcomes of inter-firm collaboration. Each of these independent variables is explained in the following section.

8.2.1 Outcomes/Performance: (a) Objective Returns or Benefits

The objective performances are measured using 12 benefits as discussed in Chap. 3 (Burt 1983; Williamson 1991; Dyer and Singh 1998; Zacharia et al. 2011). The

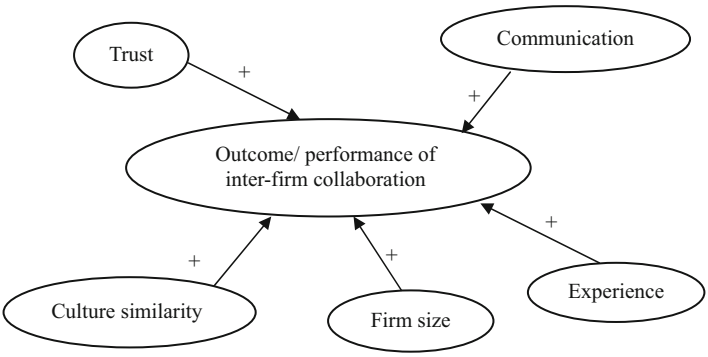

Fig. 8.1 Framework of key determinants for successful inter-firm collaboration (Source: Derived by the author)

objective success rate – OBSi (i = 1–12) is based upon the following 12 objective benefits[1]:

1. OBSTEC – access to new technology,
2. OBSCMP – improved global competitiveness,
3. OBSMSH – increased market share,
4. OBSCOS – cost-saving,
5. OBSRND – assist R&D,
6. OBSMIF – increased market influence,
7. OBSPFT – improved profitability,
8. OBSPDT – improved productivity,
9. OBSQLT – improved product quality,
10. OBSINO – increased innovation,
11. OBSGOV – access to government programs and
12. OBSPGM – allow participation in the global market.

These variables are obtained from questionnaire question 4.1 as in Table 8.1 below. For a more detailed discussion see Chap. 4. The last item in the question is to record new benefits generated from telecommunication industry' inter-firm collaborations, which is to verify the results from the qualitative study in this thesis "results from previous empirical studies may not be applied to new and dynamic industries, such as the telecommunication industry". Each of the 12 variables are valued from 0 to 5. As indicated in the questionnaire attached in the appendix C to this thesis, the number '0' (blank) is assumed as no benefits for this objective return from this inter-firm collaboration. Number '1' is a small increase, '2' is a medium increase, '3' is a large increase, '4' is a substantial increase and '5' is a very substantial increase in this objective return. Each of these objective returns is used as an objective independent variable in the quantitative model in the following sections.

8.2.2 Outcomes/Performance: (b) Subjective Success Rates

As discussed in Chaps. 3 and 4, both subjective assessment and fulfilling expectations are important in measuring the success rate of inter-firm collaboration (Reinig 2003; Hartono 2004). Therefore, they are obtained from questions 4.2 and 4.3 as in Table 8.2 below. For a more detailed discussion see Chap. 4. The SUBSUC (subjective overall success rate) and EXPECTED (fulfil expectations level) are measured by a five point Likert-type scale based upon the manager's opinion. The number '5' is strongly disagree, '4' is disagree, '3' is neutral, '2' is agree and '1' is strongly agree with the fulfil expectations or succeed in this inter-firm

[1] The 12 Objective benefits are used in separate regression models.

Table 8.1 Objective benefits and returns in the questionnaire

Benefits	Question 4.1 What benefits has this collaboration brought (Please leave blank if there is no influence.)
OBSTEC	Access to new technology
OBSCMP	Improved global competitiveness
OBSMSH	Increased market share
OBSCOS	Saving in costs
OBSRND	Assist research and development
OBSMIF	Increased market influence
OBSPFT	Improve profitability
OBSPDT	Improve productivity
OBSQLT	Improve product quality
OBSINO	Increase innovations
OBSGOV	Access to government programs
OBSPGM	Allowed participating in the global market

Source: Questionnaire designed in this thesis

Table 8.2 Subjective success rate in the questionnaire

Success rate	Questions
SUBSUC	4.2. To what extent do you agree this collaboration has fulfilled expectations?
EXPECTED	4.3. Would you regard this collaboration as successful?

Source: Questionnaire designed in this thesis

collaboration. Each of them is used as a subjective independent variable in the quantitative model in the following sections.

8.2.3 Independent Variables: Firm Size

Firm size is usually measured by annual sales or turnover, total assets, capital returns, and/or worldwide employee numbers of the firm in previous research. However, the definition of firm size is different in each country and even in different industries (Harvie and Lee 2003). Some of the previous empirical studies focus on developed countries (such as U.S.A. or Japan) and some only adopt financial data from annual reports which exclude the majority of micro and small sized firms. As this study has focused on Australia and China, the official definition used for firm size in both Australia and China is adopted. Firm size is generally measured by the number of employees in both Australia and China. The definitions are described in Table 8.3 below.

Therefore, firm size is put into six categories in this study: (1) less than 5 employees; (2) 5–19 employees; (3) 20–99 employees; (4) 100–199 employees; (5) 200–499 employees; and (6) 500 or more employees. Firms in category 1 are micro sized firms in both Australia and China, firms in categories 1, 2 and 3 are small sized firms in China; categories 1 and 2 are small sized firms in Australia;

Table 8.3 Definitions of firm size used in Australia and China

Firm size (employees)	Micro firm	Small firm	Medium firm	Large firm
China[a]	<5	<99	100–500	500 or more
Australia	<5	<19	20–199	200 or more

Source: From Harvie and Lee (2003), National Bureau of Statistics of China (2011) and ABS (2004)

[a]The definitions of SMEs in China had been changed from 2011, which was based on 16 different industries and included the annual revenue and total asset value as measurement for SMEs. However, as this research was conducted during 2007 and 2009, the definitions of Chinese SMEs used in this thesis follow the previous Chinese official definitions for SMEs

categories 4 and 5 are medium sized firms in China; categories 3 and 4 are medium sized firms in Australia; category 6 are large sized firms in China; and categories 5 and 6 are large sized firms in Australia. Therefore, firm size is defined using official definitions in Australia and China in this thesis. Two dummy variables are used in the model to verify the influence of firm size on performance or outcomes of inter-firm collaboration. LARGESIZE is the first dummy variable, in which '1' is more than 500 employees in China or 200 employees in Australia and '0' is less than those numbers in two countries. SMEs is a reference variable as a reverse of LARGESIZE firm, which is less than 500 employees in China or 200 employees in Australia.

To examine the influence of size difference on inter-firm collaboration a dummy variable based on size difference (SIZEDIF) is used in this study, calculated as the difference between the size of the surveyed firm and the size (in terms of employee numbers) of its partner. If size difference is '0' it means that the interviewed firm collaborated with a smaller partner. If the size difference is '1' it means that the surveyed firm collaborated with a peer or larger sized firm. If the partner firm size is unknown to the surveyed firm, it is assumed that the surveyed firm size is larger (because a larger firm usually has less information on its smaller partners). Size difference is used to examine the results from the previous qualitative study: firms prefer larger partners in inter-firm collaborations, and hypothesis 6 of the second primary research question in Chap. 4 "Size difference can be used to replace firm size in collaboration model". Therefore, SIZEDIF is used to replace absolute firm size in the quantitative models. These variables are obtained from questionnaire questions 1.2 and 2.2 as in Table 8.4 below. For a detailed discussion see Chap. 4.

8.2.4 Control Variables: Trust

As discussed in Chap. 3 the previous literature has defined trust based upon two principle concepts: reliance and risk (Currall and Judge 1995). Trust is an expression of confidence in inter-firm collaboration (Friedman 1991; Barney and Hansen 1994; Gulati 1998). Factors such as honest dealing (Das and Teng 1998) voracity, industry reputation (Barney 1986; Grant 1996; Saxton 1997; Lui and Ngo 2005),

Table 8.4 Firm size and size difference in the questionnaire

Firm size	Questions
Firm size (LARGESIZE and SIZEDIF)	Part 1: Information of your company 1.2. Full-time employee numbers
Partner size (SIZEDIF)	Part 2: Information of your partner 2.2. Full-time employee numbers

Source: Questionnaire designed in this thesis

business networks (Saxton 1997), previous experience (Gulati 1995b; Nooteboom et al. 1997), business and process (Creed and Miles 1996; Lui and Ngo 2005), quality of communication, openness on information (Zaheer et al. 1998; Elg 2007), and risk (Ring and Van de Ven 1994; Adobor 2005) have been used to study trust among collaborating partners. A contact person is vital to business trust, which is an omission in the previous literature (Adobor 2006a). Managers from the qualitative interviews also indicated that a contact person and similar goals are vital to the performance and outcomes of inter-firm collaboration in both Australia and China.

Drawing from the literature and suggestions from the interviewed managers, this study used a composite index for trust calculated from seven questions as designed in Chap. 4. As for the measurement, a five point Likert-type scale is adopted to indicate the interviewee subjective judgment on the trust level (SUBTRUST), risk level (RISK), structure similarity (SIMSTRUC), working process similarity (SIMPROCE), similar goal (SIMGOAL), industry reputation level of the partner firm (PREPUT), and reliability level of the contact person (CONTRELIA). As the risk level is negatively related to the trust level (Garvis 2000), the sign for the risk level is expected to be negative. The business network participation (NETWORK) is measured by five scales: 5-business network organizer; 4-very active in networks; 3-often attend business networks; 2-rarely attend networks; and 1-never attend business networks. Information share (INFOSHARE) is an objective value calculated from the interviewee's information openness (from 12 questions on the partner's information as listed in Table 8.5 below). The bigger the number the more information is known about its business partner. Therefore, '0' means no information about the business partner was obtained and a larger number means more information about the business partner (e.g. partner firm size, partner's previous experience, business structure and working process) was obtained. TRUST is an index calculated from all these related variables. Each of these variables is obtained from questionnaire questions as in Table 8.5 below. For a detailed discussion see Chap. 4. The formula for TRUST is as below:

$$\text{TRUST} = \text{SUBTRUST} - \text{RISK} + \text{SIMGOAL} + \text{SIMSTRUC} + \text{SIMPROCE} + \text{CONTRELIA} + \text{PREPUT} + \text{NETWORK} + \text{INFOSHARE}$$[2]

[2] It is assumed that each of these variables has an equal weighting in the formula for TRUST.

Table 8.5 Trust variables in the questionnaire

Trust	Questions
SUBTRUST	3.3. What is the trust level for this collaboration?
RISK	3.4. What is the risk level for this collaboration?
SIMGOAL	3.1 How similar are you and your business partner? (Please leave it blank if not sure)
SIMSTRUC	Expectations and Goals
SIMPROCE	Business Structures
	Working processes
CONTRELIA	2.5. The reliability level of the manager or contact person of your partner
PREPUT	2.6. How do you perceive the reputation level of your partner in its industry?
NETWORK	1.4. What role do you usually play in business networks?
INFOSHARE	Part 2: Information on your partner
	2.1. Country of ownership
	2.2. Full-time employee numbers
	2.3. Has your partner had similar collaboration experience within the last 10 years?
	2.4. What role does your partner usually play in its business networks?
	2.6. How do you perceive the reputation level of your partner in its industry?
	Part 3: Collaboration
	3.1 How similar are you and your business partner? (Please leave it blank if not sure)
	Expectations and Goals
	Culture backgrounds (include all ownership, contact manager and chief officers)
	Languages (include all contact employees)
	Religions (include all contact persons)
	Technological developments
	Business Structures
	Working processes

Source: Questionnaire designed for this thesis

8.2.5 Control Variables: Communication

Communication is examined through three aspects: efficiency, understanding, and proper frequency of communication during inter-firm collaborations (Olkkonen et al. 2000; Elg 2007; Zacharia et al. 2011). These characteristics have been suggested and examined by the interviewed managers in the first round of the pilot interviews. The formula for COMMU is as below:

$$\text{COMMU} = \text{COMMEFF} + \text{COMMUND} + \text{COMMFRE}^{3}$$

The quality of communication is calculated by summing the efficiency of communication (COMMEFF), understanding of communication (COMMUND),

[3] It is assumed that each of these variables has an equal weighting in the formula for COMMU.

Table 8.6 Communication variables in the questionnaire

Firm size	Questions 3.2. To what extent do you agree about the following communication quality involved in this collaboration?
COMMEFF	Efficiency of communication
COMMUND	Understanding of communication
COMMFRE	Frequency of communication

Source: Questionnaire designed for this thesis

and frequency of communication (COMMFRE). A five point Likert-type scale, from '1' (less quality in communication) to '5' (better quality in communication), is adopted to measure each of these communication variables. Each of these variables is obtained from questionnaire question 3.2 as in Table 8.6 above. For a detailed discussion see Chap. 4.

8.2.6 Control Variables: Previous Experience

There is debate in the literature on the contribution of previous experience to the performance of inter-firm collaboration. As discussed in Chaps. 3 and 4, some researchers have found that experience plays a significant role in collaboration results and performance (Harrigan 1986; Parkhe 1993b; Saxton 1997; Dyer and Singh 1998; Kay 1999; Hagedoorn et al. 2003). Others have argued that experience only contributes to certain types (same partner, same type, or within a short period) of collaboration (Saxton 1997; Winter and Zollo 1999). The formula for EXPERIENCE is as below:

$$\text{EXPERIENCE} = \text{EXPERI} + \text{PEXP}^{4}$$

The qualitative case study for both Australia and China showed that the experiences of a firm did not contribute significantly to inter-firm collaboration in the telecommunications industry. Therefore, it will be further examined in the quantitative analysis in this chapter. Collaboration experience in this chapter is the sum of the experience of the interviewed firm (EXPERI) and the experience of its partner firm (PEXP). A five point Likert-type scale is adopted to measure each of them. These two variables are obtained from questionnaire questions 1.3 and 2.3 as in Table 8.7 below. For a detailed discussion see Chap. 4.

[4] It is assumed that each of these variables has an equal weighting in the formula for EXPERIENCE.

Table 8.7 Previous experience in the questionnaire

Experience	Questions
EXPERI	Part 1: Information about your company
	1.3. Do you have similar collaboration experience within the last 10 years?
PEXP	Part 2: Information on your partner
	2.3. Does your partner have similar collaboration experience within the last 10 years?

Source: Questionnaire designed for this thesis

8.2.7 Control Variables: Cultural Similarity (Cultural Difference)

An empirical cross-national study conducted by Kuada (2002) showed that partners in different nations had limited knowledge about each other's culture, which affected the trust level during collaborations but had limited influence on the overall performance and results of the inter-firm collaboration. Vilana and Monroy (2010) argue that cultural similarity is also influenced by the external business environments (e.g. the stability of financial market or political environment). The framework proposed by Ronen and Shenkar (1985) included four dimensions of cultural difference: culture, language, religion, and technology similarities, which was based on comprehensive cultural literature. This framework was superior in identify the different attitudes and values in different cultural cluster groups and was adopted by many empirical studies. Therefore, it is also adopted in this thesis.

Therefore, culture similarity (CULTURE) in this thesis is examined using five different dimensions. The dimensions include culture similarity (SIMCULT), language similarity (SIMLANG), religion similarity (SIMREIG), and technological similarity (SIMTECH) (Park and Ungson 1997). LOCNAT (location and nationality difference) is a composite measure calculated from the location distance (whether located in the same continent) and nationality difference (measured by whether the collaborating firms have the same nationality, including multinational firms) of the collaborating firms. The formula for CULTURE is as below:

$$\text{CULTURE} = \text{SIMCULT} + \text{SIMLANG} + \text{SIMREIG} + \text{SIMTECH} + \text{LOCNAT}^{5}$$

LOCNAT is calculated from questions 1.1 and 2.1 as in Table 8.8, in which '1' means the nationalities are different and located continents are different (e.g. one firm is from Australia and the partner is from Africa), '2' means either nationalities or locations are different (e.g. one firm is from Australia and the partner is from New Zealand) and '3' means both firms have the same nationality and are located in the same continent (e.g. both firms are from Australia or have departments in Australia). The other four subjective measurements are obtained through a five point Likert-type scale question 3.1, in which '1' is not similar, '2' is quite

[5] It is assumed that each of these variables has an equal weighting in the formula for CULTURE.

Table 8.8 Culture similarity in the questionnaire

Trust	Questions
SIMCULT	Part 3: Collaboration
SIMLANG	3.1 How similar are you and your business partner? (Please leave it blank if not sure)
SIMREIG	Culture backgrounds (include all ownership, contact manager and chief officers)
SIMTECH	Languages (include all contact employees)
	Religions (include all contact persons)
	Technological developments
LOCNAT	Part 1: Information on your company
	1.1. Country of ownership (Please select multiple options if joint ownership)
	Part 2: Information on your partner
	2.1. Country of ownership (Please select multiple options if joint ownership)

Source: Questionnaire designed for this thesis

dissimilar, '3' is neutral, '4' is quite similar and '5' is very similar. These variables are obtained from questions as in Table 8.8 above. For a detailed discussion see Chap. 4.

8.3 Econometric Model

The second primary research question in Chap. 4 focuses on the key determinants of successful inter-firm collaboration. This thesis adopts a definition of inter-firm collaboration which includes a broader range of business transactions. Therefore, the general framework from Kale (1999) is adopted and expanded to include some new variables that are important to inter-firm collaboration which were identified during the qualitative case studies of Australia and China.

As discussed above, five key determinants: trust (TRUST), size (LARGESIZE as a dummy variable for large sized firm as '1' and SMEs as '0'), communication (COMMU), experience (EXPERIENCE), and culture similarity (CULTURE) are identified in this collaboration model. Three dependent variables: objective collaboration performance (OBSUCi, i=1–12), subjective success rate (SUBSUC), and fulfil expectations level (EXPECTED), are used in collaboration model 1 to 3. To study the different influences of each factor on the success rate and performance of inter-firm collaboration, an ordered probit method is adopted.

$$\begin{aligned} \text{OBSUCi} = {} & \beta 1\ \text{LARGESIZE} + \beta 2\ \text{TRUST} + \beta 3\ \text{COMMU} \\ & + \beta 4\ \text{EXPERIENCE} + \beta 5\ \text{CULTURE} + \varepsilon\ (\text{i} = 1 - 12) \end{aligned} \tag{1}$$

$$\begin{aligned} \text{SUBSUC} = {} & \beta 1\ \text{LARGESIZE} + \beta 2\text{TRUST} + \beta 3\ \text{COMMU} \\ & + \beta 4\ \text{EXPERIENCE} + \beta 5\ \text{CULTURE} + \varepsilon \end{aligned} \tag{2}$$

$$\begin{aligned} \text{EXPECTED} = {} & \beta 1\ \text{LARGESIZE} + \beta 2\text{TRUST} + \beta 3\ \text{COMMU} \\ & + \beta 4\ \text{EXPERIENCE} + \beta 5\ \text{CULTURE} + \varepsilon \end{aligned} \tag{3}$$

Where, OBSUCi (i = 1–12) are 12 objective performances or benefits brought by inter-firm collaboration; SUBSUC is the subjective value of the final success rate by the manager; EXPECTED is the subjective value of the fulfil expectation; LARGESIZE is a dummy variable for large firm, "1" means large sized firm and "0" means small or medium sized firm; TRUST is an index calculated from 9 dimensions as discussed in the following section; COMMUNICATION is the quality of communication in terms of efficiency, understanding and frequency; EXPERIENCE is firm experience and its partner's experience before the collaboration; CULTURE is the culture similarity between the interviewed firm and its partners; and ε is an error term. As discussed in previous sections, each control variable is obtained through different questions via a questionnaire.

Hypothesis one to five for the second primary research question in Chap. 4 can be explained in the following model via the sign for firm size, trust, communication, experience, and culture similarity as in the following specification:

$$\begin{aligned} & \text{Performance/Outcome} = \\ & \quad \text{f}\,(\text{Size}\,(+), \text{Trust}\,(+), \text{Communication}(+), \text{Experience}\,(+), \text{Culture}\,(+)) + \varepsilon \end{aligned}$$

Hypothesis six will be examined by introducing size difference in the collaboration models and comparing its influences on the performance and success rate of inter-firm collaboration with firm size from collaboration models in both Australia and China. Hypothesis seven will be examined by comparing the results from the Australian and Chinese datasets.

8.4 Data

8.4.1 Source of Data

The data for this analysis was collected from 341 Australian and Chinese firms through an online survey as described in Chap. 4. In the end, there were 339 valid surveys in this study including 100 samples from Australia and 239 samples from China. To reduce the complexity of this study, all of the surveys are based on collaboration cases, without separated parts for firms and cases as in the qualitative study in this thesis. A test for normality was carried out by analyzing the graphics of a single series and computing the skewness and kurtosis for each variable in Australia and China.

Table 8.9 Quantitative survey of Chinese firms

Basic descriptive statistics – China		Total sample: 239			
Type					
	Firm type	**Local owned**	**Foreign owned**	**(Multinational)**	
		209 (87.5 %)	30 (12.5 %)	12 (5 %)	
Size	**(* defined by China)**				
	Firm Size	**Micro**	**Small**	**Medium**	**Large**
		79 (33.1 %)	60 (25.1 %)	25 (10.5 %)	75 (31.4 %)
Independent		**Mean**	**Std. Dev.**	**Min.**	**Max.**
	Trust	32.23	4.17	11	43
	Communication	7.70	1.92	2	12
	Experience	6.19	2.32	1	11
	Culture	17.08	4.76	1	23
Performance and Success		**Mean**	**Std. Dev.**	**Min.**	**Max.**
	OBSTEC	2.22	2.10	0	5
	OBSCMP	1.76	2.00	0	5
	OBSMSH	1.66	1.89	0	5
	OBSCOS	2.12	2.11	0	5
	OBSRND	1.72	2.04	0	5
	OBSMIF	2.44	2.09	0	5
	OBSPFT	2.26	1.95	0	5
	OBSPDT	1.59	1.90	0	5
	OBSQLT	1.60	1.96	0	5
	OBSINO	1.64	1.96	0	5
	OBSGOV	1.46	1.96	0	5
	OBSPGM	1.56	1.99	0	5
	SUBSUC	3.41	1.09	1	5
	EXPECTED	3.38	1.07	1	5

Source: Data collected in this thesis

8.4.2 Basic Descriptive Statistics

The basic descriptive statistics for the Chinese and Australian results are described in Tables 8.2 and 8.3 below. Different sized firms (micro, small, medium, and large) are included in this study. This study also included foreign owned firms and multinational firms.

As shown in Table 8.9, there are a total of 239 samples in the Chinese database, including 209 (87.5 %) local firms and 30 (12.5 %) foreign firms. There are 12 multinational firms in the 30 foreign firms. In terms of firm size, there are 79 μ sized firms (less than 5 employees), 60 small sized firms (5–100 employees), 25 medium sized (100–500 employees) and 75 large sized firms (more than 500 employees) in the studied Chinese sample. The independent variables: trust,

communication, experience and culture similarity, follow a normal distribution. The standard deviation for trust, communication, experience and culture are 4.17, 1.92, 2.32 and 4.76 respectively. The subjective success rate: SUBSUC (subjective success rate) and EXPECTED (fulfil expectations level) follow a normal distribution with mean values around 2.6. However, the objective performances have high skewness towards '0' (no benefits).

As shown in Table 8.10, there are a total of 100 samples in the Australian database, including 96 (96 %) local firms and 4 (4 %) foreign firms. There is only 1 multinational firm of the 4 foreign firms. In terms of firm size, there are 91 μ sized firms (less than 5 employees), 2 small sized firms (5–19 employees), 2 medium sized (20–199 employees) and 5 large sized firms (more than 200 employees) in the studied Australian samples. In 2011 SMEs accounted for 99.7 % of all businesses in Australia, and small businesses constituted 91 % of all businesses (85.2 % of total businesses are micro sized) (ACCC 2009).

Compared with the Chinese dataset the percentages of local firms and micro firms are higher in Australia. The subjective success measures are higher with lower standard deviations in Australia than in China. However, the objective performances are much lower in Australia than in China. The mean values for trust, experience and culture similarity are lower in Australian inter-firm collaborations. However, the mean values for communication are higher in Australia than in China.

8.4.3 Separated Results for Different Sized Firms

To examine the influence of firm size on different perspectives of collaboration performance and the different returns for Australian and Chinese firms, a cross-tabulation method is adopted in both the Chinese and Australian different firm size analysis. The results are shown in Tables 8.11 and 8.12:

As shown in Table 8.11, in China the top returns from inter-firm collaboration for small sized firms are OBSTEC – access new technology, OBSCOS – cost saving and OBSMIF – increase market influence. The top returns for medium sized firms are OBSMSH – increase market share and OBSMIF – increase market influence. The top returns for large sized firms are OBSMIF – increase market influence and OBSPFT – increase profitability. The top benefits for all sized firms in China are OBSMIF – increase market influence and OBSPFT – increase profitability.

As shown in Table 8.12, in Australia the top returns from inter-firm collaboration for small sized firms are OBSCOS – cost saving and OBSMIF – increase market influence. As the number of medium sized firms is too small (only two cases), there are no outstanding benefits for medium sized firms in Australia. The top return for large sized firms is OBSMIF – increase market influence. The top benefit for all sized firms in Australia is OBSCOS – cost saving, which is much higher than all the other returns.

Table 8.10 Quantitative survey of Australian firms

Basic descriptive statistics – Australia		Total sample: 100			
Type					
	Firm type	**Local owned**	**Foreign owned**	**(Multinational)**	
		96 (96 %)	4 (4 %)	1 (1 %)	
Size	**(* Defined by Australia)**				
	Firm Size	**Micro**	**Small**	**Medium**	**Large**
		91 (91 %)	2 (2 %)	2 (2 %)	5 (5 %)
Independent		**Mean**	**Std. Dev.**	**Min.**	**Max.**
	Trust	32.11	3.84	22	43
	Communication	8.10	1.86	3	12
	Experience	5.43	2.09	2	11
	Culture	14.90	4.09	5	23
Performance and Success		**Mean**	**Std. Dev.**	**Min.**	**Max.**
	OBSTEC	1.42	2.14	0	5
	OBSCMP	1.30	2.08	0	5
	OBSMSH	0.37	1.16	0	5
	OBSCOS	2.80	2.31	0	5
	OBSRND	0.50	0.41	0	5
	OBSMIF	1.89	2.32	0	5
	OBSPFT	0.68	1.55	0	5
	OBSPDT	0.47	1.33	0	5
	OBSQLT	0.73	1.67	0	5
	OBSINO	0.50	1.40	0	5
	OBSGOV	0.39	1.31	0	5
	OBSPGM	0.92	1.89	0	5
	SUBSUC	3.73	1.00	1	5
	EXPECTED	3.43	1.02	1	5

Source: Data collected in this thesis

From these results there is a clear trend for inter-firm collaboration for different sized firms. Small sized firms are more likely to collaborate on cost saving and increasing market influence and large sized firms focus more on their market influence and profitability in both Australia and China. Therefore, Chinese businesses target more on increasing profits or market influence in their inter-firm collaborations. However, for Australian businesses, decreasing production cost is more important in inter-firm collaborations. Given the different results generated from Australian and Chinese datasets, the benefits coming from inter-firm collaboration are very different in different countries. Are the performances of collaborations also influenced by different factors in different countries? To answer this question the results are examined via a quantitative data analysis method in the following section.

Table 8.11 Chinese results for different sized firms

China	OBSTEC	%	OBSCMP	%	OBSMSH	%	OBSCOS	%	OBSRND	%	OBSMIF	%	OBSPFT	%
Small 0	62	45	77	55	93	67	69	50	86	62	58	42	71	51
1	3	2.2	1	0.7	1	0.7	3	2.2	1	0.7	3	2.2	4	2.9
2	7	5	7	5	7	5	6	4.3	7	5	7	5.1	11	7.9
3	16	12	17	12	15	11	14	10	13	9.4	16	12	16	12
4	16	12	14	10	17	12	16	12	18	13	15	11	19	14
5	35	25	23	17	6	4.3	31	22	14	10	39	28	18	13
Subtotal	139	100	139	100	139	100	139	100	139	100	139	100	139	100
Medium 0	5	20	6	24	2	8	9	36	8	32	3	12	1	4.2
1	2	8	0	0	1	4	0	0	0	0	1	4	0	0
2	4	16	4	16	3	12	0	0	3	12	1	4	4	17
3	4	16	2	8	6	24	5	20	2	8	7	28	10	42
4	4	16	10	40	9	36	8	32	6	24	8	32	6	25
5	6	24	3	12	4	16	3	12	6	24	5	20	3	13
Subtotal	75	100	75	100	75	100	75	100	75	100	75	100	75	100
Large 0	33	44	43	57	30	40	30	40	37	49	26	35	17	23
1	2	2.7	1	1.3	3	4	0	0	1	1.3	4	5.3	2	2.7
2	3	4	9	12	5	6.7	3	4	4	5.3	5	6.7	3	4
3	11	15	6	8	13	17	10	13	9	12	10	13	16	21
4	13	17	7	9.3	15	20	18	24	6	8	13	17	22	29
5	13	17	9	12	9	12	14	19	18	24	17	23	15	20
Subtotal	25	100	25	100	25	100	25	100	25	100	25	100	25	100
All size +	139		114		114		131		108		151		150	
China	OBSPDT	%	OBSQLT	%	OBSIND	%	OBSGOV	%	OBSPGM	%	EXPECTED	%	SUBSUC	%
Small 0	83	60	86	62	83	60	92	66	87	63				
1	4	2.9	4	2.9	4	2.9	1	0.7	4	2.9	2	1.4	16	12
2	7	5	10	7.2	5	3.6	6	4.3	6	4.3	69	50	44	32
3	12	8.6	14	10	18	13	11	7.9	15	11	29	21	46	33
4	19	14	14	10	18	13	9	6.5	7	5	25	18	21	15
5	14	10	11	7.9	11	7.9	20	14	20	14	14	10	12	8.6
Subtotal	139	100	139	100	139	100	139	100	139	100	139	100	139	100
Medium 0	7	28	5	20	7	28	10	40	7	28				
1	0	0	3	12	2	8	0	0	0	0	3	12	3	12
2	5	20	1	4	2	8	3	12	1	4	14	56	14	56
3	6	24	2	8	5	20	5	20	3	12	6	24	6	24
4	6	24	9	36	4	16	4	16	10	40	2	8	2	8
5	1	4	5	20	5	20	3	12	4	16	0	0	0	0
Subtotal	75	100	75	100	75	100	75	100	75	100	75	100	75	100
Large 0	40	53	40	53	39	52	43	57	44	59				
1	1	1.3	2	2.7	1	1.3	3	4	1	1.3	13	17	13	17
2	7	9.3	4	5.3	6	8	3	4	6	8	42	56	38	51
3	7	9.3	6	8	6	8	7	9.3	4	5.3	11	15	15	20
4	13	17	9	12	10	13	11	15	11	15	3	4	3	4
5	7	9.3	14	19	13	17	8	11	9	12	6	8	6	8
Subtotal	25	100	25	100	25	100	25	100	25	100	25	100	25	100
All size +	109		108		110		94		101		239		239	

Source: Data collected in this thesis

Table 8.12 Australian results for different sized firms

Australia		OBSTEC	%	OBSCMP	%	OBSMSH	%	OBSCOS	%	OBSRND	%	OBSMIF	%	OBSPFT	%
Small	0	67	72	70	75	89	96	38	41	86	92	59	63	80	86
	1	1	1.1	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	1	1.1	1	1.1	0	0	0	0	2	2.2
	3	1	1.1	1	1.1	0	0	1	1.1	0	0	1	1.1	1	1.1
	4	2	2.2	4	4.3	1	1.1	9	9.7	2	2.2	4	4.3	3	3.2
	5	22	24	18	19	2	2.2	44	47	5	5.4	29	31	7	7.5
Subtotal		93	100	93	100	93	100	93	100	93	100	93	100	93	100
Medium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	1	50	1	50	1	50	1	50
	3	2	100	1	50	1	50	1	50	0	0	0	0	0	0
	4	0	0	1	50	1	50	0	0	0	0	1	50	1	50
	5	0	0	0	0	0	0	0	0	1	50	0	0	0	0
Subtotal		2	100	2	100	2	100	2	100	2	100	2	100	2	100
Large	0	0	0	1	20	1	20	0	0	2	40	0	0	2	40
	1	1	20	0	0	0	0	1	20	0	0	0	0	1	20
	2	1	20	1	20	1	20	0	0	1	20	0	0	0	0
	3	1	20	0	0	0	0	3	60	0	0	1	20	1	20
	4	2	40	3	60	3	60	1	20	2	40	4	80	1	20
	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal		5	100	5	100	5	100	5	100	5	100	5	100	5	100
All size +		**33**		**29**		**10**		**62**		**12**		**41**		**18**	
		OBSPDT	%	OBSQLT	%	OBSINO	%	OBSGOV	%	OBSPGM	%	EXPECTED	%	SUBSUC	%
Small	0	86	92	81	87	86	92	89	96	78	84				
	1	1	1.1	0	0	0	0	0	0	0	0	4	4.3	21	23
	2	0	0	1	1.1	1	1.1	0	0	0	0	54	58	40	43
	3	1	1.1	0	0	0	0	0	0	1	1.1	17	18	20	22
	4	1	1.1	1	1.1	1	1.1	0	0	1	1.1	12	13	10	11
	5	4	4.3	10	11	5	5.4	4	4.3	13	14	6	6.5	2	2.2
Subtotal		93	100	93	100	93	100	93	100	93	100	93	100	93	100
Medium	0	0	0	0	0	0	0	0	0	0	0				
	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	1	50	1	50
	3	1	50	2	100	1	50	1	50	1	50	0	0	0	0
	4	0	0	0	0	1	50	0	0	0	0	0	0	1	50
	5	1	50	0	0	0	0	1	50	1	50	1	50	0	0
Subtotal		2	100	2	100	2	100	2	100	2	100	2	100	2	100
Large	0	1	20	2	40	2	40	2	40	2	40				
	1	1	20	0	0	0	0	1	20	0	0	2	40	2	40
	2	1	20	0	0	0	0	0	0	1	20	2	40	1	20
	3	0	0	2	40	0	0	0	0	0	0	1	20	2	40
	4	2	40	0	0	3	60	0	0	0	0	0	0	0	0
	5	0	0	1	20	0	0	2	40	2	40	0	0	0	0
Subtotal		5	100	5	100	5	100	5	100	5	100	5	100	5	100
All size +		**13**		**17**		**12**		**9**		**20**		**100**		**100**	

Source: Data collected in this thesis

8.5 Data Analyses and Results

8.5.1 Performance and Objective Returns

The objective returns in collaboration model (1) are conducted by an Ordered Probit method.[6] The datasets for China and Australia are analysed separately.

As shown in Table 8.13, the objective performances of inter-firm collaboration are influenced by different factors in terms of different returns. However, in general, TRUST plays a significant positive role in most of the objective returns (except OBSCOS – cost saving and OBSGOV – access to government programs) in China. CULTURE plays a significant negative role in all objective returns in China, which is the opposite of what might be expected. COMMU has a significant

Table 8.13 Benefits from collaboration – China

VARIABLES	OBSTEC	OBSCMP	OBSMSH	OBSCOS	OBSRND	OBSMIF
LARGESIZE	–0.221	–0.372**	0.290*	0.0222	0.244	–0.0263
	(0.169)	(0.179)	(0.172)	(0.170)	(0.176)	(0.166)
TRUST	0.0400*	0.0851***	0.0956***	–0.00204	0.0474*	0.0433*
	(0.0229)	(0.0248)	(0.0246)	(0.0225)	(0.0247)	(0.0226)
COMMU	–0.0921**	0.0141	0.00217	0.0773*	0.0115	0.0041
	(0.0437)	(0.0466)	(0.0464)	(0.0442)	(0.0470)	(0.0433)
EXPERIENCE	0.0263	–0.00643	0. 00881	0.0330	–0.0331	–0.0287
	(0.0358)	(0.0381)	(0.0376)	(0.0361)	(0.0380)	(0.0356)
CULTURE	–0.0540***	–0.132***	–0.140***	–0.0440**	–0.114***	–0.0435**
	(0.0177)	(0.0195)	(0.0194)	(0.0177)	(0.0192)	(0.0176)
VARIABLES	OBSPFT	OBSPDT	OBSQLT	OBSINO	OBSGOV	OBSPGM
LARGESIZE	0.540***	0.121	0.104	0.182	–0.119	–0.150
	(0.165)	(0.175)	(0.176)	(0.174)	(0.182)	(0.184)
TRUST	0.0815***	0.0739***	0.0793***	0.0633***	0.0371	0.0587**
	(0.0228)	(0.0246)	(0.0245)	(0.0243)	(0.0250)	(0.0258)
COMMU	0.0136	0.0125	0.00784	0.0186	0.0261	0.0731
	(0.0434)	(0.0464)	(0.0467)	(0.0462)	(0.0477)	(0.0485)
EXPERIENCE	–0.0587*	–0.117***	–0.0213	–0.0660*	0.0299	–0.0175
	(0.0356)	(0.0382)	(0.0382)	(0.0375)	(0.0391)	(0.0396)
CULTURE	–0.0659***	–0.113***	–0.125***	–0.102***	–0.120***	–0.164***
	(0.0176)	(0.0192)	(0.0193)	(0.0189)	(0.0197)	(0.0207)

Source: Data collected in this thesis

Standard errors in parentheses
p<0.1; ** p<0.05; *** p<0.01

[6] Another Probit model has been tested for this study (using a dummy variable for OBSUCi in model 1). Although the adjusted R^2 is slightly higher than the Ordered Probit model, the significance levels and signs of the coefficients are not significantly different.

Table 8.14 Benefits from collaboration – Australia

VARIABLES	OBSTEC	OBSCMP	OBSMSH	OBSCOS	OBSRND	OBSMIF
LARGESIZE	1.029*	0.964*	1.110*	–0.501	1.120*	1.112**
	(0.567)	(0.572)	(0.598)	(0.533)	(0.607)	(0.545)
TRUST	0.0829*	–0.0828*	–0.115*	0.0305	–0.00953	0.0223
	(0.0440)	(0.0441)	(0.0660)	(0.0387)	(0.0519)	(0.0413)
COMMU	0.339***	0.115	–0.0256	0.165**	0.0181	–0.163**
	(0.0966)	(0.0876)	(0.110)	(0.0770)	(0.102)	(0.0769)
EXPERIENCE	–0.162*	–0.138*	0.228**	0.0393	–0.0286	–0.132*
	(0.0856)	(0.0803)	(0.113)	(0.0710)	(0.0927)	(0.0738)
CULTURE	–0.0618	0.0511	0.0860	0.0603*	–0.00581	–0.0263
	(0.0390)	(0.0381)	(0.0625)	(0.0347)	(0.0451)	(0.0352)
VARIABLES	OBSPFT	OBSPDT	OBSQLT	OBSINO	OBSGOV	OBSPGM
LARGESIZE	1.045*	1.107*	0.672	1.315**	2.103***	1.283**
	(0.596)	(0.604)	(0.595)	(0.652)	(0.814)	(0.633)
TRUST	0.0429	–0.00835	0.0395	0.0373	–0.223**	–0.0880*
	(0.0464)	(0.0506)	(0.0481)	(0.0526)	(0.110)	(0.0502)
COMMU	0.062	0.16	0.0179	0.154	0.167	–0.0452
	(0.0943)	(0.112)	(0.0939)	(0.114)	(0.160)	(0.0917)
EXPERIENCE	–0.101	0.0402	0.103	–0.0848	0.0333	–0.0662
	(0.0851)	(0.103)	(0.0897)	(0.110)	(0.152)	(0.0858)
CULTURE	–0.0240	0.0459	–0.0106	0.0632	0.325**	0.0494
	(0.0416)	(0.0509)	(0.0433)	(0.0523)	(0.146)	(0.0420)

Source: Data collected in this thesis

Standard errors in parentheses

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

negative influence on OBSTEC – access to new technology and a significant positive influence (at the 10 % level) on OBSCOS – cost saving in China. LARGESIZE has a significant negative influence on OBSCMP – increase global competitiveness and significant positive influence on OBSMSH – increase market share and OBSPFT – increase profitability in China. On the other hand, EXPERIENCE has a significant negative influence on OBSPFT – increase profitability, OBSPDT – increase productivity and OBSINO – increase innovation in China. These results compare with the Australian results in Table 8.14:

As shown in Table 8.14, the Australian results are different from the Chinese ones. In general, LARGESIZE plays a significant positive role in most of the objective returns (except OBSCOS – cost saving and OBSQLT – increase product quality) in Australia. CULTURE plays a significant positive role on OBSCOS – cost saving and OBSGOV – access to government programs in Australia. TRUST plays a significant positive role on OBSTEC – access new technology but a significant negative role on OBSCMP – increase global competitiveness, OBSMSH – increase market share, OBSGOV – access to government program and OBSPGM – participate in the global market in Australia. COMMU has a significant positive influence on OBSTEC – access new technology and OBSCOS – cost saving and has a significant negative influence on OBSMIF – increase market influence in Australia. EXPERIENCE has a

Table 8.15 Subjective success rates – Australia and China

VARIABLES	CHINA SUBSUC	AUSTRALIA SUBSUC
LARGESIZE	0.371**	0.105
	(0.169)	(0.562)
TRUST	0.130***	0.137***
	(0.0231)	(0.0384)
COMMU	0.278***	0.311***
	(0.0456)	(0.0737)
EXPERIENCE	–0.0281	–0.00809
	(0.0352)	(0.0641)
CULTURE	–0.0330*	–0.0786**
	(0.0173)	(0.0321)
Observations	239	100

Source: Data collected in this thesis

Standard errors in parentheses

* p<0.1; ** p<0.05; *** p<0.01

significant negative influence on OBSTEC – access new technology, OBSCMP – increase global competitiveness and OBSMIF – increase market influence but has a significant positive influence on OBSMSH – increase market share in Australia. On the other hand, culture similarity has a positive influence on OBSCOS – cost saving and OBSGOV – access to government programs in Australia.

Compared with the Chinese results, TRUST plays a less important role in Australian inter-firm collaborations in terms of objective performance or returns. It even has a significant negative influence on most of the objective performances in Australia. However, LARGESIZE plays a more important role in Australia than in China in terms of collaboration performance. CULTURE plays a more positive role in collaboration performance in Australia than in China. The objective performance in Australia and China has been influenced by very different factors. Is there any difference between the subjective success rate and fulfilling expectation levels in Australia and China (as in collaboration models 2 and 3)? To answer this question the subjective results from both Australia and China are tested and compared in collaboration model (2) and (3), in the following section.

8.5.2 Subjective Success Rate and Fulfilling Expectations

The subjective success rate and fulfilling expectation levels for both Australia and China in collaboration models (2) and (3) are examined via an ordered probit method. The Chinese and Australian results are compared in the following tables.

As shown in Table 8.15 the subjective success rate (collaboration model 2) for inter-firm collaboration in Australia and China are influenced by similar factors.

Table 8.16 Fulfilling expectation levels – Australia and China

VARIABLES	CHINA EXPECTED	AUSTRALIA EXPECTED
LARGESIZE	0.580***	1.338**
	(0.178)	(0.610)
TRUST	0.121***	0.160***
	(0.0233)	(0.0406)
COMMU	0.217***	0.257***
	(0.0456)	(0.0764)
EXPERIENCE	–0.000887	–0.0384
	(0.0361)	(0.0679)
CULTURE	–0.0387**	–0.0736**
	(0.0177)	(0.0336)
Observations	239	100

Source: Data collected in this thesis

Standard errors in parentheses
* p<0.1; ** p<0.05; *** p<0.01

TRUST and COMMU play a significant positive role on the subjective success rate in both Australia and China. CULTURE plays a significant negative role on the subjective success rate in both Australia and China. EXPERIENCE has no significant influence on the subjective success rate of collaboration in either Australia or China. However, LARGESIZE plays a significant positive role (at the 5 % level) only in China but not in Australia. These results are different from the objective performances, in which LARGESIZE plays a more important role in business performance in Australia than in China.

Table 8.16 shows the results of fulfilling expectation levels (collaboration model 3) for inter-firm collaboration in Australia and China. LARGESIZE, TRUST and COMMU play a significant and positive role in fulfilling expectation levels in both Australia and China. CULTURE plays a significant negative role in fulfilling expectation levels in both Australia and China. The coefficient for EXPERIENCE is not significant at all levels in models (2) and (3) in Australia or China. This result accords with the subjective success rate.

As the results for both the subjective success rate and fulfilling expectation levels are very similar, the two variables are assumed to be replaceable with each other. Therefore, a sign test is conducted to verify the H0: median of EXPECTED – SUBSUC = 0.

As shown in Table 8.17 the binomial for a two-sided test is 0.6488. Therefore, the H0 cannot be rejected. As shown in Tables 8.15 and 8.16, the coefficients of the independent variables for fulfilling expectations in collaboration model (3) are more significant than the results for the subjective success rate in collaboration model (2) for both Australia and China.

Table 8.17 Sign test for subjective variables

Sign test		
Sign	Observed	Expected
Positive	36	38.5
Negative	41	38.5
Zero	162	162
Two-sided test:		
Ho: median of EXPECTED – SUBSUC = 0 vs.		
Ha: median of EXPECTED – SUBSUC ! = 0 (<>)		
Pr(#positive >= 41 or #negative >= 41) = min(1, 2*Binomial(n = 77, x >= 41, p = 0.5)) = 0.6488		

Source: Data collected in this thesis

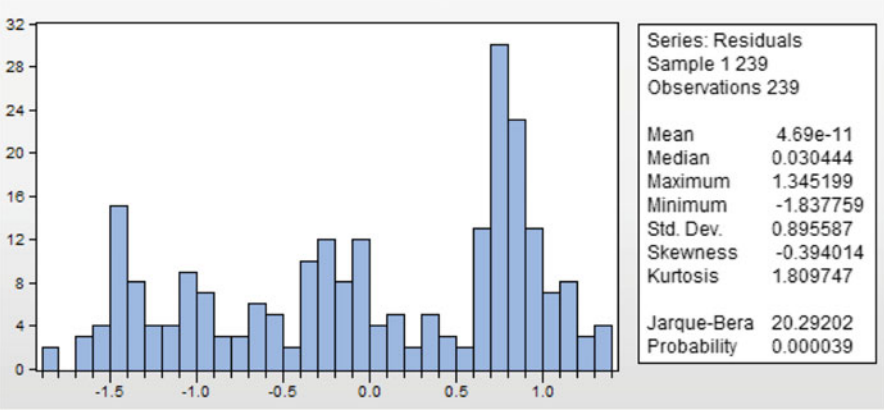

Fig. 8.2 Residuals test for normality – China (Source: Data collected in this thesis)

8.5.3 Residual Test

As shown in Fig. 8.2 the residual test shows an estimated normal distribution with a bell shaped curve. The skewness and kurtosis of the residuals are −0.39 and 1.81 for the Chinese samples. This meets the assumption of normally distributed error terms.

As shown in Fig. 8.3 the residual test shows an estimated normal distribution with a bell shaped curve. The skewness and kurtosis of the residuals are −0.72 and 2.17 for the Australian samples. It meets the assumption of normally distributed error terms.

8.5.4 Stability and Specification Test

No economic model can avoid the omitted variable problem. The adjusted goodness of fit index in this model is only 0.16, which shows that there may be omitted variables for this model. As inter-firm collaboration involves a very complex

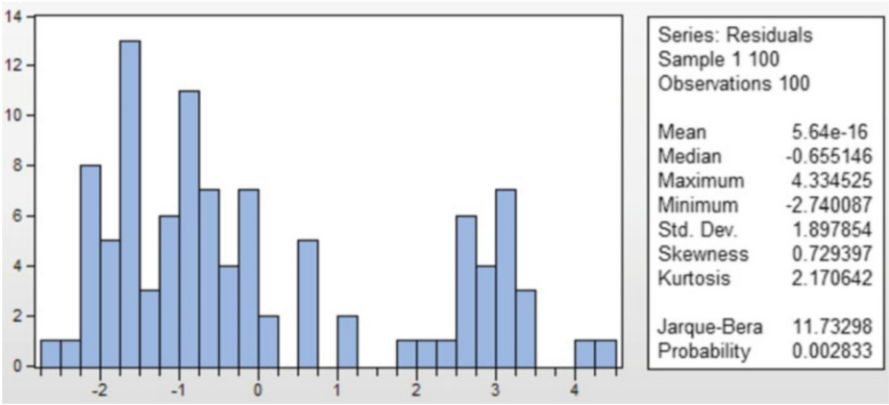

Fig. 8.3 Residuals test for normality – Australia (Source: Data collected in this thesis)

interaction between firms it is related to almost all the departments, individuals, and backgrounds of a firm, and it is different in any specific case. Therefore, the designed questionnaire would be large if all the related stories are included. As a result, the response rate would likely be low. There are always tradeoffs in such survey research.

Furthermore, some variables are not available or are unable to be published (e.g. financial data from a micro firm or the maintaining fees for Guan Xi in Chinese collaborations). As this study includes most micro and small firms, some of these factors are excluded from this thesis although they could be important to inter-firm collaboration. Therefore, the questionnaire used in this study has focused only on the most important factors.[7]

8.5.5 Replace Size with Size Difference

To examine hypothesis six for the second primary research question "Size difference has a positive influence on inter-firm collaboration. It can be used to replace size in collaboration model", SIZEDIF (size difference) is used to replace the independent variable LARGESIZE in the collaboration model (1) – (3). The results are shown in Table 8.18 for the Chinese dataset and Table 8.19 for the Australian dataset.

As shown in Table 8.18, SIZEDIF is negatively related to the subjective success rate and fulfilling expectation levels of inter-firm collaboration in the Chinese samples. The signs and significance levels of the remaining coefficients are the

[7] The correlation between the independent variables in the collaboration model is expected to be high because of the 5 point-Likert scale measurement. However, if the index for each independent variable is changed into a continuous form (divided by a constant value), the correlation has been solved and the significance level of each variable has no significant change.

Table 8.18 Using size difference to replace size – China

China	LARGESIZE	TRUST	COMMU	EXPERIENCE	CULTURE
OBSTEC		(+)*	(−)**		(−)***
OBSCMP	(−)**	(+)***			(−)***
OBSMSH	(+)*	(+)***			(−)***
OBSCOS			(+)*		(−)**
OBSRND		(+)*			(−)***
OBSMIF		(+)*			(−)**
OBSPFT	(+)***	(+)***		(−)*	(−)***
OBSPDT		(+)***		(−)***	(−)***
OBSQLT		(+)***			(−)***
OBSINO		(+)***		(−)*	(−)***
OBSGOV					(−)***
OBSPGM		(+)**			(−)***
subsuc	(+)**	(+)***	(+)***		(−)*
expected	(+)***	(+)***	(+)***		(−)**
China	**SIZEDIF**	**TRUST**	**COMMU**	**EXPERIENCE**	**CULTURE**
OBSTEC	(+)**		(−)**		(−)***
OBSCMP		(+)**			(−)***
OBSMSH		(+)***			(−)***
OBSCOS			(+)*		(−)***
OBSRND		(+)*			(−)***
OBSMIF	(+)*	(+)*			(−)**
OBSPFT	(−)***	(+)***			(−)***
OBSPDT		(+)**		(−)**	(−)***
OBSQLT		(+)**			(−)***
OBSINO		(+)*			(−)***
OBSGOV					(−)***
OBSPGM			(−)**		(−)***
Subsuc	(−)**	(+)***	(+)***		(−)**
Expected	(−)***	(+)***	(+)***		(−)***

Source: Data collected in this thesis

same as those for models with LARGESIZE (as in the upper table). Although the significance levels of some of the coefficients for objective performance are slightly different, there is no big change. Therefore, the results support hypothesis 6 "it is possible to replace size with size difference in the collaboration models". The results for the Australian samples are examined and compared in Table 8.19.

As shown in Table 8.19, SIZEDIF has no significant role in the subjective success rate and fulfilling expectation levels of inter-firm collaboration in the Australian samples. However, the signs and significance levels of the remaining coefficients are the same as those for models with LARGESIZE (as in the upper table). Although some coefficients for size difference are different in the objective performances, there is no big change in the other coefficients. Therefore, the results also support hypothesis 6. It is possible to replace size with size difference in collaboration models. Another result is that the sign of the coefficient for SIZEDIF is negative (the sign of LARGESIZE is positive), which implies that collaborations with smaller partners are easier to achieve success.

Table 8.19 Using size difference to replace size – Australia

Australia	LARGESIZE	TRUST	COMMU	EXPERIENCE	CULTURE
OBSTEC	(+)*	(+)*	(+)***	(−)*	
OBSCMP	(+)*	(−)*		(−)*	
OBSMSH	(+)*	(−)*		(+)**	
OBSCOS			(+)**		(+)*
OBSRND	(+)*				
OBSMIF	(+)**		(−)**	(−)*	
OBSPFT	(+)*				
OBSPDT	(+)*				
OBSQLT					
OBSINO	(+)**				
OBSGOV	(+)***	(−)**			(+)**
OBSPGM	(+)**	(−)*			
Subsuc		(+)***	(+)***		(−)**
Expected	(+)**	(+)***	(+)***		(−)**
Australia	**SIZEDIF**	**TRUST**	**COMMU**	**EXPERIENCE**	**CULTURE**
OBSTEC	(−)*		(+)***		
OBSCMP	(−)***	(−)**			(+)**
OBSMSH		(−)**		(+)***	
OBSCOS			(+)**		
OBSRND					
OBSMIF					
OBSPFT					
OBSPDT					
OBSQLT				(+)*	
OBSINO	(−)*				(+)**
OBSGOV		(−)*			(+)***
OBSPGM		(−)**			
Subsuc		(+)***	(+)***		(−)**
Expected		(+)***	(+)***		(−)**

Source: Data collected in this thesis

8.6 Discussion of Results

The second primary research question proposed the question "***What are the key determinants of successful inter-firm collaboration?***" with seven hypotheses. This question has been answered through the previous data analysis. The answers to the seven hypotheses and their implications are now discussed.

1. **Trust**
   The data analysis suggests that trust is significantly related with the subjective success rate and fulfilling expectation levels. The results are consistent with findings from the alliances and collaboration literature (Granovetter 1985; Borch 1994; Brunetto and Rod 2007). Trust was also mentioned as a key determinant of successful inter-firm collaboration by managers during interviews in both

Australia and China. The results accord with the qualitative results in Chaps. 6 and 7. Trust plays a vital role in inter-firm collaboration in both Australia and China.

On the other hand trust also influences or is influenced by, other variables. Communication, previous experience, and culture similarity may have a positive influence on the trust level. A higher trust level also has a positive influence on the quality of communication and the accumulation of experience.

However, separate regressions on objective returns and subjective views on the success rate in this study showed that trust is less significant to the objective performance than to the subjective success rate. The regressions supported that trust plays a more important role in Chinese inter-firm collaborations than that for Australian inter-firm collaborations. Trust is especially important in the selection and formation of inter-firm collaboration. It also plays an important role in long-term consistent collaboration.

2. **Communication**

Communication is believed to play an important role in inter-firm collaboration. Many research results support this view (Heide and Miner 1992; Kay 1993; Gulati 1998). Data analysis in this thesis also supports the view that communication is positively related with the business collaborating success rate and the fulfilment of expectation levels. It plays a more important role in the subjective success rate than in the objective performance in inter-firm collaboration. It is significant to inter-firm collaboration in both Australia and China. The results are in accord with the qualitative results reported in Chaps. 6 and 7. Proper communication plays an important role in inter-firm collaboration in both Australia and China.

In inter-firm collaboration communication is important to build and maintain a trust relationship, reduce risks and control uncertainties, accumulate good experience, and increase the possibility of further collaboration. It is vital to not only inter-firm collaborations, but also business performance and growth in the long run.

3. **Previous experience**

Previous literature on alliances suggests that one of the most important factors in an alliance success is previous alliance experience (Anand and Khanna 2000). However, Anand and Khanna (2000) and Kale (1999) also observe that, although significant, experience contributed only a limited proportion to inter-firm collaboration. The research results presented in this study suggests that previous experience is not significant or even has a negative relationship with the objective returns. It has no significant influence on the subjective success rate and the fulfilment of expectation levels in either Australia or China. The qualitative results from the interviewed managers (as reported in Chaps. 6 and 7) also suggested that the previous experience from neither the interviewed firm nor its partner is important for current inter-firm collaboration.

One possible explanation for this result is the sample selection. This study focused on telecommunications and related industries, which are highly dynamic and newly developed industries. Firms in these industries are mostly

newly established firms with less experience than firms in other traditional industries. Furthermore, they need to change their strategies and products with high frequency to suit the newly emerging technology and customer requirements. Therefore, previous experience may play a less important role or even negative role in these inter-firm collaborations. The results also underscore the fact that collaboration research should be designed specifically for different industries. Previous research results may not be applicable for new industries.

4. **Size**

   The contribution of firm size to business collaborating performance and outcomes are intensely debated. Some believe that firm size is important to the performance of inter-firm collaborations (Berg et al. 1982; Harrigan 1988; Hagedoorn and Schakenraad 1994), others argue that firm size makes a limited contribution to collaboration outcomes (Oxley 1997; Park and Ungson 1997). Another problem with previous research on firm size is the different definitions of firm size. Previous definitions of firm size usually use assets, sales amount, exchange market returns, turnover, and global employee numbers of a firm. As discussed in Chap. 4, some of these definitions have drawbacks as they exclude most micro and small firms. Therefore, this thesis categorised firm size into different size categories by the official definition of firm size in Australia and China.

   The research results from this thesis support the view that size plays a significant role in inter-firm collaboration. Large sized firms are more likely to achieve a higher collaboration performance and success rate. However, the separate regressions for the different countries showed that size only plays an important role in the subjective success measures but not for the objective returns in China. However, size plays a more important role in objective returns than the subjective success rate in Australia. One possible explanation is the different views on firm size in different cultures. In China, bigger firms usually have higher profits and industry reputation. Firms usually grow bigger as soon as they have enough funds. However, more than 99 % of firms are SMEs in Australia (ACCC 2009). Firms prefer keeping their small or micro sizes and some smaller firms have higher profits compared to that of big firms in Australia. Firms only grow bigger when they need to expand (e.g. access new markets or are jointly invested by another venture).

5. **Culture similarity**

   Empirical research by Kuada (2002) suggested that expectations for inter-firm collaboration may differ in developed and developing countries. Vilana and Monroy (2010) found that collaborators with similar firm cultures reach high assessments of satisfaction, learning and collaboration efficiency. However, Reus and Rotting (2009) found the objective measures of cultural distance show a weak positive effect and subjective measures show a negative effect on collaborating performance in China. Kim and Park (2002) also found in their empirical study that cultural similarity has a weak negative relationship with value creation in inter-firm collaboration.

Data analysis in this thesis supported some of these literature results. In terms of the subjective measure, culture similarity has significant negative influences on the collaboration success rate and the fulfilment of expectation levels in both Australia and China. In other words the more different the cultural backgrounds of the collaborating firms, the more successful is likely to be the inter-firm collaboration. However, for objective performances culture similarity plays a different role in Australia and China. It has a significant negative influence on all the objective performances of Chinese inter-firm collaborations. However, it plays a significant positive role in some of the Australian collaboration performances.

One possible explanation for the different results is that Australia and China have different culture backgrounds. Managers in Australia and China also have different views on the cultural difference. Australia has a mixed culture background with the majority of immigrants from different cultural backgrounds. Australian firms usually have better knowledge and understanding of different cultures and how to communicate with different people. On the other hand China has a strong and traditional culture, which is different from most other countries. However, Chinese firms usually have a positive view and good respect of foreign cultures. When collaborating with foreign partners, Chinese firms usually follow the working process and customs of its foreign partner. They also put more commitment into such collaboration in comparison to local collaborations, because collaborations with foreign partners usually bring higher profits. Therefore, more resources and effort are usually put in such collaborations, which, as a result, usually increase the performance and success rate of those collaborations.

Another possible explanation is, theoretically, that culture is a kind of resource of the firm. Therefore, different cultural backgrounds may represent complementary resources of the collaborating firms, which may increase the possibility of successful collaboration. This is also supported by the resource based view (Richardson 1972; Jiang et al. 2010).

6. **Size difference**

Size difference also affected the performance and success of collaboration (Chandler 1962; Rumelt 1974; Berg et al. 1982; Porter 1987; Shan and Hamilton 1991; Burgers et al. 1993). Therefore, SIZEDIF is used to replace LARGESIZE in collaboration models (1) – (3). The results in Tables 8.18 and 8.19 show that size difference plays a negative role in inter-firm collaboration. Therefore, collaborations with larger or peer sized firms are more likely to fail or have lower performances. The qualitative results in Chaps. 6 and 7 show that firms prefer peer sized or larger sized partners in their inter-firm collaborations because large firms possess more resources and assets. However, the quantitative results suggest that business should consider collaborations with smaller partners to achieve a higher performance and success rate. A possible explanation is that similar sized firms usually contribute equally into the collaboration, which helps establish stable relationships. The adoption of a large firm's strategies may have negative influences on its smaller partners. On the other hand the results also

suggest that it is possible to use size difference as an independent variable in these models.

7. **Country difference**
   The separate regressions conducted for the two countries suggested that firm size, trust, communication, previous experience and culture similarity play very different roles in inter-firm collaborations in Australia and China. The results also underscore the fact that collaboration research should be conducted separately for different countries. A factor that proved to be vital to inter-firm collaboration in one country is not necessarily important in another country (Kuada 2002). The results are also in accord with the qualitative results in Chaps. 6 and 7. A factor that proved to be vital to inter-firm collaboration in one country is not necessarily important in another country.

   The results of the quantitative study shed light on how to conduct and improve inter-firm collaborations in Australia and China. Compared with the qualitative results, this chapter provided more support for previous hypotheses and the literature. It also answered the second primary research question on the key determinants for inter-firm collaboration in Australia and China.

8.7 Conclusions

The quantitative study makes several important contributions to the collaboration research literature. First, it verifies the contribution of each independent variable to objective returns and the subjective success rate of inter-firm collaboration. Trust makes a lesser contribution to objective performance than to subjective results in inter-firm collaboration. On the other hand, trust plays a more important role in China than in Australia. However, an increase in the trust level can reduce risk and increase the quality of communication, which will increase the final collaborating success rate and increase the possibility of further long-term collaboration.

Second, the research results suggest that new collaborating types and benefits are developed during inter-firm collaboration in newly developed industries. As one of the most dynamic industries in the world, the telecommunications industry has some special characteristics. Consequently, previous research results may not be applicable to this industry.

Third, size difference plays a negative role in inter-firm collaboration. It suggests that although firms prefer peer or larger sized partners, managers should consider collaborating with smaller partners to achieve a higher performance and success rate in their inter-firm collaborations.

Fourth, research on different countries suggests that different factors may make very different contributions to collaboration results in different countries. Trust, firm size, and culture background contributed to different aspect of collaboration in Australia and China. As discussed in Chap. 7 the different market structure, products and services and regulatory systems contributed to the different results from both the qualitative and quantitative studies. The results underscore the fact

that collaboration research should be conducted separately for different countries. To collaborate with Chinese partners it is better to target bringing more profits or increasing their market influence. However, to collaborate with Australian partners it is better to target cost saving.

The quantitative study also verified some results from the qualitative study in Chaps. 6 and 7. In general, trust, communication and firm size play significant positive roles in inter-firm collaboration. However, previous experience plays less of an important role in telecommunications industry in Australian and Chinese inter-firm collaborations. Cultural similarity plays a significant negative role in both Australian and Chinese inter-firm collaborations. The contributions of this study and recommendations for business managers, government decision makers, and future researchers are discussed further in Chap. 9.

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Chapter 9
Conclusions and Recommendations

9.1 Introduction

Inter-firm collaboration plays a very important role in business development and economic growth. Focusing on inter-firm collaboration in Australia and China, this study has made several important contributions to inter-firm collaboration research. Results from both the qualitative and a quantitative study have provided some useful data and implications for researchers, managers, as well as policy makers. This chapter provides a summary of these results and contributions. This chapter will also discuss some of the limitations of this study and directions for future research.

9.2 Summary of Results and Contributions

This thesis makes the following important contributions to the literature on collaboration research. First, the definition of inter-firm collaboration has been expanded in this study. The term "collaboration" is generally not used consistently in the literature. Many terms have been used in the previous literature to refer to inter-firm collaboration, for example, cooperation, alliance, or joint activities (Kogut 1988; Williamson 1991; Burgers et al. 1993; Culpan 1993; Hagedoorn 1993; Parkhe 1993; Osborn et al. 1998; Austin 2000). This study has expanded the definition to "**inter-firm activities that are aimed at generating tangible and/or intangible benefits for each firm involved**" and to include some informal inter-firm collaborations, which play an important role in inter-firm collaboration among micro and small sized businesses or in emerging economies. This study has focused on the Chinese and Australian telecommunication industries, which also addresses a gap in previous research.

Second, this study has addressed one of the most important questions related to inter-firm collaboration – what are the key determinants for successful inter-firm

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collaboration in Australia and China. To verify the factors that influence the objective benefits and subjective success rate in inter-firm collaboration, primary data was collected for this study. Both face-to-face qualitative interviews and an online quantitative survey were adopted as complementary methods in this study (Newman and Benz 1998). The interview results provided evidence and explanation for the quantitative study and the regressions tested the "thesis of the relationships between different factors and the performance of inter-firm collaboration. The combination of a qualitative and quantitative study provided more reliable results for this thesis.

The results also answered the primary research questions "***What are the major types of collaboration, benefits and risks associated with inter-firm collaboration in the Australian and Chinese mobile telecommunication markets?***" and "***What are the key determinants of successful inter-firm collaboration?***" The results are discussed in more detail below.

First, firm size plays a significant role in business partner selection and performance. Both the qualitative study and quantitative results support this view. Hypothesis 5 has been upheld. Larger firms are easier to have successful collaborations with as they possess more resources, capital, and usually possess more experience. The quantitative study results showed that size plays a significant role in both objective returns and the subjective success rate of inter-firm collaboration. However, research on Australia and China shows that firm size contributed more to the objective returns in Australia but more to the subjective success rate in China. A possible explanation for this difference could be due to the fact that the majority of firms in Australia are micro and small sized firms (ACCC 2009). Half of Australian small businesses are sole proprietorships (Schaper and Volery 2004). According to the Industrial and Commercial Bank of China, by 20 June 1999 only 20.9 % of its short-term loans were to the non-state sector with most going to collective and foreign-owned enterprises and only 0.5 % went to private and individual enterprises (Garnaut et al. 2001). The ambiguous regulations, lack of transparency, high market entry requirements, discriminatory taxes and fees, and weak intellectual property protection are also obstacles facing most small businesses in China (Naughton 2006). Chinese businesses differ from Australian businesses with respect to the separation of ownership and control (Schaper and Volery 2004). In sum, services and the environment for small business growth are better in Australia than in China. Previous experience showed that the rapid growth of private business in China over the past 20 years has contributed significantly to the fast economic growth in China (Harvie and Lee 2003). The Chinese government should provide more business assistance services and a more level playing field for small business.

Second, size difference plays a negative role in the performance and results from inter-firm collaboration. Hypothesis 6 is not upheld due to its unexpected negative sign. Firms prefer bigger partners in their inter-firm collaboration in both Australia and China. The results are in accord with the literature which suggests that large firms usually possess more resources (Teece 1986). However, size difference is negatively related with collaborating performance. In other words the bigger the size of the partner firm compared with the interviewed firm, the lower the

performance and success rate of the inter-firm collaboration. A possible explanation for this result could be the different business structures, working processes, collaborating goals and changes of strategies between large firms and small firms. These differences may increase the risk level and conflicts with inter-firm collaboration, which leads to failure from the collaboration. Therefore, to reach a higher performance or success rate, business should consider a smaller sized partner to start with. Inter-firm collaboration among small business and industry clusters are important engines for innovation (Carr 1989; Stimson et al. 2006). Therefore, government should also encourage business clusters and collaboration among small and micro firms to increase the performances and outcomes from inter-firm collaborations.

Third, new collaborating types and benefits/returns were found in the qualitative and quantitative studies in this thesis. The results indicate new types of inter-firm collaborations are generated in the telecommunications industry. The possible causes of these new types and benefits are new technology; a new business model or new market opportunities are generated in high technology and fast developing industries. Inter-firm collaboration is a dynamic phenomenon that may not always be explained using previous literature or empirical studies. It can be argued that studies on inter-firm collaboration should take into account these changes. Continuous study of inter-firm relationships is essential to develop a robust understanding of changing business strategy (Singh and Mitchell 2005), and primary data collected through interviews may provide richer information for such a study.

Fourth, the concerns and obstacles to inter-firm collaboration are different in different countries, which support hypothesis 7. This argument is supported by the interviewed managers. Most of the Australian interviewed managers indicated that they have no problem with international inter-firm collaborations. Chinese managers, on the other hand, showed that they have less confidence when considering international collaboration. More than half of the Chinese managers chose language, cultural or communication problems and lack of experience of international business as their major obstacles with international inter-firm collaboration. One possible explanation of this difference could be the multicultural and multilanguage background of Australian firms, which have increased confidence and experiences of cross-country inter-firm collaboration. The Australian economy has been "open" to inter-firm collaboration for a longer period of time than that of China. On the other hand managers from different cultural or language backgrounds are a good "bridge" or natural contact person for inter-firm collaboration, able to identify the different needs and problems during inter-firm collaboration. Therefore, to collaborate with Chinese firms, a good understanding of the culture and language is essential to begin with.

Fifth, trust plays a vital role in inter-firm collaboration but it plays a different role for different aspects of inter-firm collaboration in different countries. Hypothesis 1 can be upheld. Trust was also mentioned as a key determinant of successful inter-firm collaboration by managers during interviews in both Australia and China. In the quantitative study, regressions for two different countries show that trust plays a negative role in objective returns but a positive role in the subjective success rate in Australia. However, it plays a significant positive role in both objective

returns and the subjective result in China. As discussed in chapter three the differences between developed and developing countries are good explanations for this result. Due to different laws and social systems, different variables play very different roles in different countries. Managers are usually risk-averse in Australia (Kuada 2002). Therefore, trust plays a limited role in Australian inter-firm collaborations. A higher trust level does not mean higher performance in inter-firm collaboration in Australia. On the other hand the legal system in China does not provide enough protection for private property (Naughton 2006) and the credit system is still under development. The preference for personal relationships and connections is therefore important in China (Boisot and Child 1999; Vipraio and Pauluzzo 2007). In this environment the trust relationship between firms plays a more important role in inter-firm collaboration. Therefore, to collaborate with Chinese partners, establishing a trusted personal relationship is important from the beginning of inter-firm collaboration, as indicated by one interviewed manager in China who said: "You need to be our friend first if you want to do business with us."

Sixth, communication plays a vital role in inter-firm collaboration in both Australia and China. Hypothesis 3 can be upheld. The quantitative study in this thesis supports the position that the quality of communication (in terms of frequency, understanding and efficiency) is significantly related with the subjective collaborating outcomes. In terms of objective performance, communication provides mixed contribution (positively and negatively) to different aspects in both Australia and China. The qualitative interviews also supported this result. Most managers from both Australia and China agreed that communication is one of the key determinants of successful inter-firm collaboration. How to increase the quality of communication should be the target of collaborators to enhance the performance of current inter-firm collaborations. Another important factor that should be considered by business managers and government policy makers are the different online communication methods adopted in different countries. Some of the common communicating tools or platforms in Australia are blocked (in special regions or periods) in China. Therefore, businesses in China usually communicate via very different tools from Australian businesses, for example the MSN in Australia and QQ in China, Facebook in Australia and Kaixinweb in China, Twitter in Australia and Weibo in China, E-bay in Australia and Alibaba in China. To collaborate with a business in China or Australia, it is very important to understand the common communicating methods and tools before the start of the collaboration. However, all of these methods require a huge amount of investment on basic infrastructure and networks from the government, and plenty of training and educational programs provided to the managers. A well developed and stable human resource market and finance market are also important to implement these strategies.

Seventh, previous experience does not play a significant role in the performance of inter-firm collaboration in the sample data. Hypothesis 2 cannot be upheld in both countries. Research results for the quantitative analysis suggest that previous experience has no significant influence on the subjective results in both Australia and China. It has very little negative influence on some of the objective returns.

These results are different from previous empirical studies (Harrigan 1986; Parkhe 1993; Saxton 1997; Dyer and Singh 1998; Kay 1999; Hagedoorn et al. 2003). A possible explanation for this result is the range of studied firms. This thesis focuses on telecommunications industry. With rapidly changing technologies and emerging new opportunities for inter-firm collaboration the previous experiences in inter-firm collaboration may play a less important role or even negative influence on current inter-firm collaboration in such dynamic and rapidly developing industries. The results also underscore the fact that inter-firm collaboration is a complex phenomenon, which may be influenced by many different factors in different environments and periods.

Eighth, culture similarity plays a significant negative role in inter-firm collaboration in China. Hypothesis 4 cannot be upheld due to its unexpected negative sign. However, it only plays a significant negative role in the subjective success rate in Australia but plays a positive role for objective returns in Australia. The result is different from most empirical studies in the literature (Das and Rahman 2009; Vilana and Monroy 2010). However, some empirical studies also found weak negative relationships between culture similarity and the performance of a inter-firm collaboration (Kim and Park 2002; Reus and Rotting 2009). One possible explanation for this result is the research focus. As discussed above, the multicultural background of Australia is a special characteristic of its businesses or managers. China, on the other hand, has a strong unique cultural background and environment for inter-firm collaborations. Managers and policy makers should notice differences in the cultural background and include some programs (such as cross-cultural activities and learning groups) in their collaborating strategies.

Ninth, the factors that influence inter-firm collaboration are different in different countries. Hypothesis 7 can be upheld. As discussed in chapters 6 and 7 the managers from China and Australia have different views on successful collaboration, risks towards international collaboration and the role of government. The quantitative results suggest that different factors play very different roles in inter-firm collaboration in China and Australia. The different social structures, business environments, legal systems, roles of government, recognitions, cultural and language backgrounds, histories, and technology adoption levels could be the key explanations of this result. There are also many other factors that influence inter-firm collaboration in different countries.

Table 9.1 summarises the key determinants for successful inter-firm collaboration in China and Australia. The key determinants for subjective outcomes (valued as the subjective success rate and fulfilling expectation levels) are similar in China and Australia. Trust, firm size and communication contributed significantly and positively to the results. Culture similarity, however, has a negative influence on subjective outcomes in both Australia and China. In terms of objective returns, the results vary in Australia and China. Most factors have a mixed contribution (both negative and positive) to different aspects of returns. In general, trust plays a significant positive role in objective returns in China. Culture similarity plays a negative role in objective returns in China, and only firm size has a positive influence on the overall objective returns in Australia. The results also support

Table 9.1 Comparative results from China and Australia

Key determinants	Hypotheses	China	Australia	Modified
Firm Size	+	+	+	+
Trust	+	+	+	+
Communication	+	+	+	+
Experience	+			
Culture difference	+	−	−	−

Source: Data collected in this thesis

that studies of inter-firm collaboration in different countries should take into account the special situation of the environment, culture background, regulations, recognitions and industry characteristics in each country.

9.3 Implications

The findings of this research may help provide insight for business managers in choosing business partners and understanding the factors that enhance current collaborating relationships with their partners. To select the "best" partner, the results of this thesis suggest that managers should consider the size difference between both firms. Firm-level trust plays a vital role in business collaboration in both Australia and China. However, trust plays a more important role in the subjective success rate rather than objective returns from collaboration. Trust plays a more important role compared to both the objective and subjective result of business collaboration in China than in Australia. The trustworthy contact person contributed significantly to a successful collaboration. The contact person plays a more important role in the Chinese market. Finding a "right" person is vital for the business to achieve successful collaboration in China. Communication, especially suitable frequency and understanding of communication, plays a vital role in business collaboration. Managers also need to consider the cultural difference between both firms when collaborating with others. The results show that the greater the difference in cultural backgrounds, the more effort may be put into the collaboration, and the higher level will be the success rate.

The results from this study also provide useful policy implications for the government. To improve the business collaboration environment, especially international collaboration, efforts need to be undertaken to encourage information sharing, a reduction in the barriers of entry, providing a level playing field for every firm, reducing the visa restrictions, and enhancing government services and support (such as consultation). Industry associations and business networks can also assist in developing a trust relationship, facilitating matching of business collaborators and information sharing. Adopting new technologies and global standards will help businesses, industry associations, and government departments enhance the success rate of both international and local inter-firm collaborations.

9.4 Computer Intelligence Methods

As the model for business collaboration is suggested to be dynamic rather than static in different countries, industries, and periods. Computing intelligence methods may be a better solution to help on decision making. However, different computing intelligence methods have their own strength and disadvantages. They are expected to work as supplementary method to provide more reliable and precise services for managers and decision maker. The combination of computer technologies and commerce research will also benefit industries, businesses, and society. Therefore, three complementary computing intelligence methods and their advantages/disadvantages are discussed below.

As shown in Table 9.2, these three different computing intelligence methods have their own advantages and disadvantages when dealing with business collaboration problems. They are discussed further in details as below.

Naïve Bayes classifier and neural network (NN) are flexible analysis techniques. Joseph (1998) indicated that these computer techniques can perform both relationship identification and structure analysis, which eliminate the need for normality. Zhang et al. (2009) suggested that it is possible to use naive Bayes classifier or neural network to help the managers to choose business collaborators. The model is dynamic with the increasing number of previous cases. However, the model is in a black-box (unknown to anyone) and it could be very complex with changing forms of variables. Therefore, it cannot give the reasons for the results but the result itself.

Decision tree (DT) is a technology widely used in industries and businesses. It is also used in predicting the business performance or failure in business studies (Ikeda et al. 2004; Gepp and Bhattacharya 2010). It can generate a set of leaves in a decision tree, which shows the importance level of different factors and the relationships between different factors. One advantage of DT is it could deal with discontinuous or missing data. The results are also very easy to be read and understood, which give good implication and suggestions for business decision makers. However, there are different algorithms in decision tree, which gives totally different results even with the same data. Even with the same algorithm, there are usually many criterions that could be set to influence the final results. Therefore, DT method is criticized for its usability in prediction.

Table 9.2 Compare different computing intelligence methods

Computing intelligence methods	Advantages	Disadvantages
Neural Network	Dynamic model using previous experiences, a process of learning	Model is in black-box (unknown to anyone)
Decision Tree	Give relationships between factors, dealing with discontinuous or missing data	Results are varies due to the different algorithms
Generic Algorism	Dynamic model, testing different specifications efficiently	Can be improved by designing the weight and specifications

Generic Algorism is a combination research method of health and informatics, which is a newly developed method in computing intelligence. It also gives very complex model as in neural network method. However, its model is visible and controllable. This adds more value for this dynamic method. It can test possible specifications more efficiently than other methods. However, if the specifications are very complex, it also takes very long time. Generic algorism could be used as complimentary of econometrics as if the weights of factors or part of the specifications are designed previously, the process of testing could be very fast and more accurate.

The factors influencing business collaboration performance could be numerous and very complex. Furthermore, the problems and key determinants for successful collaboration are different in every country or industry. Computing intelligence methods provide an alternative solution for the managers to enhance business collaborating success rate, as well as choosing business collaborators. The advanced technologies can improve the efficiency of life in different countries and industries, as well as for business collaborations.

9.5 Limitations and Future Research

There are always limitations in any economic research. It is necessary to take these limitations into account as they may impact the robustness of the results from the research. This study is limited by the range of sample size, studied countries and questions in the survey. First, the study focused on the telecommunications and related service and manufacturing industries, which are mostly high-technology and newly developed industries. Second, this study was only conducted in Australia and China to fill a gap in previous empirical studies. Third, the interview questions initially proposed were adjusted to take into account suggestions and feedback by managers from the qualitative face-to-face interviews. Therefore, they are influenced by the industrial and cultural experiences of these managers. Cultural bias is always inevitable in cross-culture studies. The differences in cognition and understanding of the questions, scales and answers may increase the bias of the results from this study.

This research makes a useful contribution to on-going work in the study of inter-firm collaboration via complementary primary data from both qualitative interview and quantitative online surveys. Results from this study suggest that collaboration is a complex and dynamic phenomenon. Factors that influence the performance of inter-firm collaboration are also different in different countries, industries and periods. Therefore, future research could focus on other countries and industries that are expected to provide different results and implications. A combination of qualitative and quantitative methods can provide complementary support and evidence, which may generate more reliable results. Therefore, future research may take into account different research methods from different disciplinary

areas (such as adopting computer intelligence methods in collaboration studies), which may bring more reliable and interesting results (Zhang 2011).

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Appendix 1 Questionnaire for Interviews

Aim of the research:

The aim of this research is to establish a global communicating and commercial channel for all mobile device providers, service providers, content providers, and technical providers. To understand better the main determinates of a successful interfirm collaboration and the obstacles threats international collaboration, the questions are based on experiences on telecommunicating collaboration. It will take 10 to 20 minutes to complete this questionnaire.

Disclosed agreement

The questionnaire is anonymous for you and your partner. All the data will be retained securely at the University of Wollongong by the researcher for purpose of analysis during this research. You are free to refuse to participate or withdraw your data at any time. If you have any question about this research, you can contact the researcher named below.

Results offer

If you would like to have one copy of the final report for this project, please mark at the end of the questionnaire. Thank you.

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Part 1: General Questions (Please mark at the appropriate box)

1.1. Identify business sectors (Multiple choice) and please add the proportional of each part of business in your company (for example 60%).

- □ Mobile Device Provider
- □ Operator/ Carrier Service Provider
- □ Mobile Service Provider
- □ Internet Service Provider
- □ Mobile Content Provider
- □ Technical Provider
- □ Other (Please specify:_____)

1.2. Which sector is your business in?

- □ Private sector
- □ Public sector
- □ Other (Please specify:_____)

1.3. Type of ownership

- □ Australian
- □ Foreign (Please specify:_____)
- □ Joint Ventured (Please specify:_____)

1.4. Employee numbers

□ Less than 5	□ 5 – 9	□ 10 – 19
□ 20 – 49	□ 50 – 99	□ 100 – 199
□ 200 – 499	□ 500 or more	

1.5. Do you or did you have collaboration with other firms?

- □ No (Please go to part 3)
- □ Yes (Please complete part 2 for each inter-firm collaboration)

Part 2: Collaboration part (Please finish this part for each collaboration, it is free to choose the important ones for you.)

2.1. What are your partner's business sectors? (Multiple choice) Please add the proportional of each part of business in your company (for example 60%).

- □ Mobile Device Provider
- □ Operator/ Carrier Service Provider
- □ Mobile Service Provider
- □ Internet Service Provider
- □ Mobile Content Provider
- □ Technical Provider
- □ Other (Please specify:_____)

2.2. Business size of your partner

□ Less than 5	□ 5 – 9	□ 10 – 19
□ 20 – 49	□ 50 – 99	□ 100 – 199
□ 200 – 499	□ 500 or more	

2.3. Collaborating type (Multiple choice)

- □ Co-production service
- □ Market share service
- □ Joint R&D service
- □ Joint Venture service
- □ Technical training and start-up assistant service
- □ Production, assembly, and buy-back agreement
- □ Patent licensing
- □ Franchising
- □ Know how licensing
- □ Management and service agreement
- □ Other (Please specify:_____)

2.4. What are the benefits brought by this collaboration (Please mark at the appropriate box. Leave the boxes blank if there is no influence.)

Access to new technology	Insignificant □	□	□	□	□ Substantial
Improved global competitiveness	Insignificant □	□	□	□	□ Substantial
Increased market share	Insignificant □	□	□	□	□ Substantial
Saving in costs	Insignificant □	□	□	□	□ Substantial
Assist R&D	Insignificant □	□	□	□	□ Substantial
Increased market influence	Insignificant □	□	□	□	□ Substantial
Improve profitability	Insignificant □	□	□	□	□ Substantial
Improve productivity	Insignificant □	□	□	□	□ Substantial
Improve product quality	Insignificant □	□	□	□	□ Substantial
Increase innovations	Insignificant □	□	□	□	□ Substantial
Access to government programs	Insignificant □	□	□	□	□ Substantial
Allowed participating global market	Insignificant □	□	□	□	□ Substantial

2.5. Is this an international collaboration?

- □ No (Please go to part 3)
- □ Yes (Please continue)

2.6. Where is your business partner located?

- □ Australia and New Zealand
- □ Asia
- □ North America
- □ South America
- □ Europe
- □ Middle East
- □ Africa
- □ Other (Please specify:_____)

2.7. Would you regard this collaboration as successful?

- □ No
- □ Yes

Part 3: Main concern or barriers on inter-firm collaboration and international collaboration (Please mark at the appropriate box)

3.1. What do you think are the main concerns or barriers affects your company to be involved in inter-firm collaboration? (Multiple choice)

- □ Lack of trust (e.g. less known of each other)
- □ Technology complexity (e.g. new technology complexity increase risks)
- □ Benefit distribution (e.g. not consistent with each other)
- □ Societal-level dynamics (e.g. economic trends and socio-economic policies)
- □ Historical, political, or cultural barriers (e.g. different culture or language)
- □ Other (Please specify:_____)

3.2. What do you think are the main concerns or barriers for international collaboration? (Multiple choice)

- □ Limited access to Finance
- □ Lack of trust on international business
- □ Lack of experience on international business
- □ Lack of global competitiveness
- □ Language, cultural, or communication barriers
- □ Lack of access to advanced technology (i.e Internet)
- □ Regulatory or government constraints
- □ Other (Please specify:_____)

Part 4: Suggestions

4.1. In your opinion, what is the most important determinate to your collaboration? What impressed you the most during these collaborations?

_____

_____

_____

_____

_____

_____

4.2. In your opinion, what types of government policies or services should be implemented to assist telecommunication firms for their future development in local and global markets?

4.3. Are there any other issues that should be considered?

Would you like to receive a copy of the final report for this project?

□ Yes □ No

By e-mail:_____
Or by mail: _____
Or by fax: _____
Others:_____

Appendix 2 Questionnaire for Interviews (Chinese)

研究目标：

此研究针对当前移动通信领域的企业间合作进行全面系统地研究，并借助现有的经验和知识建立一个全球移动领域交流平台。此调查问卷大概需要10到20分钟完成。希望您能够认真并如实地填写。谢谢！

保密协议

此调查的所有数据都将被匿名并妥善的保管在Wollongong大学，仅用于此项研究。您可以在任何时间拒绝或者撤销贵公司相关的全部数据。如果有任何其他问题，请与下列的研究人员联系。谢谢！

研究报告

如果您需要一份此研究的最终报告，请在问卷最后选择希望接收的方式。谢谢！

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第一部分：普通问题部分（请选择相应选项框）

1.1. 运营范围和每种业务所占比例（例如60%）

□ 手机制造商
□ 手机运营商
□ 手机服务提供商
□ 网络服务提供商
□ 手机内容提供商
□ 技术提供商
□ 其他 （请指明：_____）

1.2. 公司性质

□ 私有企业
□ 国有企业
□ 其他 （请指明_____）

1.3. 公司所有权

□ 中国独资
□ 外商独资 (请指明国家_____)
□ 合资企业 (请指明国家及比例_____)

1.4. 公司规模，全职员工数量：

□ 少于 5 □ 5 – 9 □ 10 – 19
□ 20 – 49 □ 50 – 99 □ 100 – 199
□ 200 – 499 □ 超过500

1.5. 请问您是否有合作伙伴？（非买卖关系的合作公司，例如研发，市场，股份）

□ 否（请直接前进至第三部分） □ 是（请继续）

第二部分：合作伙伴

（请对每一个合作伙伴填写一份，您可以选择对贵公司最重要的五个合作伙伴来填写）

2.1. 贵公司合作伙伴的运营范围和每种业务所占比例（例如60%）

□ 手机制造商
□ 手机运营商
□ 手机服务提供商
□ 网络服务提供商
□ 手机内容提供商
□ 技术提供商
□ 其他 （请指明：_____）

2.2. 公司规模，全职员工数量：

□ 少于 5 □ 5 – 9 □ 10 – 19
□ 20 – 49 □ 50 – 99 □ 100 – 199
□ 200 – 499 □ 超过500

2.3. 合作类型 (可以多选)

□ 产品合作 □ 市场合作 □ 合作科研 □ 合资融资
□ 技术培训和新公司辅助项目 □ 产品集成，装配，返销
□ 专利合作 □ 特许经营 □ 知识共享授权
□ 管理及服务提供 □ 其他 （请指明_____）

2.4. 合作给公司带来的影响 （请选择相应选项框，若没有影响，请留空）

接触最新技术	不明显 □	□	□	□	□	明显提升
增加企业国际竞争力	不明显 □	□	□	□	□	明显提升
增加市场份额	不明显 □	□	□	□	□	明显提升
成本节约	不明显 □	□	□	□	□	明显提升
科研改进	不明显 □	□	□	□	□	明显提升
增加市场影响力	不明显 □	□	□	□	□	明显提升
增加利润	不明显 □	□	□	□	□	明显提升
增加产量	不明显 □	□	□	□	□	明显提升
增加产品质量	不明显 □	□	□	□	□	明显提升
增加创新和应用	不明显 □	□	□	□	□	明显提升
增进政府关系	不明显 □	□	□	□	□	明显提升
有助于进入国际市场	不明显 □	□	□	□	□	明显提升

2.5. 此合作是否国际合作

□ 否（请直接前进至第三部分） □ 是（请继续）

2.6. 贵公司合作伙伴来自：

□ 亚洲 □ 澳大利亚及新西兰地区 □ 北美洲

□ 南美洲 □ 欧洲 □ 中东 □ 非洲

□ 其他 （请指明：_____）

2.7. 您是否认为此合作可以成为是成功的？

□ 否 □ 是

第三部分：国际合作的主要障碍和考虑因素（请选择相应选项框）

3.1. 您认为对贵公司而言，企业合作的障碍或者主要考虑的问题有哪些？（可多选）

□ 缺乏信任（例如缺乏对对方的了解）

□ 技术复杂度过高（使合作风险上升）

□ 利益分配（例如很难达成一致）

□ 社会性风险（例如经济走势，政策变化）

□ 历史，政策，文化障碍（例如不同地区的语言文化差异）

□ 其他 （请指明：_____）

3.2. 您认为对贵公司而言，与国际企业合作的障碍或问题有哪些？（可多选）

□ 资金短缺 □ 对国际商务的信任度问题

□ 缺乏国际合作经验 □ 缺乏国际竞争力

□ 语言和交流障碍 □ 文化习俗障碍

□ 技术水平障碍（例如互联网的应用） □ 政策法规的限制

□ 其他 （请指明：_____）

第四部分：意见建议

4.1.

在您看来，影响贵公司合作成败的最重要因素是什么？在跟其它企业合作的过程中，给您留下印象最深的因素是什么？

4.2.

在您看来，什么样的政府政策可以有助于帮助通讯信息科技公司实现国际化并且参与到国际市场中竞争？

4.3. 您是否还有其它考虑或建议？

请问您是否希望接收本研究的最终报告？

□ 是（请选择并记录您的接收方式） □ 否

电子邮件：

邮件：

传真：

其他方式：

Appendix 3 Questionnaire for Quantitative Study

Please finish the following questions for each of your previous inter-firm collaborations (Please mark at the appropriate box)

Part 1: Information of your company

1.1. Country of ownership (Please select multiple options if joint ownership)

☐ Australia ☐ New Zealand ☐ East Asia ☐ South Asia ☐ North America

☐ South America ☐ UK ☐ Other Europe ☐ Middle East ☐ Africa

1.2. Full-time employee numbers

☐ Less than 5 ☐ 5 – 19 ☐ 20 – 99 ☐ 100 – 199 ☐ 200 – 499 ☐ 500 or more

1.3. Do you have similar collaboration experience within last 10 years?

☐ No ☐ Less ☐ Some ☐ Many ☐ Plenty experience

1.4. What role do you usually play in business networks?

☐ Organizer ☐ Very active ☐ Often attend ☐ Rarely attend ☐ Never attend

Part 2: Information of your partner

2.1. Country of ownership (Please select multiple options if joint ownership)

☐ Australia ☐ New Zealand ☐ East Asia ☐ South Asia ☐ North America

☐ South America ☐ UK ☐ Other Europe ☐ Middle East ☐ Africa

2.2. Full-time employee numbers

☐ Less than 5 ☐ 5 – 19 ☐ 20 – 99 ☐ 100 – 199 ☐ 200 – 499 ☐ 500 or more

☐ Not sure

2.3. Does your partner have similar collaboration experience within last 10 years?

☐ Unknown ☐ No ☐ Less ☐ Some ☐ Many ☐ Plenty

2.4. What role does your partner usually play in its business networks?

☐ Unknown ☐ Organizer ☐ Very active ☐ Often attend ☐ Rarely attend ☐ Never attend

2.5. The reliable level of the manager or contact person of your partner

☐ Not reliable ☐ Quite unreliable ☐ Neural ☐ Quite reliable ☐ Very reliable

2.6. How do you perceive the reputation level of your partner in its industry?

☐ Unknown ☐ Very low ☐ Low ☐ Neural ☐ High ☐ Very high

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Part 3: Collaboration

3.1 How similar is your and your business partner in the following? (Please leave it blank if not sure)

Similarity	Not similar	Quite unsimilar	Neural	Quite Similar	Very Similar
Expectation and Goal	❒	❒	❒	❒	❒
Culture background (include all ownership, contact manager and chief officers)	❒	❒	❒	❒	❒
Language (include all contact employees)	❒	❒	❒	❒	❒
Religions (include all contact persons)	❒	❒	❒	❒	❒
Technological development	❒	❒	❒	❒	❒
Business Structure	❒	❒	❒	❒	❒
Working process	❒	❒	❒	❒	❒

3.2. To what extent do you agree the communicate quality in this collaboration?

Satisfactory	Strongly agree	Agree	Neural	Disagree	Strongly disagree
Frequency of communication	❒	❒	❒	❒	❒
Understanding of communication	❒	❒	❒	❒	❒
Efficiency of communication	❒	❒	❒	❒	❒

3.3. What trust level would regard this collaboration in?

☐ Very low ☐ Low ☐ Neural ☐ High ☐ Very high

3.4. What risk level would regard this collaboration in?

☐ Very low ☐ Low ☐ Neural ☐ High ☐ Very high

Part 4: Performance and result

4.1. What benefits does this collaboration brought (Please leave blank if there is no influence.)

Benefits	Very substantial	Substantial large	Large increase	Medium increase	Small increase
Access to new technology	❒	❒	❒	❒	❒
Improved global competitiveness	❒	❒	❒	❒	❒
Increased market share	❒	❒	❒	❒	❒
Saving in costs	❒	❒	❒	❒	❒
Assist research and development	❒	❒	❒	❒	❒
Increased market influence	❒	❒	❒	❒	❒
Improve profitability	❒	❒	❒	❒	❒
Improve productivity	❒	❒	❒	❒	❒
Improve product quality	❒	❒	❒	❒	❒
Increase innovations	❒	❒	❒	❒	❒
Access to government programs	❒	❒	❒	❒	❒
Allowed participating global market	❒	❒	❒	❒	❒
Other (please specify)_____	❒	❒	❒	❒	❒

4.2. To what extent do you agree this collaboration has fulfilled the expectation?

☐ Strongly agree ☐ Agree ☐ Neural ☐ Disagree ☐ Strongly disagree

4.3. Would you regard this collaboration as successful?

☐ Strongly agree ☐ Agree ☐ Neural ☐ Disagree ☐ Strongly disagree

The final result report will be available after 1st Dec, 2010 through the following link:

www.wemosoft.com/gccp/survey.html

Appendix 4 Questionnaire for Quantitative Study (Chinese)

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此研究是面向如何提高企业间合作成功率的研究项目。请根据贵公司以往的每个合作案例填写下面的问题（在选框中点击即可）

第一部分：贵公司相关

1.1. 公司所有者的国籍（如果是合资公司可多选）

□中国 □其他东亚国家 □东南亚国家 □澳大利亚及新西兰 □北美洲国家
□南美洲国家 □英国 □其他欧洲国家 □中东国家 □非洲国家

1.2. 全职员工数量

□少于5 □5 – 19 □20 – 99 □100 – 199 □200 – 499 □500及以上

1.3. 贵公司在此次合作之前是否有过类似的合作经验？

□ 没有 □ 很少 □ 有一些 □ 很多 □ 非常多

1.4. 贵公司在公司商务网络活动中的角色是？

□组织者 □积极参与者 □有时参与 □很少参与 □从不参与

第二部分：此次合作中合作伙伴相关

2.1. 合作伙伴所属国籍（如果是合资公司可多选）

□中国 □其他东亚国家 □东南亚国家 □澳大利亚及新西兰 □北美洲国家
□南美洲国家 □英国 □其他欧洲国家 □中东国家 □非洲国家

2.2. 合作伙伴的全职员工数量

□不清楚 □少于5 □5 – 19 □20 – 99 □100 – 199 □200 – 499
□500及以上

2.3. 合作伙伴在此次合作之前是否有过类似的合作经验？

□ 不清楚 □ 没有 □ 很少 □ 有一些 □ 很多 □ 非常多

2.4. 合作伙伴在其公司商务网络活动中的角色是？

□不清楚 □组织者 □积极参与者 □有时参与 □很少参与 □从不参与

2.5. 您认为合作伙伴派出的项目经理或者联系人的诚信程度如何？

□ 不可信 □ 不是很可信 □ 中等 □ 很可信 □ 非常可信

2.6. 您对合作伙伴公司在行业中的声誉的评价是？

□不清楚 □ 很低 □较低 □ 中等 □ 较高 □ 很高

第三部分：此次合作相关

3.1 您认为贵公司及合作伙伴在下列选项中的相似度有多高（如果不确定请保留空白）

相似程度	完全不同	很不同	有些相似	很相似	非常相似
对于合作的目标及期望	❒	❒	❒	❒	❒
文化背景（包含公司所有者，联系人和经理）	❒	❒	❒	❒	❒
语言背景（包含所有接触的员工）	❒	❒	❒	❒	❒
信仰背景（包含所有接触的员工）	❒	❒	❒	❒	❒
技术背景	❒	❒	❒	❒	❒
公司结构或部门划分	❒	❒	❒	❒	❒
工作流程及方式	❒	❒	❒	❒	❒

3.2. 在此次合作中，您对于双方交流沟通的满意度如何？

满意度	很满意	满意	中等	不满意	很不满意
交流的频率（是否适中）	❒	❒	❒	❒	❒
双方的相互理解程度	❒	❒	❒	❒	❒
每次沟通的效率	❒	❒	❒	❒	❒

3.3. 您如何评价此次合作的信任程度？

□ 很低□ 低 □ 中等 □ 高 □ 很高

3.4. 您如何评价此次合作的风险程度？ 度

□ 很低□ 低 □ 中等 □ 高 □ 很高

第四部分：合作成果及收益

4.1. 此次合作给贵公司带来的收益有哪些（如果对下列某项没有影响，请保留空白）

收益	非常显著的提高	很显著提高	显著提高	中等提高	很少提高
接触最新或先进技术	❒	❒	❒	❒	❒
增加了公司（国际）竞争力	❒	❒	❒	❒	❒
增加了公司市场份额	❒	❒	❒	❒	❒
节约了成本	❒	❒	❒	❒	❒
增加了科研成果	❒	❒	❒	❒	❒
增加了公司的市场影响力	❒	❒	❒	❒	❒
增加了公司利润	❒	❒	❒	❒	❒
增加了公司的产量	❒	❒	❒	❒	❒
增加了产品质量	❒	❒	❒	❒	❒
增加了创新能力	❒	❒	❒	❒	❒
使公司拓展政府渠道	❒	❒	❒	❒	❒
使公司能够进入国际市场	❒	❒	❒	❒	❒

其他（请指明）	❒	❒	❒	❒	❒

4.2. 您是否认为此次合作达到了您期望的结果？

□ 完全达到预期 □ 基本达到预期 □部分达到预期 □ 基本未达预期 □ 没有达到预期

4.3. 您认为此次合作对贵公司来说是否成功？

□ 非常成功 □ 成功 □ 中等 □ 不成功 □ 非常不成功

此次研究的最后结果会在2010年12月1号之后更新到此链接，欢迎查看：

www.wemosoft.com/gccp/survey.html