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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