THE TRINITY OF KEY COMPETITIVENESS SOURCES FOR SMES IN AN EMERGING ECONOMY: CREDIT ACCESS, INNOVATION AND COLLABORATIVE ADVANTAGE

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DECLARATION

I certify that this thesis:

1. does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university; and

2. to the best of my knowledge and belief, does not contain any material previously published or written by another person except where due reference is made in the text.

Signature : …….

Date : 21st August 2020

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SUMMARY

Small and medium enterprises (SMEs) are the backbone of an economy, contributing to jobs creation and the growth of national income in many countries. However, the majority of SMEs in developing countries have been operating at low productivity, and hence low competitiveness. Earlier well-established theories including competitive advantage theory, the resources-based view and collaborative advantage theory have elaborated firm competitiveness factors in detail. However, these theories are generated from the experiences of large, well-established companies, mainly in developed countries. In order for these theories to be applicable to firms in the developing countries, it needs to adapt in accordance to the unique features of SMEs.

This thesis offers another way of looking at SMEs' competitiveness by examining how internal firm factors interact with external factors to establish the key sources of competitiveness. These sources can be grouped into: (1) credit access, which represents the foundation factor; (2) innovation, which represents the growth factor; and (3) collaborative advantage (CA), which represents the expansion factor. The objective of this thesis is to investigate the effect of the three key competitiveness sources on SMEs' performances. A questionnaire and interviews were conducted in 177 SMEs in the automotive sector in Indonesia and the data were analysed across three domains: credit access, innovation, and collaborative advantage. The data was collected in 2017 and information provided by respondents is based on firm condition in 2016.

The analysis of credit access is based on a study of credit rationing from the demand side. The study found that, for borrowers, credit rationing significantly reduces a firm's probability of investing, and hence negatively affects firm performance. For non-borrowers, all types of non-price credit rationing (quantity, transaction cost, risk and cultural) negatively affect the probability of investing and hence lack of new investment. The three common variables that reduce the probability of rationing are offering a higher ratio of collateral to the proposed

loan, establishing a risk-sharing scheme with peers and increasing competition among banks.

The analysis of innovation segregates innovation activities into three phases: innovation effort, innovation output and its relationship with firm performance. The main finding is that, in addition to standard price factors, non-price factors also contribute to each phase of innovation. Price factors play a role in moderating the direct relationship between product innovation and firm performance, but non-price factors moderate the indirect relationship.

CA is examined using the PLS-SEM Hierarchical Component Model. The empirical findings show that CA positively and significantly affects SMEs' performance, and the effect is stronger when firm capability is taken into account. Furthermore, the analysis shows that the combined effect of the three key competitiveness sources on firm performance is significant.

This thesis contributes to asymmetric information theory by examining firms' risk-sharing schemes as a screening criterion to reduce ex-ante and ex-post risks of credit allocation. This research also contributes to non-price credit rationing theory by incorporating the influence of cultural factors on the borrowing behaviour of non-borrowers. This thesis contributes to frugal innovation theory by showing how non-price factors moderate the indirect relationship between product innovation and firm performance, which has not previously been explained. The thesis also contributes to the theory of CA by examining how SMEs build inter-firm trust and improve dynamic synchronisation among collaborators. In addition, this study brings new insight by incorporating relational capital as a non-price factor in resources investment.

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LIST OF THESIS PRESENTATIONS

The proposal and main chapters of this thesis have been sent to refereed conferences and/or presented in seminars as follows:

1. The thesis proposal was presented at a doctoral student colloquium on 15 February 2017 in Adelaide (organised by Australia and New Zealand International Business Academy/ANZIBA).

2. A progress report on Chapter 5 was presented at a Flinders University seminar on 20 November 2017 (organised by the College of Business, Government and Law, Flinders University).

3. A progress report on Chapter 4 was presented at a Flinders University seminar on 17 May 2018 (organised by the College of Business, Government and Law, Flinders University).

4. A paper on credit rationing was presented at the 31st PhD Conference in Economics and Business on 31 Oct – 2 Nov 2018 in Sydney (organised by UNSW, Sydney).

5. A paper on innovation was accepted by the G-Forum Conference on 10–2 October 2018 in Stuttgart, Germany.

6. A paper on credit access was accepted by the 31st Australasian Finance and Banking Conference on 13–15 Dec 2018 in Sydney.

7. A paper on credit access was presented at the Accounting and Finance Association of Australia and New Zealand (AFAANZ) Conference on 7-9 July 2019 in Brisbane, Queensland.

8. A progress report on Chapter 6 was presented at a Flinders University seminar on 31 July 2019 (organised by the College of Business, Government and Law, Flinders University).

9. A paper on collaborative advantage was presented at ANZIBA 2020 conference on 17–19 February 2020 in UTS Business School, University of Technology Sydney.

LIST OF ACRONYMS

ACFTA	ASEAN-China Free Trade Area
AEC	ASEAN Economic Community
AIC	Akaike information criterion
AS	Annual sales
ASEAN	Association of Southeast Asian Nations
AVE	Average variance extracted
BIC	Bayesian information criterion
BIPIK	*Bimbingan dan Pengembangan Industri Kecil* (Guidance and Development of Small Industries)
BPS	Indonesian Bureau of Statistics
CA	Collaborative advantage
CBU	Completely built-up
CCM	Collaborative commitment
CDM	Crepon, Duguet, Mairesse
CEFA	Collaborative efficiency agreement
CIKS	Collaborative information and knowledge sharing
CIS	Community innovation survey
CKD	Completely knocked down
CMB	Common method bias
CMP	Conditional mixed process
CPL	Collaborative planning
CCM	Collaborative commitment
CRSK	Collaborative risk sharing
CRSS	Collaborative resources sharing
CRC	Collaborative relational capital
CSRP	Collaborative synchronised response
ERBV	Extended resources-based view
FA	Fixed assets
FC	Firm capability

FDI	Foreign direct investment
FP	Firm performance
FSA	Financial service authority
GAIKINDO	*Gabungan Industri Kendaraan Bermotor Indonesia* (The Association of Indonesia Automotive Industries)
GDP	gross domestic product
GIAMM	*Gabungan Industri Alat-alat Mobil dan Motor* (Indonesian Automotive Parts & Components Industry Association)
GII	Global innovation index
GLM	Generalized linear model
HCM	Hierarchical component model
HOC	Higher order construct
HTMT	Heterotrait–monotrait ratio
ICT	Information and communication technology
KUR	*Kredit Usaha Rakyat* (micro-credit program)
LCGC	Low cost green car
LCRs	Local content requirements
LIK	*Lingkungan Industri Kecil* (Small Industry Estates)
LOC	Lower order construct
LR	Likelihood ratio
MARB	Mean absolute relative bias
MNCs	Multinational companies
NES	Not elsewhere specified
OECD	Organisation for economic co-operation and development
OEMs	Original equipment manufacturers
OLS	Ordinary least squares
PLS-SEM	Partial least squares structural equation modelling
R&D	Research and development
RBV	Resources-based view
RCA	Revealed comparative advantage
RMSE	Root mean square error

SCC	Supply chain collaboration
SDGs	Sustainable development goals
SEZ	Special economic zone
SLR	Systematic literature review
SMEs	Small and medium enterprises
SNI	*Standar Nasional Indonesia* (Indonesian National Standard)
SOEs	State-owned enterprises
UPT	*Unit Pelaksana Teknis* (Technical Service Centre)
VAF	Variance accounted for
VIF	Variance inflation factor
2SLS	Two-stage least squares
2SRI	Two-stage residual inclusion

CHAPTER 1

INTRODUCTION

1.1 Background

Small and Medium Enterprises (SMEs) are the backbone of an economy, contributing to jobs creation and the growth of national income in many countries. The World Bank (2017) estimates that registered SMEs in emerging economies employ on average about 50 percent of the total workforce and contribute more than 35 percent of national income.[1] In developing countries like those in the Southeast Asian region, SMEs constitute the vast majority of the total business entities, and significantly influence each nation's economy. The average share of SMEs in some countries in ASEAN is more than 90% of the total number of business entities. In an extreme case, such as Indonesia, the numbers of SMEs including micro enterprises are 62.93 million units (99.9% of total business entities) and absorb 116.67 million employees equalling 97.02% of the total national workers (Ministry of Cooperative and SME, Republic of Indonesia, 2017).

In the last few decades, there has been evidence to suggest that the majority of SMEs in developing countries are operating at low productivity, and hence low competitiveness in both the domestic and international markets (Aldaba, R. M. 2008; Long, 2003; Tambunan, 2009b). Tambunan (2009b) found that SMEs'

[1] The World Bank estimated that the contribution of SMEs to the emerging economies is even higher when unregistered SMEs are included.

productivity level in Indonesia is only about one third of that of large enterprises.[2] Looking at a case study of Vietnam, Long (2003) provides evidence that SMEs' productivity is far lower than the productivity of state-owned enterprises (SOEs) and multinational companies (MNCs).[3] This phenomenon might threaten the sustainability of SMEs and therefore needs be explored to improve their competitiveness.

Empirical studies have shown various evidence of factors affecting SMEs' competitiveness. Some researchers have identified that lack of access to finance as one of the main obstacles hindering SMEs from achieving a higher level of competitiveness (Thorston Beck & Demirguc-Kunt, 2006; Jinjarak & Wignaraja, 2016; Minetti & Zhu, 2011; Rahaman, 2011; Singh, Garg, & Deshmukh, 2007; Tambunan, 2009a). A report published by the World Bank (2017) supports this view, providing evidence that about 55 to 68 percent of SMEs in developing countries experience credit constraints. Limited access to financial sources would normally lead to lack of resources for hiring well-trained employees, expanding business networks and linkages, and upgrading technologies.

Meanwhile, some other researchers explain that low capacity to innovate could be a major hindrance to SMEs' high performance (Baumann & Kritikos, 2016; Harvie, 2010; Ofreneo, 2016; Turner, Ledwith, & Kelly, 2010; Van de Vrande, de Jong, Vanhaverbeke, & de Rochemont, 2009). Innovation is key for firms to improve

[2] Data from Indonesia in 2006, in which productivity was calculated using labour productivity as a proxy for firm productivity.

[3] In the case study of Vietnam in 2001, productivity was calculated using revenue per employee and assets per employee.

their quality, efficiency, productivity and sustainability. The significant role of innovation in improving SMEs' performance has been evident in both developed and developing countries (Angilella & Mazzù, 2015; SK Chetty & Campbell-Hunt, 2003; Gashi, Hashi, & Pugh, 2013; Sanchez, Alezandro, & Ricardo, 2015; Segawa, Natsuda, & Thoburn, 2014).

In addition to those two factors, researchers account for weak business networks among stakeholders as the main factor contributing to the slow growth in business and impeding the internationalisation process of firms (Sylvie Chetty & Blankenburg H., 2000; Hanna & Walsh, 2008; J.-j. Kim & Hemmert, 2016b; Shaw, 2006). J. H. Dyer (2000) states that good networking is becoming more critical in competing in the international market and it is not simply between companies, but rather between value chains. J.-j. Kim and Hemmert (2016a) found that, in the case of Korean SMEs, networking under a sub-contracting platform provides abundant opportunities for SMEs to engage in the international market. In addition, studies conducted by Lin and Lin (2015), Cao and Zhang (2011), Flynn, Huo, and Zhao (2010) and Doven Lavie (2006b) acknowledge that networks correlate positively with firm performance.

The earlier well-established theories such as competitive advantage theory by Porter (1985), the resources-based view (RBV) by Barney (1991), the extended RBV by Doven Lavie (2006b), and collaborative advantage (CA) theory by J. H. Dyer (2000) have also addressed firm competitiveness factors from various perspectives. These theories are helpful in understanding the basic problems

affecting firm performances and in seeking ways to improve firms' competitiveness. However, applying these theories into SMEs operating in developing countries will need some adjustments because of the unique features of SMEs businesses.

The unique features of SMEs include bearing higher business risks (Jüttner, 2005; Sahiti, 2019), relying more on relational capital (Manimala, Wasdani, & Vijaygopal, 2019; Welbourne & Pardo-del-val, 2009), and sensitive to changes in the external business environment (Prajogo & McDermott, 2014; Sahiti, 2019). In addition, many SMEs are also operating at limited resources that affect their ability to innovate, to invest in expansion and to widen their networking.

Considering the above-mentioned issues, there is a need to develop an alternative competitiveness model that takes into account SMEs' characteristics in Indonesia as one of developing countries. Underpinned by relevant theories and a systematic literature review (SLR), this study proposes an alternative model of SMEs' competitiveness by addressing the three above-mentioned competitiveness factors (credit access, innovation and collaborative advantages) both independently and holistically. This thesis will describe these factors as the key competitiveness sources for SMEs.

1.2 Research Objectives

The objective of this study is to examine the effect of each key competitiveness source (credit access, innovation and collaborative advantage) on SMEs' performance. This study will explore the key competitiveness sources by

examining the case of Indonesia's automotive component SMEs. Based on the findings, the study will conclude by formulating an alternative model of competitiveness sources for Indonesian SMEs producing automotive components.

To achieve the research objective, it is necessary to address the following research questions:

1. To what extent and how has credit access affected SMEs' performance?
2. To what extent and how has innovation contributed to improving SMEs' performance?
3. To what extent and how has collaborative advantage influenced SMEs' performance?
4. How would credit access, innovation and collaborative advantage altogether affect SMEs' performance?

1.3 Research Methodology

This study used a deductive approach, which emphasises observing and exploring specific phenomena then moves to broader generalisation and theory.

1.3.1 Unit of Analysis

The unit of analysis of this research is SMEs producing automotive components operating in Indonesia. The considerations behind choosing this unit of analysis are: *first,* SMEs producing automotive components have high potential to become a key source of domestic employment creation and could become generators for establishing both forward and backward linkages with other related

manufacturing sectors; *second*, Indonesia's automotive component SMEs have been facing various constraints on many internal and external factors including limited access to finance, low capacity to innovate and lack of ability to establish mutual networking in the supply chain; and *third,* automotive components are part of the 12 priority integration sectors of the ASEAN Economic Community (AEC).[4] These considerations are in line with Indonesia's development agenda as well as one of the Sustainable Development Goals (SDGs), which is to promote industrialisation, and foster inclusive and sustainable economic growth.

1.3.2 Sample, Sampling Method and Data Collection

The sample for this research was determined using stratified random sampling. This sampling method was chosen to get a clear picture of the characteristics of SMEs producing automotive components in the research location. Moreover, it was intended to minimise the potential bias in the sample selection process. The strata were selected based on two characteristics including geographical location and number of employees. The selection of strata based on geographical location is intended to capture the location's variability of samples in the landscape of Indonesia's manufacturing industries. Based on the geographical location, four provinces of Republic of Indonesia were selected, namely, Jakarta, West Java, Central Java and East Java because they are the hubs of automotive components industry in Indonesia. The selection of strata based on number of employees is intended to capture the representative firm size, such as small and medium firms.

[4] There are 12 priority integration sectors under the AEC scheme: (1) agro-based goods; (2) air transport; (3) automotive products; (4) e-ASEAN including ICT equipment; (5) electronics goods; (6) fisheries; (7) health care products; (8) rubber-based goods; (9) textiles and clothing; (10) tourism; (11) wood-based products; and (12) logistics.

Table 1.1 presents the relevant features of strata in accordance with location of the automotive components and its firm size.

Table 1. 1 Relevant Features of Strata in Accordance with Location and Firm Size

Location \ Firm Size	Small	Medium
Jakarta	Few small firms operate in this region; Tier 3[5]	Many medium firms operate in this region; Tier 2 and 3, authorized and non-authorized workshop
West Java	Many small firms operate in this region; Tier 3, authorized and non-authorized workshop	Hub of many medium firms; Tier 2 and 3, authorized and non-authorized workshop
Central Java	Hub of many small firms; Tier 3, authorized and non-authorized workshop	Many medium firms operate in this region; Tier 2 and 3, authorized and non-authorized workshop
East Java	Hub of many small firms; Tier 3, authorized and non-authorized workshop	Many medium firms operate in this region; Tier 2 and 3, authorized and non-authorized workshop

The procedures for sampling were as follows: (a) selecting the specific locations based on the above. In this study, the location selected were Jakarta, West Java, Central Java and East Java; (b) determining the firm size based on the number of employees; (c) obtaining the list of the companies in accordance to the designed stratification; (d) choosing the appropriate sample using simple random sampling.

The quantitative data for this study were collected using a questionnaire sent to SMEs engaged in automotive components manufacture. The data on the firms were supplied by the Ministry of Industry, Republic of Indonesia, Yayasan Dharma Bhakti Astra, and SMEs automotive components business associations (*GIAMM, PIKKO, ASPILOW and PASINDO).* The questionnaires were distributed

[5] "Tier 1 producers are generally large multinationals that supply components, systems, and modules directly to automakers. In addition to manufacturing, these firms may undertake supply chain management, inventory control, systems integration, foreign investment, and extensive design and R&D. Tier 2 and Tier 3 suppliers are generally smaller in size and product/function scope and are often less likely to have the financial resources and customer base to support significant foreign investment. Tier 2 suppliers generally provide parts and materials for finished components/assemblies to Tier 1, whereas Tier 3 suppliers often provide raw materials or parts to a wide variety of industries, including the motor vehicle sector" (USITC, 2010, p. 7-4)

to 520 SMEs through direct visits to the factory and via post to the firm owners or firm managers. In addition, I also developed an online questionnaire and send the website link to the firms by email. I received 201 responses questionnaires (a response rate of about 38.65% % from the total of distributed questionnaire). The response rate of respondents in East Java was the highest (41.6%), followed by Central Java (41.3%), West Java (31.00%) and Jakarta (24.00%). Respondents in the small firm category provided higher response rate (41.89%) than that in the medium firm category (30.67%). After screening, 177 responses were usable. Most of unused responses are questionnaires with incomplete answer. The results are presented in Table 1.2 and Table 1.3 below.

Table 1.2 Sample Distribution Before Screening

Firm Size / Location	Small			Medium			Total		
	D	O	RR (%)	D	O	RR (%)	D	O	RR (%)
Jakarta	5	1	20.00	20	5	25.00	25	6	24.00
West Java	50	8	16.00	50	23	46.00	100	31	31.00
Central Java	110	50	45.45	40	12	30.00	150	62	41.33
East Java	205	96	46.83	40	6	15.00	245	102	41.63
Total	370	155	41.89	150	46	30.67	520	201	38.65

Note: D=Distributed; O=Obtained; RR=Response Rate
Source: Primary data, 2017

Table 1.3 Sample Distribution After Screening

Firm Size / Location	Small		Medium		Total	
	Number of Sample	Percentage to The Total Sample (%)	Number of Sample	Percentage to The Total Sample (%)	Number of Sample	Percentage to The Total Sample (%)
Jakarta	1	0,56	5	2,82	6	3,39
West Java	4	2,26	20	11,30	24	13,56
Central Java	43	24,29	9	5,08	52	29,38
East Java	91	51,41	4	2,26	95	53,67
Total	139	78.53	38	21.47	177	100.00

Source: Primary data, 2017

The sample collection period was in March 2007 to June 2017. Among the 177 firms, 8% from Tier 1, 16% from Tier 2, 5% from Tier 3 and 72% were from authorized and non-authorized workshop. Majority of the samples are from small firms (78.53%), and the remaining is from medium firms (21.47%). In this sample, I calculated the average number of employees is 17. The majority of the questionnaires (96.61%) were collected through direct visits to the factories. In this case, almost all of the questionnaires were filled in by the firms' owners. The remaining questionnaires were collected online (2.26%) and by post (1.13%).

The quality and consistency of the respondents' answers to the questions in the questionnaire were evaluated in several ways. First, I provided every respondent with my mobile phone number and personal email. These were written on the cover of the questionnaire. Therefore, the respondents had full access to make contact with me anytime when they had questions regarding the research and/or needed more explanation regarding the questions in the questionnaire. Second, during the site visits, the field research assistants and I offered to assist the respondents to fill out the questionnaire straight away. This was intended to help the respondents if they needed more explanation about certain questions in the questionnaire. During the process, the research assistants and I neither directed the respondents nor intervened to provide specific answers. Third, to check the consistency of respondents' answers, some questions in the questionnaire were repeated in different ways. For example, a similar question is asked twice where the first question's answer is provided via numerical options and the second question's answer is provided via qualitative options.

In addition to the questionnaire, interviews were also conducted with selected SMEs respondents, and representatives of business associations, and central and local government. In this phase, the sample was selected using purposive sampling. I interviewed representatives of three local business associations (two in East Java and one in West Java) and two national business associations in Jakarta. For interviews with governments, I selected agencies whose main duty is to manage automotive component of SMEs.

The validity of the questions in the questionnaire was discussed and checked with several parties. First, I conducted discussions with leaders of SMEs associations, *Gabungan Industri Alat-alat Mobil dan Motor (GIAMM)* (Automotive Parts & Components Industry Association) and *Perkumpulan Industri Kecil-Menengah Komponen Otomotif (PIKKO)* (Automotive Components Small-Medium Industry Association), to gather their views on the relevance of the questions in the questionnaire to the current context of SMEs. Second, the questionnaire was also discussed and reviewed by the economic researchers at *Lembaga Ilmu Pengetahuan Indonesia* (the Indonesian Institute of Sciences/ LIPI). Third, at the proposal stage, the questionnaire was reviewed by academics at Flinders University through a series of discussions. In addition, I had also pre-tested the questionnaire with 7 SME entrepreneurs. The questionnaire was also translated into the Bahasa Indonesia and verified by two Indonesian native speakers.

Meanwhile, secondary data were collected from various trusted sources such as the Ministry of Cooperative and SMEs, Ministry of Industry, Ministry of Trade, Ministry of Manpower, the Chamber of Trade and Industry, business associations

and *Biro Pusat Statistik* (the Indonesian Bureau of Statistics/BPS). In addition, other data were also obtained from journal articles, the internet and seminar materials.

1.4 Contributions of the Study

This research contributes to the literature on credit access by filling two important gaps. *First*, this study contributes to asymmetric information theory by incorporating a firm risk-sharing scheme as one of the screening criteria to reduce asymmetric information. While many factors have been discussed, risk-sharing schemes have not been sufficiently explored. The existing literature on screening devices to minimise asymmetric information mainly focuses on certain instruments such as collateral (Berger, Frame, & Ioannidou, 2016; Bester, 1987; Menkhoff, Neuberger, & Suwanaporn, 2006), the strength of relationship (Kirschenmann, 2016; Kysucky & Norden, 2016) or historical loan repayments (Jiménez & Saurina, 2004; Yaldız Hanedar, Broccardo, & Bazzana, 2014). S*econd*, this study contributes to non-price credit rationing theory by incorporating the dimension of personal belief in decisions to borrow especially from the non-borrower's point of view. The existing literature on non-price credit rationing such as Boucher, Guirkinger, and Trivelli (2009b) and Guirkinger and Boucher (2008) focus only on three types of rationing (quantity, transaction cost and risk). In Indonesian culture where the majority of the population are Muslim,[6] personal belief/religion has a significant influence on economic activities, including taking loans from banks. For instance, Islamic law prohibits Muslims from taking bank

[6] According to the Indonesian Bureau of Statistic (BPS) 2010 census, the Muslim population was 87.2 % of Indonesia's total population.

loans because banks charge and interest rate that is thought to be exploitative. Under such conditions, many Muslim entrepreneurs are not motivated to take up loans with this characteristic. I call this self-refusal to obtain interest rate–based loan cultural rationing.

This research contributes to the literature on innovation by filling two critical gaps. *First*, this study contributes to frugal innovation theory by providing evidence of the importance of non-price factors in innovation. While price factors are known to contribute to innovation (for example, Baumann and Kritikos (2016); Kancs and Siliverstovs (2016); Huang (2011); Hall B.H., Lotti, and Mairesse (2009); Griffith, Huergo, Mairesse, and Peters (2006)), there is limited evidence on the impact of non-price factors. The effect of non-price factors, such as supply chain linkages, social media engagement, competition and R&D collaboration, is, to my knowledge, yet to be sufficiently explored in tandem with price factors. *Second*, this study demonstrates the importance of SMEs' creativity in machinery innovation in an emerging economy and the impact on firms' performance. By separating the analysis of machinery innovation from process and product innovation, this study presents a clearer picture of the contribution of machinery innovation for SMEs in emerging economies where most of the firms are experiencing frugal conditions.

The study also makes three contributions to the literature on collaborative advantage (CA) as follows. First, it reconceptualises the CA model to suit the unique characteristics of SMEs in developing countries including the importance of inter-firm trust building among collaboration members. Second, it incorporates

the role of relational capital as a non-price factor in resources investment, which offers an additional perspective to the existing literature on CA, which is dominated by price factors. Third, it examines the synchronisation of responses to external shocks as one instrument to reduce transaction costs. In addition, the analysis of the combined effect contributes to the literature on SMEs' competitiveness by proposing the three competitiveness sources as an alternative model to improve the performance of SMEs operating in Indonesia.

This study also contributes to the practical and policy aspects. The findings of this study can be used as one of references to improve the competitiveness level of automotive components SMEs. The findings of this study are based on the analysis of the automotive components industry in the small and medium sized enterprises. The findings are relevant for micro business group in the automotive component industry. However, the findings might not directly apply to other SMEs producing different products. Other small and medium sized enterprises especially in the manufacturing sectors could adopt the three key competitiveness sources in this study with adjustment according to their business nature.

1.5 Thesis Structure

This thesis consists of eight chapters. Chapter 1 is the introductory chapter, describing the background, objectives, research questions, research methodology, and contributions of the study. Chapter 2 is an overview of the development of Indonesian SMEs with special reference to SMEs producing automotive components. This chapter begins by presenting the dynamics of Indonesia's SMEs,

describing the history of the automotive components industry in Indonesia, reviewing its current development, analysing its competitiveness and discussing it in relation to the three sources of competitiveness, namely, credit access, innovation, and CA.

Chapter 3 presents a literature review on the theories of firm competitiveness that were used as the basis for deriving the three key competitiveness sources for SMEs. This study also conducts a systematic literature review (SLR) to explore the transformation of the firm competitiveness factors from 1990 to 2018.

Chapter 4 presents the results, analysis and discussion related to research question 1. I start the discussion by examining the effect of credit rationing on a firm's probability of investing in expansion. The discussion covers both firms that borrow from banks (borrowers) and firms that leave the credit market for various reasons (non-borrowers). This is followed by a discussion of the factors affecting credit rationing, in particular the three common factors that are found for borrowers and non-borrowers. These factors are willingness to offer a higher ratio of collateral to the proposed loan, achieving higher sales growth and establishing a risk-sharing scheme with peers. Finally, the effect of credit rationing on firm performance is examined.

Chapter 5 presents the results, analysis and discussion relating to research question 2. This chapter discusses the empirical investigation of the effect of price and non-price factors in innovation on firm performance. Three phases of analysis are presented, namely, innovative effort, innovation outputs and productivity

measures. The roles of price and non-price factors are discussed for each phase of innovation. In discussing the innovation output and productivity measure phase, I offer a different view to many studies by separating machinery innovation from process and product innovation.

Chapter 6 presents the results, analysis and discussion related to research question 3. This chapter examines the effect of collaborative advantage (CA) on firm performance. It also discusses the indirect effect of CA on firm performance through firm capability as a mediating variable. Prior to examining this effect, a CA conceptual model that addresses unique features of SMEs is thoroughly discussed. The unique features include relational capital, risk sharing and synchronised responses to external changes.

Chapter 7 presents the results, analysis and discussion related to research question 4. This chapter investigates the combined effect of credit access, innovation and CA on firm performance. To examine the combined effect, all relevant variables from the three key competitiveness sources are selected, bundled and run simultaneously. The key competitiveness sources that were analysed individually in the preceding chapters are examined together in this chapter, thus developing the model of the trinity of key competitiveness sources.

Chapter 8 summarises the empirical findings. It highlights the contribution of the study to the theories, implications for businesses and policy recommendations. Finally, the limitations of the study and recommendations for future research are presented.

CHAPTER 2
AN OVERVIEW OF THE DEVELOPMENT OF INDONESIA'S SMES

2.1 Introduction

SMEs play an important role in the Indonesian economy especially in terms of their contribution to employment and gross domestic product (GDP) growth. While the majority of Indonesian SMEs operate in the agriculture and trading sectors, which are regarded as labour-intensive sectors, the portion of SMEs operating in the manufacturing sectors is relatively low.

Indonesian automotive component SMEs are business entities that are strategic positioned to absorb abundant workforces of various skill levels, creating wide linkages with other sectors and potentially generating exports to international markets. So far, the growth of Indonesia's automotive components industry has been volatile due to many internal and external factors, for example, constraints in the production process, limited access to finance, low innovation capacity and lack of networking in the supply chain.

This chapter discusses the dynamics of Indonesia's SMEs, followed by the automotive components industry with a focus on the history and development of the automotive industry, firm competitiveness and the challenges to improving their competitiveness.

2.2 The Role of SMEs in the Indonesian Economy

Indonesia adopts several definitions of SMEs. Table 2.1 provides two definitions of SMEs based on the SMEs law and the Bureau of Statistics (BPS). Indonesian Law No. 20 (2008) on Micro, Small and Medium Enterprises classifies enterprises based on the net value of their fixed assets (FA) excluding land and business premises or their annual sales (AS). However, BPS defines SMEs according to the number of employees. A small firm is a firm employing 5 to 19 employees and a medium firm is a firm with 20 to 99 employees. This study will adopt the definition of SMEs of BPS.

Table 2.1 Indonesia's SMEs: Classification as Small or Medium Enterprises

Enterprises	Criteria Based on Law No. 20 (2008)		Criteria Based on BPS
	Net value of fixed assets (FA)	**Annual sales (AS)**	**Number of employees (persons)**
Small	Rp 50 million < FA ≤ Rp 500 million (US$ 3,557–35,572)	Rp 300 million < AS ≤ Rp 2.5 billion (US$ 21,343–177,860)	5–19
Medium	Rp 500 million < FA ≤ Rp 2.5 billion (US$ 35,572–177,860)	Rp 2.5 billion < AS ≤ Rp 50 billion (US$ 177,860–3,557,199)	20–99

Source: Indonesia's Law No. 20 (2008) on Micro, Small and Medium Enterprises and BPS

The Ministry of Cooperative and SMEs of the Republic of Indonesia recorded that in 2017 the number of SMEs (including micro enterprises) was approximately 62,922,617 units, equaling 99.9% of the total enterprises. SMEs employ more than 97% of the total workforce (Table 2.2). Historically, the high contribution of SMEs to employment is because they are prevalent in heavily labour-intensive sectors, such as the agricultural sector, livestock, forestry and fisheries. A recent census,

however, showed that in 2017 SMEs in non-agricultural sectors also contributed significantly to employment, with about 59,266,885 people or nearly half of the total SME employees working in SMEs in non-agricultural sectors (BPS, 2019). The top three SME employers in non-agricultural sectors are motor vehicle trading, maintenance and repairing; manufacturing; and the hotel and restaurant sector.

Table 2.2 Number of Enterprises and Employees 2017

Enterprises	Number of enterprises		Number of employees	
	Unit	**Share of total (%)**	**Persons**	**Share of total (%)**
Micro enterprises	62,106,900	98.70	107,232,992	91.91
Small enterprises	757,090	1.20	5,704,321	4.89
Medium enterprises	58,627	0.09	3,736,103	3.20
Large enterprises	5,460	0.01	3,586,769	3.07
Total	62,928,077	100.00	116,673,416	100.00

Source: Ministry of Cooperative and SMEs-Republic of Indonesia (2017)

Even though SMEs contribute greatly to employment, their contribution to added value activities lags behind large enterprises. In 2017, SMEs (including micro enterprises) only contributed 57.08% to Indonesia's gross domestic product (GDP). On the other hand, large enterprises, which were only 0.1% of total enterprises, contributed 42.92% to GDP (Figure 2.1). Another main issue with SMEs is the low productivity level of their employees. In 2017, the average annual productivity of

Indonesian SMEs' employees was only Rp 201.38 million.[7] In contrast, employees of large enterprises produced about Rp 1,137.16 million on average, which is 5.6 times higher.

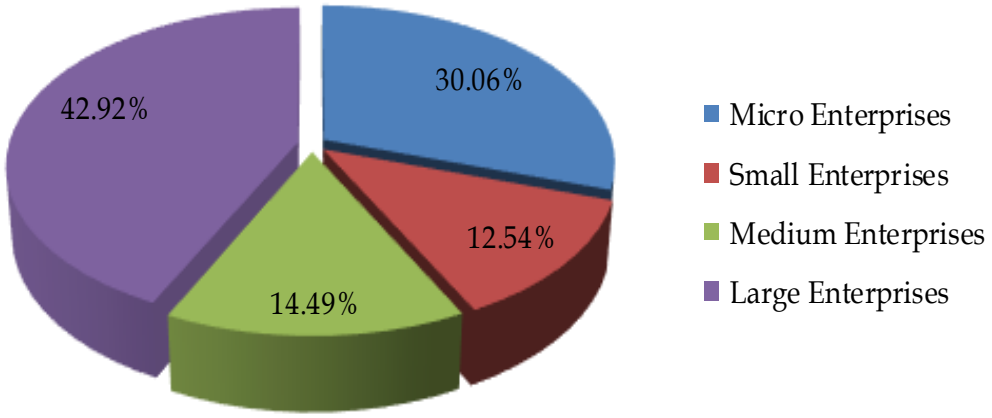


Figure 2.1 The Contribution of Indonesia's SMEs to GDP in 2017, Based on Constant Price of 2010

Source: Ministry of Cooperative and SMEs, Republic of Indonesia (2019)

The contribution of SMEs to exports is far behind large enterprises. In 2017, while large enterpises contributed about 85.8% to the export value of non-oil and gas products, SMEs' contribution was only 14.17%. Exports from manufacturing SMEs mostly come from medium-sized enterprises. The main export products of SMEs are products using a low level of technology such as food and beverage products, textiles, leather goods and footwear, wood products and forest products. On the other hand, there are few exports of manufacturing products that come from SMEs using a higher level of technology such as transportation and manufacturing equipment and electronics.

7 Productivity per employee is measured by dividing the share of gross domestic product of each category of enterprise by the number of employees.

Indonesia's SMEs have faced a number of constraints for a long time. The two crucial constraints faced by SMEs are lack of access to finance and a low level of technological capabilities (Adam & Lestari, 2017; Kusumawardhani, Rahayu, & Maksum, 2015; Tambunan, 2019). The other common problems include difficulties in obtaining raw materials locally, lack of relevant business information, difficulties in marketing and high transportation costs caused by less developed infrastructures.

These constraints and the slow handling in resolving these problems to some extent are caused by inadequate policies to support the development and growth of SMEs (Tambunan, 2008; Wie, 2006). In this thesis, I will divide the discussion of Indonesia's SMEs' development into two periods, namely the New Order (1967–1998) and post–New Order (1998–present).

2.2.1 SMEs' Development in the New Order Period (1967–1998)

In the early days of New Order period, the government seemed to show less interest in fostering SMEs. According to Wie (2006), policies to empower SMEs in this period were conservative as SMEs were perceived as unimportant economic actors, that needed to be assisted through welfare rather than being a significant contributor to the economy. Kusumawardhani et al. (2015) called the New Order SMEs policy a traditional policy within a public administration paradigm, in which government policies to develop SMEs were conducted more through direct

assistance programs such as subsidies. According to them, this was based on the narrow thinking that SMEs needed protection from competition.

In the financial sector, to widen the credit access of the manufacturing sector, the government launched several credit schemes including *Kredit Investasi Kecil (KIK)* (Small Investment Credit), *Kredit Modal Kerja Permanen (KMKP)* (permanent working capital credit) and *Kredit Usaha Kecil (KUK)* (Small Business Credit). All of these credit schemes were offered to SMEs with subsidised interest rates.

Due to the underdeveloped nature of Indonesian financial institutions at that time, those credit programs only managed to reach a small number of SMEs (Tambunan, 2011), and many of those programs were unsuccessful in assisting SMEs (Adam & Lestari, 2017; Robinson, 2001; Seibel, 2005; Wie, 2006). Adam and Lestari (2017) and Wie (2006) assert that the main problem with these programs was the inability of the banks to fully understand SMEs' need for support, resulting in adverse selection and moral hazard problems. In the view of Robinson (2001), one of the reasons that the credit programs failed was that the schemes offered to the SMEs had low interest rates, and hence were unable to cover the loan costs, which increased the risks of the lending programs.

To promote the innovation capacity of SMEs, the government provided a technical assistance scheme through clustering and training programs. In the late 1970s, the clustering program was carried out through the establishment of *Lingkungan Industri Kecil (LIK)* (Small Industry Estates) in several regions. Each LIK was equipped with facilities for training and facilities to improve the quality of SMEs'

products. The establishment of LIK was also considered the government's effort to build collaboration between SMEs.

In the 1980s, the government also launched a small industries development program called *Bimbingan dan Pengembangan Industri Kecil (BIPIK)* (Guidance and Development of Small Industries). BIPIK programs were carried out through training in each of the clusters of SMEs with members ranging from 50 to 100 small firms. Wie also mentioned that a Technical Service Centre (UPT) was provided to assist SMEs with technical matters and input provisions.

Wie (2006) cites the study of Grizzelli (1988), who found that LIK and UPT had failed in their effort to improve SMEs' innovation capacity and their performance. The innovation capacity of Indonesian companies in general, including SMEs, during this period was relatively low. One of the indicators of this was the low number of patent applications. According to Katila (2000); Tambunan (2009b), patent applications are one of the best indicators of firms' level of innovativeness. The World Development Indicators (2018) recorded that during 1980–1998, applications for patents by Indonesian residents averaged only about 49 patents per year. It is unfortunate that there is no official record of patent applications by type of firm especially from SMEs.

The failures of those innovation programs were mainly attributed to improper policy design and lack of human resources capacity both from the government and SMEs. The officers responsible for implementing the policy had few technical skills and inexperience in implementing programs for SMEs. In addition, the top-

down approach of the programs was not effective in reaching SMEs and could not meet the real needs of the enterprises. Wie (2006) also mentions that BIPIK programs had very little effect on improving firms' innovation capacity. because the common training facilities in many centres had not been properly maintained.

Learning from the failure of these schemes, the government decided to change its policy of developing SMEs through indirect assistance programs in the early 1990s. The government introduced a foster father-business partner linkage scheme. Through this program, the government encouraged large enterprises to cooperate with SMEs. In addition, state-owned enterprises (SOE) were also pushed to cooperate with SMEs. This cooperation was intended to improve SMEs' management capabilities, technological capacity, marketing skills and access to finance (Wie, 2006)

2.2.2 SMEs' Development in the Post–New Order Period (1998–Present)

The post–New Order government has shown a high commitment to promoting the development of viable SMEs (Wie, 2006). Further, Wie (2006) explains that the orientation of SMEs development programs has changed to become more "market oriented, demand driven programs based on efficiency considerations" (p. 35). The four major policies under this approach are: (1) the establishment of a friendly business environment for SMEs; (2) the development of financial institutions that can provide affordable finance for SMEs; (3) the effective provision of non-financial business support services to SMEs; (4) the promotion of strategic networking between SMEs and domestic or foreign large enterprises.

In the financial sector, the government was aware that one major obstacle to SMEs obtaining credit from formal financial institution is their inability to provide sufficient collateral. While many SMEs have assets in terms of land and buildings, they cannot use it for their loan as collateral because those assets are uncertified without formal land title. Learning from the failure of the previous regime's policy, instead of providing an interest rate subsidy, the government improved and sped up the registration of land title to give SMEs access to formal financial institutions (Wie, 2006). Therefore, SMEs can now use their assets as collateral when applying for credit to formal institutions.

The commitment of the government to improve SMEs' access to credit was formalised through the Presidential Instruction (Instruksi Presiden No. 6/2007) on the acceleration of the business sector and empowerment of SMEs to improve their competitiveness. Through this instruction, the government introduced *Kredit Usaha Rakyat* (KUR) (micro-credit program) on 5 November 2007. KUR is a guaranteed microfinance program especially for SMEs to access loans from formal financial institutions, such as banks. For the loan disbursement, the government has worked together with several banks such as BRI, Bank Mandiri, Bank BNI, Bank BTN, Bank Syariah Mandiri and Bank Bukopin to channel money to the SMEs.

In this KUR program, while banks have full responsibility for loan disbursements, the government provides a partial credit guarantee and determines the credit

limits and the interest rates. In addition, the government has also provided a credit guarantee facility through PT Askrindo and Perum Jamkrindo.

Adam and Lestari (2017) have identified two strengths of the KUR program. First, the KUR program attracts risk-averse "feasible SMEs" to borrow by providing a partial credit guarantee. This addresses the issue of insufficient collateral as the reason SMEs are unable to obtain regular loans from formal financial institutions. Second, the KUR program reduces uncertainty or bias as a result of information asymmetry between risk-averse "feasible SMEs" and banks. This program helps to resolve the adverse selection and moral hazard problems of credit allocation in inefficient sectors.

Many Indonesian researchers consider that the KUR program has achieved its goal of giving SMEs wider access to finance (Adam & Lestari, 2017). Adam and Lestari (2017) report that the number of KUR borrowers increased substantially from 2.3 million to 12.3 million borrowers during the period 2008–2014. In 2014, the average loan per borrower was about Rp 14.2 million (US$ 1,010). In 2018, about 4.4 million additional SMEs received credit from the KUR The success of the KUR program can also be seen from the non-performing loan rate, which averages only 3.9%. This is far below Indonesia's microfinance prudential requirement rate of 5%.

Even though the KUR program has contributed positively to the accessibility of finance for SMEs, this program also has many weaknesses. First, the KUR program only reaches about 20 percent of the total SMEs (including micro

enterprises). Second, the credit allocation of the KUR program is too concentrated on certain sectors, for example the trading sector. Third, for some banks, the program has not been able to channel the funds in accordance with the original purpose of the program to promote productive purposes.

Under the post-New Order regime, the development of SMEs' innovation capacity has shown significant improvement. During this period, there was a significant increase in patent applications. In the period between 1999 and 2008, patent applications by residents averaged 238 patents per year. This number is almost five times higher than the annual average number of patent applications during the previous regime.

Although there was a positive trend in the number of patent applications, the level of innovation capacity of Indonesian firms still lags behind some neighbouring countries. For instance, Thai residents submit on average about 785 patents and Malaysia 446 patents annually. In addition, by employing a ratio of firms with ISO certificate ownership to total firms as an alternative indicator of the level of firms' innovativeness, Tambunan (2009b) also records that in 2006, were only 22.13% of Indonesian firms owned an ISO certificate. This number is far lower than in Thailand (44.63%), Vietnam (37.84%), and Malaysia (31.43%).

To improve the innovation culture amongst firms in general including SMEs, the government introduced the National Innovation System. Based on Agenda Riset Nasional (National Research Agenda) 2010–2014, the government gives priority to seven fields of focus of science and technology development: (i) food security; (ii)

energy sector; (iii) information and communications technology; (iv) technology and transportation management; (iv) defence and security technology; (vi) health and medicine technology; and (vii) advanced materials.

According to ERIA (2014), thus far innovation policy is still relatively underdeveloped. This is because the Indonesian innovation strategy has been conducted sporadically through policy documents without a consistent approach. Further, ERIA states that, institutionally, there is a lack of policy coherence where every ministry has their own plan and policy. As a result, there is no synergistic effect when each individual ministry implements their policy.

2.3 Historical Development of Indonesia's Automotive Components Industry

2.3.1 The Early Phases of Indonesia's Automotive Components Industry Development

The history of the automotive components industry in Indonesia can be divided into three phases. The *first phase* started in 1969 when the government of Indonesia opened the door for car imports, both of completely built-up (CBU) and completely knocked-down (CKD) cars (GAIKINDO, 2015). To support this industry, local businesses responded positively by setting up automotive components factories that produced various parts and accessories for cars such as batteries, jigs and fixtures. In addition, many local business enterprises were encouraged to join industry by providing auxiliary services such as painting, welding, trimming and metal finishing.

The growth of local automotive component enterprises gained momentum when the government implemented a policy in the mid-1970s which limited CBU import and promoted local content requirements (LCRs) in producing cars. The LCRs program is also known as a "deletion program".[8] Under this program, the government required the automotive component enterprises operating in Indonesia to gradually increase their use of locally produced components and reduce the import of components.

To promote the LCRs program, the government of Indonesia imposed high import duties on CBU cars at the beginning of the 1970s. Mallarangeng (2005) mentions that the import tariff on CBU cars is nearly double that on CKD cars. Further, he explains that the CKD import tariff for sedans was increased between 50% and 100% and the automotive components' import tariff was increased from 10% to 20%.

The LCRs program made it increasingly attractive for local business entrepreneurs to explore the manufacturing of automotive components. Haryo Aswicahyono (2000) mentions that in the initial phase in 1977 this program was targeted to promote locally produced tyres, batteries and paint, with an extension to produce transmissions, engines, brakes, axles and other components in the next phase. In addition, GAIKINDO (2015) also found that these policies spurred many SMEs to produce automotive components like radiators, mufflers, silencers, wheels, car seats and interiors, electric cables, rubber gaskets and jigs.

8 In Indonesian language, it is called *program penanggalan*.

The *second phase* was marked by a government policy re-orientation on the automotive components industry from an open door to a protectionist policy. In the early 1980s, while the government continued its LCRs program by imposing high import tariffs and a tax on imported automotive components, this protectionist policy encouraged local enterprises to produce components of higher value-adding such as transmissions, clutches, engines, brake systems, metal mouldings and door control systems. Later, this policy increased the number of domestic enterprises venturing into production of engines for cars, block clutch transmissions and fan propellers.

The LCR increased significantly for some car models by the mid-1990s (Haryo Aswicahyono, 2000). For instance, the average local content ratio for sedans was ranging between 5% and 42% with the average about 11%. For vehicles with larger production runs and a simpler manufacturing process such as light commercial vehicles of less than five tons, the local content ratio was quite high, averaging 40%.

To support the local content requirements, the government encouraged large firms to collaborate with small firms as suppliers under a subcontracting program. The government-driven subcontracting program also aimed to help in the process of technology transfer from large firms to small-scale domestic firms in the automotive component industry. However, the technology transfer process did not materialise because many of the larger firms had limited technological capacity (Haryo Aswicahyono, 2000). In some cases, the technology transfer

worked in the reverse direction where local small companies who had joint ventures with foreign companies had the more advanced technological capacity.

Moreover, Haryo Aswicahyono (2000) and Sato (1998) mention that partnership relationships between large companies (including OEMs) and supplier companies were typically opportunistic, shallow, short-term and exclusive. Suppliers tend to behave opportunistically because they have to fulfil adequate economies of scale where they are forced to serve several firms at the same time.

In the *third phase*, the development of the automotive component industry in Indonesia was coloured by a combination of open door and protectionist policies. The growth of the automotive components industry in this phase increased tremendously. Haryo Aswicahyono (2000) mentions that by the mid-1990s, local firms had expanded their products to many car components including shock absorbers, exhaust systems, filters, pistons, petrol and diesel engines, axles, transmissions, steering systems, safety glass, high quality forged parts, wiring harnesses and wheel rims.

At the end of the 1990s, the Indonesian government abandoned the LCRs program and soon after, with the Asian Financial Crisis of 1998, the government announced a new automotive policy to attract foreign direct investment (FDI) and to promote the export of automotive products (GAIKINDO, 2015). In 2006, the government eliminated import tariffs on automotive components to promote car exports.

Furthermore, in 2012, to promote environmental sustainability, the government began a Low Cost Green Car (LCGC) program, which encourages the industry to use up to 80 percent locally produced automotive components. Several car manufacturers such as Toyota, Daihatsu, Nissan, Honda and Suzuki have joined the LCGC program. By 2015, car manufacturers committed to invest about US$ 3 billion and the automotive components makers planned to invest about US$ 3.5 billion (GIAMM, 2015). The production capacity of LCGC is estimated between 300,000 and 600,000 cars per year.

2.3.2 The Current Development of Indonesia's Automotive Components Industry

In the current setting, the Indonesian automotive industry plays a pivotal role in creating jobs and widening the networks among various industries. GIAMM (2015) reports that in 2013 the original equipment manufacturers (OEMs) or car producers – mainly from Japan – operating in Indonesia have established direct linkages with about 57,000 auto components firms and related companies that provide jobs to more than 1.3 million employees.[9] The structure of Indonesia's automotive industry comprises five main groups (Figure 2.2).

9 GIAMM is *Gabungan Industri Alat-alat Mobil dan Motor* (Indonesian Automotive Parts & Components Industry Association).

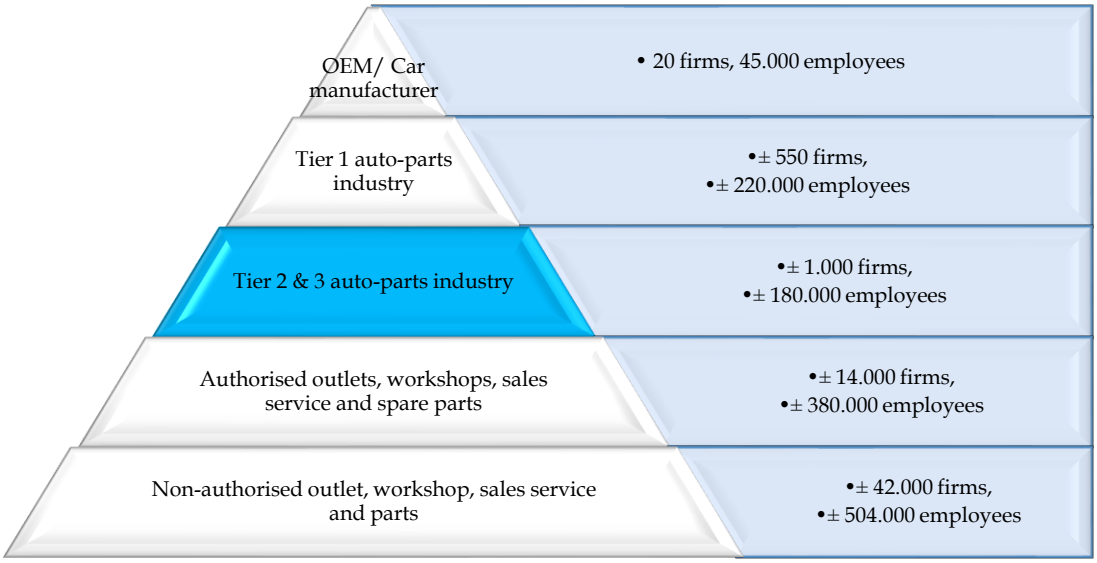


Figure 2.2 Structure of Indonesia's Automotive Industry in 2013

Source: GIAMM (2015)

At the top of the pyramid is OEMs or car assembler companies. In 2013, there were 20 OEMs/car assembler companies of various brands operating in Indonesia. In the second layer of the pyramid is the Tier 1 automotive parts industry, with about 550 firms. In this group, the size of the firms is mostly large and medium enterprises. The Tier 2 and Tier 3 automotive component industry, which forms the third layer of the pyramid structure, have about 1,000 firms that generally consist of medium and small enterprises. The two bottom layers of the pyramid are authorised and non-authorised outlets, workshops, sales, service/maintenance and spare parts. Beyond this structure, there are thousands of companies, mostly SMEs with no business affiliations to the OEMs. Those companies produce after-market automotive components and supply them directly to the market.

2.3.3 Indonesia's Car Production and Sales Growth

Indonesia's car production growth in the last decade was fairly high. As shown in Table 2.3, total car production in 2006 was only 296,008 units and this grew

significantly by 39% in the following year. The car manufacturers doubled their production to 600,628 units in 2008. During the global financial crisis of 2009, Indonesia's car manufacturers cut their production by 22.6%. A year later as the economy recovered, car production increased significantly. In 2012, for the first time, Indonesia's car production exceeded 1,000,000 units and this positive trend was maintained until 2014. The slowdown in the domestic and global economy in 2015 reduced Indonesia's car production by 15.4%. A year later, the car manufacturers increased car production by 7.2% and continued to grow until 2018.

Table 2.3 Indonesia's Car Production and Sales Growth, 2006–2018

Year	Car production (units)	Growth of car production (%)	Domestic car sales (units)	Growth of domestic car sales (%)
2006	296,008		318,904	
2007	411,638	39.10	433,341	35.90
2008	600,628	45.60	603,774	39.30
2009	464,816	- 22.60	483,648	-19.90
2010	702,508	51.10	764,710	58.10
2011	837,948	19.30	894,164	16.90
2012	1,053,270	25.70	1,116,230	24.80
2013	1,208,211	14.70	1,229,901	10.20
2014	1,298,523	7.50	1,208,028	-1.80
2015	1,098,780	- 15.40	1,013,291	-16.10
2016	1,178,346	7.20	1,062,729	4.90
2017	1,217,518	3.30	1,079,534	1.60
2018	1,343,743	10.40	1,151,284	6.60

Source: (GAIKINDO, 2019)

Domestic car sales increased substantially during the period 2006–2018. In 2006 car sales only recorded 318,904 units. Car sales nearly quadrupled to 1,229,901 units in 2013. During 2006–2013, the number of domestic car sales was always

higher than the number of cars produced. The gap was covered by car imports from various countries with Japan as the major supplier. Along with the slowdown of Indonesian economic growth in 2014 and 2015, car sales in the domestic market decreased by 1.80% and 16.10% respectively. When the economy recovered in 2016, demand for cars increased and continued to grow until 2018.

OEMs operating in Indonesia have a production capacity which can be increased at any time if there is a surge in car demand. Firms in Tier 1, 2 and 3 also have the capacity to support OEM car production. According to the SMEs automotive component entrepreneurs in East Java (Sidoarjo, Pasuruan and Gresik) and West Java (Cikarang and Karawang), their current operating capacity is only around 70% of their maximum capacity.

Table 2.4 Indonesia's Car Production by OEMs Brand, 2015 and 2018

No	OEMs/brand	2015		2018	
		Production (units)	Share (%)	Production (units)	Share (%)
1	Toyota	471,289	42.89	531,573	39.56
2	Daihatsu	163,315	14.86	201,387	14.99
3	Honda	148,096	13.48	156,621	11.66
4	Suzuki	130,967	11.92	124,194	9.24
5	Mitsubishi Motor	51,148	4.65	164,107	12.21
6	Mitsubishi Fuso	35,792	3.26	53,680	3.99
7	Datsun	29,736	2.71	11,840	0.88
8	Hino	19,735	1.80	43,599	3.24
9	Nissan	18,800	1.71	3,468	0.26
10	Isuzu	16,934	1.54	2,6051	1.94
11	Chevrolet	4,562	0.42	-	-
12	Hyundai (Pc)	2,840	0.26	3,520	0.26
13	Mercedes-Benz	2,777	0.25	-	-
14	BMW	2,170	0.20	3,127	0.23
15	Volkswagen	379	0.03	-	-
16	Renault (Pc)	137	0.01	177	0.01
17	Audi	103	0.01	-	-
18	Wuling	-	-	16,146	1.20
19	DFSK	-	-	2031	0.15
20	MINI	-	-	170	0.01
21	UD TRUCK	-	-	1968	0.15
22	FAW	-	-	84	0.01
	Total	1,098,780	100.00	1,343,743	100.00

Source: GAIKINDO (2015)

The increasing production capacity of OEMs and some other large firms is a result of their massive investment during the last 5 years. The Ministry of Industry of the Republic of Indonesia reported that in 2014 the total investment of car manufacturers and automotive components producers had reached US$ 4.3 billion. EIBN (2014) recorded several investments from Japanese car manufacturers including: (a) Toyota invested around US$ 2.7 billion to expand its production

capacity to 570,000 units, including plans to build a new factory in Karawang, West Java; (b) Daihatsu began operating its plant in Karawang to produce LCGC Daihatsu Alya and Toyota Agya cars; (c) Suzuki invested around US$ 917 million into the construction of a new plant to increase its production capacity to 250,000 units; (d) Nissan invested US$ 400 million to increase its production capacity from the current 150,000 units to 250,000 units.

Investors' interest in investing in the Indonesian automotive industry continues to grow. The latest data published by Indonesia's Investment Coordinating Board (2018) recorded 823 investment projects in the field of motorised vehicle industries with an investment value of US$ 971.32 million.

Many large domestic and multinational automotive component companies have established production networks with firms in Tiers 1 and SMEs in Tier 2 and 3 that act as component suppliers. Examples of large domestic automotive components companies include Astra Otopart, ADR Group, Indospring Group, Dharma Polimetal Group and Bakrie Group.

Table 2.5 Some Centres of Automotive Component SMEs in Java

Region	Number of enterprises
West Java, Jakarta and Banten	
Jabodetabek	149
Sukabumi	588
Bandung	1.297
Central Java	
Tegal	7.541
Klaten	330
Juwana	5
Purbalingga	275
East Java	
Sidoarjo	1.122
Pasuruan	1.076
Bondowoso	20
Yogyakarta	
Yogyakarta	65

Source: GAIKINDO (2015)

Geographically, the hub of the automotive and automotive components industry with and without OEM affiliations is concentrated in Java (Table 2.5). The industries spread over regions like West Java, Jakarta, Banten, Central Java, East Java and Yogyakarta. For their production base, OEMs and their affiliation firms are concentrated in Jakarta and West Java. The main reason is because these regions offer better infrastructure such as easy access to and from international ports for export and import activities. In addition, these regions are also the largest market for national automotive products, both for products sold through OEMs and after-market.

Figure 2.3 Centres of Automotive Component SMEs in Java, Indonesia

2.3.4 The Competitiveness of Indonesia's Automotive Components Products

To observe the level of competitiveness of Indonesia's automotive components in the international market, I calculated the revealed comparative advantage (RCA) HS 8708 (parts and accessories of motor vehicles).[10] For comparison purposes, I picked the RCA of the automotive components from the ASEAN region and the Far East region. The automotive components producers from these regions have been important for Indonesia both as peers in establishing regional production networks and as the main competitors, especially in the domestic and ASEAN markets.

In the period 2010–2017, the competitiveness of Indonesia's automotive components products remained weak. This is indicated by the low value of the RCA. Table 2.6 shows that the value of the Indonesian RCA for HS 8708 from 2010 to 2017 is less than one, which means Indonesia has a low comparative advantage in that group of products. The RCA value in 2010 was recorded at 0.38 and had dropped to 0.29 in 2011, before rebounding to 0.40 in 2012. The highest RCA so far touched 0.59 in 2016, but slightly fell back to 0.53 in 2017.

10 RCA is an index for calculating the relative advantage of certain products and assessing a country's export potential. The RCA value is calculated using the following formula: "RCAij = (xij/Xit) / (xwj/Xwt) Where xij and xwj are the values of country i's exports of product j and world exports of product j and where Xit and Xwt refer to the country's total exports and world total exports. A value of less than unity implies that the country has a revealed comparative disadvantage in the product. Similarly, if the index exceeds unity, the country is said to have a revealed comparative advantage in the product" (https://wits.worldbank.org, 2019)

Table 2.6
Indonesia's RCA for HS 8708 in Comparison with Other ASEAN Countries

Year	RCA for HS 8708						
	ASEAN countries				Far East countries		
	Indonesia	Thailand	Malaysia	Vietnam	China	Japan	South Korea
2010	0.38	1.10	0.20	0.30	0.54	2.35	1.97
2011	0.29	1.05	0.19	0.29	0.56	2.39	2.04
2012	0.40	1.32	0.20	0.35	0.57	2.58	2.14
2013	0.40	1.43	0.20	0.35	0.59	2.54	2.19
2014	0.46	1.48	0.18	0.33	0.60	2.34	2.11
2015	0.56	1.46	0.18	0.27	0.57	2.10	2.00
2016	0.59	1.40	0.18	0.25	0.58	2.13	1.91
2017	0.53	n.a.	0.16	0.23	0.60	2.17	1.49

Source: Author's calculation based on data from https://comtrade.un.org/data/

In comparison to several car-producing countries in ASEAN, Indonesia's competitiveness for this product is still better than Malaysia and Vietnam. However, Indonesia lags behind Thailand which consistently has an RCA value for HS 8708 of more than 1. Thailand not only excels in competitiveness in HS 8708 automotive components, but also excels in overall automotive products in HS 87 (other vehicles of railway rolling stock and parts and accessories). In 2016, while Indonesia's RCA for HS 87 was only 0.47, Thailand's RCA reached 1.48.

The competitiveness of Indonesia's automotive components also lags behind some car-producing Far East countries such as Japan, Korea and China. Japan is the most competitive country in this region for HS 8708 group of products with an RCA value always higher than 2. Similar to Japan, Korea also has high competitiveness for automotive components. Unlike Japan and Korea, China's competitiveness for automotive components products remains weak, as indicated

by an RCA value that is less than one. However, China's competitiveness for these products has increased gradually over the last three years.

Automotive components from Far East countries and Thailand have a high share in the Indonesian domestic market. While Japan and Korea mostly sell OEM automotive components, China has penetrated Indonesia's market with after-market auto parts. Japan provides automotive components to support their well-established car brands such as Toyota, Honda, Nissan, Suzuki, Mazda, Mitsubishi and Daihatsu, and Korea for their brands such as Kia and Hyundai. Products from Japan and Korea are perceived by Indonesian customers as high-quality products. On the other hand, after-market products from China are viewed by Indonesian customers as substitutes for Japanese or Korean brands with a more affordable price.

Even though Indonesia's competitiveness for the HS 8708 group of products lags behind Japan, Korea, Thailand and China, there is a positive trend. Indonesia's RCA value for these products has improved continuously with a slight fluctuation. The increasing trend of the competitiveness of Indonesia's automotive components in foreign markets is confirmed by the improved export performance in the last seven years. Table 2.7 below shows that in the period 2010–2017 the export of Indonesian automotive components has always grown except for in 2011 and 2013. In 2012, the export value of Indonesia's automotive components reached $ 1.12 billion, growing fantastically at about 32.42% from the previous year. The export growth of the products had slowed in 2013, but was able to rebound in

2014 and 2015 by posting exports growth of 14.26% and 13.24% respectively. In 2016 and 2017, the exports growth of these products was still positive but experienced a slight decline. Because global export growth of automotive components is higher (5.3% in 2017) than Indonesia's overall export growth, this is a challenge to the Indonesian automotive component industry to increase their export performance by improving their competitiveness.

Table 2.7
Export and Import of Indonesia's Automotive Components (HS Code 8708)

Period	Export		Import		Trade balance	
	Value (billion US$)	Growth (%)	Value (billion US$)	Growth (%)	Value (billion US$)	Growth (%)
2010	1.17		1.96		-0.79	
2011	1.12	-4.73	2.28	15.96	-1.16	46.84
2012	1.48	32.42	2.98	30.99	-1.50	29.31
2013	1.42	-4.01	3.22	7.91	-1.80	20.00
2014	1.62	14.26	2.91	-9.63	-1.29	-28.33
2015	1.83	13.24	2.46	-15.53	-0.63	-51.16
2016	1.98	7.99	2.59	5.57	-0.61	-3.17
2017	2.05	3.64	3.17	22.04	-1.12	83.61

Source: https://comtrade.un.org/data/

Table 2.8 shows that in 2017, the top ten automotive components exports were: HS 870840 (gear box), HS 870829 (parts and accessories of bodies, other than safety seat belts), HS 870899 (parts and accessories NES), HS 870870 (road wheels and parts and accessories), HS 870850 (drive axles with differential), HS 870891 (radiators), HS 870830 (brakes, servo brakes and parts), HS 870893 (clutches and parts), HS 870880 (suspension shock absorbers) and HS 870894 (steering wheels,

columns and boxes). Four automotive components (safety seat belts, safety airbags with inflator system, silencers and exhaust pipes, and suspension shock-absorbers) recorded an excellent performance with export growth average more than 20% during the period 2010–2017.

Table 2.8 Export of Indonesia's Automotive Components (HS Code 870810–870899) in Million US$

HS Code	Products	2010	2011	2012	2013	2014	2015	2016	2017	Average growth 2010–2017 (%)
70840	Gear boxes	320.10	236.37	430.50	376.04	576.22	671.51	730.49	721.81	17.24
870829	Parts and accessories of bodies, other than safety seat belts	97.42	106.01	120.74	136.99	140.05	221.30	251.30	303.37	18.67
870899	Parts and accessories NES	166.58	157.22	210.63	249.62	251.33	297.69	347.37	288.19	9.38
870870	Road wheels and parts and accessories thereof	249.90	256.25	281.61	278.07	291.17	282.12	252.13	255.97	0.53
870850	Drive axles with differential	112.87	111.33	149.78	101.96	84.45	89.23	112.44	154.90	7.64
870891	Radiators	93.23	91.22	94.61	93.69	83.96	80.01	85.02	93.36	0.22
870830	Brakes, servo brakes and parts thereof	31.90	32.60	33.14	37.98	48.96	53.84	69.70	73.20	13.11
870893	Clutches and parts	51.31	55.77	79.89	77.67	76.27	72.21	61.36	72.76	6.51
870880	Suspension shock absorbers	8.54	13.36	23.19	16.66	18.40	24.79	23.03	24.62	20.96
870894	Steering wheels, columns and boxes	17.78	22.24	17.56	14.34	14.38	16.41	17.53	23.69	6.01
870810	Bumpers and parts thereof	13.29	16.61	13.61	10.37	11.35	12.28	12.84	16.23	4.53
870895	Safety airbags with inflator system, parts thereof	4.81	13.28	18.64	21.00	19.12	8.47	9.08	12.19	29.45
870892	Silencers and exhaust pipes	2.56	2.60	2.54	1.96	3.08	3.70	6.26	8.64	23.01
870821	Safety seat belts	0.42	0.52	0.51	1.40	1.21	0.87	2.49	4.17	58.38

Source: Author's calculation based on data from https://comtrade.un.org/data/

The top ten destination countries of automotive component exports for 2017 were Thailand, Japan, Malaysia, Brazil, Mexico, the Philippines, India, China, the USA and Pakistan (Table 2.9). The share of exports to these ten countries reached 84.2% of Indonesia's total exports for the HS 8708 group of products. The remaining 15.8% is spread over several countries in Asia, Africa and Europe.

In the period 2010–2017, Thailand, Japan and Malaysia were always in the top three positions of Indonesia's largest export destinations for automotive components. The high share of Indonesia's automotive component exports to Thailand and Malaysia indicates that regional production networks in the ASEAN region are well established in the automotive component industry. Thailand has been known as the largest automotive producer in ASEAN. Meanwhile, Malaysia is known as a pioneer in ASEAN by developing the Proton and Perodua national cars. The high share of Indonesia's automotive component exports going to Japan is closely related to the production network of Japanese OEMs which are the main investors in the automotive industry in Indonesia such as Toyota, Honda, Nissan, Suzuki, Mazda, Mitsubishi and Daihatsu.

Exports of Indonesian automotive components to several countries such as Brazil, Mexico, India, China, Pakistan and Vietnam experienced a significant increase in the period 2010–2017. The increased economic growth in these countries is one of the factors driving the increase in the demand for cars and their components. For the case of India, the high growth of car sales intended for the lower middle segment of society developed by automobile manufacturer Tata Nano also created its own production network for the automotive industry, thereby increasing the demand for automotive components. The increase in exports of Indonesian automotive components to China is closely related to the opening of the Chinese market to products from ASEAN countries since the enactment of the ASEAN–China Free Trade Area (ACFTA) since 2010.

Table 2.9 Top 10 Export Destination Countries of Indonesia's Automotive Components (HS Code 8708), 2017

No	Top 10 export destination countries (2010)			Top 10 export destination countries (2017)		
	Countries	Value (million US$)	Share (%)	Countries	Value (million US$)	Share (%)
1	Thailand	290.93	24.90	Thailand	501.03	24.40
2	Japan	241.09	20.60	Japan	271.95	13.20
3	Malaysia	150.86	12.90	Malaysia	251.81	12.30
4	Philippines	76.41	6.50	Brazil	126.57	6.20
5	Brazil	69.72	6.00	Mexico	121.93	5.90
6	USA	56.90	4.90	Philippines	114.41	5.60
7	China	35.39	3.00	India	94.61	4.60
8	Vietnam	34.00	2.90	China	85.51	4.20
9	Other Asia, NES	32.21	2.80	USA	81.43	4.00
10	United Kingdom	27.92	2.40	Pakistan	78.57	3.80
	Subtotal	1,015.43	86.70	Subtotal	1,727.82	84.20
11	Rest of the world	155.29	13.3	Rest of the world	325.30	15.80
	Total	1,170.71	100	Total	2,053.12	100

Source: Author's calculation based on data from https://comtrade.un.org/data/

Looking at the data above, the potential to develop the automotive component industry in Indonesia is promising given the domestic market is increasing and the export market is also growing. In the domestic market, the increasing growth of car production and car sales demonstrates the market potential of automotive components and accessories for cars. The growing imports of automotive components are also a reflection that there are huge opportunities for the local industry to optimise their sales in the domestic market.

On the import side, Table 2.10 shows that in 2017 the top ten automotive components imported by Indonesia were: HS 870899 (parts and accessories), HS 870840 (gear box), HS 870829 (parts and accessories of bodies other than safety belts), HS 870850 (drive axles with differential), HS870830 (brakes, servo brakes

and parts), HS 870894 (steering wheels, columns and boxes), HS 870880 (suspension shock absorbers), HS 870893 (clutches and parts), HS 870870 (road wheels and parts and accessories) and HS 870895 (safety airbags with inflator system and parts). The growth of imports for four products (safety seat belts, safety airbags with inflator system, gear boxes, brakes, servo brakes and parts, and parts and accessories other than safety seat belts) was more than 10% during 2010–2017.

Table 2.10 Import of Indonesia's Automotive Components (HS Code 870810–870899) in Million US$

HS Code	Products	2010	2011	2012	2013	2014	2015	2016	2017	Average growth 2010–2017
870899	Parts and accessories NES	1061.20	1084.66	880.71	888.52	920.79	867.50	865.49	812.97	-3.45
870840	Gear boxes	169.96	201.99	431.13	546.32	517.03	407.34	545.83	724.77	28.46
870829	Parts and accessories of bodies, other than safety seat belts	159.41	252.14	411.15	433.14	378.00	266.82	276.32	351.91	16.48
870850	Drive axles with differential	227.14	246.12	318.40	343.30	306.03	254.52	254.99	337.29	7.19
870830	Brakes, servo brakes and parts thereof	88.11	109.79	144.08	160.27	168.11	156.08	185.95	246.70	16.66
870894	Steering wheels, columns and boxes	199.70	233.46	245.91	113.91	158.73	205.31	175.48	171.29	2.90
870880	Suspension shock absorbers	52.98	69.22	68.41	74.56	80.50	62.49	52.51	72.27	6.53
870893	Clutches and parts	99.84	92.23	82.46	69.65	81.98	87.09	68.04	72.15	-3.66
870870	Road wheels and parts and accessories thereof	42.71	63.55	59.55	36.52	43.30	45.17	56.13	67.16	10.09
870895	Safety airbags with inflator system, parts thereof	25.91	45.50	59.48	12.03	16.86	71.08	49.96	66.01	55.82
870891	Radiators	40.17	48.85	57.71	56.93	48.71	36.35	41.46	54.19	6.20
870810	Bumpers and parts thereof	26.92	24.03	42.16	42.25	36.15	27.32	32.32	42.28	10.74
870892	Silencers and exhaust pipes	40.93	48.35	42.33	63.58	66.74	33.79	30.88	22.63	-3.41
870821	Safety seat belts	8.20	15.92	22.16	20.80	19.75	10.73	2.98	3.71	4.10

Source: Author's calculation based on data from https://comtrade.un.org/data/

The top ten origin countries of automotive component imports for 2017 were Japan, Thailand, China, the Philippines, India, Vietnam, the USA, Germany, Malaysia and the Republic of Korea (Table 2.11). The share of imports from these ten countries reached 94.7% of the Indonesia's total imports for the HS 8708 group of products. The remaining 5.3% was imported from several countries in Asia, Europe and Africa.

In the period 2010–2017, Japan and Thailand were always the largest supplier countries of Indonesian automotive components. The high share of imports from Japan occurs because many car manufacturers in Indonesia have production networks incorporated in OEMs from Japan such as Toyota, Honda, Nissan, Suzuki, Mazda, Mitsubishi and Daihatsu. Indonesia's importation of automotive components from Japan is dominated by three main products, namely HS 870840 (gear boxes), HS 870899 (parts and accessories) and HS 870850 (drive axles with differential). Meanwhile, the largest imports from Thailand include HS 870899 (parts and accessories), HS 870829 (parts and accessories other than safety belts), HS 870830 (brakes, servo brakes and parts).

The implementation of the AEC has, to some extent, driven the higher intra-trade (export and import) among ASEAN countries. Furthermore, interestingly, these data indicate that high intra-trade also encourages the establishment of regional production networks in the ASEAN automotive component industry. In addition, the establishment of ASEAN's free trade agreement with China has also increased trade between Indonesia and China in automotive components.

Table 2.11 Top 10 Countries of Origin of Indonesia's Automotive Component Imports (HS Code 8708), 2017

No	Top 10 import countries of origin (2010)			Top 10 import countries of origin (2017)		
	Countries	Value (million US$)	Share (%)	Countries	Value (million US$)	Share (%)
1	Japan	771.41	39.30	Japan	1,440.11	45.50
2	Thailand	659.41	33.60	Thailand	901.59	28.50
3	Germany	89.45	4.60	China	189.05	6.00
4	China	82.58	4.20	Philippines	87.03	2.70
5	Malaysia	80.94	4.10	India	78.77	2.50
6	USA	53.11	2.70	Vietnam	77.09	2.40
7	Other Asia, NES	39.67	2.00	USA	63.49	2.00
8	Rep. of Korea	35.06	1.80	Germany	58.14	1.80
9	Philippines	31.55	1.60	Malaysia	55.45	1.80
10	Australia	29.15	1.50	Rep. of Korea	47.20	1.50
	Subtotal	1,872.33	95.40	Subtotal	2,997.91	94.70
11	Rest of the world	90.94	4.6	Rest of the world	167.14	5.3
	Total	1,963.28	100	Total	3,165.05	100

Source: Author's calculation based on data from https://comtrade.un.org/data/

Overall, during the period 2010–2017, the import value of Indonesian automotive products was always higher than the value of its exports. As a result, Indonesia continuously experienced a trade deficit in the HS 8708 group of products. In 2017, the five products that had the biggest trade deficit were HS 870899 (parts and accessories), HS 870850 (drive axles with differential), HS 870830 (brakes, servo brakes and parts), HS 870894 (steering wheels, columns and boxes) and HS 870895 (safety airbags with inflator systems and parts).

Table 2.12 Trade Balance of Indonesia's Automotive Components (HS Code 870810–870899) in Million US$

HS Code	Products	2010	2011	2012	2013	2014	2015	2016	2017
870899	Parts and accessories NES	-894.62	-927.44	-670.07	-638.90	-669.46	-569.81	-518.12	-524.77
870850	Drive axles with differential	-114.28	-134.79	-168.61	-241.34	-221.57	-165.29	-142.55	-182.39
870830	Brakes, servo brakes and parts thereof	-56.20	-77.19	-110.94	-122.28	-119.15	-102.25	-116.25	-173.50
870894	Steering wheels, columns and boxes	-181.92	-211.22	-228.35	-99.57	-144.35	-188.90	-157.95	-147.60
870895	Safety airbags with inflator system, parts thereof	-21.11	-32.22	-40.84	8.98	2.26	-62.61	-40.88	-53.82
870829	Parts and accessories of bodies, other than safety seat belts	-61.99	-146.13	-290.41	-296.15	-237.94	-45.52	-25.01	-48.54
870880	Suspension shock absorbers	-44.43	-55.85	-45.21	-57.90	-62.10	-37.70	-29.48	-47.65
870810	Bumpers and parts thereof	-13.63	-7.42	-28.54	-31.88	-24.80	-15.03	-19.48	-26.04
870892	Silencers and exhaust pipes	-38.38	-45.75	-39.78	-61.62	-63.66	-30.09	-24.62	-14.00
870840	Gear boxes	150.14	34.39	-0.63	-170.28	59.19	264.18	184.66	-2.95
870821	Safety seat belts	-7.78	-15.39	-21.65	-19.40	-18.55	-9.86	-0.50	0.46
870893	Clutches and parts	-48.53	-36.46	-2.57	8.02	-5.71	-14.88	-6.68	0.62
870891	Radiators	53.06	42.37	36.90	36.76	35.25	43.67	43.56	39.17
870870	Road wheels and parts and accessories thereof	207.19	192.70	222.06	241.55	247.86	236.95	196.00	188.81

Source: Author's calculation based on data from https://comtrade.un.org/data/

2.4 The Challenges of Indonesia's Automotive Components Industry

Indonesian automotive component SMEs have found it tougher to increase their competitiveness in the regional and international markets after the Association of Southeast Asian Nations (ASEAN) launched the ASEAN Economic Community (AEC) framework on 31 December 2015. Under the AEC framework, the trade flow of goods and services within ASEAN countries will meet the very minimum of protective policies in terms of tariffs and non-tariffs.

In responding to this regional economic integration, Indonesian automotive component SMEs and related stakeholders (government, industry, research centres/universities) will need to re-visit their policies. At the macro level, these include improving the coherence of policy among the agencies and increasing the

participation of members of the supplier chain in the automotive industry (Yamamoto (2012). At the firm level it is important that the government and private sector work together to widen financial access of SMEs because many of them are being constrained financially. To improve productivity, SMEs also need support to improve their innovation capacity.

2.4.1 Challenges in Improving the Business Environment to Attract Investors

This section provides information about the comparison of manufacturing competitiveness index in the automotive component industry between Indonesia and some members of ASEAN countries. In addition, it also explains about access to finance situation and investment competitiveness, which is proxied by ease of doing business. This is important given the context of ASEAN Economic Community (AEC) where automotive components are included as one of 12 priority integration sectors under AEC.

Efforts to improve the competitiveness of automotive components need to be done holistically from upstream to downstream. One of the upstream problems is how to improve the business environment to attract investors to the automotive component industry. A study by Tonby, Jonathan Ng, and Mancini (2014) of the map of competitiveness for the location of automobile industry and automotive components investment shows that Indonesia's position is less attractive than Thailand and Vietnam.

Figure 2.4 shows that Indonesia has good competitiveness in terms of low prices, but loses competitiveness in terms of quality. Its scores are better than Malaysia,

Singapore and Thailand in the cost index, but still far behind in the quality index. Indonesia is in the same quadrant as Vietnam and the Philippines, as producers with lower quality and lower costs. However, Indonesia has better competitiveness than Vietnam and the Philippines because the level of car sales in Indonesia tends to increase and the availability of manufacturing base components is adequate to attract more investors.[11]

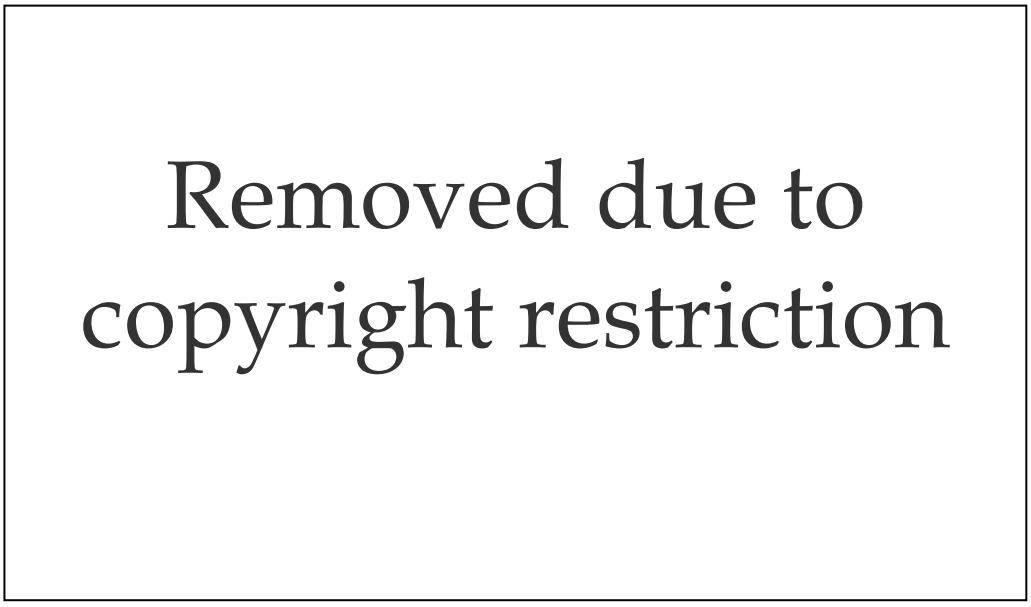


Figure 2.4 Manufacturing Competitiveness Index for Locating Plants in Motor Vehicle and Automotive Component industries

Source: (Tonby et al., 2014)

In its ranking of ease of doing business, the World Bank (2018) only places Indonesia 72nd out of 190 countries. Indonesia's ranking is far lower than some

11 The competitiveness of investment locations is calculated by considering the competitiveness cost index and the quality index: "The cost index is calculated by estimating costs for key indicators such as the number of employees, utilities, and industrial space required, and comparing each location's total costs with the average of all other locations under consideration. A higher cost index indicates a more expensive location. The quality index is a weighted index of select quality indicators, depending on factors most relevant to the particular sector and project requirements. The score for each location is calculated using an algorithm based on the raw data point and weights. A high score indicates a better quality location" (Tonby, Ng, & Mancini, 2014, pp. 5–6).

other ASEAN countries such as Singapore (2), Malaysia (24), Thailand (26) and even Vietnam (68). This obviously indicates that starting and/or expanding businesses in Indonesia is more challenging, administratively costly and takes a longer time for approval than in some other ASEAN countries. In one of the basic indicators such as the ease of getting credit or funds, Indonesia lags behind Brunei Darussalam, Cambodia, Singapore, Malaysia and Vietnam. ERIA (2014) also found that Indonesian SMEs' access to finance still lags behind Singapore and Malaysia. This fact discourages potential investors from establishing or expanding their business in this country.

2.4.2 Challenges in Improving SMEs' Innovation Capacity

Improving innovation capacity is one of the keys to increase the competitiveness level of automotive component products. Many SMEs that are not affiliated with car OEMs or Tier 1 and Tier 2, have relatively low innovation capacity. The low innovation capacity of many SMEs are mainly caused by insufficient internal resources and restricted access to acquire external resources.

According to the Global Innovation Index (GII), Indonesia's innovativeness in the 2013–2018 period lagged behind Singapore, Malaysia, Thailand, Vietnam and even the Philippines (Figure 2.5). [12] Similarly, ERIA (2014) findings rank Indonesia's technology and technology transfer (based on ASEAN SMEs' policy

12 The GII consists of two sub-indices, namely the innovation input sub-index and the innovation output sub-index. The innovation input sub-index is constructed of five pillars: institutions, human capital and research, infrastructure, market sophistication, and business sophistication. The innovation output sub-index is constructed of two pillars: knowledge and technology, and creative outputs.

index) fourth with a score of 3.8 after Singapore (5.6), Malaysia (4.9) and Thailand (4.3).

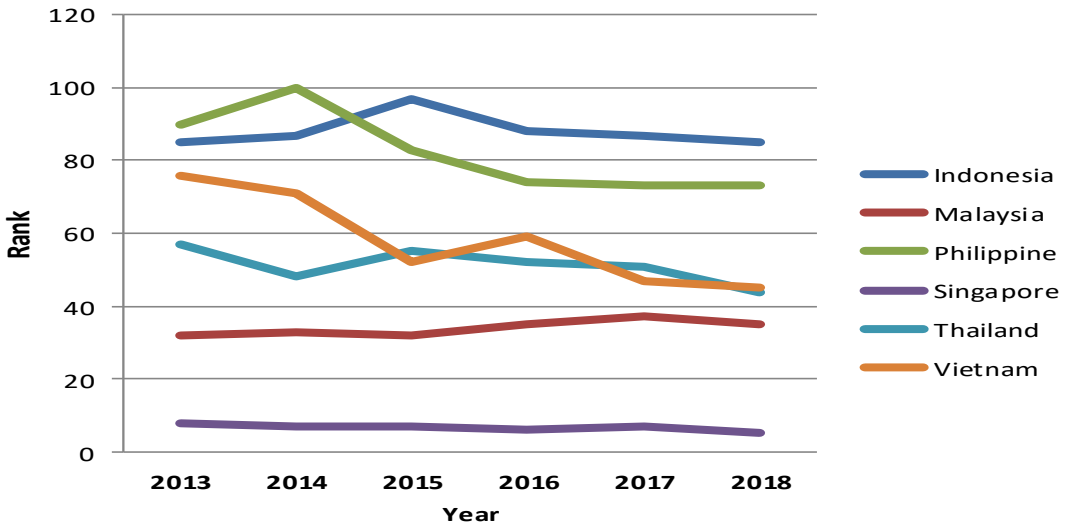


Figure 2.5 Indonesia's Rank in the Global Innovation Index

Source: Cornell University, INSEAD, and WIPO (2013–2018)

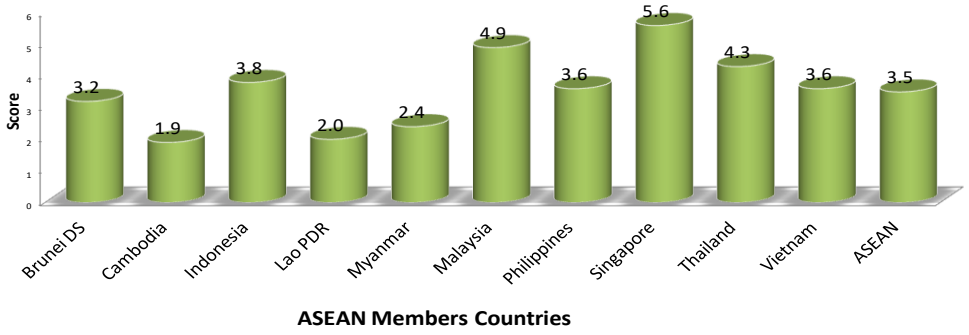


Figure 2.6 ASEAN SMEs Policy Index for Technology and Technology Transfer[13]

Source: ERIA (2014)

13 Scores for technology and technology transfer are constructed from four sub-dimensions: (1) promoting technology dissemination; (2) fostering technology cooperation to develop R & D focusing on commercialization of knowledge; (3) promoting clusters and business networks; (4) finance and technology development.

One of the keys to improving SMEs' innovation capacity is to work together or to increase collaboration between innovation actors. The triple helix concept, which integrates three important actors (government, tertiary education institutions/research institutions and the private sector) could be used as a model for improving SMEs' innovation capacity. Given the limited resources possessed by tertiary education institutions and the private sector, the government would need to be the initiator of innovation centres. The experiences of several countries such as Mexico, India and Taiwan show that the government's active role in encouraging SMEs' innovation has been successful in increasing SMEs' innovation capacity and competitiveness. The Taiwan government has encouraged the strengthening of SMEs' innovation capacity through research and development (R&D) activities in the form of innovation incubators and research centres (Tsai & Wang, 2008). In addition, the Taiwan government also encourages R&D collaboration between domestic companies and foreign companies that already have proven innovative capability such as Volkswagen, Honda, Toyota, Nissan and Ford (Jan & Hsiao, 2004).

In Indonesia, the Ministry of Cooperative and SMEs has adopted an incubator model of innovation development through collaboration with several domestic universities. However, its focus is on simple, non-high-tech industry such as food and beverage SMEs. The development of future incubators needs to be directed to more high-tech industry (such as automotive components) that has high added value and broad linkages with other strategic sectors. Furthermore, the innovation

incubator model should be synergised with the development of industrial clusters, for instance special economic zones for the automotive industry.

2.4.3 Challenges in Promoting Wider Networking between SMEs and Large Enterprises

The involvement of automotive component SMEs in the supply chain of Indonesia's car industry is still very low. This is because collaboration between OEMs operating in Indonesia and domestic enterprises is not well developed (Yamamoto, 2012). As a result, the network of SMEs supplying the larger companies and OEMs is limited. According to Kobayashi (2014), the number of automotive components suppliers in Tier 1 to Tier 3 in Indonesia is only one third of Thailand's suppliers.

It is unfortunate that, not only is their supply network small in number, but H. Aswicahyono and Kartika (2010) also found that Indonesian automotive components firms play little role in global production networks. They tend to be involved in assembling manufacturing, which is the lowest position in the value chain ladder. Many Indonesian automotive component firms in Tier 2 and Tier 3 are unable to compete as major suppliers for car manufacturers because they have limited financial resources to support their expansion.

Considering those constraints, it is very important for SMEs to build a close and mutually beneficial collaboration with experienced larger companies including foreign companies, for example through a joint venture scheme. Collaboration can include a variety of features including human resource development, technological progress, marketing, and R&D activities. Ideally, the cooperation

between SMEs and large enterprises in the automotive industry should follow the concept of firm linkages described by UNIDO (2001). As illustrated in Figure 2.7, the development of the domestic automotive industry should be inclusive by including SMEs as an important supplier in the production chain. SMEs have great potential to become suppliers from the lowest to the middle positions in the supply chain.

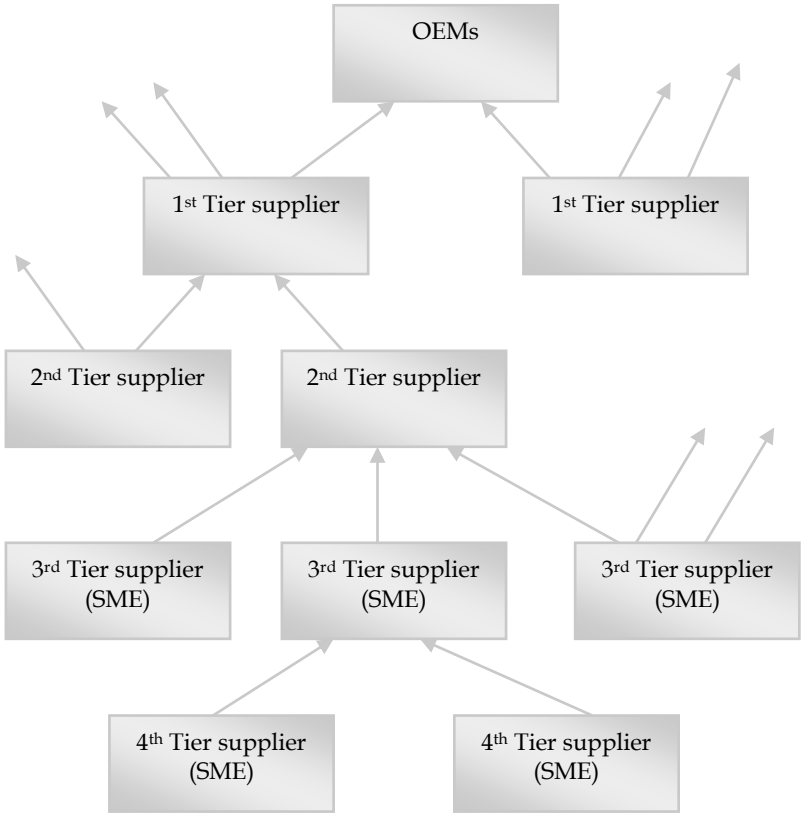


Figure 2.7 How SMEs Fit into the Supply Chain with Large Enterprises and OEMs

Source: United Nations Industrial Development Organisation (UNIDO, 2001)

In addition to the above-mentioned constraints, efforts to increase automotive component SMEs' competitiveness are also constrained by external problems whereby the upstream industries are unable to provide adequate raw materials.

As a result, the automotive component industry is highly dependent on imported raw materials, especially materials like plastics and goods from plastics (HS 39), iron and steel (HS 72), electrical machines/equipment (HS 85) and machinery/mechanical aircraft (HS 84).

2.5 Summary of the Chapter

The Indonesian automotive components industry has potential to continue to grow and be competitive. The increasing demand for cars in the domestic market and positive trends in the global market are producing new market opportunities for automotive components and accessories for cars. However, the automotive components industry especially at the SME level is still experiencing the classical problems of the production process, that is, limited access to finance for investing and expanding, low innovation capacity and weak collaboration with larger companies. These make it difficult for SMEs to improve their productivity and hence competitiveness.

Considering the conditions of automotive component SMEs, strategies to increase competitiveness need to be based on the competitiveness foundation embedded within every firm. In light of this, it is essential to explore the effect of the sources of competitiveness, i.e. credit access, innovation and collaborative advantage, on the competitiveness of SMEs in the Indonesian automotive components industry, and their impact on firm performance.

CHAPTER 3
LITERATURE REVIEW

3.1 Introduction

This chapter presents an overview of the current state of knowledge from both theoretical and empirical research on firm competitiveness. The chapter starts by reviewing theories that underpin the way this thesis derives the three competitiveness sources for SMEs. In addition, a systematic literature review (SLR) has been conducted to confirm the importance of the three competitiveness sources in the last three decades from 1990 to 2018. The theories combined with the SLR are used as a justification for identifying factors used in determining the key competitiveness sources.

3.2 The Theory of Firm Competitiveness

The theory of firm competitiveness has evolved over time. Under current global business dynamics, competitiveness theory has evolved into more sophisticated thought. The term "firm competitiveness" is defined differently by different scholars and hence there is no single definition of this term that suits all situations. Appendix 3 shows that, while some researchers define competitiveness according to sources, including internal and external factors (Barney, 1991; Jeffrey H. Dyer, 2000; Joshi, Nepal, Rathore, & Sharma, 2013; Doven Lavie, 2006b; Porter, 1985; Sirikrai & Tang, 2006; Ülengin, Önsel, Aktas, Kabak, & Özaydın, 2014), other researchers define competitiveness by emphasising indicators of firm performance (Grant, 2014; Schoemaker, 1990; Sydney G. Winter, 1995). In addition, some other

scholars link the concept of firm competitiveness with the industry's and nation's competitiveness (Cho & Moon, 2000; Hamalainen, 2003; Porter, 1990).

In the literatures on firm competitiveness, three theories have emerged that have been cited by many scholars as the most influential theories. Those theories are: (1) competitive advantage theory by Porter (1985); (2) collaborative advantage theory by J. H. Dyer (2000); (3) the resources-based view (RBV) by Barney (1991) and the extended resources-based view (ERBV) by Doven Lavie (2006b).

Sections 3.2.1 - 3.24 are the theoretical foundation for overall thesis. In these sections, the theories to support the three key competitiveness sources are explained. Every theory explained in these sections is adapted suit the characteristics of the SMEs in developing countries.

3.2.1 Competitive Advantage Theory by Porter (1985)

Porter (1985) defines competitive advantage as a situation in which a firm performs above the average performance of other firms in the same industry. According to Porter's theory of firm competitiveness, a firm will gain competitive advantage through two basic strategies: *lower cost* and *differentiation*. A combination of these two basic strategies with the scope of activities to achieve them leads to the third generic strategy, which is called *focus strategy* (*cost focus and differentiation focus*). Lower cost is the ability of a firm to design, produce, and market a comparable product more efficiently that its competitors. Differentiation

is the ability to provide unique and superior value to the buyer in terms of product quality, special features, or after-sale service.

To achieve a lower cost advantage, Porter (1985) suggests controlling the cost drivers and reconfiguring the value chain. The cost drivers can be controlled by focusing on costs that influence the total cost of a firm's activities. In its efforts to lower the costs of inputs, a firm should exploit linkages with suppliers to increase its bargaining power. Meanwhile, the value chain can be reconfigured by adopting differences in production process, differences in firm integration, new distribution and marketing channels, etc. Porter claimed that the strategy of controlling cost drivers and reconfiguring the value chain will reduce the costs of inputs and hence improve performance. Sigalas and Economou (2013) support Porter's view and R. S. Allen and Helms (2006) and Spanos and Lioukas (2001), who empirically tested Porter's claim found that a low-cost strategy positively affects a firm's market performance and profitability.

Even though the strategy of controlling cost drivers and reconfiguring the value chain has been shown to improve firm performance, it seems that the strategy is more appropriate for large enterprises with adequate resources (Parnell, 2006; Wright, 1987). Large enterprises can easily scale up production, establish vertical and horizontal integration, and even change the channels of distribution and marketing. In contrast, this strategy will need to be adapted for SMEs, given some limitations of SMEs. For instance, SMEs' ability to control cost drivers through increasing economies of scale and maximising production capacity are

constrained by their lack of financial resources. Under financial constraints, a firm will be unable to expand production capacity or to allocate resources for new investment (Denis & Sibilkov, 2010; Saltari & Travaglini, 2001).

Controlling cost drivers and reconfiguring the value chain would also contribute to the strategy of differentiation. According to Porter (1985), the potential sources of differentiation can be derived from the firm's value chain and any other value of the firm's activities. Another important factor Porter stresses in pursuing costs and differentiation strategies is the role of technology. Technology can lower costs in several ways such as developing low-cost processes, facilitating automation and lowering product design costs. Many studies also provide evidence that a differentiation strategy contributes to firm performance (R. S. Allen & Helms, 2006; Mosakowski, 1993; Sigalas & Economou, 2013; Spanos & Lioukas, 2001).

Pursuing a differentiation strategy, however, as Porter highlights, often incurs high costs. Therefore, it is important for SMEs to consider Porter's suggestion that a firm intending to apply a differentiation strategy should exploit all sources of differentiation that are not costly, such as the use of linkages, networking or collaboration. A firm should also focus on differentiation in areas where the firm has a sustainable advantage.

Notably, Porter emphasises that the way a firm formulates competitive strategies has to be based on a comprehensive understanding of attractiveness in that industry. The rules of the competition that determine industry attractiveness in any industry are embodied in five competitive forces: the entry of new

competitors, the threat of substitutes, the bargaining power of buyers, the bargaining power of suppliers, and the rivalry among the existing competitors (Porter, 1985).

Although the theory of firm competitiveness introduced by Porter has laid a solid foundation for firms to improve their competitiveness, this theory can be enhanced to accommodate the characteristics of SMEs in developing countries. Beside the issue of lack of financial resources, it is notably that most SMEs also have low innovation capacity and technology, meaning they are unable to afford the appropriate or the latest technology for a differentiation strategy. In addition, many SMEs have no strong networks or collaboration with their supply chain peers, and hence they cannot obtain mutual benefits to improve firm performance. Addressing these points would add depth to the analysis of how SMEs in developing countries optimise their limited resources in the competitive environment, both financial and non-financial, to produce innovation outputs in order to reduce cost and create product uniqueness.

3.2.2 Resources-Based View (RBV) by Barney (1991) and Extended RBV by Lavie (2006)

Unlike Porter's framework of competitive advantage, which views a firm as a bundle of activities, RBV has a different perspective that views a firm as a bundle of unique resources (Spanos & Lioukas, 2001). The key assumption of the RBV is that firm resources, such as assets, capabilities, organisational processes, firm attributes, information and knowledge, are controlled by the firm (Barney, 1991).

Resources can also include various types of tangible and intangible assets that are tied semi-permanently to a firm, such as brand names, in-house knowledge of technology, employment of skilled personnel, trade contracts, machinery, efficient procedures, capital, etc (Maijoor & Witteloostuijn, 1996; Wernerfelt, 1984).

The RBV proposes two basic assumptions: first, firm resources are heterogeneous and second, resources may not be able to move freely across of the firms. Firm resources must have four attributes to be considered potentially sustainable and to increase competitive advantage: valuable, rare, imperfectly imitable and non-substitutable (Barney, 1991).

RBV perceives controlled resources as valuable and therefore driving the strategy configuration to achieve sustainable competitive advantage (Cao & Zhang, 2011; Mahoney & Pandian, 1992) and the ability of a firm to generate rent based on controlled resources leads to a sustainable and profitable market position (Conner, 1991). To generate rent from the resources, a firm should have the capability to manage the resources.

Even though the RBV has been acknowledged as one of the most cited and an influential theory in strategic management, the theory has also been criticised considerably by many researchers. There are at least two notable issues that should be considered in order for this theory to work in SMEs. First, the definition of resources is ambiguous when applied to SMEs (Kraaijenbrink, Spender, & Groen, 2010). It does not differentiate between the resources and the capabilities of

firms and it also does not clearly explain the mechanism of how different types of resources contribute to achieving sustainable competitive advantage.

Second, the RBV might apply only to large firms with significant market power (Connor, 2002) and to firms that already possess valuable, rare, inimitable and non-substitutable resources (Miller, 2003). Therefore, SMEs, especially those operating in developing countries, which mostly have limited resources, cannot acquire the resources needed to gain sustained competitive advantage alone. SMEs need to establish networks or collaboration with other firms to obtain strategic benefits from the exchange and sharing of price and non-price (tangible and intangible) resources.

Considering the limitation of SMEs' resources, extended RBV (ERBV) by Doven Lavie (2006b) proposes another way to improve SMEs' competitive advantage through discovering more appropriate price and non-price factors. The ERBV suggests that internal resources (controlled resources) and external resources can contribute to strengthening a firm's competitive advantage.

Doven Lavie (2006b) further explains that the benefit of combining those two resources could occur through four mechanisms: (a) internal rent, which is benefit obtained from intra-firm resources and peers' resource complementarities, such as firm reputation; (b) appropriated relational rent, which is benefit extracted from peers' shared resources that are jointly possessed within the firm network, such as relationship-specific assets, knowledge sharing and governance mechanisms; (c) inbound spill-over rent, which is benefit derived from the network's shared and

non-shared resources, such as knowledge of a non-shared resource that is embedded in a shared resource; and (d) outbound spill-over rent, which is a benefit resulting from unintended leakage from the focal firm's resources in collaboration or networking.

Through these four mechanisms, SMEs engaging in collaboration could obtain benefits from their peers, such as acquiring new knowledge for procuring inputs, collaborating in innovation activities, sharing knowledge, managerial skill, market information, sharing the risks, advancing technology, etc. Looking at all of these factors highlights the importance of the contribution of non-price factors as valuable resources.

3.2.3 Collaborative Advantage Theory by Dyer (2000)

The role of networking to improve competitiveness is becoming more important as competition in the market is not simply between companies, but rather between value chains (Jeffrey H. Dyer, 2000). Managing networking requires a specific strategy to allocate resources efficiently as the interdependency among firms is also increasing (Jeffrey H. Dyer, 2000; Kanter, 1994a; G. Li, Fan, Lee, & Cheng, 2015; Thun & Hoenig, 2011).

The contemporary debate on how a firm networking framework should be developed between firms and their suppliers has been divided into two contrasting paradigms. According to Porter (1990), firms are encouraged to increase their supplier networks in order to maximise their bargaining power and hence lead to profit optimization. On the other hand, Jeffrey H. Dyer (2000) offers

a different paradigm called collaborative advantage (CA). He suggests that firm profit optimization through firm collaboration should be framed by a mutual bargaining position between buyers and suppliers.

Under the CA framework, J. H. Dyer (2000) claims that suppliers will be incentivised to maintain their loyalty, share their knowledge and achieve better performance. Dyer applied the CA dimension and empirically tested it in the automotive industry. He then introduced three important pillars of CA, namely (1) inter-firm trust building, (2) dedicated asset investment, and (3) knowledge sharing routines, as shown in Figure 3.1.

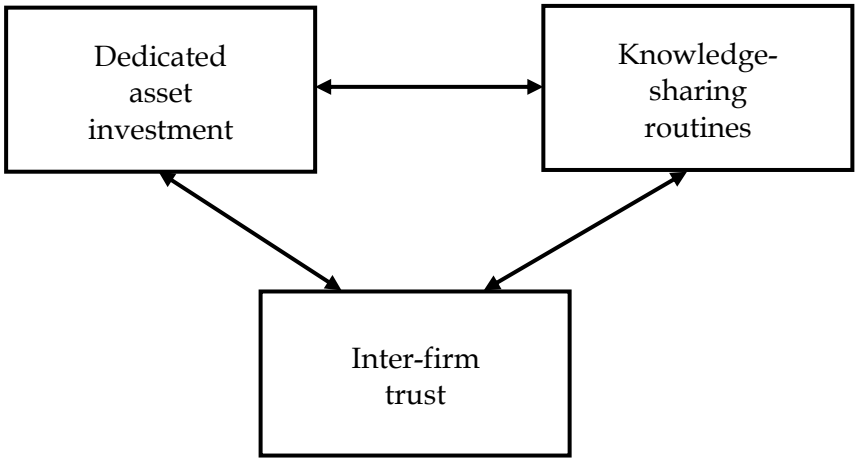


Figure 3.1 Three Key Sources of Inter-organisational Collaborative Advantage

Source: J. H. Dyer (2000)

Among these three pillars, J. H. Dyer (2000) suggests that inter-firm trust building is an important foundation in order to have a successful collaboration. Some scholars also acknowledge the importance of inter-firm trust by arguing that inter-firm trust building is the prerequisite for successful CA or any other type of firm networking (Dania, Xing, & Amer, 2018; J. H. Dyer, 2000; Huxham & Vangen, 2005; D. T. Wilson, 1995). Trust will significantly contribute to a more effective

collaboration due to the raising of mutual awareness (Adam, 2007; Batt & Purchase, 2004; Kogut, 2000; Möller & Svahn, 2004). Without having trust, J. H. Dyer (2000) argues that members of a collaboration will be unwilling to invest their valuable assets and also reluctant to share useful information. Thus, trust facilitates parties investing their dedicated assets and sharing their knowledge.

The second pillar of CA is dedicated asset investment. This is defined as investment made by a firm in the value chain that is specialised to those other firms in the chain (J. H. Dyer, 2000). The purpose of investing the dedicated assets is to improve the productivity of the parties to the collaboration and the speed of firms' coordination to develop unique products. He further suggests parties should invest in three different types of asset investment, namely, site specialisation, physical specialisation and human specialisation.

The third pillar of CA is knowledge-sharing routine. J. H. Dyer (2000) suggests parties to a collaboration should exchange valuable information and knowledge promptly and systematically to help each other to become more efficient and effective in producing competitive products. Learning from Toyota's experiences, he proposes several activities in order to share knowledge among the parties to collaboration effectively: establishing associations with suppliers, supplier learning teams and problem-solving teams, conducting on-site consulting, transferring employees, and providing performance feedback and process monitoring.

Considering the unique features of SMEs, three important issues that have not been addressed by Dyer and that will make CA theory more applicable to SMEs are the sharing of risks among collaboration members, strengthening relational capital and synchronising responses to external changes. It has been widely recognised that SMEs bear high risk in their business (Camuffo, Furlan, & Rettore, 2007; Ellegaard, 2008; Sahiti, 2019) and their risk burden is even higher than larger enterprises in the supply chain (Jüttner, 2005).

In the pillar of dedicated asset investment, it seems that Dyer's focus is more on tangible assets such as site, physical and human specialisation. He has not elaborated the importance of intangible or non-price factors in firm collaboration. Non-price factors such as culture or relational capital among peers have been found to affect the success of firm collaboration through intrinsic motivation, values and ideologies (Kanter, 1994b; McAdam, Miller, & McSorley, 2019; Semrau, Ambos, & Sascha, 2016; Thai & Turkina, 2014; Z. Wu & Pullman, 2015).

Knowledge sharing is also recognised as a key requirement (Sheu, Yen, & Chae, 2006) and "essential ingredient" (Min, Roath, Daugherty, Genchev, & et al., 2005) of collaboration. Simatupang and Sridharan (2005) and Davenport, Harris, De Long, and Jacobson (2001) acknowledge the importance of knowledge and information sharing as a means to support firm coordination and synchronisation to formulate better decisions and to take actions based on full information.

Looking at these features highlights the importance of conceptualising collaboration between SMEs in developing countries as mutual collaboration with

peers, incorporating risk-sharing schemes, relational capital and synchronised responses to changing conditions.

3.2.4 Other Views of Firm Competitiveness

Some scholars provide different perspectives to explain firm competitiveness. While Porter (1985) focuses on two basic strategies (cost and differentiation), Joshi et al. (2013), Sirikrai and Tang (2006), Tcha (2003) and Ülengin et al. (2014) emphasise factors in achieving a strategy of competitiveness sources.

In the specific case of the automotive industry, Joshi et al. (2013) found that the main factors of firm competitiveness are the buyer-supplier relationship, costs, technology, flexibility, quality, delivery and customer demand. Ülengin et al. (2014), who also looked at automobile manufacturing, identified the quality of local suppliers, taxation, the ease of access to loans, innovation capacity, companies' spending on R&D, the availability of the latest technologies, and research networks between university and industry as means of achieving firm competitiveness.

There are also researchers who recognise the significant role of networking among suppliers and between suppliers and buyers (Joshi et al., 2013; Ülengin et al., 2014). Several researchers acknowledge the substantial contribution of R&D to firm competitiveness (Guan, Yam, Mok, & Ma, 2006; Joshi et al., 2013; Sirikrai & Tang, 2006; Ülengin et al., 2014). Sirikrai and Tang (2006) acknowledge the importance of government policies as one of the main drivers of firm competitiveness. Specifically, Ülengin et al. (2014) identify the role of government

in taxation policy and access to finance as contributing factors to firm competitiveness.

Referring to the views of Porter (1985), Barney (1991), Lavie (2006), Dyer (2000) and other above-mentioned scholars, I can identify that the factors affecting firm competitiveness cannot stand alone, depending only on internal firm sources. They have to be combined with factors external to the firm. These factors in turn could contribute to the ability of a firm to produce products with efficient costs. Further, those competitiveness factors could also contribute to the ability of a firm to differentiate its products with high uniqueness that cannot be perfectly imitated by competitors.

Competition among firms in the same industry tends to increase over time, which could motivate every firm to find their best strategy to grow and to beat their rivals. It is common for firms to apply a variety of strategies to counterattack their competitors' tactics in the market. These practices could lead to a change of factors affecting firm competitiveness that are internal and external to the firm. To explore such a transformation of firm competitiveness factors in relation to its theoretical foundation and empirical investigation, this study conducted a systematic literature review (SLR), which is explained in the following section.

3.3 The SLR of Firm Competitiveness Factors in the Last Three Decades

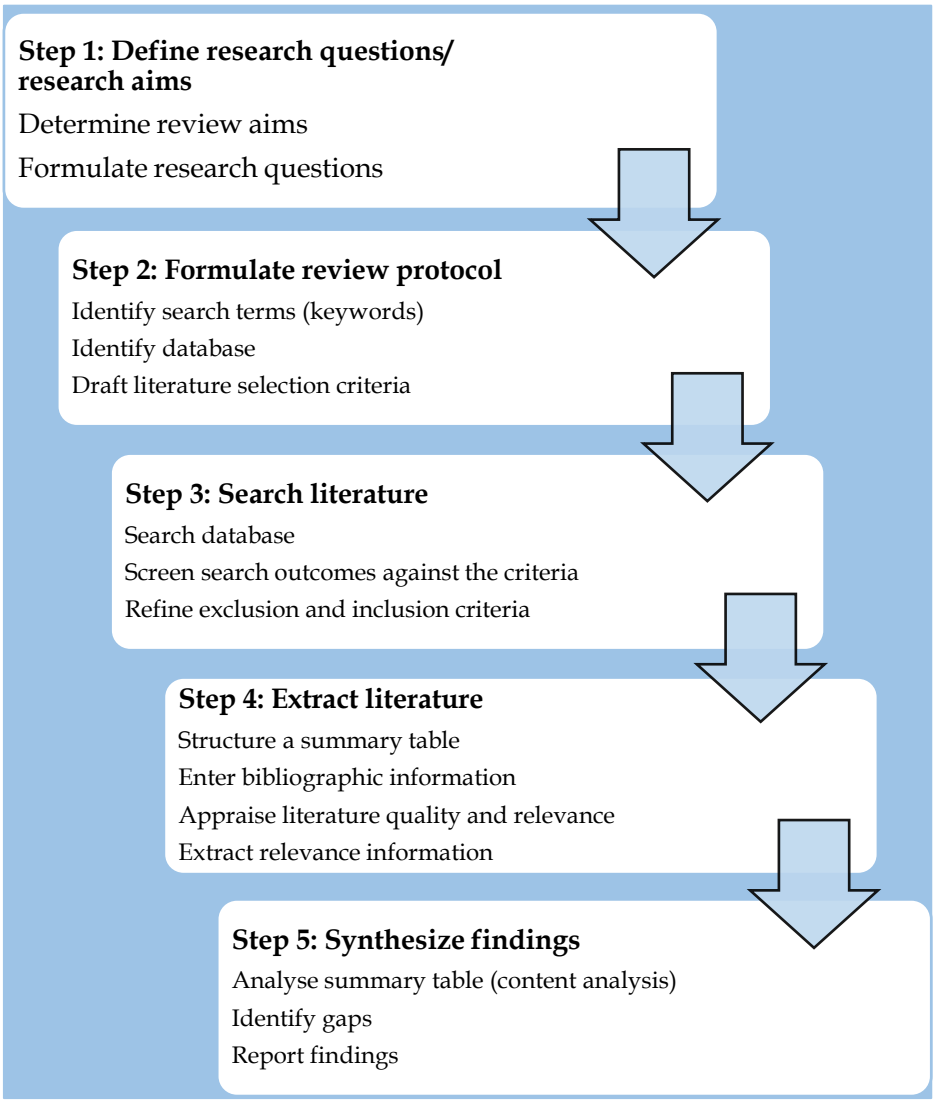
The review of the firm competitiveness factors in the last three decades is conducted through a systematic literature review (SLR). An SLR is defined as a review that adheres closely to a set of scientific methods that comprehensively

identify, appraise, and synthesise all the relevant studies on a particular topic (Petticrew & Roberts, 2005). The SLR process will help to minimise potential biases in exploring relevant studies or theories as it involves examining all the related existing materials and filtering them to fit the purpose of the research (Petticrew & Roberts, 2005; Pickering & Byrne, 2014).

The SLR process in this study followed the steps introduced by Pickering and Byrne (2014) and Yang, Khoo-Lattimore, and Arcodia (2017). The process is divided into five steps (Figure 3.2): step 1 is defining the research questions/research aims; step 2 is formulating the review protocol; step 3 is searching the literature; step 4 is extracting the relevant literature; and step 5 is synthesising the findings of the literature review.

Step 1: Defining the Research Questions/Research Aims

The SLR began by defining the objective of the review, which was to explore the transformation of firm competitiveness research themes in the last three decades from 1990 to 2018. The timeframe of the SLR is divided into three periods: (1) 1990–2000; (2) 2001–2010; and (3) 2011–2018. The reason for starting the timeframe in 1990 is the emergence of Porter's theory of firm competitiveness in the mid-1980s and the resource-based view (RBV) at the beginning of 1990s, which have had great influence on firm competitiveness theory as well as the way firms implement their strategy.



Source: Adopted from Yang et al. (2017) and Pickering and Byrne (2014)

Figure 3.2 SLR Process

Step 2: Formulating the Review Protocol

The SLR has been managed through Flinders University online library (Library FindIt). It collects literature from various databases such as Elsevier, Emerald, JSTOR, ProQuest, SAGE, Science Direct, Springer, Wiley, etc.

The searching process used a combination of several keywords to capture research that has investigated firm performance and/or firm competitiveness in the small-to-medium scale. The four key phrases used were: *determinants of firm*

competitiveness; small medium enterprises; manufacturing sector; and *automotive components industry.* This study used similar keywords to explore the literature from the three periods to maintain the consistency of the literature search. The key phrase "*determinants of firm competitiveness*" was intended to capture the theoretical foundation of competitiveness factors at the firm level. The second key phrase "*small medium enterprises"* corresponds to the firm scales that became the focus of this study, which is competitiveness of SMEs. The third key phrase "*manufacturing sector"* limits the sector, and the final key phrase "*automotive components industry"* represents the unit of analysis in this study.

Step 3: Searching the Literature

Figure 3.3 shows the literature selection in the SLR process. As of 9 January 2018, the total number of research outputs identified as potential sources for the systematic review process was 1,872. The distribution of the sources based on their period is 312, 723 and 837 records in the periods 1990–2000, 2001–2010 and 2011–2018 respectively. The sources are of various types (dissertations, articles, books, conference proceedings, newspaper articles and reviews) published by various large publishers across the world. The increasing numbers of published sources indicate that many researchers are now paying more attention to the importance of SMEs' competitiveness.

In order to obtain credible and suitable literature for this study, four consecutive screening criteria were applied. *First*, the sources were screened against the credibility selection criteria, where only peer-reviewed sources were included.

This screening process removed 1,240 out-of-scope sources, and only 632 sources were retained. *Second*, the sources were then filtered against the suitability field criteria, where only sources in the fields of business, economics and manufacturing were included. The second screening process eliminated 220 out of 632 sources, and therefore retained 412 sources for the next stage of the process. All the sources are published in the refereed journals.

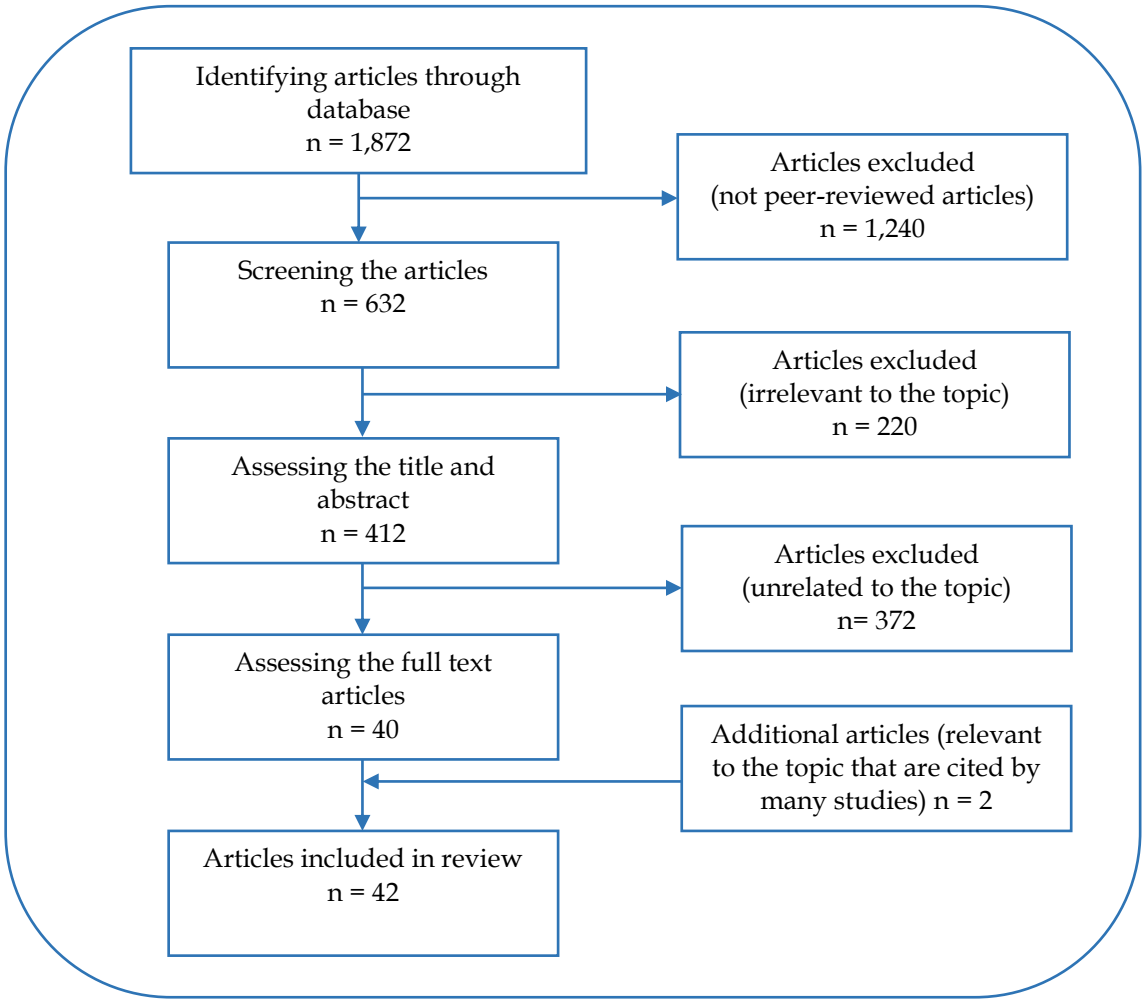


Figure 3.3 Literature Selection in the SLR Process

Third, the screening was intended to select the sources that are relevant and related to the topic of this study. To do so, the sources were assessed based on their titles and abstracts. At this screening stage, 40 sources were selected. *Fourth*,

the full text of all sources was screened for their relevancy to the topic of this study. After reading thoroughly the contents of the 40 sources, all the sources were found to be eligible to be included as the final sample for analysis. They were distributed in the order of 10, 14 and 16 sources in the respective periods of 1990–2000, 2001–2010 and 2011–2018. Two critical sources were added to this review process. They are important because they provide useful references on methodology. Hence, in total, there were 42 sources in the review.

Step 4: Extracting the Relevant Literature

In extracting the literature, I examined the sources for review based on journals, geographical context and method of analysis. Table 3.1 presents the distribution of articles included in the review based on the journals. I found that the 42 articles included in the review were published in 32 journals. The top seven most reviewed journals in this SLR process were: (1) *Research Policy* (9.52%), (2) *International Journal of Production Economics* (7.14%), (3) *International Journal of Operations & Production Management* (4.76%), (4) *International Small Business Journal* (4.6%), (5) *Supply Chain Management* (4.6%), (6) *Sustainability* (4.6%), and (7) *Technovation* (4.6%). The rest of the articles were spread over various journals in the fields of business, economics, management, development and urban studies.

Table 3.1 Distribution of SLR Articles by Journal

Journal title	Number of articles				
	1990–2000	2001–2010	2011–2018	Total	Percentage (%)
Research Policy	1	1	2	4	9.52
International Journal of Production Economics	1		2	3	7.14
International Journal of Operations & Production Management	1	1		2	4.76
International Small Business Journal	1	1		2	4.76
Supply Chain Management		1	1	2	4.76
Sustainability			2	2	4.76
Technovation	1		1	2	4.76
ASEAN Economic Bulletin	1			1	2.38
Asia Pacific Business Review		1		1	2.38
Asian Business & Management		1		1	2.38
Bulletin of Indonesian Economic Studies	1			1	2.38
Competition & Change			1	1	2.38
Competitiveness Review: An International Business Journal		1		1	2.38
Economics of Innovation and New Technology		1		1	2.38
European Journal of Operational Research			1	1	2.38
Industrial and Corporate Change			1	1	2.38
Journal of Industry, Competition and Trade			1	1	2.38
Journal of Small Business Management		1		1	2.38
Journal of Advances in Management Research			1	1	2.38
Journal of Development Studies	1			1	2.38
Journal of Economic Geography			1	1	2.38
Journal of International Entrepreneurship		1		1	2.38
Journal of International Economics			1	1	2.38
Journal of Southeast Asian Economies			1	1	2.38
Management International Review		1		1	2.38
OECD Papers		1		1	2.38
Oxford Development Studies		1		1	2.38
Oxford Review of Economic Policy			1	1	2.38
Technology Analysis & Strategic Management		1		1	2.38
European Journal of Development Research			1	1	2.38
Urban Studies	1			1	2.38
World Development	1			1	2.38
Total	10	14	18	42	100.00

Table 3.2 presents the distribution of articles based on the geographical context of analysis. About 42.86% of the articles originated from European countries. The study of firm competitiveness in the Asian context was in second position with 35.71% (India 11.90%, China 7.14%, Indonesia 4.76%, Malaysia 4.76% and the rest 7.14%). About 11.90% of studies examined a cross-country context. The remaining articles focused on Africa, the USA and Australia.

Table 3.2 Distribution of SLR Articles by Geographical Context

Countries	Search period			Total	Percentage (%)
	1999–2000	2001–2010	2011–2018		
European	4	3	11	18	42.86
Asia	2	7	6	15	35.71
Cross-country	1	3	1	5	11.90
Africa	1	1	0	2	4.76
USA	1	0	0	1	2.38
Australia	1	0	0	1	2.38
Total	10	14	18	42	100.00

Table 3.3 Distribution of SLR Articles by Method

Methods	Search period			Total	Percentage (%)
	1999–2000	2001–2010	2011–2018		
Qualitative studies	9	6	6	21	50.00
Quantitative studies	1	7	11	19	45.24
Mixed methods	0	1	1	2	4.76
Total	10	14	16	40	100.00

Table 3.3 presents the distribution of the reviewed articles based on their methods. Half of the total articles (50%) were analysed using qualitative methods. Nearly half of the total articles (45.24%) employ quantitative methods. I recorded various

quantitative methods used in the studies such as confirmatory factor analysis, path analysis, logistic regression, correlation, pooled ordinary least squares model, discriminant analysis, principal component analysis, structural equation modelling, fixed effect analysis and total factor productivity index. The remaining papers (4.76%) used mixed methods/triangulation.

Step 5: Synthesising the Findings

Table 3.4 shows the distribution of the themes in the firm competitiveness studies in the 42 selected articles. The themes across the extracted articles were highly diverse and overall I found 17 themes. The percentage distribution of these themes is displayed in Table 3.5. The top ten most researched themes in the firm competitiveness studies during the period 1990–2018 were: innovation (20.98%), collaboration/strategic alliances/networking (11.83%), knowledge/technological capability (11.72%), government policy/support (10.16%), supply chain relationship (9.99%), R&D (8.14%), human resources (5.97%), financial constraints (5.24%), financial support (4.13%) and clustering/agglomeration (3.29%). These ten themes account for the majority (91.45%) of the total researched themes. The remaining themes covered joint ventures, marketing, FDI, debt finance, entrepreneurial values, investment, and economic integration.

Table 3.4 Distribution of SLR Papers by Theme of the Research

	Innovation	Knowledge/technological capability	Human resources	R&D	Collaboration/ strategic alliances/ networking	Supply chain relationship	Clustering/ agglomeration	Marketing	Financial constraints	Debt finance	Financial support	Investment	Government policy/ support	Entrepreneurial values	Joint venture	FDI	Economic integration
1999–2000																	
Dhingra (1991)					o										o		
Hill (1995)	o	o	o										o				
Humphrey and Schmitz (1996)					o		o						o				
Calderini and Cantamessa (1997)	o	o				o											
Hoffman, Parejo, Bessant, and Perren (1998)	o			o					o								
Alcorta and Peres (1998)	o	o	o	o					o				o				
Edgington (1999)	o					o					o		o				
Kotey (1999)										o				o			
Gunasekaran, Forker, and Kobu (2000)	o	o			o												
Kaplinsky (2000)	o				o	o											

	Innovation	Knowledge/technological capability	Human resources	R&D	Collaboration / strategic alliances/ networking	Supply chain relationship	Clustering/ agglomeration	Marketing	Financial constraints	Debt finance	Financial support	Investment	Government policy/ support	Entrepreneurial values	Joint venture	FDI	Economic integration
2001–2010																	
Davies (2001)		o					o										
Cigolini, Cozzi, and Perona (2004)						o											
Ying-Pin (2005)						o		o									
Shapira, Youtie, Yogeesvaran, and	o	o	o	o													
Singh et al. (2007)			o						o								
Potter and Proto (2007)			o								o						
Buckley, Clegg, Zheng, Siler, and												o				o	
Savignac (2008)	o			o					o								
Ranga, Miedema, and Jorna (2008)	o	o		o													
Morrison, Pietrobelli, and	o				o	o											
Tambunan (2008)	o				o				o				o				
Hanna and Walsh (2008)	o	o			o												
Rosli and Kari (2008)	o	o			o								o				
Sierk, Nicolas, and Adam (2010)	o				o	o		o			o		o				

	Innovation	Knowledge /technological	Human resources	R&D	Collaboration/ strategic alliances/ Networking	Supply chain	Clustering/ agglomerati	Marketing	Financial constraints	Debt finance	Financial support	Investment	Government policy/	Entrepreneurial values	Joint	FDI	Economic integration
2011–2018																	
Pavlínek and Zenka (2011)	o																
Gunday, Ulusoy, Kilic, and	o																
Nam (2011)		o													o		
Minetti and Zhu (2011)									o								
Revilla and Fernández (2012)	o	o		o													
Arun, Ram, Haritha, and Arindam	o																
Mañez, Rochina-Barrachina,	o																
Nicolini, Scarpa, and Valbonesi											o		o				
Nathan and Overman (2013)	o						o						o				
Joshi et al. (2013)		o			o	o											
Ülengin et al. (2014)		o		o	o	o					o		o				
Kalayci and Pamukçu (2014)				o									o			o	
F. Lu et al. (2015)	o						o										
Soosay and Hyland (2015)						o											
Baumann and Kritikos (2016)	o	o	o	o													
Gracia and Paz (2017)					o	o											
Kotturu and Mahanty (2017)	o	o	o	o	o	o											
Aldaba, R. M. (2017)	o				o								o				o

Table 3.5 the Percentage Distribution of the SLR Themes

No	Themes	Percentage (%)			
		1990–2000	2001–2010	2011–2018	Average
1	Innovation	21.21	20	21.74	20.98
2	Collaboration/strategic alliances/networking	12.12	12.5	10.87	11.83
3	Knowledge/technological capability	12.12	10	13.04	11.72
4	Government policy/support	12.12	7.5	10.87	10.16
5	Supply chain relationship	9.09	10	10.87	9.99
6	R&D	6.06	7.5	10.87	8.14
7	Human resources	6.06	7.5	4.35	5.97
8	Financial constraints	6.06	7.5	2.17	5.24
9	Financial support	3.03	5	4.35	4.13
10	Clustering/agglomeration	3.03	2.5	4.35	3.29
11	Joint venture	3.03	0	2.17	1.73
12	Marketing	0	5	0	1.67
13	FDI	0	2.5	2.17	1.56
14	Debt finance	3.03	0	0	1.01
15	Entrepreneurial values	3.03	0	0	1.01
16	Investment	0	2.5	0	0.83
17	Economic integration	0	0	2.17	0.72
	Total	100	100	100	100

In the three periods of the search (1990–2000, 2001–2010 and 2011–2018), I found no significant change in the research themes in the studies of firm competitiveness. The theme of innovation and other closely related themes such as knowledge/technological capability, R&D and human resources remained the most popular themes in the studies of firm competitiveness throughout the three periods of the search. Even though I cannot conclude that the more frequent the theme is researched in the literature, the more important it is, some studies in the review such as Hoffman et al. (1998), Kaplinsky (2000), Gunday et al. (2011), Arun et al. (2012), Mañez et al. (2013), Joshi et al. (2013), Ülengin et al. (2014) and Baumann and

Kritikos (2016) provide evidence that engaging in innovation is one of the key requirements for firms to improve their competitiveness.

While it is evident that innovation positively affects firm performance, for many firms, especially small and medium scale firms, conducting innovation is a big challenge. One of the challenges for SMEs that wish to innovate is lack of resources, especially financial resources. In the review, financial constraint was among the top ten themes that were widely discussed in the three search periods. Some papers in this review clearly show that many SMEs have experienced credit constraints (Hill, 1995; Hoffman et al., 1998; Savignac, 2008; Singh et al., 2007). Savignac (2008) states that the probability of a firm conducting innovative activities is significantly reduced by about 20% due to financial constraints. In a developing country like Indonesia, as Hill (1995) explains, the ability of firms to innovate is very low because they do not have enough financial resources to deploy for the purposed of innovation. Further, Hill (1995) mentions that on average only 0.5% of a firm's expenditure is allocated for local R&D.

From the review, I also observe that another challenge faced by firms in developing countries is the lack of support from research institutions and/or universities to innovate, such as in the case of Latin America and the Caribbean (Alcorta & Peres, 1998) and Indonesia (Hill, 1995). Support from peers, research institutions/universities and other players in innovation activities is one of the keys to successful innovation (Edgington, 1999). Furthermore, Edgington (1999) mentions that important players should be available to develop an innovation atmosphere,

which includes core firms and governments (key players), supply firms, banks, chambers of commerce and industry (stakeholders) and venture enterprises and universities (marginal players). Their interaction in the innovation space can produce product diversification and continuous upgrading (Edgington, 1999).

Acknowledging the importance of collaboration with other firms and research institutions and/or universities shows that non-price factors in addition to price factors (such as finance and human resources) can play a crucial role in successful innovation. In one of the review papers, I also found a discussion of the importance of non-price factors in innovation activities. Calderini and Cantamessa (1997) identify several exogenous non-price factors that influence the success of a company's innovation including pressure from customers and competitors, and cooperation with suppliers.

In my view, the importance of non-price factors in innovation has not been adequately researched in the three search periods. The review shows that studies of innovation activities are still concentrated on price factors with emphases on R&D, technological upgrading, human resources, etc. On the other hand, research on how SMEs utilise non-price factors to strengthen their innovation capacity has not been explored much. This is very important because SMEs have limited resources in terms of price factors. The majority of SMEs in developing countries operate and innovate with very limited resources.

SMEs in developing countries also need to face the challenge that arises from limited access to finance. The success rate of SMEs in obtaining loans from formal financial institutions such as banks is a result of contributing price factors such as high collateral (high ratio of collateral to loans). Again, in developing countries, the majority of SMEs do not have sufficient assets to provide as collateral for loans. If this trend continues, SMEs will not be able to overcome their credit constraints. Therefore, it is important to explore how non-price factors can contribute to the success of SMEs in getting loans from formal financial institutions.

Firms' networking is another research theme that is also widely discussed in the reviewed papers. Researchers use various terms for firms' networking such as collaboration, strategic alliances, supply chain relationship, supply chain management, etc. The studies in this review show evidence that networking with peers helps firms to improve their performance (Cigolini et al., 2004; Gracia & Paz, 2017; Hanna & Walsh, 2008; Humphrey & Schmitz, 1996; Kaplinsky, 2000; Soosay & Hyland, 2015; Ülengin et al., 2014).

After analysing the contents of the papers and categorizing the factors affecting firm competitiveness into 17 themes, as mentioned above, further screening was needed to find the most important factors that contribute to competitiveness for SMEs. The focus of the reviewed papers on 17 themes implies that scholars have a diverse perspective in explaining the factors affecting firm competitiveness. Connecting these themes with the theories of firm competitiveness by Porter (1985), RBV by

Barney (1991) and ERBV by Lavie (2006) and collaborative advantage by Dyer (2000) can reveal the integrating factors that affect firm competitiveness.

The strategies of cost leadership and differentiation promoted by Porter (1985) can work perfectly if they are supported by an adequate capacity to innovate. Through innovation, firms can produce goods and services at competitive prices and of high quality, and offer uniqueness. To conduct innovation, firms will need sufficient resources, mostly price factors, such as spending on R&D, hiring skilful employees, scaling up investment, etc.

However, it is evident that firms, especially SMEs, operating in developing countries are facing resource constraints, particularly financial constraints. Therefore, firms' efforts to improve their product and price competitiveness through the strategies of cost leadership and differentiation without continuous innovation may not fully work. Pushing SMEs to innovate without sufficient resources to cover their operational costs would put SMEs at high risk as the outcome of innovation is highly uncertain and the process is risky (Rosenbusch, Brinckmann, & Bausch, 2011; Wolff & Pett, 2006). Hence, it cannot be assumed that all SMEs have sufficient financial resources to innovate. This is where it is important to assist SMEs by widening their access to finance. Having better access to finance would provide more opportunities for SMEs to engage in innovation as well as to scale up their production.

Under scarce resource conditions, SMEs are also required to be more creative in utilising non-price factors that can be motivating factors to increase competitiveness, as suggested by Lavie (2006) through the ERBV. Furthermore, given that competition

in the present context is not only between firms, but also between supply chains, the efforts to strengthen SMEs' competitiveness should involve strengthening networking, as described by Dyer (2000) through the theory of collaborative advantage.

Considering the above-mentioned explanation, this study offers another view of firm competitiveness, specifically that of SMEs. By synthesising the theoretical foundations of the theory of competitiveness, extended RBV and the theory of collaborative advantage and also the themes derived from the SLR, this study established the three competitiveness sources of SMEs: (1) credit access, which represents the foundation factor; (2) innovation, which represents the growth factor; and (3) collaborative advantage, which represents the expansion factor.

The *foundation factor* basically looks at the essential elements needed by every firm for it to *operate*. At a minimum, the firm should have sufficient financial resources to support the purchase of feasible instruments and equipment used for production.

The *growth factor* looks at the creativity elements needed by every firm for it to *operate* and *grow*. In order to compete and sustain itself, at a minimum, a firm requires innovation to survive in a very tight market competition. Bell (2002) and Petrakis (2016) believe that innovation is pivotal for long-term firm sustainability.

The *expansion factor* looks at the supporting elements needed by every firm for it to *operate, grow and sustain*. In order to compete effectively, at a minimum, a firm requires strong and extensive networking/collaboration support from its peers

(Handfield, 2002; Johnson, 2003; Doven Lavie, 2006a; Lin & Lin, 2015; Park, Mezias, & Song, 2004; Sheu et al., 2006).

The theories and literature used to support each of the key competitiveness factors and how these factors affect firm performance will be discussed along with the hypothesis development in next three main chapters on credit access, innovation, and collaborative advantage and their effect on firm performance.

3.4 Summary of the Chapter

Chapter 3 has reviewed the literature on theoretical and empirical research on firm competitiveness. Three main theories (firm competitiveness theory, RBV & ERBV, and collaborative advantage theory) are being used to underpin this study. Synthesising these theories and the systematic literature review (based on peer-reviewed articles published during the three decades 1990–2018) provides a clear path to derive the factors affecting firm competitiveness. These factors are: (1) credit access as the foundation factor; (2) innovation as the growth factor; and (3) collaborative advantage as the expansion factor. In this study, these three factors are called "the trinity of key competitiveness sources for SMEs".

CHAPTER 4

THE EFFECT OF CREDIT RATIONING ON THE PROBABILITY OF SMES INVESTING: AN ANALYSIS OF BORROWERS AND NON-BORROWERS

4.1 Introduction

The availability of sufficient financial resources is essential to support small and medium enterprises' (SMEs') decisions to invest, grow and compete sustainably. Loans from formal institutions such as banks and financial institutions are likely to be the main source of financing for SMEs. In developed countries, most SMEs have easier and wider access to credit from formal financial institutions such as banks (OECD, 2018). In contrast, SMEs in developing countries have difficulty in getting loans, which limits their investment capacity (World Bank, 2017). In other words, they have been suffering from credit constraints or credit rationing.

Ayyagari, Demirguc¸-Kunt, and Maksimovic (2010) found that in low- and middle-income countries about 17% of SMEs utilise bank loans as their source of financing. A recent report by the World Bank (2017) shows that the structure of funding sources for investment by SMEs in developing countries is still dominated by internal funds, about 72% of the total funds for investment. Funds from banks contribute only 14% and the remainder is covered by other sources, such as credit provided by suppliers, equity and stock contributions, etc.

Credit rationing that occurs either in developed or developing countries has an adverse effect on firms' ability to invest, to expand their market and to increase

growth (Clementi & Hopenhayn, 2006; Jinjarak & Wignaraja, 2016; Rahaman, 2011). As a consequence, credit rationing is considered as one of the main obstacles to SMEs improving their level of competitiveness (Thorston Beck & Demirguc-Kunt, 2006; Tambunan, 2009a). The World Bank (2017) even forewarns that if SMEs are locked out of bank financing and do not have support from other sources, this could lead to what is called the "Valley of Death" and they could die.

Credit rationing can be affected by various factors. The presence of asymmetric information is considered the main reason for limited access to credit (Berger et al., 2016; De Meza & Webb, 1987; Kirschenmann, 2016; Stiglitz & Weiss, 1981). Asymmetric information in the credit market happens when lenders lack information to make lending decisions on loan proposals from potential borrowers. Rationing can also happen because of asymmetric expectations of lenders and borrowers on the probability of loan repayment (Paloni, 2014). Asymmetric expectations arise when lenders and borrowers use different assessment techniques on their projects. Under such conditions, lenders who are without sufficient information about the risk level of the potential borrowers' proposed projects tend to be more prudent in their assessment.

In developing countries, the presence of asymmetric information and asymmetric expectations pushes lenders to apply tougher screening criteria in addition to the collateral requirement commonly found in loan guarantees. The stricter criteria add credibility to the borrowers, such as the strength of the relationship between lenders and borrowers, previous loan history, contractual agreements, personal guarantees,

etc. Also often the availability of business risk-sharing schemes between firms and their counterparts will give confidence to the lenders and hence add credibility to the borrowers.

Firms establishing risk-sharing schemes tend to act prudently in managing their projects (Adler, Pittz, & Meredith, 2016). Firms who established risk sharing schemes under supply chain management have trust and ties with their peers. Firms and their peers will regularly monitor the quality control of the overall production process. Any production faults causing product defects, even made unintentionally, could have implications such as the severance of contracts with peers for future projects. The risks are double: losing their contracts with peers and hence, suffering from an inability to meet the regular loan repayments.

From a macroeconomic perspective, severe credit rationing can also occur when the financial system of an economy has not been well-developed (Love, 2003). This may result in imperfect competition among banks, where a few large banks become monopolistic or oligopolistic. Leon (2015), Ryan, O'Toole, and McCann (2014) and Cetorelli and Peretto (2012) suggest that the degree of competition among banks can significantly affect the supply of credit. Promoting bank competition would essentially push lenders to widen credit access, provide better services and offer cheaper costs of borrowing.

Credit rationing could also happen to non-borrowers who potentially pass the screening criteria set by the lenders. However, non-borrowers choose to leave credit market because of certain reasons. Boucher et al. (2009) mention three main reasons

for non-borrowers leaving the credit market: quantity rationing, transaction costs and risk factors. In the Indonesian context, credit rationing could also happen because of cultural factor where potential borrowers leave credit market that has been provided by conventional banks/lenders due to their religious view. So, the mismatch between lending system provided by banks and personal beliefs causing them refuse to accept interest rate–based loans.

The objective of this chapter is to examine the extent to which credit rationing affects firms' decision to invest. Considering the structure of financing for SMEs in Indonesia context, examining the effect of credit rationing on the probability of a firm investing would provide important contribution because of two reasons. First, I could explore the factors affecting credit rationing of SMEs from price and non-price perspective. Second, I could trace the mechanism of how SMEs allocate their funding under rationing condition through routine and capital expenditure to optimise their performance.

My approach to examining credit rationing will be based on the demand side of credit and hence I will examine borrowers' and non-borrowers' perspectives. This is different from previous studies such as Regis (2018), and Aristei and Franco (2014), who only examined credit rationing from the borrowers' perspective; or Boucher et al. (2009b) and Guirkinger and Boucher (2008), who only investigated credit rationing from the non-borrowers' perspective. I define borrowers as those who are successful in obtaining loans in the credit market. Minetti and Zhu (2011) divide the credit rationing of borrowers into two types, namely weak and strong rationing.

Non-borrowers refer to those who have affirmatively decided not to enter the credit market for various reasons. Boucher et al. (2009b) mention three main reasons for non-borrowers leaving the credit market: quantity rationing, transaction costs and risk factors.

The chapter proceeds as follows: Section 4.2 provides the theoretical background and hypotheses development. Section 4.3 describes the data and descriptive statistics. Section 4.4 explains method of analysis. Section 4.5 presents the results, discussion and robustness check. Section 4.6 concludes.

4.2 Theoretical Background and Hypothesis Development

4.2.1 Credit Rationing Definition

Credit rationing addresses the condition of loan applicants/borrowers who are unable to obtain credit for various reasons. Jaffee and Russell (1976) define credit rationing as a situation where demand for credit exceeds the supply of loans at the interest rate set by the banks. Meanwhile, Stiglitz and Weiss (1981) refer to credit rationing as:

> "(a) among loan applicants who appear to be identical some receive a loan and others do not, and the rejected applicants would not receive a loan even if they offered to pay a higher interest rate; or (b) there are identifiable groups of individuals in the population who, with a given supply of credit, are unable to obtain loans at any interest rate, even though with a larger supply of credit, they would" (pp. 394–395)

Minetti and Zhu (2011) define credit rationing from the borrowers' perspective, and divide it into weak and strong credit rationing. Weak rationing refers to situations where a firm demands more credit at the market interest rate. Strong rationing represents situations when the firm demands more credit at the market interest rate and subsequently demands more credit than it actually obtained in the previous loan application (Minetti and Zhu, 2011).. Boucher et al. (2009b) define credit rationing from the non-borrowers' perspective. It refers to those who leave the credit market voluntarily – or decide not to enter the credit market – for the following reasons: (1) quantity rationing (not meeting collateral requirements); (2) high transaction costs; and (3) risk rationing (risk averse/avoidance of the consequences of borrowing).

For this study, following Minetti and Zhu (2011) and Boucher et. al (2009), I define credit rationing as the condition where the demand for credit cannot be fulfilled by the supply of loans with the requirements set by the lenders.

4.2.2 Credit Rationing and Firm Investment

The traditional theory of investment states that a firm's financial structure is irrelevant to its investment decisions. This follows the view of Modigliani and Miller (1958), who argue that a firm's capital structure has no effect on the market value of the firm under perfect capital market conditions. This view assumes that external funds perfectly substitute for internal sources and therefore firms will have access to external funds at the required interest rate. As a consequence, the decision of a firm to invest is independent from their financial condition.

The literature, however, depicts an alternative view on this. In particular, the decision of a firm to invest is affected by financial factors (Denis & Sibilkov, 2010; Fazzari, Hubbard, Petersen, Blinder, & Poterba, 1988; Myers & Majluf, 1984; Saltari & Travaglini, 2001). These factors include the availability of internal funding, access to credit markets, and/or access to new debt or equity finance. This view argues that capital from internal and external sources are not perfect substitutes because of the following: transaction costs, tax, the agency problem, financial distress cost, and asymmetric information.

The presence of asymmetric information between lenders and borrowers has been widely researched as one of the sources that pushes the cost of borrowing and/or the requirement of collateral to rise (Bernanke & Gertler, 1990; Clementi & Hopenhayn, 2006; Schiantarelli, 1996). Further, Bernanke and Gertler (1990) explain that, under such conditions, the ability of potential borrowers to obtain financing from external resources would to some extent depend on the creditworthiness of borrowers as reflected in their net worth.

Schiantarelli (1996) describes the premium on external finance as an inverse function of a borrower's net worth (liquid and illiquid assets as collateral). This implies that having lower or negative shocks to net worth may lead to a higher premium on external finance, which could affect potential borrowers' borrowing behaviour. This shows that asymmetric information could lead to a higher premium on external financing and may cause credit rationing. As a result, it reduces the funds available for firms to invest in expansion.

Potential borrowers having access to productive and profitable investments, but holding limited net worth, would be severely affected by credit rationing. In such conditions, the investment decisions of firms will depend on their financial structure, particularly the internal funds generated from sales growth and its profits (Myers & Majluf, 1984; Saltari & Travaglini, 2001; Schiantarelli, 1996). This is also consistent with the cash holdings view, which maintains that internal funds are more valuable as a source of investment when firms are financially constrained (Denis & Sibilkov, 2010).

Considering the above-mentioned theories, this study proposes the following hypotheses:

> ***Hypothesis H1A:*** *For borrowers, regardless of weak or strong rationing, credit rationing negatively affects a firm's probability of investing.*
>
> ***Hypothesis H1B:*** *For non-borrowers, regardless of quantity, transaction cost, risk or cultural rationing, credit rationing negatively affects a firm's probability of investing.*

4.2.3 Asymmetric Information Theory and Loan Screening Instruments

In the credit market, asymmetric information between lenders and borrowers limits the credit access of borrowers (Berger et al., 2016; De Meza & Webb, 1987; Kirschenmann, 2016; Stiglitz & Weiss, 1981). Asymmetric information occurs in the credit market when lenders lack sufficient information to make precise lending decisions on loan proposals from potential borrowers. Under such conditions, lenders have difficulty distinguishing between less risky borrowers and riskier

borrowers based on their loan application. Therefore, lenders, in an effort to optimise profit as well as to balance the risk of loans, adopt tighter screening criteria such as imposing a higher interest rate, requiring collateral or asking for additional trusted instruments.

Collateral Requirement

According to asymmetric information theory, a collateral requirement is the most common screening instrument applied to borrowers. A collateral requirement helps to reduce ex-ante risks of credit allocation in terms of adverse selection and ex-post risks such as moral hazard behaviour (Berger, Scott Frame, & Ioannidou, 2011; Menkhoff, Neuberger, & Rungruxsirivorn, 2012). From the borrowers' side, collateralisation acts as a signalling device that reveals their potential risk of default (Bester, 1985; Comeig, Brio, & Fernandez-Blanco, 2014; Menkhoff et al., 2012).

Menkhoff et al. (2012) and Bester (1987) also suggest that collateral requirements provide borrowers with an incentive to execute their projects in an appropriate manner. In developing countries where the ratio of collateral to proposed loans is high, the willingness to offer such collateral not only indicate that borrowers are risk takers, but also shows their confidence that they can run the proposed projects successfully. Borrowers handing over the collateral to lenders can also be interpreted as a willingness of the borrowers to be responsible for any failures of the projects financed by the loans.

It is common practice in developing countries that the collateral value required by banks is much more than the amount of the proposed loan, for instance 250 percent for Indonesian case (Hidayat, 2009) and 180-300 percent of the loans disbursed for latin America cas (Oehring, 1995) Menkhoff et al. (2006) and Hainz (2003) argue that a high degree of collateral is demanded in emerging economies for two main reasons: (a) the higher cost of evaluation, utilisation and liquidation of the collateral; and (b) less competition among banks, which empowers monopolistic or oligopolistic banks to obtain rents by requiring higher collateral value.

The type of collateral required by lenders from borrowers may vary. In developing countries, when dealing with borrowers from SMEs, lenders usually require them to provide personal collateral in the form of fixed assets (such as land, house and factory). This practice is a signal to make borrowers more credible and encourages discipline to repay the loan responsibly (Duarte, Matias Gama, & Esperança, 2017; Menkhoff et al., 2012). Furthermore a standard loan contract usually states that the lender has full right of access to the collateral whenever the borrower fails to repay the loan. To reduce the credit risk and asymmetric information, lenders will usually seek additional information, for instance, past history of loan borrowing, the lending relationship strength and asking for additional trustworthy instruments.

Strength of the Lending Relationship

The role of the strength of the lending relationship in reducing problems of asymmetric information has been extensively discussed in the literature (Karolyi, 2018; Kirschenmann, 2016; Kysucky & Norden, 2016). Kirschenmann (2016) and

Sobel (1985) suggest that a longer relationship between a lender and a borrower is expected to reduce credit rationing. However, this is not a consensus among the researchers. de la Torre, Martínez Pería, and Schmukler (2010) suggest that the development of new lending technology has significantly reduced the role of the strength of the lending relationship between lenders and borrowers.

Among various dimensions of the strength of the lending relationship, some researchers suggest using time as a proxy (Cenni, Monferrà, Salotti, Sangiorgi, & Torluccio, 2015; Kysucky & Norden, 2016). Furthermore, Kysucky and Norden (2016) propose the age of the firm and the relationship's duration as two proxies of the strength of the relationship. Further, Kysucky and Norden mention that the age of the firm represents public information and the duration of the relationship represents private information.

Risk-Sharing Schemes

The literature has acknowledged that additional information can complement screening instruments in order to reduce asymmetric information. Examples are historical information about overdue payments (Jiménez & Saurina, 2004; Yaldız Hanedar et al., 2014); firm certification as a proxy of a firm's quality; and also a firm's track record of losses due to theft, robbery, vandalism or fire (Yaldız Hanedar et al., 2014).

In this study, I introduce risk-sharing schemes between firms and their peers as a complement of screening instruments to reduce asymmetric information in the credit assessment process. This could contribute to the literature of asymmetric

information especially in relation to credit allocation for SMEs lending. The basic idea, the type of risk sharing and the mechanism of how this scheme could impact credit allocation will be explained below. The idea is that when a firm agrees to establish a risk-sharing scheme with peers, it implies that the firm is willing to disclose its business risks. In defining a risk-sharing scheme, this study follows the definition of a risk-sharing mechanism proposed by G. Li et al. (2015). They define risk-sharing schemes as "situations in which supply chain members use more formal policies and arrangements (agreements or contracts) to share the obligation and responsibilities in activities and/or resources relating to supply chain risk management" (p. 85).

The sources of risk of firms can take several forms. Transactional cost economics theory focuses on tangible asset risk, such as cost and risk in integrating various business activities (Lorenzoni & Lipparini, 1999). On the other hand, agency theory emphasises intangible asset risk, such as risk on information sharing (G. Li et al., 2015). Meanwhile, based on the sources of risks, Martin Christopher and Peck (2004) categorise supply chain risk into three types: (a) internal to the firm (such as process and control risks); (b) external to the firm but internal to the supply chain network (supply and demand risks); and (c) external to the partnership (environmental risks). These risks can affect firm performance directly and indirectly.

It is common for a firm to have risk-sharing schemes with more than one peer. Thus, when this firm applies for loans to a bank, the bank can check the firm's business risks through its peers. Moreover, gathering information on the borrower's track

record via several peers could provide banks with more credible information. Therefore, risk-sharing schemes could be used by banks to reduce the ex-ante risk of credit allocation, and hence avoid adverse selection.

Furthermore, risk-sharing schemes could also be used to minimise ex-post risks of credit allocation by preventing moral hazard behaviour. Firms establishing a risk-sharing scheme are likely to develop a monitoring system to avoid any potential hazard problem by its members. Therefore, besides the bank's regular monitoring, the surveillance of ex-post credit for borrowers engaging in a risk-sharing scheme may indirectly involve the borrower's peers.

Under risk-sharing schemes, firms tend to manage their projects prudently (Adler et al., 2016). However, deception by either suppliers or buyers could possibly occur under a risk-sharing scheme (Graebner, 2009; Marks, Mirvis, & Brajkovich, 2001). As Adler et al. (2016) and Graebner (2009) suggest, any possible deception under a risk-sharing scheme can be anticipated by preparing comprehensive contracts. Therefore, firms that establish risk-sharing schemes tend to maintain high trust and ties with their peers. Any misconduct by the members such as breaching contracts to gain self-benefits could have implications such as the severance of contracts with peers for future projects.

Firms could gain various benefits when establishing risk-sharing schemes with peers. The most obvious is reducing their vulnerability to supply chain problems and disruptions (Faisal & Lam, 2015; Jüttner, 2005; O. Tang & Nurmaya Musa, 2011). Risk-sharing schemes with peers could also strengthen long-term cooperation with

the peers and hence lead to better financial performance (M. Christopher & Lee, 2004; G. Li et al., 2015; Sodhi M S & Tang, 2012). This in turn could increase the bankability of the firms when applying for credit to banks.

4.2.4 Competition among Banks

Credit rationing can also be affected by the level of competition among banks. In the existing literature, however, the effect of competition among banks in alleviating credit rationing remains unclear. There are two different views: the market power hypothesis and the information hypothesis.

The proponents of the market power hypothesis argue that, in a competitive banking market, financing constraints can be reduced (Thorsten Beck et al., 2004; Leon, 2015; Ryan et al., 2014). Cetorelli and Peretto (2012) suggest that competition among banks could increase credit supply through two channels: increasing the aggregate volume of loans and reducing interest rates. Clark, Radić, and Sharipova (2018) mention that lower interest rates could benefit not only borrowers, but also banks, because moral hazard and adverse selection problems in the lending process can be minimised. Furthermore, Clark et al. (2018) also suggest that, based on their research findings in CIS countries, competition among banks would contribute to financial stability at the macro level.

In countries with poor financial institution development where power is concentrated in few large banks, credit rationing can prevail (Thorsten Beck et al., 2004; Hainz, 2003; Love, 2003; Ryan et al., 2014). Under such circumstances, credit

rationing for SMEs has become more critical as they cannot afford loans with the high cost of borrowing.

In contrast, the supporters of the information hypothesis suggest that increasing bank competition may lead to credit obstacles and increase the costs of credit. This view assumes that higher competition may discourage banks from investing and strengthen to need to acquire additional information to reduce asymmetric information (Dell'Ariccia & Marquez, 2006; Fungáčová, Shamshur, & Weill, 2017; Petersen & Rajan, 1995). As a result, banks will offset the borrower's potential risks through driving up the lending rate, and hence constraining the credit supply.

Even though banks' cynical view that SMEs are not attractive for many type of investments still exists, recent research by de la Torre et al. (2010) provides evidence countering the conventional belief. They found that private banks in countries with a more developed financial system view SMEs as a profitable growth sector.[14] Furthermore, these banks have taken initiatives to expand their lending facilities to SMEs by exploring new businesses opportunities, improving their lending technologies and enhancing their risk management strategy. Improved lending technologies, both in transactional and relationship lending, have reduced the probability of potential borrowers being rejected by the banks (Bartoli, Ferri, Murro, & Rotondi, 2013).

14 The authors conducted field research by taking a sample of 48 private banks in Chile, Columbia, Serbia, Australia, Brazil, India, the Netherlands, Poland, Thailand, the UK, the US, Argentina, Mexico, Peru, Puerto Rico and Venezuela.

4.2.5 Credit Rationing Theory and Non-Price Factors

Boucher, Guirkinger, and Trivelli (2009a) look at the cause and origin of credit rationing, including price and non-price rationing. Price rationing is attributed to the demand side of credit when both borrowers and non-borrowers are not willing to propose a loan because they do not need additional capital or realise that the interest rate is too high. Unlike rationing that occurs to the borrowers, credit rationing from non-borrowers side is caused either by price or non-price rationing. Three types of credit rationining from non-borrowers perspective are: quantity, transaction costs, and risk rationing.

Quantity rationing is a situation in which lenders deny borrowers' loan proposals because the loan supply is less than borrowers' effective demand.[15] Boucher et al. (2009a) argue that the rejection is due to the presence of asymmetric information. For instance, the rationing may occur because a borrower cannot provide the required collateral, which is used as an instrument to eliminate the asymmetric information problem in assessing the quality of borrowers.

Transaction cost rationing occurs when the potential borrower has no intention to borrow because of high transaction costs, which can substantially reduce the potential profitability of their projects. A borrower bears at least two types of transaction costs: (1) fixed costs (time and monetary costs associated with screening the application, enforcing the loan contract, and monitoring the borrower's compliance), and (2) non-monetary costs such as the psychological effort of dealing

15 Effective demand is defined as the demand for contracts available in the actually existing or asymmetric information world (Boucher et al., 2009).

with institutional bureaucracy and procedure (Guirkinger & Boucher, 2008; Mallik, 2014).

Risk rationing occurs because the cost of meeting a contract's requirements is too high, which in turn may reduce the potential return of the projects. If the return of the project is lower than expected, then the probability of repaying the debt would be lower. Under such a circumstance, the potential borrower tends to leave the credit market to avoid the risk of losing the collateral.

Unlike quantity, transaction costs and risk rationing, which consider the economic factors as the main reasons to leave the credit market, cultural rationing occurs because potential borrowers due to their personal beliefs refuse to obtain interest rate–based loans. This type of self-refusal exists because they have internalised religious values or beliefs into their business activities that comply with Islamic/sharia rules (from the Quran and the Sunnah) as the core value system (Harrison & Ibrahim E. (Eds), 2016). According to sharia rules, any transactions with interest or excessive interest, risk or uncertainty, and based on speculation are strongly prohibited (A. J. Wilson & Abdul Rahman, 2015). Analysing this self-refusal rationing could contribute to the theory of credit rationing from non-price rationing perspective.

Harrison and Ibrahim E. (Eds) (2016) contend that financial institutions under a sharia system promote equitable risk sharing, inclusive growth and a fair distribution of wealth. Therefore, in its lending-borrowing practices, the sharia banking system promotes the principle of profit and loss sharing. Through this

system, lenders as well as borrowers share the risks associated with the projects financed by the lenders (Thorsten Beck, Demirgüç-Kunt, & Merrouche, 2013; Obid & Naysary, 2014). Due to the asymmetric information problem, similar to the conventional banking system, every transaction (loan) under sharia has to be backed up by a contract that involves tangible assets.

Hence, this study hypothesises:

> ***Hypothesis H1C**: These factors (a. having higher sales growth, b. offering a higher collateral value, c. having a longer duration of firm–bank relationship, d. an increase in the number of banks, and e. establishing a risk-sharing scheme with peers), decrease the probability of borrowers' credit rationing*

> ***Hypothesis H1D**: These factors (a. having higher sales growth, b. offering a higher collateral value, c. having a longer duration of firm–bank relationship, d. an increase in the number of banks, and e. establishing a risk-sharing scheme with peers), decrease the probability of non-borrowers' credit rationing*

4.2.6 Credit Rationing and Firm Performance

Limited access to finance, or credit rationing, as many researchers argue, may affect firm performance (Ayyagari et al., 2010; Clementi & Hopenhayn, 2006; Jinjarak & Wignaraja, 2016; Minetti & Zhu, 2011; Rahaman, 2011; Tambunan, 2009a). Clementi and Hopenhayn (2006) and Rahaman (2011) state that credit constraints have an adverse effect on a firm's ability to expand its investment and to obtain higher growth. Minetti and Zhu (2011) found that high-tech industries exposed to the

competition of fast emerging economies are affected more by credit constraints than the traditional industries. This phenomenon has been a cause for concern for policy makers because constrained credit hinders the process of economic transformation at the macro level.

In contrast, Ayyagari et al. (2010), Rahaman (2011) and Ferrando and Mulier (2013) suggest that firms with better access to external finance (from formal financial institutions) generate a higher profit reinvestment rate compared with firms that only rely on internal financial sources or informal finance. They do not totally neglect the important effect of self-financing and informal credit on the growth and continuity of small business. However, they did not find any evidence that informal finance is associated with excellent firm performance.

Credit rationing can also affect firm performance by limiting market expansion. Under foreign market competition, firms with lower creditworthiness are less likely to expand to the export market (Caggese & Cuñat, 2013); (Berman & Héricourt, 2010; Minetti & Zhu, 2011). Minetti and Zhu (2011) found that firms which lack access to finance have a probability of exporting their products of about 39% lower than non-financially constrained firms, which can reduce potential foreign sales by more than 38%. In addition, a firm with high dependence on external finance is more affected by credit rationing than those with high dependence on internal sources.

Among many variables that can become the nexus between credit access and firm performance are firm age, firm size and firm networks. The research findings by Minetti and Zhu (2011), Rahaman (2011) and Sakai, Uesugi, and Watanabe (2000)

confirm the relationship between firm age and credit rationing. In particular, Minetti and Zhu (2011) show that credit rationing can impede the growth of new businesses or start-up businesses as younger firms are more affected by credit rationing than older firms. Sakai et al. (2000) argue that, as a firm becomes more mature, the cost of borrowing decreases. In regard to firm size, Rahaman (2011) and Ferrando and Mulier (2013) found that small firms receive higher positive impact from improved access to finance compared to larger business entities. Meanwhile, Park et al. (2004) and Tanriverdi (2006) believe that networking helps firms to secure wider access to resources.

Thus, this study hypothesises:

> ***Hypothesis H1E:*** *For borrowers, regardless of weak or strong rationing, credit rationing negatively affects firm performance.*

4.3 Data and Descriptive Statistics

Table 4.1 describes the variables used in this study and Table 4.2 presents the descriptive statistics of the overall sample, borrowers and non-borrowers. The statistics in Table 4.2 show that 25% of the SMEs sample enlarged their business through investment in expansion during 2012–2017. Borrowers were more active than non-borrowers in expanding their business. About 32% of borrowers could use their money for investment while only 18% of non-borrowers could afford to expand their business. The data on firm achievement indicators also shows that borrowers achieved better sales growth (8.98% vs. 6.89%) as well as profit growth (9.45% vs. 6.45%) than non-borrowers.

Table 4.1 Variables Description of Credit Rationing and Firm Performance

Variables	Measurements
Investment in expansion	Binary value = 1 if firm made new investment (expands the existing factory and/or opens new factory) within last five years, and value = 0 otherwise
Profit growth	Growth of profit (last year) *
Sales growth	Growth of sale (last year) *
Firm networking with peers	Binary value = 1 if firm has supportive supply linkage peers, and value = 0 otherwise
Competition with ASEAN	Binary value = 1 if firm states that its products are competing with imported products from ASEAN, and value = 0 otherwise
Competition with China	Binary value = 1 if firm states that its products are competing with imported products from China, and value = 0 otherwise
Weak rationing	Binary value = 1 if firm states that it would have liked to obtain more credit at the market interest rate, and value = 0 otherwise
Strong rationing	Binary value = 1 if firm states that it would have liked to obtain more credit at the market interest rate and it demanded more credit than it actually obtained, and value = 0 otherwise
Quantity rationing	Binary value = 1 if firm states that it is unable to obtain credit because the collateral to meet bank requirement is insufficient, and value = 0 otherwise
Transaction cost rationing	Binary value = 1 if firm states that it voluntarily withdrew from credit market because the transaction cost to acquire credit is expensive, and value = 0 otherwise
Risk rationing	Binary value = 1 if firm states that it voluntarily withdrew from credit market because it worried about losing its collateral, and value = 0 otherwise
Cultural/personal belief rationing	Binary value = 1 if firm states that it voluntarily withdrew from credit market because of religious belief, and value = 0 otherwise
High collateral value	Binary value = 1 if firm is willing to offer higher collateral value than proposed credit amount, and value = 0 otherwise
Duration of firm–bank relationship	Binary value = 1 if firm has relationship with the bank (saving or borrowing) more than 5 years, and value = 0 otherwise
Competition among banks	Growth of the number of bank branches in the period 2012–2016 in four provinces of research location (in percentage)
Competition among sharia banks	Growth of the number of sharia bank branches (BPR Sharia) in the period 2012–2016 in four provinces of research location (in percentage)
Risk-sharing scheme with peers	Binary value = 1 if firm has risk-sharing scheme with its supply linkage peers in production process and product return, and value = 0 otherwise
Purchase of raw materials	Binary value = 1 if firm used the credit to purchase raw materials, and value = 0 otherwise
Purchase of machinery	Binary value = 1 if firm used the credit to purchase machinery, and value = 0 otherwise
Workshop expansion	Binary value = 1 if firm used the credit to expand the workshop, and value = 0 otherwise
Marketing expansion	Binary value = 1 if firm used the credit to expand marketing, and value = 0 otherwise
Firm size (number of employees)	Number of full-time employees (in ln, last year)
Firm age (< 10 years)	Binary value indicates the firm's age group. Firm with < 10 years = 1, and value = 0 otherwise

* obtained from the respondents based on their profit change in the period 2015–2016

Table 4.2 Descriptive Statistics of Credit Rationing and Firm Performance

Variables	Mean			Difference in mean between borrowers and non-borrowers (std. error)
	Whole sample	Borrowers	Non-borrowers	
Investment in expansion	0.25	0.32	0.18	0.13** (0.065)
Profit growth (%) *	8.21	9.45	7.08	2.37** (1.175)
Sales growth (%)	7.89	8.98	6.89	2.09** (1.019)
Firm networking with peers	0.49	0.55	0.43	0.12** (0.075)
Competition with ASEAN	040	0.46	0.34	0.12** (0.073)
Competition with China	0.82	0.82	0.82	0.00 (0.058)
Weak rationing	-	0.71	-	
Strong rationing	-	0.60	-	
Quantity rationing	-	-	0.53	
Transaction cost rationing	-	-	0.52	
Risk rationing	-	-	0.35	
Cultural/personal belief rationing	-	-	0.45	
High collateral value	0.22	0.31	0.14	0.16*** (0.061)
Duration of firm–bank relationship	0.46	0.54	0.39	0.15** (0.075)
Competition among banks	2.90	2.90	2.90	0.00 (0.038)
Competition among sharia banks	-	-	1.09	
Risk-sharing scheme with peers	0.49	0.53	0.45	0.08 (0.075)
Firm size (number of employees)	12	23	11	0.53*** (0.137)
Firm age (< 10 years)	0.42	0.53	0.33	0.20*** (0.073)
Observation	177	85	92	

* Significant at 10%, ** Significant at 5%, *** Significant at 1%
Source: Primary data, 2017. Notes: The numbers show the mean.
In the estimation, I calculated profit growth and number of employees in natural logarithmic form.

Both borrowers and non-borrowers suffered from credit rationing of various types. The descriptive statistics show that, among the borrowers, 60% experienced strong rationing and 71% had to deal with weak rationing. More than half of the non-borrowers withdrew from the credit market because of quantity rationing (53%) and transaction cost rationing (52%). In addition, about one third (35%) of non-borrowers

avoided the credit market due to risk. Interestingly, almost half (45%) of the non-borrowers leave the credit market with interest rate–based loans because of cultural considerations.

The descriptive statistics also reveal that 31% of the borrowers and 14% of the non-borrowers were willing to provide higher collateral value than the proposed loan amount. More than half (54%) of the borrowers had a relationship with the banks of more than 5 years in saving and borrowing activities. For non-borrowers, only 39% had a relationship of more than 5 years with the banks for saving only. Competition among banks was proxied by the growth of bank branches and growth of sharia bank branches in the four provinces of the research, and they recorded about 2.9% and 1.09% respectively.

The descriptive statistics recorded that both borrowers and non-borrowers were actively engaging in networking with other firms. More than half (55%) of the borrowers and about 43% of the non-borrowers were actively engaging with their peers. This networking includes backward linkages (cooperation with suppliers of raw material) and forward linkages (cooperation with buyers of their outputs).

In the competitive pressure variables, the statistics showed that 46% of borrowers and 34% of non-borrowers were competing with automotive parts imported from ASEAN. The variable of competition with ASEAN is worth noting because since 2015 ASEAN countries have implemented regional economic integration under the ASEAN Economic Community (AEC). About 82% of both the borrowers and non-

borrowers were competing with imported products from China. This could pose a threat to the Indonesian automotive components industry.

4.4 Method of Analysis

To investigate the effect of credit access on the probability of a firm investing, I adopted an econometric model popularised by Minetti and Zhu (2011). Minetti and Zhu (2011) developed a model that examines the impact of credit rationing on firms probability of exporting and their operating profit. The theoretical foundation of their model is based on the view that credit constraint can affect the ability of a firm to enter foreign markets through their ability to meet the fixed costs of exporting activities (Manova, 2010 and Chaney, 2005, as cited in Minetti and Zhu, 2011).

I adapt Minetti and Zhu's (2011) model in the following ways. First, while Minetti and Zhu's model applied to the probability of a firm exporting, I am examining the effect of credit rationing on the probability of a firm investing in expansion. Studies have showed that credit rationing has an adverse effect on investment and firm growth (Bernanke & Gertler, 1990; Clementi & Hopenhayn, 2006).

Second, unlike Minetti and Zhu's model, which focuses only on borrowers, this study extends the analysis to include non-borrowers. In my analysis of borrowers, I looked at their degree of rationing, namely weak and strong rationing. Meanwhile in the analysis of non-borrowers, I looked at the main reason for credit rationing. For non-borrowers' credit rationing, Boucher et al. (2009b) examined quantity, transaction costs and risk rationing. The breakdown of these three types of rationing

is based on an approach called direct elicitation methodology. For my study, I add cultural rationing in addition to these three types of credit rationing.

Under the assumption that the unobserved factor is normally distributed and has zero mean and unit variance, the equation for the probability of a firm investing is specified as follows:

$$Prob\ (Invest_i = 1) = prob(\alpha_1 + \beta_1 C_i + \boldsymbol{\upsilon_i \omega_1} + \varepsilon_i > 0) \quad (1A)$$
$$= \phi(\alpha_1 + \beta_1 C_i + \boldsymbol{\upsilon_i \omega_1})$$

where C_i is a dummy variable of credit rationing with binary value = 1 if a firm has credit rationing and value = 0 otherwise. Meanwhile, υ_i is a vector of independent variables explaining a firm's probability of investing; ϕ is a standard normal cumulative density function (cdf) and ε_i is the unobserved factor. Under credit rationing that may cause a lack of funds to invest, the value of β_1 is expected to be significantly negative. On the other hand, if a firm has wide access to financial resources, the value of β_1 is expected to be significantly positive.

The independent variables are as follows. To account for achievement of the firm, I use sales growth as higher sales growth is a good signal of a firm's creditworthiness in the credit market. Aivazian and Santor (2008) also show that increasing a firm's cash flows or internal net worth from sales growth may reduce moral hazard and adverse selection problems in the financial market, leading to better quality credit.

To account for a firm's cooperation, I used a firm's networking with peers, including backward and forward linkages, which provides an opportunity to acquire additional funds for investment. To capture the effect of external pressure on the probability of a firm investing, I used variables that measure the response of a firm to external competitors. I posit that imported automotive components from ASEAN countries are a threat to the Indonesian automotive industry. Imported parts from China are also considered major competitors in Indonesia.

I used the number of employees as a proxy for firm size to capture whether larger firms have a higher probability of investing under credit rationing. I used firm age to capture whether older firms or younger firms have a higher probability of investing under credit rationing. These two variables are control variables in the equation.

There is a possibility that the variable credit rationing (C_i) in equation (1A) is endogenous. The likelihood of a firm being financially rationed in the credit markets could be affected by the firm's credit risk, firm characteristics and other exogenous variables from the supply side of the credit market. The endogeneity of credit rationing could occur because of the possible correlation between the unobserved determinants of the firm's probability of investing and the unobserved determinants of credit rationing.

To deal with this issue, following this studies: Minetti and Zhu (2011) and Aristei and Franco (2014) who applied the model to examine the effect of credit rationing on the probability of a firm exporting; Regis (2018) applied the model to examine the effect of credit access on the investment decision, I employed a recursive bivariate

probit model for the joint analysis of the probability of investing and the probability of being rationed. The assumption of the model is all firms have access to investment in expansion, but may not have sufficient financial resources to fund the project The probability model of credit rationing is formulated as follow:

$$Prob(C_i = 1) = prob(\boldsymbol{\chi_s \delta} + \boldsymbol{v_i \psi} + \mu_i > 0) \quad (1B)$$
$$= \phi\,(\boldsymbol{\chi_s \delta} + \boldsymbol{v_i \psi})$$

where, C_i is a dummy variable of credit rationing with binary value = 1 if a firm has credit rationing and value = 0 otherwise; χ_s is a vector of variables of exogenous restriction from the supply side that does not exert a direct effect on a firm's probability of investing. It includes high collateral value, duration of the firm–bank relationship, competition among banks within the province where a firm operates, and risk sharing with peers; $\boldsymbol{v_i}$ is an exogenous variable from the demand side that consists of some variables in equation (1A) such as firm characteristics (firm size and firm age) and other variables capturing the quality of a firm's investment opportunities and potential demand for credit (sales growth).

In many studies such as Fungáčová et al. (2017) and Leon (2015), the level of competition among banks is measured by structural indicators (Herfindahl–Hirschman index and CR5) or non-structural indicators (Lerner index and H-statistic). In my study, inadequate data on the banking sector in the four provinces of this research prevented me from calculating such banks' competition measures. I used a proxy (growth of bank branches) to capture the effect of bank competition on credit rationing.

In the Indonesia context, the SMEs businesses especially those are producing automotive components has been growing rapidly. They need additional fund to grow their businesses through investment in expansion. However, many of them cannot obtain bank loans because the interest rate (or the costs of funding) and the collateral requirements are too high. These problems occur to some extent due to limited number of the banks and hence the competition among banks to provide better offer for the potential borrowers is low.

SMEs are the potential borrowers that would participate in the credit market if the cost of funds and collateral requirements are more affordable. Therefore, to enable the SMEs as potential borrowers to participate in the credit market, competition among banks in the region is one of the strategies that should be promoted.

In the case of cultural rationing of non-borrowers, the growth of bank branches is substituted with the growth of rural sharia bank branches (BPR Sharia). That enabled me to capture the influence of sharia bank competition on the borrowing behaviour of non-borrowers and their probability of credit rationing.

Even though the variable of credit rationing (C_i) enters equation (1B) as an endogenous variable, Greene (2002) suggests that the endogenous nature of one of the variables in the recursive bivariate probit model can be ignored in formulating the log-likelihood. Despite the fact that, under the recursive bivariate probit model, the model can be identified even with the same set of exogenous variables being present in both equations (Wilde, 2000), I follow Maddala and Lee (1976) and Marra and Radice (2011) to exclude some instrumental variables from equation (1A) to

make the model robust to misspecification of error distribution. In my credit rationing model (equation 1B), I excluded variables related to the firm's cooperation dimension (firm networking with peers) and external pressure (competition with ASEAN and competition with China).

The bivariate model of firm probability of investing and firm probability of being rationed was estimated through maximum likelihood estimation. This method generates a consistent approach to the estimations of the parameters, has approximate normal distribution and produces lower variance (Garrido, Deb, Burgess, & Penrod, 2012; Greene, 2002; C. Li, S., Poskitt, & Zhao, 2016). In addition, the method is also statistically well interpreted. I ran the estimation using statistical software STATA.

The coefficients of the bivariate probit model in equations (1A) and (1B) could not be directly interpreted. Instead, the average marginal effects of independent variables were calculated. This differs from the linear regression model in which estimated coefficients are directly treated as marginal effects. Under the probit model where fitted value is estimated through a non-linear probit function, the marginal effect of the variables needs to be calculated from inside the function. Therefore, the marginal effect is obtained by multiplying the estimated coefficients with the probability density function. The marginal effects measure the change of the conditional probability of the dependent variable due to the change in the value of each independent variable, assuming all other independent variables are constant.

To investigate the effect of credit rationing on firm performance, only the analysis of borrowers is applicable. I estimated firm performance with the following equation:

$$fp_i = \alpha_1 - \gamma_i C_1 + \gamma_i \omega_1 + \varepsilon_i \quad (1C)$$

Where fp_i is firm performance; C_i is a dummy variable that equals 1 if a firm has credit rationing and 0 otherwise; ω_1 is a vector of independent variables affecting firm performance (sales growth, firm networking with peers, competition with ASEAN, competition with China, firm size and firm age) and ε_i is unobserved factors that affect the dependent variable.

4.5 Results and Discussion

The results of the bivariate probit model in equations (1A) and (1B) for borrowers experiencing weak and strong credit rationing are presented in Table 4.3. While interpreting the results, the focus will be on the average marginal effects.

Table 4.3 The Probability of Borrowers Investing and Factors Affecting Credit Rationing

	Weak credit rationing			**Strong credit rationing**		
	Investing in expansion			Investing in expansion		
Variables	Coefficient (std. error)		Average marginal effects	Coefficient (std. error)		Average marginal effects
	(1)		(2)	(3)		(4)
Credit rationing	-1.571	***	-0.534***	-1.737	***	-0.577***
	(0.362)		(0.119)	(0.266)		(0.079)
Sales growth	0.004		0.001	0.009		0.003
	(0.021)		(0.007)	(0.019)		(0.006)
Firm networking with peers	0.785	**	0.232**	0.649	**	0.212**
	(0.333)		(0.092)	(0.299)		(0.088)
Competition with ASEAN	0.467	*	0.145*	0.448	*	0.152*
	(0.273)		(0.088)	(0.256)		(0.089)
Competition with China	-0.441		-0.149	-0.125		-0.043
	(0.417)		(0.150)	(0.254)		(0.089)
Firm size (ln)	0.148		0.046	0.101		0.034
	(0.167)		(0.052)	(0.162)		(0.055)
Firm age (< 10 years)	-0.714	*	-0.221**	-0.814	**	-0.273**
	(0.368)		(0.108)	(0.347)		(0.110)
	Weak credit rationing			**Strong credit rationing**		
	(5)		(6)	(7)		(8)
Sales growth	-0.059		-0.017	-0.070	*	-0.027*
	(0.041)		(0.012)	(0.038)		(0.015)
High collateral value	- 1.772	***	-0.578***	-1.015	***	-0.388***
	(0.290)		(0.079)	(0.247)		(0.087)
Firm-bank relationship	- 0.395		-0.113	-0.381		-0.146
	(0.318)		(0.089)	(0.306)		(0.116)
Competition among banks	- 1.617	***	-0.472***	-1.720	***	-0.667***
	(0.499)		(0.140)	(0.595)		(0.233)
Risk sharing with peers	-0.645	**	-0.184**	-0.491	*	-0.188*
	(0.329)		(0.088)	(0.284)		(0.107)
Firm size (ln)	- 0.082		-0.024	-0.249		-0.096
	(0.177)		(0.052)	(0.167)		(0.065)
Firm age (< 10 years)	-0.512		-0.147	-0.716	*	-0.271*
	(0.388)		(0.112)	(0.375)		(0.135)
Wald test (X^2)	80.21			73.11		
p-value for Wald test	0.000			0.000		
LR test (X^2)	8.477			6.867		
p-value for LR test	0.004			0.008		
Number of observations	85			85		

* Significance at 10%, ** Significance at 5%, *** Significance at 1%

4.5.1 The Effect of Credit Rationing on a Firm Probability of Investing in Expansion

4.5.1.1 Analysis of the Borrowers

Table 4.3 shows that statistically the recursive bivariate probit model fits the data well, as indicated by a significant Wald test: $X^2 = 80.21$, $p < 0.000$ and $X^2 = 73.11$, $p < 0.002$ for weak and strong rationing respectively. In addition, the likelihood ratio (LR) test for both weak and strong rationing also rejects the null hypothesis of zero correlation ($X^2 = 8.477$, $p < 0.000$ for weak rationing and $X^2 = 6.867$, $p < 0.000$ for strong rationing). These suggest that unobserved factors (disturbance errors) in equations (1) and (2) are significantly correlated. This implies that the variable of credit rationing is endogenous. Knapp and Seaks (1998) suggest that the result of an LR test provides a similar result to a Hausman endogeneity test. Therefore, credit rationing can be jointly estimated with investment in expansion.

I observe that credit rationing has a negative effect on a firm's probability of investing in expansion for both weak and strong rationing. The negative effect is statistically significant at 1%. However, when I turn to the average marginal effects, Table 4.3 column 4 shows that strong rationing (-0.577) gives a slightly larger impact than weak rationing (-0.534). This implies that strong rationing decreases a firm's probability of investing by 57.7%, assuming all other independent variables are constant.

I also examined this relationship when weak and strong rationing were assumed to be exogenous. The results show that credit rationing has no significant effect on a firm's probability of investing. This indicates that ignoring the endogeneity of credit

rationing could lead to an understatement of the negative effect of rationing on a firm's probability of investing in expansion. Minetti and Zhu (2011) and Aristei and Franco (2014) suggest that one of the reasons could be related to omitted variables, such as the agency problem among the firm's stakeholders. Lenders (principals) may have more information about firms (agents) than those reported in the loan application. Therefore, fewer prospective borrowers (observed by lenders) could have a high probability of being rationed. Another reason could be related to the borrowers' business risks and their capacity to provide collateral that does not meet lenders' expectations. To compensate for the high risks of lending to borrowers, lenders may require a high value of collateral. Failure to meet these lenders' expectations may increase the probability of rationing.

Among the independent variables, credit rationing seems to have the largest impact on a firm's probability of investing in expansion. The findings also show that firm networking with peers and competition with ASEAN positively affect a firm's probability of investing in expansion at a 5% and 10% level of significance, respectively.

The positive impact of a firm's networking with peers indicates that having supportive peers and good networking increases the likelihood of the firm investing in expansion. High motivation to expand the business could indicate a positive expected return on investment in the near future. This is consistent with Cao and Zhang (2011), Flynn et al. (2010) and Frohlich and Westbrook (2001), who found that having supply chain collaboration with peers increases the return on investment.

My results show that having mutual firm cooperation with peers increases a firm's probability of investing by about 23.2% and 21.2% for weak and strong rationing, respectively. From my interviews, several firms reported that they acquired more competitive prices for raw materials from their supportive suppliers. At the same time, the availability of well-connected buyers gives them confidence to sustainably expand their business. In some cases, where the products are critical to buyers, buyers are happy to offer funds for investment to ensure a continuous supply.

Competition with ASEAN also has a significant positive impact on a firm's probability of investing under weak and strong rationing. This means Indonesian automotive component SMEs are responding positively to the competition from ASEAN. This suggests that a competitive environment drives firms to expand. The implementation of AEC in 2015 could be one of the drivers of investment. Our results are consistent with those of Akdogu and MacKay (2008) and Grenadier (2002), who found that firms tend to invest more and react faster in highly competitive industries.

From the SMEs' business strategy point of view, increasing the probability of investment as a response to the tighter competition from ASEAN competitors can be interpreted in two ways. First, it indicates that Indonesian SMEs are strengthening their business defence strategy in the face of an onslaught of automotive components from ASEAN. SMEs are responding actively through investment in expansion to the implementation of AEC that promotes free flow of automotive components products. Second, Indonesian SMEs are preparing a counter-attack strategy to enter

the ASEAN market. Investment in expansion could increase the economics of scale leading to better price competitiveness for SMEs to enter ASEAN market.

The variables associated with firm characteristics show different impacts on a firm's probability of investing in expansion. While firm size, as proxied by the number of employees, has no significant effect, firm age has a significant effect with a negative sign for both weak and strong rationing, indicating that young firms are less likely to expand their business. This is in line with the research results of Minetti and Zhu (2011) and Levenson and Willard (2000). Under certain circumstances, however, young firms may respond differently. For instance, Swinney, Cachon, and Netessine (2011) found that, when start-up firms are competing with established firms in which market uncertainty is high and capacity costs are not declining, start-up firms tend to invest early and established firms invest later.

The evidence that credit rationing negatively affects a firm's probability of investing in expansion for both weak and strong rationing confirms **hypothesis H1A.**

4.5.1.2 Analysis of the Non-borrowers

The results of the bivariate probit model in equations (1A) and (1B) for non-borrowers experiencing quantity, transaction cost, risk and cultural rationing are presented in Table 4.4. When interpreting the results, I will focus my discussion on the average marginal effects.

Table 4.4 shows that the bivariate probit model for the four types of credit rationings of the non-borrowers fits the data well, as indicated by a Wald test ($X^2 = 48.03$, $X^2 =$

45.04, $X^2 = 52.02$, $X^2 = 40.39$ with $p < 0.000$ for quantity, risk, transaction cost and cultural rationing respectively). In addition, the likelihood ratio (LR) test for the four types of rationing also rejects the null hypothesis of zero correlation. This suggests that unobserved factors (disturbance errors) in the two equations (1A) and (1B) are significantly correlated. This implies that credit rationing is endogenous. Therefore, in these four types of rationing, investment in expansion and credit rationing can be jointly estimated.

I observe evidence of a statistically significant negative effect of credit rationing on a firm's probability of investing in expansion for all four types of rationing (1% level of significance for quantity, transaction cost and cultural and 5% level of significance for risk). However, in terms of the marginal effects, transaction cost rationing (-0.423) has the largest impact of any of the types of rationing (quantity -0.269, cultural -0.200 and risk rationing -0.088). In comparison with borrowers, I found that the magnitude effect of credit rationing on the probability of investing of the non-borrowers is smaller. This indicates that non-borrowers' decision to invest is less sensitive to the availability of external finance compared to the borrowers.

Unlike the results in the borrowers' case, sales growth and firm networking with peers now have a positively significant impact on a firm's probability of investing. A plausible reason could be that a business experiencing growth in sales can invest in expansion without borrowing. This also suggests that firms with limited access to loans from banks can substitute the funding with internal resources, such as business profits accumulated from sales growth. My findings are consistent with the

view of Fazzari et al. (1988), who mention that if a firm is facing severe credit rationing, the firm's level of investment will heavily rely on internal funds by retaining a high portion of their income as funds for investment. In addition, this is in line with the cash holdings view, suggesting that internal sources are more valuable to finance investment for constrained firms (Denis & Sibilkov, 2010). Some non-borrowers also use their own personal funds and family funds to expand their business. My questionnaire found that about 39% of non-borrowers prefer their own personal and family funds to bank loan to expand their business production capacity.

Since the marginal effects of sales growth on the probability of investing is relatively small, there is a possibility that non-borrowers also receive assistance elsewhere, possibly from their peers. This view is supported by the positive effect of the variable of firm networking with peers, for which I found consistent results across all four types of credit rationing. My interview results indicate that some peers assist them with a reasonable amount of money through soft loans with only personal trust as collateral. Some other peers support them with flexible payments for purchasing raw materials and other production equipment.

The finding is credit rationing in all four types (quantity, transaction cost, risk and cultural) negatively affects a non-borrowers' probability of investing in expansion confirms **hypothesis H1B**.

Table 4.4 The Probability of Non-borrowers Investing and Factors Affecting Credit Rationing

Variables	Quantity rationing		Risk rationing		Transaction cost rationing		Cultural rationing	
	Investing in expansion		Investing in expansion		Investing in expansion		Investing in expansion	
	Coefficient (std. error)	Average marginal effects	Coefficient (std. error)	Average marginal effects	Coefficient (std. error)	Average marginal effects	Coefficient (std. error)	Average marginal effects
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Credit rationing	-1.612 ***	-0.269*	-0.906 **	-0.088	-2.006 ***	-0.423***	-1.424 ***	-0.200*
	(0.392)	(0.145)	(0.409)	(0.057)	(0.390)	(0.098)	(0.499)	(0.114)
Sales growth	0.243 ***	0.035**	0.273 ***	0.031**	0.197 ***	0.038***	0.152 *	0.022
	(0.094)	(0.017)	(0.087)	(0.016)	(0.063)	(0.011)	(0.085)	(0.015)
Firm networking with peers	1.233 **	0.207***	1.315 ***	0.185***	0.661 **	0.135**	1.084 *	0.178***
	(0.622)	(0.066)	(0.433)	(0.061)	(0.404)	(0.058)	(0.608)	(0.068)
Competition with ASEAN	-0.074	-0.010	-0.262	-0.028	0.137	0.027	0.045	0.006
	(0.375)	(0.051)	(0.370)	(0.042)	(0.309)	(0.063)	(0.514)	(0.075)
Competition with China	0.473	0.055	0.301	-0.029	0.574	0.089*	0.629	0.069
	(0.443)	(0.043)	(0.431)	(0.041)	(0.373)	(0.049)	(0.502)	(0.047)
Firm size (ln)	-0.248	-0.036	-0.245	-0.028	-0.054	-0.010	0.083	0.012
	(0.344)	(0.052)	(0.356)	(0.042)	(0.298)	(0.057)	(0.369)	(0.053)
Firm age (< 10 years)	-0.672	-0.083	-0.159	-0.017	-0.197	-0.037	-0.604	-0.075
	(0.506)	(0.054)	(0.409)	(0.041)	(0.371)	(0.064)	(0.500)	(0.058)
	Quantity rationing		**Risk rationing**		**Transaction cost rationing**		**Cultural rationing**	
	(9)	**(10)**	**(11)**	**(12)**	**(13)**	**(14)**	**(15)**	**(16)**
Sales growth	0.072	0.029	0.088	0.029	0.045	0.018	-0.100 *	-0.039*
	(0.056)	(0.022)	(0.067)	(0.022)	(0.045)	(0.018)	(0.059)	(0.023)
High collateral value	- 1.244 ***	-0.430***	-1.784 ***	-0.350***	- 1.027 ***	-0.376***	-1.534 ***	-0.434***
	(0.472)	(0.121)	(0.461)	(0.062)	(0.321)	(0.097)	(0.530)	(0.083)
Firm–bank relationship	- 0.176	-0.070	-0.958 ***	-0.294***	- 0.610 **	-0.240**	-0.286	-0.110
	(0.302)	(0.120)	(0.361)	(0.096)	(0.290)	(0.110)	(0.345)	(0.131)
Competition among banks	- 0.302	-0.121	0.034	0.011	-0.308	-0.123	-	-
	(0.664)	(0.265)	(0.576)	(0.193)	(0.548)	(0.218)		
Competition among sharia bank	-	-	-	-	-	-	-0.147 **	-0.057**
							(0.70)	(0.027)
Risk sharing with peers	-0.771 ***	-0.300***	-1.068 ***	-0.336***	-0.478 **	-0.189**	-0.624 **	-0.237**
	(0.282)	(0.104)	(0.315)	(0.086)	(0.229)	(0.089)	(0.296)	(0.106)
Firm size (ln)	- 0.744 ***	-0.297***	-0.586 *	-0.196*	- 0.239	-0.095	0.060	0.023
	(0.275)	(0. 110)	(0.357)	(0.120)	(0.258)	(0.103)	(0.298)	(0.116)
Firm age (< 10 years)	-0.219	-0.087	-0.094	-0.031	0.065	0.026	-0.050	-0.019
	(0.325)	(0.129)	(0.351)	(0.115)	(0.302)	(0.120)	(0.351)	(0.137)
Wald test (X^2)	48.03		45.04		52.02		40.39	
p-value for Wald test	0.000		0.000		0.000		0.000	
LR test (X^2)	8.677		8.707		5.992		3.208	
p-value for LR test	0.003		0.003		0.014		0.073	
Number of observations	92		92		92		92	

* Significance at 10%, ** Significance at 5%, *** Significance at 1%

4.5.2 Factors Affecting Credit Rationing

4.5.2.1 Analysis of the Borrowers

Columns 5 and 7 of Table 4.3 display the estimate of equation (1B) on weak and strong credit rationing. In total there are five factors that affect credit rationing and three of them (high collateral value, competition among banks and risk sharing with peers) are common for both weak and strong rationing. The results show that these three variables affect negatively and significantly both weak and strong rationing at a 1% and 10% level of significance, respectively. In addition, two others (sales growth and firm age) affect strong rationing only.

High collateral value negatively affects credit rationing at a 1% level of significance. This suggests that a firm offering a higher ratio of collateral to the desired loan has a lower probability of being rationed. However, as far as the average marginal effect is concerned, offering a high collateral value has a bigger impact on weak rationing (-0.578) than on strong rationing (-0.388). The estimated average marginal effect of -0.578 implies that offering higher collateral reduces the probability of weak rationing by 57.8%, assuming all other independent variables are held at their mean value.

In the context of Indonesia as an emerging economy, the decision of banks to require higher collateral value as one of main instruments in the credit screening process is a common practice. Since many banks perceive SME loans as high-risk lending, loans backed up with liquid and high value of collateral are considered to be less risky. By having such collateral, the potential for non-performing loans can be minimised or avoided.

The impact of competition among banks on credit rationing is significant at 1%. The results of the marginal effect reveal that the impact of competition among banks on strong rationing (-0.667) is larger than on weak rationing (-0.472), suggesting that increasing competition among banks by a 1% growth of bank branches could reduce firms' probability of experiencing strong and weak rationing by 66.7% and 47.2% respectively. There are several possible reasons why increasing competition among banks may reduce rationing. One reason is that competition among banks drives banks to offer lower interest rates (Cetorelli & Peretto, 2012; Leon, 2015), less stringent requirements on collateral (Hainz, 2003), and better designed products and services (Leon, 2015). Another reason is that increasing the number of bank branches may widen the coverage of banks to reach out to savers as an additional source for lending (Cetorelli & Peretto, 2012).

Risk sharing with peers has a negative and significant effect on weak and strong rationing at 5% and 10%, respectively. This means that firms establishing a risk-sharing scheme with their peers tend to have less rationing. When observing the average marginal effects, I found that the magnitude is similar (-0.184 vs. -0.188) in both rationing cases. This criterion has yet to be adopted by banks in assessing loan applications. From the interviews with some SME entrepreneurs, SMEs find that it is essential to look at how they can share out their risks with their supply chain peers.

Risk-sharing schemes are a common practice of many automotive component SMEs in Indonesia. Each firm has their own practice and they apply their risk-sharing schemes differently. Some firms exchange information about product failures and

together bear the costs during the production process. Some firms, however, exchange information about meeting delivery deadlines. Others focus on risk sharing through after-sale product returns or share the risk of unforeseeable circumstances that prevent them from fulfilling the terms of their contracts (a force majeure clause) such as natural disasters (floods and earthquakes).

In emerging economies, the risks of operating any business are considered to be substantially high. The sources of such risks include political instability, security threats, poor law enforcement, unstable costs of raw materials due to exchange rate fluctuations, etc. The World Bank (2018) survey on the Ease of Doing Business 2018 shows that the indicator of business risks in emerging economies, on average, is higher than in developed economies. Learning from history and/or experiences, many firms are aware of these risks. Therefore, to minimise their operational risks, it is common practice for firms to share the risks with their supply chain peers.

The results described above confirm **hypothesis H1C (a, b, d and e)** but not **hypothesis H1C(c)**.

4.5.2.2 Analysis of the Non-borrowers

Columns 9 to 16 of Table 4.4 display the estimate of factors affecting the four types of credit rationing (quantity, risk, transaction cost and cultural) of non-borrowers. They show that each type of credit rationing is affected by different factors. In total there are six factors affecting credit rationing, of which two of them (high collateral value and risk sharing with peers) are common to all four types of credit rationing. These two factors negatively affect the four types of credit rationing at a 1% to 5% level of

significance. In addition, four other factors (sales growth, firm–bank relationship, competition among sharia banks, and number of employees) only affect certain types of rationing.

Similar to the borrowers, high collateral value for the non-borrowers negatively affects credit rationing at a 1% level of significance for all four types of credit rationing. This suggests that firms offering a higher ratio of collateral to the desired loan have lower probability of being rationed. However, as far as the average marginal effect is concerned, offering high collateral value has a slightly bigger impact on cultural rationing (-0.434) than quantity (-0.430), transaction cost (-0.376), and risk rationing (-0.350). The estimated average marginal effect of -0.434 implies that offering higher collateral reduces the probability of cultural rationing by 43.4%, assuming all other independent variables are constant.

Risk sharing with peers also negatively affects the four types of credit rationing at a 1% level of significance for quantity and risk rationing and a 5% level of significance for transaction cost and cultural rationing. This means that firms establishing a risk-sharing scheme with their peers tend to have a lower probability of being rationed. Marginally, firms facing risk rationing may reduce their probability of credit rationing by 33.6% by establishing a risk-sharing scheme with peers. This is a higher magnitude effect than for the other three types of rationing (quantity 30%, cultural 23.7% and transaction cost rationing 18.9%).

Having a longer relationship between lenders and non-borrowers negatively affects the probability of risk and transaction cost rationing at a 1% and 5% level of

significance, respectively. When measured in terms of the average marginal effects, firms with more than 5 years relationship with banks reduce their probability of risk rationing and transaction cost rationing by 29.4% and 24% respectively. One possible reason is that if a bank has a longer relationship with its customers, it has more knowledge about the history of its customers' credit risk and level of leverage (Cenni et al., 2015; Von Thadden, 1995). Subsequently, banks could offer loans that match the risk tolerance level of the potential borrowers and the collateral being offered. The longer relationship with customers could also reduce transaction costs. The established longer relationship gives banks more room to lessen the complexity of the credit assessment procedure, and hence reduce the overall transaction costs.

Among the four types of rationings, competition among banks is found to affect the probability of cultural rationing only as indicated by the significance variable of competition among sharia banks. It negatively affects cultural rationing at a 5% level of significance with a marginal effect of -0.057. This implies that increasing the growth of sharia banks by 1% reduces the probability of cultural rationing by 5.7%. Though the effect is relatively small, it is noteworthy that the presence of sharia banks could play an important role in influencing decisions about rationing. In other words, the presence of sharia banks increases access to credit. This finding is consistent with that of Ullah and Lee (2012), who found that Islamic-minded potential borrowers are inclined to choose sharia banking services even if they have to sacrifice their conventional banking needs. Moreover, Ghannouchi, Fiordelisi, Molyneux, and Radic (2012) found that in some countries, such as Indonesia, Pakistan, Turkey and the United Arab Emirates, Islamic banks have better cost

efficiency than conventional banks, and therefore it could lower the cost of borrowing. Theoretically, this is consistent with the market power hypothesis, which maintains that bank competition alleviates credit constraint (Thorsten Beck et al., 2004; Leon, 2015; Ryan et al., 2014).

The results described above confirm **hypothesis H1D (a, b, c, d and e).**

4.5.3 Credit Rationing and Its Effect on Operating and Capital Expenditure

I expand the analysis of borrowers by examining the effect of weak and strong rationing on firm expenditure. This provides further analysis of how credit rationing affects the behaviour of borrowers in allocating their resources to run their firm sustainably. Similar to credit rationing, equations (1A) and (1B) were employed to estimate this part. The only difference is I replaced the dependent variable in equation (1A) with 5 different type of expenditure (purchase of raw materials, purchase of machinery, workshop expansion, marketing expansion and R&D). The same model was estimated for each type of expenditure individually. The results, categorised into operating and capital expenditure, are shown in Table 4.5.

Table 4.5 Operating and Capital Expenditure Affected by Credit Rationing

	Weak rationing		Strong rationing	
Expenditure	Coefficient (std. error)	Average marginal effects	Coefficient (std. error)	Average marginal effects
	(1)	(2)	(3)	(4)
Operating expenditure				
Purchase of raw materials	-0.530	-0.070	-1.118 ***	-0.219***
	(0.728)	(0.096)	(0.340)	(0.083)
Capital expenditure				
Purchase of machinery	-0.279	-0.087	-0.701	-0.221
	(0.664)	(0.202)	(0.665)	(0.207)
Workshop expansion	-1.502 ***	-0.487***	-1.517 ***	-0.483***
	(0.350)	(0.111)	(0.283)	(0.086)
Marketing expansion	-0.780	-0.311	-1.082	-0.411
	(0.678)	(0.249)	(1.068)	(0.370)
R&D	-0.822	-0.306	-1.309 ***	-0.473***
	(0.603)	(0.227)	(0.227)	(0.072)

* Significance at 10%, ** Significance at 5%, *** Significance at 1%
Note: The equation for this estimation is similar to equations (1A) and (1B).

Table 4.5 shows that statistically the recursive bivariate probit model fits the data well, as indicated by a significant Wald test for the five different type of expenditure (purchase of raw materials, purchase of machinery, workshop expansion, marketing expansion and R&D). Testing for the likelihood ratio (LR), to examine the correlation between unobserved factors in the two equations (credit rationing and expenditure), yields significant results for only some type of expenditure. These are workshop expansion for weak rationing and three other types of expenditure (purchase of raw materials, workshop expansion and R&D) for strong rationing. A significant LR test implies that the variable of credit rationing is endogenous, and therefore credit rationing can be jointly estimated with those significant types of expenditure.

The results show that strong rationing affects operating expenditure (purchase of raw materials) in addition to capital expenditure (especially, workshop expansion and R&D) at a 1% level of significance. The marginal effect shows that the effect on capital expenditure (-0.483 for workshop expansion and -0.473 for R&D) is more than double the effect on operating expenditure (-0.219 for purchase of raw materials). In the case of weak rationing, only capital expenditure (workshop expansion) is affected at a 1% level of significance, marginally about -0.487.

4.5.4 Credit Rationing and Firm Performance

I estimated the effect of credit rationing on firm performance based on equation (1C) in which credit rationing is treated both as an exogenous and an endogenous variable. The results of estimations through ordinary least squares (OLS), two-stage least squares (2SLS) and two-stage residual inclusion (2SRI) are presented in Table 4.6.

Columns 1 and 3 of Table 4.6 report the OLS estimation results where credit rationing is treated as an exogenous variable. The results show credit rationing in both weak and strong rationing has a statistically significant negative effect on firm performance at a 5% level of significance. In addition, firms with higher sales growth and those that are larger in size also tend to generate significantly higher profit growth.

Since there is a possibility that credit rationing in equation 1C is endogenous, I therefore also estimated the effect of credit rationing on firm performance using an instrumental variable approach. Minetti and Zhu (2011) adopt this method by

acquiring the instrumental variable from the predicted probability of credit rationing. For this estimation, I used the fitted probability of credit rationing derived from equation (1B) as an instrument for credit rationing. I then estimated equation (1C) through the two-stage least squares (2SLS) method. Statistically, the entire model fits the classical assumption requirements for normal error distribution (normality), constant variance of the errors (homoscedasticity) and non-existence of a high correlation between variables (multicollinearity).

The 2SLS model specification of equation (1C) fits the data well, as shown by the Wald test, which is highly (statistically) significant for both weak rationing (X^2= 128.43, p< 0.000) and strong rationing (X^2= 103.70, p< 0.000). A test of endogeneity revealed that credit rationing is endogenous, as indicated by the Wooldridge robust score and robust regression F for weak rationing (X^2= 13.65, p< 0.000) and strong rationing (X^2= 16.91, p< 0.000). The F statistics in the first stage regression for the joint significance test also confirmed that the instrumental variable has significant explanatory power for profit growth after controlling for the effect of other independent variables. Moreover, the F-test statistic in the first stage of regression is by far greater than 10, suggesting that the instrument does not suffer from any weak instrument problems (Stock, Wright, & Yogo, 2002).

Furthermore, the test of the strength of the instrumental variable using an Anderson-Rubin test revealed that the instrument is not weak, as indicated by the value from this test (18.14 and 24.93 for weak and strong rationing respectively) being higher than the critical value (3.84) at a 95% confidence interval. Testing the quality of the

instrumental variable using Stock and Yogo's test yields a similar result, further confirming that the instrument is not weak. Considering these tests, the 2SLS estimation results of equation (1C) are more reliable than the OLS.

However, the problem with the 2SLS estimation is that the predicted probability employed as an instrumental variable is obtained from a non-linear (probit) model. This may make the estimated results inconsistent if the first stage or second stage is non-linear (Greene, 2002; O'Malley, Frank, & Normand, 2001). Hence, the two-stage residual inclusion (2SRI) was adopted. Some studies such as Terza, Basu, and Rathouz (2008) have shown that 2SRI works better with non-linear models.

I examined equation (1C) through 2SRI with a generalized linear model (GLM). In the first stage, the treatment equation of credit rationing was estimated by using a Bernoulli distribution for binary data and probit link. Response residuals are produced at this stage. They consist of unobservable factors in the first stage equation (credit rationing). In the second stage, the equation of firm performance is estimated by using a Gaussian distribution and log link in which the dependent variable and response residuals from the first stage are included as independent variables. The 2SRI results show that the model specification of equation (1C) fits the data well, as shown by the Wald test for weak rationing (X^2= 228.62, p< 0.000) and for strong rationing (X^2= 270.71, p< 0.000).

Table 4.6 Credit Rationing and Firm Performance

	OLS		2SLS		2SRI	
	Weak rationing	Strong rationing	Weak rationing	Strong rationing	Weak rationing	Strong rationing
Dependent variables: profit growth (ln)	Coefficient (std. error)	Coefficient (std. error)	Coefficient (std. error)	Coefficient (std. error)	Coefficient (std. error)	Coefficient (std. error)
	(1)	(2)	(3)	(4)	(5)	(6)
Credit rationing	-0.198 **	-0.182 **	-0.595 ***	-0.794 ***	-0.359 ***	-0.486 ***
	(0.081)	(0.077)	(0.155)	(0.232)	(0.059)	(0.103)
Sales growth	0.046 ***	0.046 ***	0.039 ***	0.037 ***	0.011 ***	0.010 ***
	(0.012)	(0.012)	(0.010)	(0.009)	(0.001)	(0.001)
Firm networking with peers	-0.030	-0.015	-0.017	0.056	-0.071	-0.069 *
	(0.084)	(0.084)	(0.093)	(0.111)	(0.043)	(0.040)
Competition with ASEAN	0.005	0.021	-0.032	0.015	-0.051	-0.030
	(0.077)	(0.075)	(0.083)	(0.092)	(0.041)	(0.038)
Competition with China	-0.086	-0.091	-0.136	-0.191	-0.071	-0.078
	(0.110)	(0.107)	(0.116)	(0.129)	(0.056)	(0.050)
Firm size (ln)	0.137 ***	0.132 **	0.100 *	0.053	0.069 ***	0.044 **
	(0.050)	(0.051)	(0.057)	(0.068)	(0.023)	(0.023)
Firm age (< 10 years)	-0.073	-0.095	-0.069	-0.162 *	-0.069 *	-0.118 ***
	(-0.072)	(-0.074)	(0.079)	(0.099)	(0.036)	(0.036)
R^2	0.680	0.680	0.609	0.481	0.676	0.708
Wald test (X^2)			128.43	103.70	228.62	270.71
***p*-value for Wald test**			0.000	0.000	0.000	0.000
Root MSE	0.381	0.362	0.401	0.440	0.368	0.349
AIC	76.186	76.150	93.313	117.535	0.937	0.831
BIC	95.727	95.721	112.855	137.076	-327.363	-328.399
Test of endogeneity						
Wooldridge robust score chi2			11.35	10.61		
***p*-value**			0.000	0.000		
Robust regression F			13.65	16.91		
***p*-value**			0.000	0.000		
F test	9.39	9.21				
First stage regression F test	0.000	0.000	58.31	31.02		
***p*-value for F test**			0.000	0.000		
Anderson-Rubin value			18.14	24.93		
95% critical value			3.84	3.84		
Number of observations	85	85	85	85	85	85

* Significance at 10%, ** Significance at 5%, *** Significance at 1%

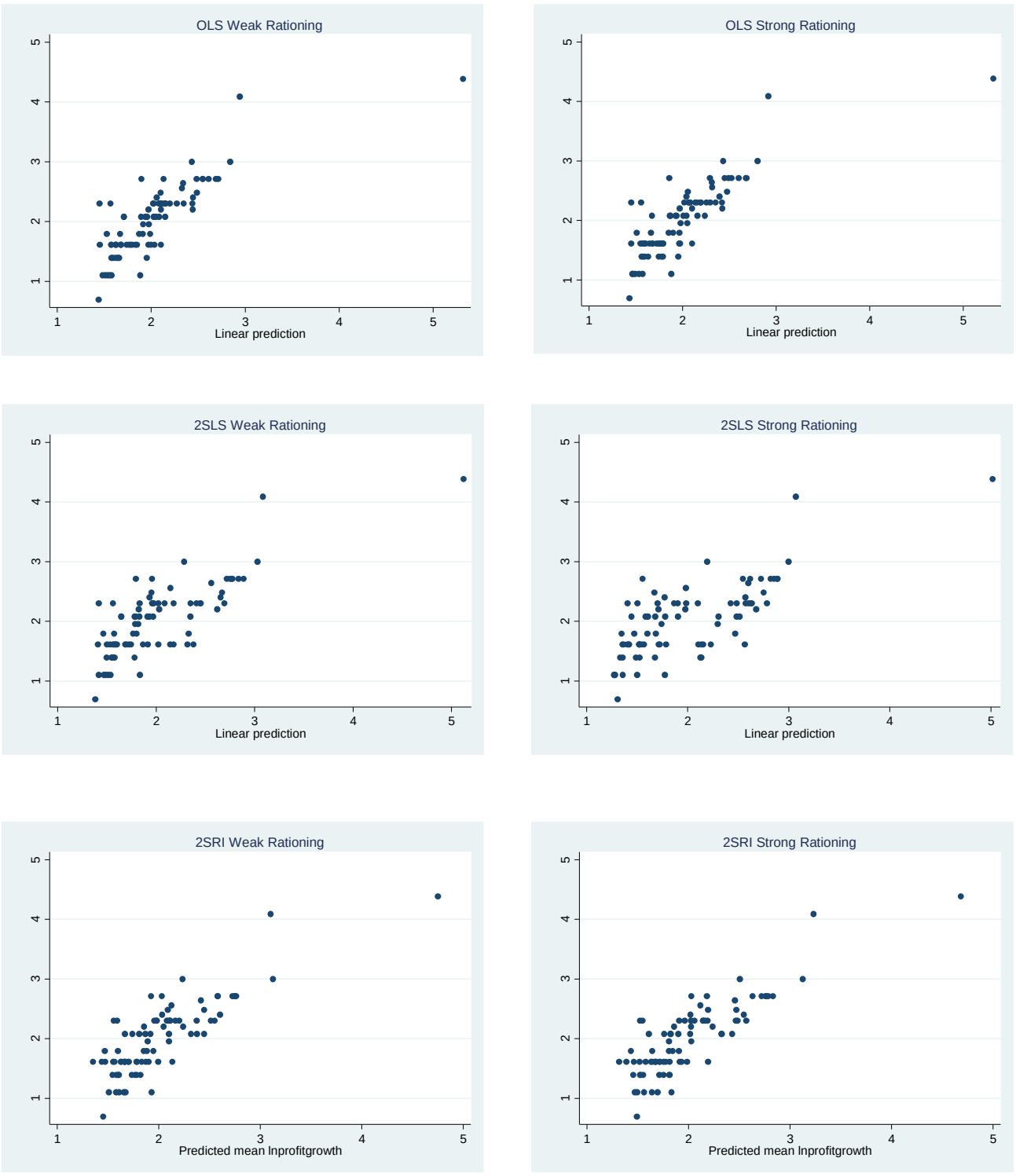


Figure 4.1 Plots of Predicted versus Actual Values for OLS, 2SLS and 2SRI

In comparison to the OLS and 2SLS, the 2SRI shows better model specification. Three measurements to compare these three models were used, namely the values of root mean square error (RMSE), Akike information criterion (AIC) and Bayesian

information criterion (BIC), and goodness fit of the model (R^2). The 2SRI for both weak and strong rationing produces the lowest values of RMSE (weak = 0.368, strong = 0.349) compared to the RMSE of OLS (weak = 0.381, strong = 0.362) and 2SLS (weak = 0.401, strong = 0.440). This indicates that, under 2SRI, the predicted values are closest to the observed data points. Figure 4.1 illustrates the plots of predicted versus observed values of profit growth for OLS, 2SLS and 2SRI.

The 2SRI has also the lowest values of AIC and BIC. The smallest value of AIC and BIC indicates that the chosen model specification is estimated to be closest to the unknown reality from other models (Burnham & Anderson, 2002). In addition, the goodness of fit of the model, as adjudged by R^2, also shows that 2SRI has higher predictive performance compared to OLS and 2SLS. In the following the results of equation (1C) are discussed based on the 2SRI estimation.

The parameters of 2SRI using GLM log links are equal to the logs of arithmetic means and their ratios, and therefore can be interpreted directly (Moran, Solomon, Peisach, & Martin, 2007). The 2SRI results in Table 4.6 show that both weak and strong rationing affect firm performance negatively at a 1% level of significance.

The point estimate of weak rationing is -0.359. Assuming all other variables are constant, this suggests that weak rationing could decrease a firm's profit growth by 35.9%. The impact of strong rationing on firm performance is larger than that of weak rationing. At a 1% level of significance, the point estimate of the effect is -0.486. Holding all other variables constant, firms experiencing strong rationing suffer from

a 48.6% reduction in profit growth. This is about 12.7% higher than the effect of weak rationing.

There are three other significant variables that have an impact on firm performance for both weak and strong rationing: sales growth, firm size and firm age. Sales growth positively affects firm performance. Larger firms perform better than smaller firms. Younger firms (less than 10 years) show poorer performance than older firms. Further, under strong rationing conditions, firm networking with peers seems to negatively affect firm performance. This does not augur well for firms in the Indonesian automotive component industry because networking with peers is hindered by the limited resources.

Overall, the results of the analysis of the effect of credit rationing on firm performance confirms **hypothesis H1E**.

4.5.5 Robustness Check and Limitations

The robustness checks to examine the reliability of my model were conducted in several ways such as adding, removing or modifying the variables (X. Lu & White, 2014). First, I estimated the equation of a firm's probability of investing using a probit model by treating credit rationing as an exogenous variable. The results show that statistically there is no evidence that credit rationing of all types (weak, strong, quantity, transaction cost, risk and cultural) significantly affects a firm's probability of investing. This indicates that treating credit rationing as an endogenous variable under a recursive bivariate model yields more precise results in estimating the effect of rationing on a firm's probability of investing.

Second, in the test of probability of investing in expansion through a recursive bivariate probit both for borrowers and non-borrowers, I removed some variables (firm networking with peers, competition with ASEAN and competition with China) from the equation of probability of investing. At the same time, in the equation for credit rationing, while I kept bank branch growth as an external factor, I eliminated the variables of duration of firm–bank relationship and number of employees. The results of the test are consistent with the main results of my model where credit rationing of all types (weak, strong, quantity, transaction cost, risk and cultural) reduce a firm's probability of investing.

Third, in the test of firm performance, I conducted two robustness checks: the first was modifying the equation of firm performance by replacing sales growth with firm productivity (sales per employee) and the second was eliminating some covariates except credit rationing and sales growth. The first test yielded a consistent result where both weak and strong rationing reduce a firm's profit growth. The second test produces consistent findings where both types of rationing decrease a firm's profit growth, with the magnitude of the effect almost similar to that reported in my main model. The reboustnest test results are put in appendix 5.

4.6 Summary of the Chapter

In this study, I examined the effect of credit rationing on a firm's decision to invest in expansion using cross-sectional data from a survey of 177 SMEs in the automotive components industry of Indonesia. While prior research such as Regis (2018) and Minetti and Zhu (2011) focuses only on the borrowers' perspective, my analysis uses directly measured credit rationing from borrowers' and non-borrowers' responses. Considering the endogeneity issue of credit rationing, I adopted the recursive bivariate probit model from Minetti and Zhu (2011) to estimate a firm's probability of investing in expansion and firm performance. I also incorporated firm characteristics (age and size), pressure from regional competition (with ASEAN and China) and external factors (firm networking with peers) into the model.

For borrowers, regardless of weak and strong rationing, I found that credit rationing significantly reduces a firm's probability of investing in expansion. The adverse effect of strong rationing is more than that of weak rationing. Consequently, while firms with strong rationing are unlikely to meet their needs for both operational and capital expenditure, firms with weak rationing only face difficulty meeting their capital expenditure. My estimate using 2SRI shows that weak and strong rationing negatively affect firms' profit growth by more than 35.9% and 48.6% respectively.

Further investigation suggests that a borrower's probability of weak and strong rationing can be reduced when it is willing to offer a higher ratio of collateral to the proposed loan and to establish a risk-sharing scheme with peers. Increasing the competition among banks will contribute to reducing the probability of both

rationings too. In addition, the probability of strong rationing can also be decreased by achieving higher sales growth.

For non-borrowers, for all types of rationing (quantity, risk, transaction cost and cultural), I found evidence that credit rationing has a significant negative effect on a firm's probability of investing in expansion. The results of the marginal effects are however lower than that of borrowers. My results also show that firms' internal funds generated through sales growth are exploited as one of the main sources of investment in expansion. I also found that non-borrowers' decision to invest in response to the pressure of regional competition is slower than that of borrowers.

Further investigation suggested that non-borrowers will have a lower probability of rationing when they offer a higher ratio of collateral to the proposed loan and establish a risk-sharing scheme with peers. For those who are experiencing cultural rationing, their probability of rationing will be lower in the presence of sharia banks. In addition, having a longer relationship with a bank will also lessen the probability of risk and transaction cost rationing.

CHAPTER 5

INNOVATION IN AN EMERGING ECONOMY: DO NON-PRICE FACTORS PLAY A ROLE?

5.1 Introduction

Many studies suggest that firm performance is enhanced by innovation activities (Baumann & Kritikos, 2016; Coad, Segarra, & Teruel, 2016; Kancs & Siliverstovs, 2016; Rosenbusch et al., 2011). However, small and medium-sized enterprises (SMEs) in emerging economies typically have low capacity to undertake innovation, which could be a major hindrance to achieving a higher level of performance and increasing competitiveness (Harvie, 2010; Sturgeon, 2011; Turner et al., 2010; Van de Vrande et al., 2009). Tambunan (2009b) provides evidence that Indonesian SMEs' low level of innovativeness adversely affects their productivity, which is only about one third of that of large enterprises. A recent report by the OECD (2018b) shows that the productivity of Indonesia's small and medium enterprises was 16% and 31% respectively of that of large enterprises.

The low capacity of SMEs to innovate arises out of both price and non-price factors. Price factors refer to expenses or expenditures incurred for innovation activities that require a substantial amount to be disbursed, for example, research and development (R&D) expenditure, machinery investment, product accreditation and certification, and employees' professional development expenditures. These expenditures directly affect production costs and may hinder SMEs from innovating. Consequently, SMEs resort to or rely on non-price factors to increase their innovation activities and

thereby strengthen their competitive advantage. Non-price factors refer to efforts or influences that have little or negligible effect on production costs, for example motivation to innovate, supply chain linkages or collaboration between the firm and peers, external competitive pressure and active social media engagement. I argue that these non-price factors may improve SMEs' capacity to innovate under constraints or frugal conditions. This could work if SMEs having a frugal mindset that perceives resources constraints as an opportunity rather than a disadvantage, i.e., by empowering existing and potential resources owned by themselves or their peers.

Some scholars argue that non-price factors could potentially drive innovation activities in SMEs. For example, Do, Budhwar, and Patel (2018) and Amabile (1988) examine the qualities of individuals that influence creativity and argue that motivation to innovate is the most important factor in generating creative ideas from every individual in the firm. Zubielqui, Jones, Seet, and Lindsay (2016), Lowik, van Rossum, Kraaijenbrink, and Groen (2012) and Laursen (2011) found that firm networking and collaboration with peers motivate and promote a firm's innovation activities. Additionally, support from a wide sector of the economy, including universities, government agencies and research institutions, is essential. Furthermore, external pressure from competitors can also stimulate a firm's innovation (Chamsuk, Fongsuwan, & Takala, 2017; Gorodnichenko, Svejnar, & Terrell, 2010). In this internet age, open innovation through social media engagement can be a pivotal driver for SMEs to acquire ideas to help them innovate at an affordable price or even for free with reasonable effort (Mount & Martinez, 2014).

Given the condition of Indonesian automotive components SMEs that have been lacking in both price and non-price factors, empowering their non-price factors could motivate them to innovate through various means such as innovation cooperation or collaboration. Such type of innovation sharing is expected to become a new trend under the fourth industrial revolution. In this era, with an emphasis on adoption and network effects, utilising non-price factors like open innovation can motivate automotive components SMEs to increase their innovation activities and hence generate higher innovation output.

I further explore the role of price and non-price factors in moderating (or mediating) the relationship between innovation and firm performance. For this study, I adopted the extended Crepon, Duguet, Mairesse (CDM)[16] model as used by Baumann and Kritikos (2016). This model views innovations as having three phases: innovation effort, innovation output and the relationship between innovation and firm performance. I tested the effect of price and non-price factors in each of these three innovation phases. In addition, unlike previous research on innovation output (such as Griffith et al. (2006); Hall B.H. et al. (2009); Baumann and Kritikos (2016)), where the focus has been on process output and product output, I also considered a third type of innovation output called machinery output. This refers to machinery innovation, in particular in SMEs in emerging economies. SMEs' innovations focus heavily on machinery innovation because many of them are unable to afford the latest technology in the market. Consequently, they have creatively adapted and/or

16 The original CDM model was established by Crepon, Duguet, and Mairessec (1998) to analyse the effect of innovation on firms' productivity.

modified their existing machinery to operate efficiently. The discussion of machinery innovation will be emphasised in the second phase or innovation output phase.

The rest of the chapter proceeds as follows: Section 5.2 provides the theoretical background and hypotheses development. Section 5.3 describes the data and descriptive statistics. Section 5.4 explains the method of analysis. Section 5.5 presents the results, discussion and robustness checks. Section 5.6 concludes.

5.2 Theoretical Background and Hypothesis Development

Innovation refers to the process of adoption of internally or externally generated devices, systems, policies, programs, processes, products or services that are new to the adopting organisation (Rosenbusch et al., 2011). It can be analysed from two perspectives, namely, innovation input and innovation output (Baumann & Kritikos, 2016; Duran, Kammerlander, Essen, & Zellweger, 2016; Rosenbusch et al., 2011; Sarooghi, Libaers, & Burkemper, 2015; Zubielqui et al., 2016).[17]

This study examines the factors affecting firm innovation, both price and non-price factors, from three main perspectives: frugal innovation theory, the extended resources-based view (ERBV) and the theory of competition and strategy.

[17] Innovation input refers to resources dedicated by firms for the purpose of innovation, for example financial resources, skilled employees engaging in R&D, materials and information. Innovation output refers to process and product innovations. The European Commission (2012) defines process innovation as "the implementation of a new or significantly improved production process, distribution method, or supporting activity". Product innovation is defined as "the market introduction of a new or significantly improved good or service with respect to its capabilities, user friendliness, components or sub-systems". Machinery innovation refers to activities to modify and/or repair existing machinery and related equipment.

5.2.1 Frugal Innovation Theory for Emerging Economies

Frugal innovation theory is an influential theory to explain firms' innovation activities in emerging economies. Frugal innovation has been identified using different terminologies such as "inclusive innovation" by George, McGahan, and Prabhu (2012), "low cost innovation" by Agnihotri (2015) and "affordable value innovation" by Ernst et al. (2015). Even though some features of these innovations vary, their natures are similar; all refer to the ability to innovate with fewer or constrained resources (Navi Radjou & Prabhu, 2015).

Frugal innovation is a common phenomenon experienced by most firms especially small firms and those in emerging economies. Unlike radical innovation, which focuses on the invention of pioneering technologies, frugal innovation tends to focus on improvised innovation through utilising or modifying existing technologies, such as innovation in machinery modifications. As a consequence, the core products of frugal innovators are mostly goods and/or services intended to serve low-income consumers (Prahalad, 2012). Examples are a low-cost health product called BAT to help visually impaired people and an affordable energy device called BIJLI to convert kinetic energy from bicycle wheels into electrical energy (Navi Radjou, 2018, February 26). In the case of automotive components, since automotive customers are mostly in the middle- and high-income group, frugal innovation products are intended to serve price-sensitive customers.

Agnihotri (2015) asserts that, in conducting frugal innovation, one of the keys to success is to have a "frugal mindset". This is a different way of thinking that perceives resource constraints as an opportunity rather than a threat to innovate.

Furthermore, Agnihorti (2015) emphasises that, under frugal conditions, while having skills is necessary to conduct frugal innovation, a firm may also change its culture and instil it into all employees. Furthermore, a frugal mindset could creatively discover new opportunities by recombining scarce and less useful existing resources in order to create higher value (Baker & Nelson, 2005; Ernst et al., 2015; Halme, Lindeman, & Linna, 2012).

Given the resource constraints faced by many firms in emerging economies, the proponents of frugal innovation theory suggest that it empowers firms to use their existing and potential resources to innovate. George et al. (2012) and Ernst et al. (2015) suggest frugal firms should establish networks with their counterparts to support each other, either through exchange or sharing of knowledge. Firms with a frugal mindset may also capitalise on threats from competitors as one source of motivation to innovate at a higher level.

The theory of competition and strategy also recognises the importance of non-price factors in innovation activities (Gambardella & McGahan, 2010; George et al., 2012; Gorodnichenko et al., 2010). According to this theory, direct and indirect pressure from competitors can stimulate firm innovation. Direct pressure could arise from price differences and differentiated products. Indirect pressure could arise from various sources. Gambardella and McGahan (2010) found that indirect pressures occur through the development of markets for intellectual property. The availability of this market, in which firms can purchase technology, tends to reduce the competitive advantage of firms who have relied on that technology. Under such

conditions, firms would be motivated to innovate to seek more advantageous technology in order to produce the products efficiently with lower cost and also be motivated to compete in order to sell the products at a more competitive price.

The above-mentioned theories suggest that non-price factors could play a significant role in increasing innovative effort and producing innovation outputs that finally lead to improved firm performance. These non-price factors such as supply chain linkages, R&D networking/collaboration, and external competitive pressure to produce lower-cost products and to sell at a lower price are worth investigating together with price factors for their impact on a firm's innovation activities.

5.2.2 Hypothesis Development

The significant role of price factors in innovation has been evident. Previous studies have found that price factors will have positive effects on innovative effort via high investment in R&D. Kancs and Siliverstovs (2016), Segawa et al. (2014), Ülengin et al. (2014), Jan and Hsiao (2004) and Kancs and Siliverstovs (2016) show that firms who are committed to investing more in R&D will achieve more in productivity gains. In contrast, Sturgeon (2011) found that in China and India during the early phase of the automotive industry's development, many Tier 2 suppliers were unable to compete because of their inability to meet the quality standards required by the original equipment manufacturers (OEMs). The main cause was the suppliers' lack of R&D capacity or effort and therefore inability to adapt quickly to demand for technological improvements from their customers.

Innovation effort could also be influenced by the decision of a firm to invest in expansion (Chudnovsky, López, & Pupato, 2006). Chudnovsky, López and Pupato (2006) further mention that, in the Argentine manufacturing sector, innovation expenditure sharply decreased when firms postponed investment. Allocating more funds for investment in expansion typically increases a firm's size as proxied by the total number of employees. Many studies have found a positive relationship between firm size and the firm's innovation effort (Baumann & Kritikos, 2016; Chudnovsky et al., 2006; Czarnitzki & Hottenrott, 2011).

A firm's decision to allocate funding for innovation activities can be also influenced by the availability of tertiary-qualified employees (Chudnovsky et al., 2006; Bronwyn H. Hall, Lotti, & Mairesse, 2012). Such skilled employees have been shown to increase the probability of innovation success (Bronwyn H. Hall et al., 2012; Segarra-Blasco, 2010) and benefit firms by continuously upgrading efficiency and increasing productivity (Baumann & Kritikos, 2016).

Considering the limitations on SMEs' innovation capacity or effort (given the burden of price factors), some studies recommend that governments should step in and provide support to SMEs to innovate (T. J. Allen, Utterback, Sirbu, Ashford, & Hollomon, 1978; Grabowski, Pamukcu, Szczygielski, & Tandogan, 2013; Mahmood & Rufin, 2005; Moore & Garnsey, 1993). Government support may take the form of direct or indirect supports. Direct support can be delivered through funding or subsidies for innovative activities. Indirect support may involve a set of favourable government regulations, incentives and facilities that create a friendly environment

for firms to be aggressively involved in innovation. These include tax incentives, protection of intellectual property rights, facilitation of processes and products, employee certifications, establishing innovation service centres and others. Gupta and Wang (2016, November 16) show that in China the central and local governments have actively supported the innovation activities of SMEs by providing direct grants for research and investment. In recent years, the central government has launched a number of programs aimed at cultivating scientific talent.[18]

There is no consensus, however, on whether government intervention results in positive outcomes for the industry. Discussion of the role of government in firm innovation can be traced back to Souder and Chakrabarti (1978), who contend that it is not the government's role to substantially stimulate, control and nurture the process of firm innovation. In contrast, Sun and Cao (2018) and Mahmood and Rufin (2005) assert from an institutional perspective that transformation from a centralised innovation policy to market-oriented and democratic governance are necessary to maintain innovation sustainability, or else the process of innovation could be stifled. Meanwhile, according to Kaufman, Wood, and Theyel (2000) and Wong and He (2003), support from the government can provide innovation inputs, but it cannot directly improve firms' innovation outputs.

Even though the mainstream research has found that price factors have a more dominant effect on the success of innovation, non-price factors have also begun to

18 The most prominent among these are the National Science Fund for Distinguished Young Scholars, the Chang Jiang Scholars Program and the Thousand Talents Plan. These programs, respectively, support deserving scientific projects, attract distinguished visiting scholars and lure top Chinese researchers from living abroad.

show a prominent role. However, there are a few research that investigate both price- and non-price factors together. To fill this gap, this study will examine the role of non-price factors and price factors simultaneously and their impact on innovation. Ülengin et al. (2014) analysed the competitiveness of the Turkish automotive industry and found that price factors such as investment in R&D and non-price factors such as supply chain linkages with peers or universities are among the important factors for the future competitiveness of the industry.

Zubielqui et al. (2016) and Lowik et al. (2012) suggest that firm supply chain linkages could motivate SMEs to conduct innovative activities. Further, they mention that knowledge acquired from collaboration with such market-based actors can improve innovation outcomes. In addition to market-based collaboration, firms can also acquire knowledge for innovation from science-based actors such as R&D institutions and universities (Zubielqui et al., 2016). Some researchers report that collaboration with science-based actors has a positive effect on a firm's absorptive capacity (Moilanen, Østbye, & Woll, 2014).

While there is substantial evidence to support the view that collaboration on innovation has positive effects, some researchers have found contrasting evidence. Rosenbusch et al. (2011) confirm that internal innovation processes lead to a positive firm performance, but innovation under external collaborations with supply chain linkages shows no significant effect on performance. Damanpour, Szabat, and Evan (1989) suggest that, based on dissimilar research results on the effect of innovation on firm performance, some forms of innovation could be more beneficial than others.

Rosenbusch et al. (2011) advocate that the effect of innovation on firm performance should be viewed aggregately, considering both positive and negative results, by considering mediating and moderating contextual factors.

The decision to engage in innovation activities can also be influenced by external pressure from competitors (Blundell, Griffith, & Van Reenen, 1999; Calderini & Cantamessa, 1997; Gorodnichenko et al., 2010; Bronwyn H. Hall et al., 2012). By examining firm-level data from 27 emerging economies, Gorodnichenko et al. (2010) show that competition with foreign competitors stimulates innovation activities in both the manufacturing and service sectors. Meanwhile, a study by Bronwyn H. Hall et al. (2012) found that Italian manufacturing firms facing European or other international competitors have much higher R&D intensities (by 20% or 30%). However, competition pressure from local and regional competitors has no effect on R&D expenditure.

Following the above-mentioned theories and evidence, I then hypothesise:

> ***Hypothesis*** *H2**A**:* *Price factors (investment in expansion, tertiary-qualified employees and government support) together with non-price factors (supply chain linkages, motivation to innovate and motivation to compete) positively affect a firm's innovative efforts.*

Using the CDM model, (Bronwyn H. Hall et al., 2012) found evidence of a link between innovation and firm performance in Italian manufacturing SMEs. At the innovation output phase, they found that R&D intensity (spending of R&D per employee) considerably affects both process and product innovations. In addition to

R&D intensity, they also found that information and communications technology (ICT) plays a crucial role in product innovation. In the firm performance phase, their results show that, while both process and product innovations positively affect a firm's productivity, process innovation has a larger impact.

Baumann and Kritikos (2016) investigated the link between R&D, innovation and firm performance in Germany's micro enterprises as well as SMEs. At the innovation output phase, they found that expenditure on R&D produces process and product innovations, and that the probability of producing a product innovation is almost two and a half times more than that of producing a process innovation. Furthermore, they also found that the link between product innovation and firm performance is stronger than the link between process innovation and firm performance.

For this study, I incorporated machinery innovation by separating it from process innovation. The main reason for separating machinery innovation for analysis is that it provided a clearer picture of the contribution of machinery innovation for the Indonesian automotive component SMEs. This is particularly important because SMEs in Indonesia have been facing difficulty in upgrading their machinery to the latest technology due to financial constraints. Hence, I hypothesise:

> ***Hypothesis H2B:*** *Price factors (R&D intensity, investment intensity and ICT investment) together with non-price factors (R&D networking and competition) positively affect a firm's innovation outputs (process, machinery and product).*
>
> ***Hypothesis H2C:*** *Innovation outputs (process, machinery and product) positively affect a firm's performance.*

This study considered how both price and non-price factors affect the relationship between product innovation and SMEs' performance directly and indirectly. The direct effect could occur through the interaction between product innovation and price and non-price factors as moderators affecting firm performance. In addition, price and non-price factors could also moderate the indirect relationship between product innovation and firm performance. This occurs when moderating variables (in this study, I use variables of price and non-price factors), affect the strength of indirect relationship between product innovation and firm performance. The relationship between product innovation and firm performance is said "indirect" because it is mediated by the productivity level variable.

To this end, I selected price and non-price factors that relate to the phase of commercialisation of product innovation, instead of process and machinery innovations. Product innovation was chosen because I will see the direct effect of price and non-price factors on the innovative output/outcome. For price factors I chose certification and government support and for non-price factors, I chose supply chain linkages and social media engagement.

It is evident that innovation not only entails benefits, but also risks. While the potential benefits occur in the long-run, firms tend to incur losses in the short-run (Block & MacMillan, 1993, as cited in Rosenbusch et al. 2011). Furthermore, the outcome of innovation is highly uncertain and the process is risky (Rosenbusch et al., 2011; Wolff & Pett, 2006). Crawford (1987) and Berggren and Nacher (2001) found that the probability of success in innovation is not high. Even when a firm has

successfully produced an output of innovation, that does not mean it can commercialise it quickly. Firms are required to pass and pay for product certification, which is costly and time consuming (Joubert, 1998; Larry, Liwana, & David, 1997; J. Wu & Wu, 2019).

J. Wu and Wu (2019), Martínez-Costa., Micaela, Martínez-L., R., and Choi (2008), Daniel (2011) and Prodromos, Dimitrios, and Nikolaos (2015) contend that, though costly and time consuming, product certification (ISO 9000) motivated by internal motives substantially improves product quality, which in turn increases market share, customer satisfaction and sales revenue. Starke, Rangamohan, Nuno MMD., and Claudio F. (2012) also found that product certification (ISO 9000) is associated with improved firm performance through an increase in sales revenue, decrease in costs and an increase in turnover ratios. Boiral and Marie-Josée (2007) and Brown, Ton van der, and Kate (1998) also point out the positive effect of certification on firm performance. Consequently, such costs would be a significant price factor that could moderate the link between innovation and firm performance. However, Benner and Tushman (2013) and Terziovski and Guerrero (2014) found that implementation of ISO 9000 certification decreases product innovation performance. Mehmet Sıtkı and Emre (2012), who analysed certification in SMEs in Turkey, had mixed findings.

In order to improve firm performance through innovation, several scholars have also proposed the use of a supply chain linkage platform (Cao & Zhang, 2011; Joshi et al., 2013; Porter, 1985; Ülengin et al., 2014). Moreover, Cao and Zhang (2011) found that supply chain collaboration has a positive impact on a firm's financial performance in

the long run as it can increase sales growth and earn higher profits. J.-j. Kim and Hemmert (2016a) also find that, for Korean SMEs, supplier-buyer linkage platforms have provided abundant opportunities for internationalisation of the SMEs.

A new and interesting phenomenon which could contribute to innovation performance is social media engagement. Over the last decade, the rapid growth of the internet has enabled firms, including SMEs, to easily acquire applicative knowledge (using search engines such as Google and Yahoo and social media such as YouTube or Facebook). These resources provide abundant applicative knowledge that can be used by firms to advance their knowledge in order to innovate. Mount and Martinez (2014) view social media as a pivotal instrument for open innovation for firms.[19] They examine how social media can be used for open innovation at different stages of the innovation process that firms can pursue to ensure benefits. Willingness to engage in social media and join supply chain linkages indicates that firms are open to external sources. As Rubera, Chandrasekaran, and Ordanini (2016) and Laursen and Salter (2006) suggest, firms with high openness to external resources tend to have better innovative performance. Hence, I hypothesise:

> ***Hypothesis H2D:*** *Price factors (certification and government support) and non-price factors (supply chain linkages and social media engagement) moderate the* ***direct relationship*** *between product innovation and firm performance.*

19 Open innovation is defined as systematically encouraging and exploring a wide range of internal and external sources for innovation opportunities, consciously integrating that exploration with firm capabilities and resources, and broadly exploiting those opportunities through multiple channels (West and Gallagher (2006).

Hypothesis H2E: *Price factors (certification and government support) and non-price factors (supply chain linkages and social media engagement) moderate the* ***indirect relationship*** *between product innovation and firm performance.*

5.3 Descriptive Statistics

Table 5.1 describes the variables used in this study and Table 5.2 presents the descriptive statistics of the overall sample. Table 5.2 shows that more than half of the sample firms have conducted innovation in the last 5 years with nearly half (49%) having conducted process innovation, and 64% and 65% of the firms having undertaken product and machinery innovations, respectively. Frugal conditions are considered the main reason for the high rate of automotive component SMEs carrying out machinery innovation. While most machinery innovation took the form of modifying and/or upgrading old machinery (82%), some SMEs also developed totally new machinery for the production process (16%). Only 2% of firms imported machinery from abroad.

Only 12% of the sample firms had certified their product innovation through the Indonesian National Standard (SNI). Despite being active in conducting innovation, only 14% of the sample firms have more than 10% tertiary-qualified employees. The statistics also show that, for the last five years, approximately 25% of the firms had invested in expansion and 38% of the firms received government support.

Table 5.1 Variables Description of Innovation and Firm Performance

Variables	Measurements
Firm performance	Employee productivity (sales per employee in ln, last year)
R&D intensity	Spending on R&D per employee (in ln, last year)
Process innovation	Binary value = 1 if firm conducted process innovation within last five years, and value = 0 otherwise
Machinery innovation	Binary value = 1 if firm conducted machinery innovation within last five years, and value = 0 otherwise
Product innovation	Binary value = 1 if firm conducted product innovation within last five years, and value = 0 otherwise
Number of employees	Number of full-time employees (in ln, last year)
Tertiary-qualified employees	Dummy variable that indicates the percentage of university-graduate employees at the firm. Firm with > 10% university-graduate employees = 1, and value = 0 otherwise
Investment intensity	Spending on machinery (new purchase and repair) per employee (in ln, last year)
ICT investment intensity	Spending on ICT (internet, telephone, computer software & hardware) per employee (in ln, last year)
Investment in expansion	Binary value = 1 if firm made new investment within last five years, and value = 0 otherwise
Product certification	Binary value = 1 if firm registered SNI certification for their product innovation output, and value = 0 otherwise
Government support	Binary value = 1 if firm receives government support for innovation, and value = 0 otherwise
Supply chain linkages	Binary value = 1 if firm takes part as original equipment manufacturers (OEM) supplier either in Tier 2 or Tier 3, and value = 0 otherwise
Social media engagement	Binary value = 1 if firm engages in social media to gather ideas for innovation, and value = 0 otherwise
Motivation to innovate	Binary value = 1 if firm is under cost competition pressure, producing their products at higher cost than their competitors, and value = 0 otherwise
Motivation to compete	Binary value = 1 if firm is under price competition, selling their products at a higher price than their competitors, and value = 0 otherwise
Competition with China	Binary value = 1 if firm states that their products are competing with imported products from China, and value = 0 otherwise
Competition with Thailand	Binary value = 1 if firm states that their products are competing with imported products from Thailand, and value = 0 otherwise
R&D networking (with peers)	Binary value = 1 if firm has R&D cooperation with peers to support innovation, and value = 0 otherwise
R&D networking (with universities)	Binary value = 1 if firm has R&D cooperation with universities to support innovation, and value = 0 otherwise
R&D networking (with government research institutes)	Binary value = 1 if firm has R&D cooperation with government research institutes to support innovation, and value = 0 otherwise
Number of product innovations	Number of product innovation outputs produced by the firm within last five years
Firm age (< 10 years)	Dummy variable that indicates the firm's age group. Firm with < 10 years = 1, and value = 0 otherwise

Table 5.2 Descriptive statistics of Innovation and Firm Performance

Variables	Mean	St. deviation	Minimum	Maximum
Employee productivity (in ln)	18.00	0.71	15.92	20.62
R&D intensity (in ln)	14.29	1.12	12.2	18.6
Process innovation	0.49	0.50	0.00	1.00
Machinery innovation	0.65	0.48	0.00	1.00
Product innovation	0.64	0.48	0.00	1.00
Number of employees (in ln)	2.26	0.945	0.00	4.65
Tertiary-qualified employees	0.14	0.34	0.00	1.00
Investment intensity (in ln)	14.33	0.81	12.82	16.34
ICT investment intensity (in ln)	14.19	0.99	12.20	17.90
Investment in expansion	0.25	0.43	0.00	1.00
Product certification	0.12	0.33	0.00	1.00
Government support	0.38	0.49	0.00	1.00
Supply chain linkages	0.28	0.45	0.00	1.00
Social media engagement	0.29	0.46	0.00	1.00
Motivation to innovate	0.23	0.42	0.00	1.00
Motivation to compete	0.15	0.36	0.00	1.00
Competition with China	0.82	0.39	0.00	1.00
Competition with Thailand	0.19	0.39	0.00	1.00
R&D networking (with peers)	0.40	0.48	0.00	1.00
R&D networking (with universities)	0.10	0.30	0.00	1.00
R&D networking (with government research institutes)	0.07	0.26	0.00	1.00
Number of product innovations	2.10	2.17	0.00	12
Firm age (< 10 years)	0.42	0.50	0.00	1.00
Observation (177 sample)				

Source: Primary data, 2017.

The descriptive statistics also show that approximately 23% and 15% of the firms faced tight competition in cost and price, respectively. The two countries perceived as the main competitors were China and Thailand. With increasing competition in the market, many firms capitalised on non-price factors in order to be more competitive. It is noteworthy that 28% of firms are part of OEMs in either Tier 2 or Tier 3. About 24% of firms engaged in social media to acquire knowledge and for digital marketing. Furthermore, to strengthen their innovation capacity, about 40% of

the firms engaged in R&D networking with peers, 10% with universities, but only 7% with government research institutes.

5.4 Method of Analysis

To examine the effect of price and non-price factors in innovation on firm performance, this study used the extended CDM (Crepon, Duguet, Mairesse) model (Baumann & Kritikos, 2016). The strength of this model is that it allows a deeper look into the black box of the innovation process. Moreover, it sheds light on the relationship between innovation and firm performance, and also on the interaction process between the two (B.H. Hall, Lotti, & Mairesse, 2009). The model has been popular among scholars, for example B.H. Hall et al. (2009) and Conte and Vivarelli (2014) for Italy, and Griffith et al. (2006) for Germany, Spain, the UK, and France. Therefore, I expect that the extended model would contribute to examining the role of price and non-price factors in affecting each phase of innovation in the automotive components SMEs.

Following Baumann and Kritikos (2016), I modelled the effect of innovation on firm performance in three sequential stages, namely, innovation effort, innovation output, and the impact of innovation on firm performance. I then examined the role of price and non-price factors in each of these three phases of innovation. For the innovation effort phase, I examined the link between price and non-price factors and R&D intensity (defined as spending on R&D per employee) as a proxy for innovation effort. For the innovation output phase, I examined the role of price and non-price factors on the probability of SMEs successfully producing process, machinery and

product innovation outputs. Based on these probabilities, I estimated the effect of the three innovation stages on firm performance. In addition, I explored the moderating effects of price and non-price factors on the direct and indirect relationship between innovation and firm performance.

I first examined the innovation effort phase. I modelled a firm's innovation effort as follows:

$$fie_i^* = \beta x_i + \varepsilon_i \qquad (2A)$$

where, fie_i^* is a firm's innovation effort, x_i is a vector determinant of innovation effort and ε_i is the error term. The proxy for innovation effort is R&D intensity (measured by the logarithm of R&D spending per employee). Other vector determinants include price factors (i.e., number of employees, investment in expansion, tertiary-qualified employees and government support); and non-price factors (supply chain linkages, motivation to innovate and motivation to compete). I added firm age as a control variable.[20] Equation (2A) is intended to answer hypothesis H2A.

20 Hall B.H. et al. (2009) and Baumann and Kritikos (2016) argue that measuring R&D using a questionnaire could risk selection bias of endogeneity (from the error terms). To check this, Heckman's sample selection test was applied before estimating innovation effort. The Heckman model is shown as follows:

$$sie_i = \begin{cases} 1, if\ sie_i^* = \partial X_i + \varepsilon_i & > 0 \\ 0, if\ sie_i^* = \partial X_i + \varepsilon_i & \leq 0 \end{cases}$$

where sie_i equals one (1) if the firm reports innovation activities and zero (0) if otherwise. For those who report innovation activities, sie_i refers to the selection into innovation effort and it is assumed to be a function of a set of vector determinants (X_i). In Heckman's selection model, it is critical that correlation errors between the variables are tested. If the results indicate a significant lambda coefficient at a 5% level of significance, it implies that correction of selection is necessary. However, if the lambda coefficient is not significant, no correction for selection bias is necessary. I can then proceed with the estimation of innovation effort.

In the next (i.e., innovation output) phase, three innovation outputs were examined: process, machinery and product innovations. Based on the predicted R&D intensity from equation (2A), I estimated the probability of a firm undertaking each of these three innovation outputs with the multivariate probit model. Hence, the equation for each of the innovation outputs is specified as follows:

$$\begin{cases} prociv_i = \gamma_i fie_i^* + \delta_1 vi_i + \varepsilon_{1i} \\ machiv_i = \gamma_i fie_i^* + \delta_2 vi_i + \varepsilon_{2i} \\ prodiv_i = \gamma_i fie_i^* + \delta_3 vi_i + \varepsilon_{3i} \end{cases} \quad (2B)$$

where $prociv_i, machiv_i,$ and $prodiv_i$ denote the probability of innovation outputs for process, machinery and product respectively; fie_i^* represents predicted R&D $intensity$ from equation (2A); and vi_i is a vector of innovation determinants consisting of price factors, such as investment intensity (measured by the natural logarithm of spending on machinery per employee), and ICT investment intensity (measured by the natural logarithm of ICT spending per employee) and non-price factors (such as competition with China,[21] competition with Thailand, and R&D networking with peers, universities and government research institutes). ε_{1i}, ε_{2i} and ε_{3i} are error terms that are assumed to be independent. Equation (2B) is intended to answer hypothesis H2B.

21 The variable of competition in the second phase captures the effect of competition on innovation output based on the country of origin. China and Thailand were selected because Indonesia has a high share of automotive components imported from these two countries. They also capture the effect of the implementation of the ASEAN Economic Community (AEC) on Indonesian SMEs' innovation activities.

To consider the possibility that the process, machinery and product innovation equations are influenced by correlated unobservable variables, I estimated equation (2B) as a multivariate probit by using conditional mixed process (CMP) analysis. Roodman (2011) shows that CMP provides a more efficient estimation because it can simultaneously take into account the full covariance structure of the multivariate probit process. However, the coefficients of the CMP models in equation (2B) cannot be directly interpreted.[22] The average marginal effects of these outputs are used instead. The marginal effects measure the change in the conditional probability of the dependent variables due to the change in the value of one of the independent variables, assuming all other independent variables are constant.

Using the predicted probability of these three innovations from equation (2B), I examined their effect on a firm's productivity or firm performance in the third phase of the CDM model as follows:

$$fp_i = \vartheta_1 prociv_i^* + \vartheta_2 machiv_i^* + \vartheta_3 prodiv_i^* + \vartheta_5 C_i + \varepsilon_i \qquad (2C)$$

where fp_i is firm performance (measured as sales per employee); $prociv_i^*$, $machiv_i^*$, and $prodiv_i^*$ are the predicted probabilities of process, machinery and product innovations, respectively, from equation (2B); C_i is a vector of variables explaining firm performance such as tertiary-qualified employees and firm age (< 10 years); and ε_i is an error term.

22 The coefficients of the independent variable in the probit model estimated using CMP cannot be directly interpreted because there is no linear relationship between the coefficients and the probability that the dependent variable is 1. Therefore, the change in the probability is calculated by a certain function of a linear combination of the independent variables.

At this third phase, it is important to distinguish between the *direct and indirect effects* of innovations on firm performance. The main idea is illustrated in Figure 5.1 below. Figure 5.1 shows that firm performance is directly affected by innovation outputs (process, machinery and product). Both price and non-price factors can moderate the direct impact of innovation outputs on firm performance. Meanwhile, how innovation outputs indirectly affect firm performance could depend on the innovation productivity level. The more a firm produces innovation outputs, the higher their effect on firm performance. Both price and non-price factors could also moderate the ability of a firm to produce innovation outputs.

I included the number of product innovation outputs as a mediator variable and incorporated two price factors (product certification and government support) and two non-price factors (supply chain linkages and social media engagement) as moderator variables.[23] This estimation produced *direct and indirect effect* results.

23 Firms in general are concerned with improving their productivity (via getting higher sales). One of the ways of achieving this is through introducing new innovative products. If more innovative products are offered to consumers, They are likely to have an impact on sales growth.

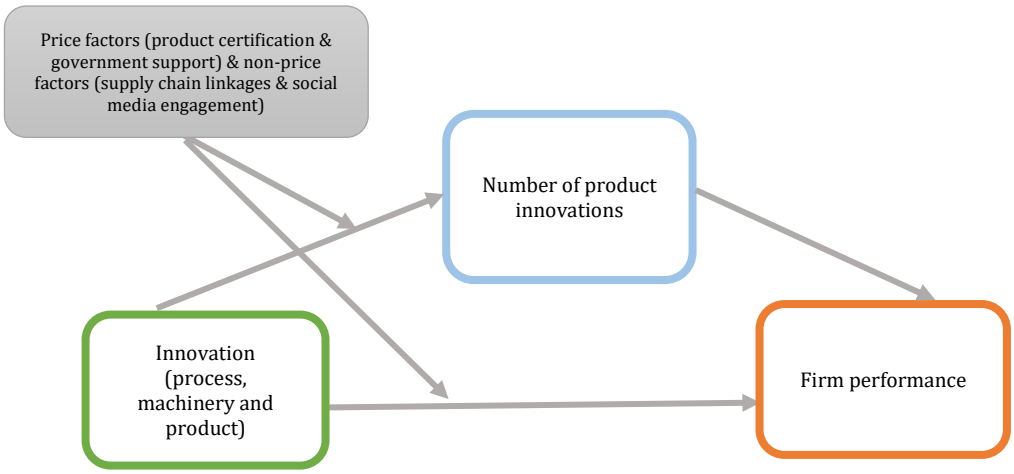


Figure 5.1 Analysis Framework

To analyse the indirect relationship, I tested the moderated mediation process using the PROCESS macro model 8 developed by Hayes (2013). The variable firm performance (measured as sales per employee) is the dependent variable and the independent variables are the predicted probabilities of process, machinery and product innovations produced by equation (2B). When examining this indirect relationship, I only looked at the impact of product innovation outputs on firm performance (instead of process and machinery innovation). This variable was chosen because it reflects the interaction between the customer and the firm. The moderated mediation model is specified with the following two equations:

$$m_i = \alpha_1 prodiv_i^* + \alpha_2 w_i + \alpha_3 prodiv_i^* w_i + \varepsilon_i \quad (2D)$$

$$fp_i = \vartheta_1 prodiv_i^* + \vartheta_2 m_i + \vartheta_3 w_i + \vartheta_4 prodiv_i^* w_i + \vartheta_5 prociv_i^* + \vartheta_6 machiv_i^* + \vartheta_7 tqe_i + \varepsilon_i \quad (2E)$$

where, m_i is a mediator represented by the number of product innovation outputs; $prodiv_i^*$ represents the predicted probabilities of product innovation outputs from equation (2B); w_i refers to price and non-price moderators; fp_i represents firm performance; $prociv_i^*$ and $machiv_i^*$ refer to the predicted probabilities of process and

machinery innovation outputs respectively from equation (2C); tqe is tertiary-qualified employees; and ε_i is an error term.

The direct effects of product, process and machinery innovations on firm performance are captured by the coefficients ϑ_1, ϑ_5 *and* ϑ_6 in equation 2E. These coefficients are intended to answer hypothesis H2C. The interaction between the direct effect of product innovation outputs and the moderator on firm performance is indicated by coefficient ϑ_4, which I used to answer hypothesis H2D. The indirect effect of product innovation on firm performance through a mediator is estimated as coefficient $\alpha_1 \vartheta_2$ in equations 2D and 2E. Price and non-price factors moderate the indirect relationship between product innovation and firm performance through a mediator estimated as $(\alpha_1 + \alpha_3)\vartheta_2$ in equations 2D and 2E. This is used to answer hypothesis H2E.

5.5 Results, Discussion and Robustness Checks

5.5.1 Innovation Effort Phase

The Heckman's sample selection test (Appendix 5.1) shows that the lambda coefficient is not significant. This indicates that the error terms of the two equations are uncorrelated. Therefore, I followed Baumann and Kritikos (2016) and Hall B.H. et al. (2009) to proceed to estimate the innovation effort model without correcting for selection bias.[24] The results for the innovation effort phase are presented in Table 5.3.

24 The results can be provided upon request.

Table 5.3 Innovative Effort Model

Variables Dependent variable: R&D intensity	Coefficient (robust std. error)	
Price factors		
Number of employees	0.244	**
	(0.121)	
Investment in expansion	0.321	*
	(0.194)	
Tertiary-qualified employees	0.629	**
	(0.261)	
Government support	-0.153	
	(0.142)	
Non-price factors		
Supply chain linkage	0.651	***
	(0.234)	
Motivation to innovate	0.350	**
	(0.175)	
Motivation to compete	0.053	
	(0.211)	
Firm age (< 10 years)	-0.034	
	(0.141)	
Observation	177	
R^2	0.360	
Adjusted R^2	0.330	

* Significance at 10%, ** Significance at 5%, *** Significance at 1%

The results for this phase are intended to test hypothesis H2A (both price and non-price factors positively affect a firm's innovation effort). For price factors, the number of employees (which represents firm size), the investment in expansion and tertiary-qualified employees significantly contribute to the increase in firms' R&D intensity. As firm size becomes larger, firms' spending on R&D tends to increase. This finding is in line with Chudnovsky et al. (2006), Czarnitzki and Hottenrott (2011) and Baumann and Kritikos (2016), who found a positive relationship between firm size and a firm's innovation effort.[25] The estimated coefficient of 0.244 implies that a 1% growth of employees would lead to around 0.244% extra budget allocation on R&D

25 In comparing small and larger firms, Baumann and Kritikos (2016) found that both smaller and larger SMEs have a positive coefficient affecting R&D intensity, for which smaller SMEs have a higher value.

spending. My interviews with the SMEs revealed that, as their businesses grow due to increasing profitability, their funding allocation to produce better products through a series of innovations in process, machineries and products is also increasing. In addition, as they grow larger, their access to external finance is also expanding and this has provided an impetus to increase expenditure on R&D.

The results also show that, as investment in expansion increases, it leads to higher spending on R&D. For government support, no significant relationship emerged for this phase. This finding is consistent to that of Baumann and Kritikos (2016) and Griffith et al. (2006) for the United Kingdom. However, Griffith et al. (2006) found that national funding has had some positive impact in Germany and Spain.

The estimated coefficient for tertiary-qualified employees of 0.629 implies that, when allocating their budget for R&D, firms employing more highly skilled employees spend about 61.5% more than their peers with less than 10% tertiary-qualified employees.[26] This indicates that the availability of highly qualified employees motivates automotive component SMEs to innovate. This finding is consistent with those of Chong and Micco (2003), Chudnovsky et al. (2006) and Bronwyn H. Hall et al. (2012), who found that labour skills positively affect innovation activities. Furthermore, the interview results also confirmed this finding. Many respondents conveyed that having tertiary-qualified employees in their SME is like a "blessing" for the company. In recent years, university graduates have shown less interest in working in SMEs. This is because they are attracted to large multinational firms

26 The interpretation of the dummy coefficient in this semi-logarithmic equation follows Kennedy (1981). The percentage change of the dummy coefficient is calculated as $\exp\left(\widehat{\beta} - \frac{1}{2}\widehat{V}\left(\widehat{\beta}\right)\right) - 1$, where $\widehat{\beta}$ and $\widehat{V}\left(\widehat{\beta}\right)$ are the estimated dummy coefficient and its variance respectively.

which offer higher salary packages and bring more benefits and prestige. Moy and Lee (2002) and Walmsley, Thomas, and Jameson (2012) also found a similar phenomenon where graduate employees prefer employment at larger companies.

For non-price factors, supply chain linkages and motivation to innovate appear to be the two factors that significantly affect firms' R&D spending. Supply chain linkages increase R&D spending. It is estimated that firms with supply chain linkages spend about 63.7% more on R&D than their peers. A plausible explanation is, since most SMEs are lacking in resources, in many cases their supply chain partners will provide substantial R&D support in the form of research funding, machinery and technical assistance. Firm partners in a higher tier are willing to disburse R&D support to lower-tiered SMEs because they have to ensure the quality of the SMEs' products meets their expectations. The interview results also reveal that many SMEs are eager to join supply chain linkages as part of their strategy to improve product quality and also expand market coverage. In the context of Indonesia's automotive industry, SMEs producing automotive components are mainly suppliers in Tier 3 that supply simple automotive parts (such as metal parts, wire parts, plastic parts, etc.) to the firms in Tier 2.

Firms facing cost competition have a higher motivation to innovate and hence allocate more funding for R&D activities, around 33.9% higher than their peers. My interviews with some respondents supported the finding that many automotive component SMEs are aware that their cost efficiency is lower than their competitors (particularly those from China). They also revealed that their production costs for

their main raw materials such as steel are 26% higher than competitors from China. In order to compensate for this high cost and to improve cost efficiency, firms have no alternative but to innovate and therefore spend more on R&D.

My finding that some price factors (investment in expansion and tertiary-qualified employees) together with non-price factors (supply chain linkages and motivation to innovate) positively affect a firm's innovation effort confirms hypothesis H2A.

5.5.2 Innovation Output Phase

The results of the CMP estimation for the innovation output phase in equation (2B) are presented in Table 5.4. While focusing on the multivariate probit estimation for innovation output, the interpretation focuses on the results of the average marginal effects. Statistically the multivariate probit model for the innovation outputs phase fits the data well, as shown by a Wald test ($X^2 = 90.32$, $p < 0.000$).

Table 5.4 Innovation Outputs

	Process innovation		Machinery innovation		Product innovation	
	Coefficient (robust std. error)	Average marginal effects (robust std. error)	Coefficient (robust std. error)	Average marginal effects (robust std. error)	Coefficient (robust std. error)	Average marginal effects (robust std. error)
Price factors						
Predicted R&D intensity	0.668***	0.195***	0.709**	0.198***	-0.305	-0.103
	(0.219)	(0.059)	(0.292)	(0.073)	(0.200)	(0.066)
Investment intensity	0.356**	0.104**	0.368*	0.103**	-0.075	-0.025
	(0.183)	(0.051)	(0.201)	(0.052)	(0.178)	(0.060)
ICT investment intensity	-0.196	-0.057	0.090	0.025	0.344**	0.116**
	(0.138)	(0.040)	(0.159)	(0.044)	(0.141)	(0.045)
Non-price factors						
Competition with China	0.569*	0.166*	0.219	0.061	-0.181	-0.061
	(0.320)	(0.094)	(0.277)	(0.077)	(0.292)	(0.098)
Competition with Thailand	-0.323	-0.094	-0.821**	-0.229***	0.497	0.168*
	(0.282)	(0.082)	(0.329)	(0.086)	(0.311)	(0.103)
R&D networking (with peers)	0.978***	0.286***	0.335	0.093	0.418**	0.141**
	(0.243)	(0.062)	(0.253)	(0.072)	(0.204)	(0.066)
R&D networking (with universities)	-0.395	-0.115	0.164	0.046	0.230	0.078
	(0.330)	(0.095)	(0.329)	(0.093)	(0.391)	(0.132)
R&D networking (with gov't research institutes)	-0.196	-0.057	0.073	0.020	0.250	0.084
	(0.379)	(0.111)	(0.575)	(0.160)	(0.466)	(0.157)
Firm age (<10 years)	0.219	0.064	0.274	0.077	0.009	0.003
	(0.235)	(0.068)	(0.265)	(0.071)	(0.215)	(0.073)
Wald test (X^2)	90.32					
p-value for Wald test	0.000					
Observations	177					

* Significant at 10%, ** Significant at 5%, *** Significant at 1%

The set of standard errors given above are robust standard errors, which means they are free from heteroskedasticity.

Table 5.4 shows that four variables (price factors: predicted R&D intensity and investment intensity; non-price factors: competition with China and R&D networking with peers) affect process innovation output significantly, with predicted R&D intensity making the most significant contribution. Increasing R&D intensity by 1% raises the probability of success in producing process innovation outputs by 0.195%. Firms will also have an advantage in process innovation outputs where there is higher investment intensity (more expenditure on machinery). This finding is

consistent with the results of Baumann and Kritikos (2016) for Germany, (Hall B.H. et al., 2009) for Italy and (Griffith et al., 2006) for France, Germany, Spain, the UK and Italy.

Pressure from Chinese competitors also enhances the likelihood of success of producing process innovation outputs. The responses to interviews indicated that one of SMEs' goals in innovation is to create an efficient production process. Without efficiency improvement, Indonesian automotive component SMEs will be unable to compete with Chinese SMEs, which can sell similar automotive components at a lower price.

Support from peers in R&D is also positively associated with the success of SMEs' process innovation. SMEs engaging in supply chain linkages in which their partners are OEMs are trained to apply the 5R principles: *Ringkas, Rapi, Resik, Rawat* and *Rajin*. These words are adopted from the Japanese management approach called 5S: *seiri* (organisation), *seiton* (neatness), *seiso* (cleanliness), *seiketsu* (standardisation) and *shitsuke* (discipline) (Gapp, Fisher, & Kobayashi, 2008). These principles have been widely adopted among automotive component SMEs, and many SMEs without OEM linkages are also practising the principles in their production process due to their significant benefits.

For machinery innovation, I found that the effect of predicted R&D intensity and investment intensity on the probability of success is slightly stronger than for other innovations. Increasing R&D intensity and investment intensity by 1% each would increase the probability of success in producing machinery innovation output by

about 0.198% and 0.103% respectively. These results show that R&D spending and investment expenditure play a crucial role in increasing the likelihood of SMEs producing machinery that fits their own needs. This result captures the effect of predicted R&D intensity on machinery innovation outputs. In previous research employing CDM this effect was unknown or was embedded in the results for process and product innovation outputs.

In the case of product innovation outputs, ICT investment intensity positively affects the probability of success in generating product innovation. This finding supports the previous results of Hall B.H. et al. (2009) for Italian manufacturing. My results show that increasing ICT investment by 1% would push up the probability of success in product innovation by 0.116%. Investment in ICT can be associated with wider access to the internet. As Chesbrough, Vanhaverbeke, and West (2006) mention, internet technology can be a major source of open innovation for firms that seek knowledge. Again, the responses to interviews confirmed that many of the SMEs' product modifications have been inspired by watching YouTube or engaging in social media channels such as Facebook. This phenomenon indicates that many SMEs producing automotive components in the sample are catching up with the use of digital technology.

Pressure from Thai competitors and support from peers in R&D also have a statistically significant positive effect on the probability of success in producing product innovation outputs. I, however, found the variable of pressure from Thai competitors negatively affects machinery innovation. The mixed results of pressure

from Thai competitors on machinery and product innovation could possibly occur because of different orientation of SMEs in managing the innovation activities. A possible explanation of this effect could be the limited financial resources faced by many Indonesian SMEs.

Under such circumstance, the threat of Thai automotive products has pushed Indonesian automotive component SMEs to focus on innovating products rather than process or machinery innovations. This is because Thai automotive parts exported to Indonesia are mainly parts produced by OEMs. Considering this condition, SMEs are motivated to find product innovation outputs that are comparable in design to the OEMs' products. Indonesian SMEs are aware that catching up with machinery equipments innovation to produce a comparable efficiency and quality with products from Thailand would be more difficult. Therefore, Indonesian SMEs tend to internalise the effect of pressure from Thai competitors on product innovation rather than machinery innovation. My findings on the significant effect of both price and non-price factors on the three innovation outputs (process, machinery and product) confirm hypothesis H2B.

It is also notable that price factors (predicted R&D expenditure, investment intensity and ICT investment intensity) seem to have a stronger effect on the probability of success of firms' innovations than non-price factors. Non-price factors, such as networking with universities and research institutes, have no significant effect on producing innovation outputs. These results are consistent with the findings of Zubielqui et al. (2016). Many respondents in this study also confirmed that

universities and research institutes are slow in responding to their requests for assistance with innovation.

5.5.3 Joint Probability of Success

Based on the results of the CMP estimation for innovation outputs in Table 5.4, I estimated the joint probability of success of process, machinery and product innovation outputs. The results are presented in the graphs below:

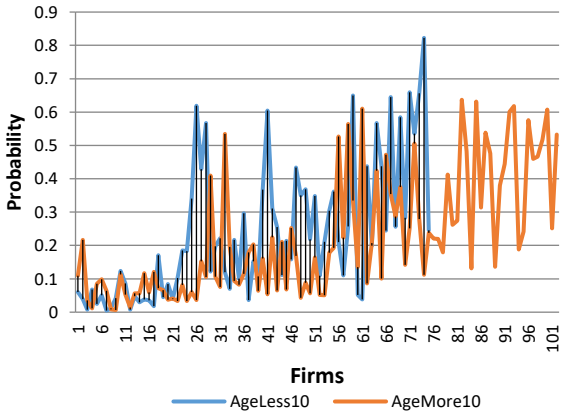


Figure 5.3 Joint Probability of Success for Process, Machinery and Product Innovation Outputs Based on Firm Age

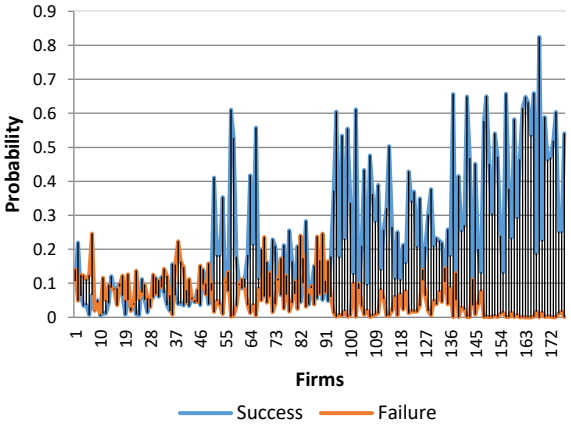


Figure 5.2 Joint Probability of Success for Process, Machinery and Product Innovation Outputs (Total Firms)

As shown in Figure 5.2, the average joint probability of firm to success in producing process, machinery and product innovation outputs at the same time is about 23%. On the other hand, the average joint probability of failure is only 5.76%. I found that firms aged less than 10 years have a slightly higher joint probability of success with 23.56% than mature firms with 22.66% (see Figure 5.3). Even though I found no significant effect of age on the three innovation outputs as reported in Table 5.4, the joint probability results indicate that younger firms tend to be more innovative than their older peers.

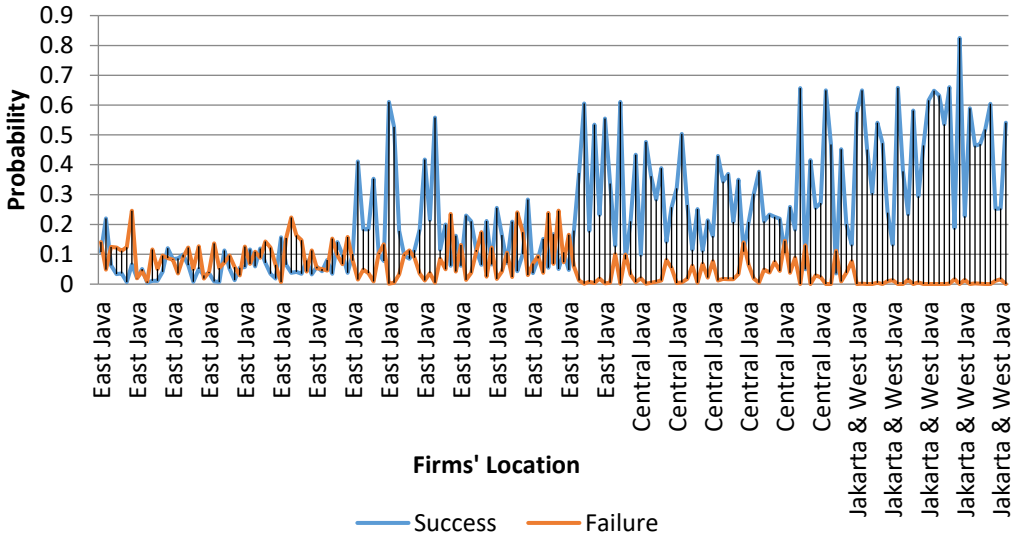


Figure 5.4 Joint Probability of Success for Process, Machinery and Product Innovation Outputs Based on Location (Total Firms)

Estimating the joint probability of success based on the firm's location reveals that firms located in Jakarta and West Java have the highest probability with 46.68% (see Figure 5.4). On the other hand, the joint probability of success of firms in Central Java and East Java is 27.96% and 13.64% respectively. By scrutinising the data, some possible factors affecting the high joint probability of success of firms producing three innovation outputs in Jakarta and West Java are related to the higher proportion of tertiary-qualified employees, supply chain linkages and R&D support from their peers.

5.5.4 Productivity Function Phase

Table 5.5 presents the direct effect results of innovation outputs (namely process, machinery and product, *raw a, d and e*) on firm performance. In examining the indirect effect results, only product innovation is explored. The moderating effect of

price factors (product certification and government support) and non-price factors (supply chain linkages and social media engagement) are also shown.

The estimation of the direct effect results in equation (2E) shows that, among the innovation outputs, the coefficients of product innovation (ϑ_1) and machinery innovation (ϑ_6) positively affect firm performance directly (row *a* and row *e*). The direct effect results of process innovation (ϑ_5) are not evident (row *d*). This might be because the effect of process innovation on firm performance is embedded in the machinery and product innovations instead. These results are consistent to that of Baumann and Kritikos (2016) and Griffith et al. (2006), especially in the case of Germany, Spain and the United Kingdom.[27] Therefore, except for process innovation outputs, the findings support hypothesis H2C.

27 Griffith et al. (2006) found that process innovation is only significant for the case of France.

Table 5.5 The Effect of Innovation on Firm Performance

Row	Variables	Price factors				Non-price factors			
		Product certification		Government support		Supply chain linkages		Social media engagement	
		Direct effect (1)	Indirect effect (2)	Direct effect (3)	Indirect effect (4)	Direct effect (5)	Indirect effect (6)	Direct effect (7)	Indirect effect (8)
	Panel A								
	Dependent variable: number of product innovations								
	Product innovation (PI)	1.947**		2.421*		1.290		0.608	
		(0.977)		(1.352)		(1.007)		(1.000)	
	Moderator	2.184		0.638		-0.577		-1.448	
		(1.796)		(1.282)		(1.169)		(1.490)	
	Interaction between product innovation & moderator	-1.433		-0.941		3.704**		3.917*	
		(2.585)		(1.904)		(1.798)		(2.175)	
	Panel B for testing hypothesis H2C								
	Dependent variable: firm performance (FP) (sales per employee, in ln)								
a	Product innovation (PI)	0.940***		0.766**		1.329***		1.282***	
		(0.272)		(0.344)		(0.310)		(0.299)	
b	Moderator	-1.126**		-0.886**		0.553*		0.216	
		(0.464)		(0.329)		(0.329)		(0.401)	
c	Interaction between product innovation & moderator	1.777***		1.148**		-0.597		-0.365	
		(0.664)		(0.489)		(0.515)		(0.591)	
d	Process innovation	0.004		0.025		-0.060		0.023	
		(0.230)		(0.229)		(0.238)		(0.235)	
e	Machinery innovation	1.223***		1.261***		1.093***		1.213***	
		(0.276)		(0.276)		(0.290)		(0.284)	
	Tertiary-qualified employees	0.305**		0.348***		0.277**		0.298**	
		(0.119)		(0.120)		(0.121)		(0.123)	
	Age < 10 years	-0.079		-0.069		-0.041		-0.063	
		(0.076)		(0.076)		(0.077)		(0.078)	
	Panel C for testing hypothesis H2D and H2E								
f	**Mediator (M) (number of product innovations)**		0.112***		0.109***		0.113***		0.117***
			(0.022)		(0.022)		(0.023)		(0.023)
g	Conditional direct effect of PI at moderator with binary value of 0	0.9400***		0.766**		1.329***		1.282***	
		(0.272)		(0.344)		(0.310)		(0.299)	
h	Conditional direct effect of PI at moderator with binary value of 1	2.717***		1.914***		0.732*		0.917*	
		(0.634)		(0.375)		(0.436)		(0.529)	
i	Conditional indirect effect of PI on FP through M at moderator with binary value of 0		0.218**		0.264**		0.146**		0.071
			(0.113)		(0.132)		(0.075)		(0.086)
j	Conditional indirect effect of PI on FP through M at moderator with binary value of 1		0.058		0.161		0.564**		0.528**
			(0.323)		(0.135)		(0.244)		(0.294)
k	Index of moderated mediation		-0.161		-0.102		0.418**		0.457*
			(0.339)		(0.170)		(0.245)		(0.304)
	Adjusted R2 Panel B	0.534		0.536		0.525		0.514	
	p value of F-test Panel B	0.000		0.000		0.000		0.000	
	Observation	177							
	Bootstrap reps	1000							

* Significant at 10%, ** Significant at 5%, *** Significant at 1%

It is worth noting that machinery innovation has a high impact on firm performance. This captures the reality for SMEs in developing countries that machinery produced under frugal conditions, where firms cannot afford cutting-edge technology, can also become a means to survive and even improve firm performance. In the interviews, I was informed that machinery innovations produced by many SMEs have higher capabilities than some machinery available in the market. Moreover, since these machines are produced for their own use, they would be difficult for competitors to imitate. This indicates that Indonesian automotive component SMEs have to some extent succeeded in capitalising on price and non-price factors to drive performance. This is consistent with the RBV, which suggests that, when a resource is valuable and difficult to imitate, it will become a source of a firm's competitive advantage.

Further analysis in equation (2E) on the interaction between the moderator and product innovation (ϑ_4) shows that the two price factors (product certification and government support) moderate the relationship between product innovation and firm performance, with coefficients of 1.777 and 1.148 respectively (row *c*). However, I did not find such evidence for the non-price factors. Hence, my findings partially support hypothesis H2D.

When examining the *indirect* relationship between product innovation and firm performance ($(\alpha_1 + \alpha_3)\,\vartheta_2$) in equations (2D) and (2E), only non-price factors (supply chain linkages and social media engagement) seem to moderate the *indirect* relationship (*row j*). S. W. Kim (2009), who focused on analysing the indirect

relationship between supply chain management and firm performance, found similar results in which supply chain integration moderates their relationship.[28]

Furthermore, the index of moderated mediation (*row k*) also shows significant positive effects for non-price moderators. This implies the indirect effect of product innovation on firm performance through the number of product innovations is moderated by supply chain linkages and social media engagement. I found insufficient evidence that price factors moderate the indirect relationship between product innovation and firm performance. Accordingly, I partially accept hypothesis H2E. The implication of these findings is that non-price factors seem to play a crucial role in moderating the *indirect* relationship between product innovation and firm performance.

Another interesting point to note from the results for non-price factors is that the magnitude of the indirect effect of social media engagement on firm performance is similar to that for supply chain linkages (row j). This could also indicate that acquiring knowledge through social media has revolutionised the way SMEs innovate in order to compete. This supports previous research by Chong and Micco (2003), who found that the internet is an important proxy for economic creativity in increasing firms' innovation capacity in developing countries. This phenomenon could become a new trend under the fourth industrial revolution.

28 The component of supply chain management in S. W. Kim (2009) research includes variables related to product innovation.

5.5.5 Robustness Checks

Robustness checks to examine the reliability of the model were conducted in several ways such as adding, removing or modifying the variables (X. Lu & White, 2014). In the test for the innovation output phase by removing some independent variables in the price factors (ICT investment and investment intensity), robustness was examined for process and machinery innovation separately and finally jointly for process and machinery innovation. The results of the test reveal consistent estimations (Appendix 5.2). Other independent variables (categorised as price factors and non-price factors) also provide findings consistent with the initial model.

For the test of the firm productivity phase, the robustness check involved two tests: the first was estimating the firm performance equation proxied by a profitability growth variable and the second was dropping variables such as tertiary-qualified employees. The first test yielded consistent results for all core independent variables (predicted probability of success of process, machinery and product innovations) (Appendix 5.3). Moreover, the coefficient sign and significance of mediator variable also showed similar results to the original model. The second test by dropping some variables also produced consistent findings (Appendix 5.4)

5.6 Summary of the Chapter

In this study, I examined the effect of price and non-price factors in innovation on firm performance. For the innovation effort phase, I found that the following variables significantly affect a firm's R&D spending: firm size proxied by number of employees; the proportion of tertiary-qualified employees; investment in expansion; supply chain linkages; and motivation to innovate. The results indicate that those variables related to price have a greater impact on R&D spending. For the innovation output phase, I found significant evidence that expenditure on R&D, machinery and ICT, and factors like pressure from competitors and R&D networking with peers, increase the probability of success in producing innovation outputs.

In my empirical model, where price and non-price factors are specified as moderators of the effect of product innovation on firm performance (productivity function phase), I found that price factors (product certification and government support) play a significant role in moderating the direct effect of product innovation on firm performance. On the other hand, non-price factors (supply chain linkages and social media engagement, in particular) seem to play a crucial role in the indirect relationship.

SMEs in general have been experiencing resource constraints, especially in emerging economies. The fourth industrial revolution has provided opportunities for SMEs to explore non-price effects on innovation and this could be challenging both for themselves and governments. Though governments are also facing budget

limitations, they can improve the situation or ease the constraints through effective policies. Hence, policies to improve SMEs' innovation capacity can be directed to capitalising on non-price factors, assisted by government policy to widen access to price factors.

CHAPTER 6

MODELLING THE COLLABORATIVE ADVANTAGE OF SMES IN PURSUIT OF COMPETITIVENESS: AN EMERGING ECONOMY CASE

6.1 Introduction

In a competitive environment, it is important for small and medium enterprises (SMEs) to collaborate with peers in order to survive, and to be competitive and sustainable. Establishing collaborations with peers and also along the supply chain is imperative as interdependency among firms is also becoming higher (J. H. Dyer, 2000; G. Li et al., 2015; Thun & Hoenig, 2011). This interdependence is a reflection of the inadequacy of firms acting alone in acquiring competitiveness in a dynamic marketplace. Collaboration can offer mutual benefits from this interdependence if managed well. Managing collaboration, however, requires specific strategies in order to allocate resources efficiently and effectively to produce valuable, inimitable and affordable products and services.

Many terminologies have been used to explain firm collaboration, such as supply chain collaboration (SCC), supply chain integration or simply firm network relationship. In the case of the automotive industry, J. H. Dyer (2000) introduces the term collaborative advantage (CA) to describe networking between firms and their peers. Huxham and Vangen (2004) describe CA as firm collaboration in which the synergistic outcome could not have been achieved if firms acted alone. Kanter (1994b) calls CA alliances between firms regardless of their location and of the role each firm plays along the supply chain. This research will operationally use the term

CA to represent firm networking. This will refer to the way firms create competitive advantages through effective inter-firm collaboration in order to achieve strategic benefits/outcomes (Cao & Zhang, 2011; J. H. Dyer, 2000; Huxham & Vangen, 2004; Jap, 2001; Kanter, 1994b). The literature on CA has been evolving around the underlying constructs with different emphases. While many studies exploit CA as a bundle of interrelated constructs (Cao & Zhang, 2011; J. H. Dyer, 2000; Huxham & Vangen, 2005; Simatupang & Sridharan, 2005), others focus on examining a particular individual construct of CA, for example risk information sharing and risk sharing mechanisms (G. Li et al., 2015), information sharing (I.-L. Wu, Chuang, & Hsu, 2014) and trust building (Das & Bing-Sheng, 1998). However, these models were designed mainly for large firms in developed economies. Hence their proposed CA models might not be fully applicable to SMEs in developing economies.

To conceptualise the constructs of the CA model that fits SMEs in Indonesia, and in particular SMEs in the automotive component industry, adaption of the generic CA model is necessary. My motivation is to construct CA model that capture unique features of SMEs in Indonesia especially in the automotive component industry. These features are as follows. First, SMEs face higher business risks than larger enterprises (Jüttner, 2005; Sahiti, 2019) and many of the them have not considered this element in their risk management strategy, such as imposing stringent terms and conditions on their customers and suppliers (Camuffo et al., 2007; Ellegaard, 2008). Second, SMEs offer more relational capital, which is lacking in large enterprises (Manimala et al., 2019; Welbourne & Pardo-del-val, 2009) and this culture of social support provides additional advantages for SEMs (Welter & Kautonen,

2005). Third, SMEs are more sensitive to the changing external environment (Prajogo & McDermott, 2014; Sahiti, 2019), for example increasing competition as the markets of developing economies are becoming more integrated. In this instance, the establishment of the ASEAN Economic Community (AEC) will have a greater impact on Indonesia's SMEs than on large enterprises.

According to J. H. Dyer (2000) there are three important pillars of CA: (1) inter-firm trust building, (2) resources investment (Dyer refers to this as dedicated asset investment), and (3) knowledge sharing. Each of the pillars is supported by different constructs. Inter-firm trust building uses constructs such as commitment, free assistance to improve productivity and efficiency. Constructs such as sharing resources for physical assets, sites and human specialisations are applied to resources investment. For knowledge sharing, constructs as such exchange of technical information are applied. In my study, in order to conceptualise a CA model that fits SMEs, I will adapt Dyer's model by incorporating new constructs into each of Dyer's CA pillars.

Of these three pillars, inter-firm trust building is the most critical (J. H. Dyer, 2000). Having trust among collaborators can reinforce the two other pillars. In light of strong competition, inter-firm trust strengthens the relationship between firms if it involves the willingness of the parties to share their risks. When firm partners share their risks, they tend to act prudently in managing their projects (Adler et al., 2016). Firms and their peers will regularly monitor the quality of the overall production process. Any production faults causing product defects, even made unintentionally,

could lead to the severance of contracts with peers for future projects. According to Huxham and Vangen (2005), when firm partners are able to show a good track record in performance and also a willingness to commit to risk sharing through a formal contractual agreement, this helps to initiate a trusting relationship.

The pillar of resources investment seems to be overshadowed by the importance of tangible assets, such as physical asset specialisation (equipment), human specialisation and site specialisation (close location). Previous studies have paid little attention to intangible or non-price resources such as relational capital. Relational capital could be the unobserved factor that may have an influence on the behaviour of firms in networking. Networking, in any form, is likely to involve people from different cultural backgrounds who might have diverse experiences. Z. Wu and Pullman (2015) state that values embedded in culture have the power to affect the structure of supply chain networks through values and ideologies. In addition, Kanter (1994b) emphasises the importance of interpersonal connections to influence the business alliances.

Thirdly, for dynamic synchronisation, it is important to consider how quickly a firm can respond to external changes. Thus far, studies of dynamic synchronisation have focused on exchanging information about markets, products, innovation, processes, etc. In light of strong competition, firms along a supply chain need to adopt a dynamic perspective, i.e., being sensitive and able to react quickly to shocks from external factors. In order to react quickly to these changes, they need to agree to synchronise their reactions. This decision making is only possible if firms exchange

critical information and agree to synchronise their reactions. Synchronisation along a network is required to produce appropriate responses that will yield effective and efficient outcomes.

The benefits of CA have been acknowledged by many researchers. Firms that have good CA can improve their performance by improving efficiency through reducing transaction costs (J. H. Dyer, 2000; Doven Lavie, 2006b; Lin & Lin, 2015), minimising opportunistic behaviours and reducing monitoring costs (Cao & Zhang, 2011). Firms could also gain CA by expanding their access to resources (Ehrenhard & Hoffmann, 2014; Tanriverdi, 2006), new information and knowledge (J. H. Dyer, 2000; Min et al., 2005; Sheu et al., 2006). In addition, CA could also offer firms a way to minimise their risks and vulnerabilities (M. Christopher & Lee, 2004; C. S. Tang, 2006).

According to some studies, the transmission of these benefits to firm performance is mediated by improving firm capability (Beamon, 1999; Flynn et al., 2010; Venkatraman & Ramanujam, 1986). Firm capability refers to a firm's ability to perform a coordinated set of tasks and to utilise firm resources to achieve particular results (Helfat & Peteraf, 2003). Firms can optimise the positive effect of CA on firm performance through their operational and dynamic capability. However, CA might not bring optimum benefits if firms are unable to establish a well-strategized CA (Fabbe-Costes & Jahre, 2008; Koufteros, Vonderembse, & Jayaram, 2005). Some studies have even found that firm networking may have an adverse effect on their performance (Eisenhardt & Tabrizi, 1995; Liker, Sobek, Ward, & Cristiano, 1996).

This chapter proceeds as follows. Section 6.2 provides the theoretical background and hypotheses development. Section 6.3 describes the data and descriptive statistics. Section 6.4 explains the method of analysis. Section 6.5 presents the results and discussion. Section 6.6 concludes.

6.2 Literature Review and Hypothesis Development

While there is a consensus that the heart of CA is joint working among firms (Cao & Zhang, 2011; Dania et al., 2018; J. H. Dyer, 2000; Flynn et al., 2010; Huxham & Vangen, 2005; Nyaga, Whipple, & Lynch, 2010; Simatupang & Sridharan, 2005), the literature provides different views on how CA should be constructed. Simatupang and Sridharan (2005) suggest that a reciprocal approach is a more appropriate concept to describe firm collaboration.[29] Based on this approach, they propose five constructs of CA: a collaborative performance system, information sharing, decision synchronisation, incentive alignment and an integrated supply chain process. Cao and Zhang (2011) also develop five constructs of CA, but with different features. They are process efficiency, offering flexibility, business synergy, product quality and innovative activities. In constructing the concept of CA, they rely on theoretical perspectives such as transactional cost economics, the resources-based view (RBV), the extended RBV and the relational view.

29 A reciprocal approach occurs when "the outputs of one feature are inputs to other features and a two-way interaction is achieved through ongoing mutual adjustment features" (Simatupang & Sridharan, 2005, p. 260).

In this study, I define CA as the way firms create competitive advantages through effective inter-firm collaboration in order to obtain strategic benefits/outcomes (Cao & Zhang, 2011; J. H. Dyer, 2000; Huxham & Vangen, 2004; Jap, 2001; Kanter, 1994b).

6.2.2 The Conceptual Development of a CA Model for SMEs

The relational view provides an appropriate theoretical foundation and rationale for my proposed CA model for SMEs. The theory asserts that the competitive advantage of collaboration can be obtained when collaborators invest dedicated assets, exchange substantial information and knowledge, combine scarce resources or capabilities for joint creation of unique products, and conduct an effective governance mechanism (Dyer & Singh, 1998). An earlier study of CA by J. H. Dyer (2000) mentioned three fundamental pillars of CA, namely inter-firm trust building, asset investment and knowledge sharing. He developed the concept of CA after conducting research in the automotive industry by comparing the firm cooperation model applied by Toyota and Chrysler. The concept of CA is developed through the relational view. This perspective leads us to establish three pillars of CA: inter-firm trust building, resources investment and dynamic synchronisation.

Designing a CA model that fits SMEs, especially in Indonesia, will require some modification to suit the unique features of SMEs. Three unique features that need to be addressed in designing a CA model are related to the nature of SMEs operating in the developing economies, which are containing higher risks (Jüttner, 2005), acknowledging relational capital (Welbourne & Pardo-del-val, 2009) and being

sensitive to external changes as the markets of developing economies become more integrated.

Synthesising the existing constructs of the CA model and considering the importance of incorporating SMEs' unique features, this study proposes eight constructs which support the three pillars of CA, as portrayed in Figure 6.1 and Table 6.1. These constructs are: (a) collaborative commitment, (b) collaborative efficiency agreement, (c) collaborative risk sharing, (d) collaborative planning, (e) collaborative resources sharing, (f) collaborative relational capital, (g) collaborative information and knowledge sharing, and (h) collaborative synchronised responses. The Conceptualisation of the CA model in this study follows Simatupang and Sridharan (2005) and J. H. Dyer (2000), who place CA constructs as the drivers of collaboration. This differs from Cao and Zhang (2011), who view CA as an output of supply chain collaboration.

The proposed CA model is expected to contribute to the theory of CA especially for strengthening inter-firm trust building through incorporating collaborative risk sharing and improving dynamic synchronisation among firms in the same networking through capturing the effect of external shocks on SME collaboration members' businesses. In addition, incorporating relational capital in the proposed CA also offers a new perspective of the importance of a non-price factor in resources investment allocated by collaboration members.

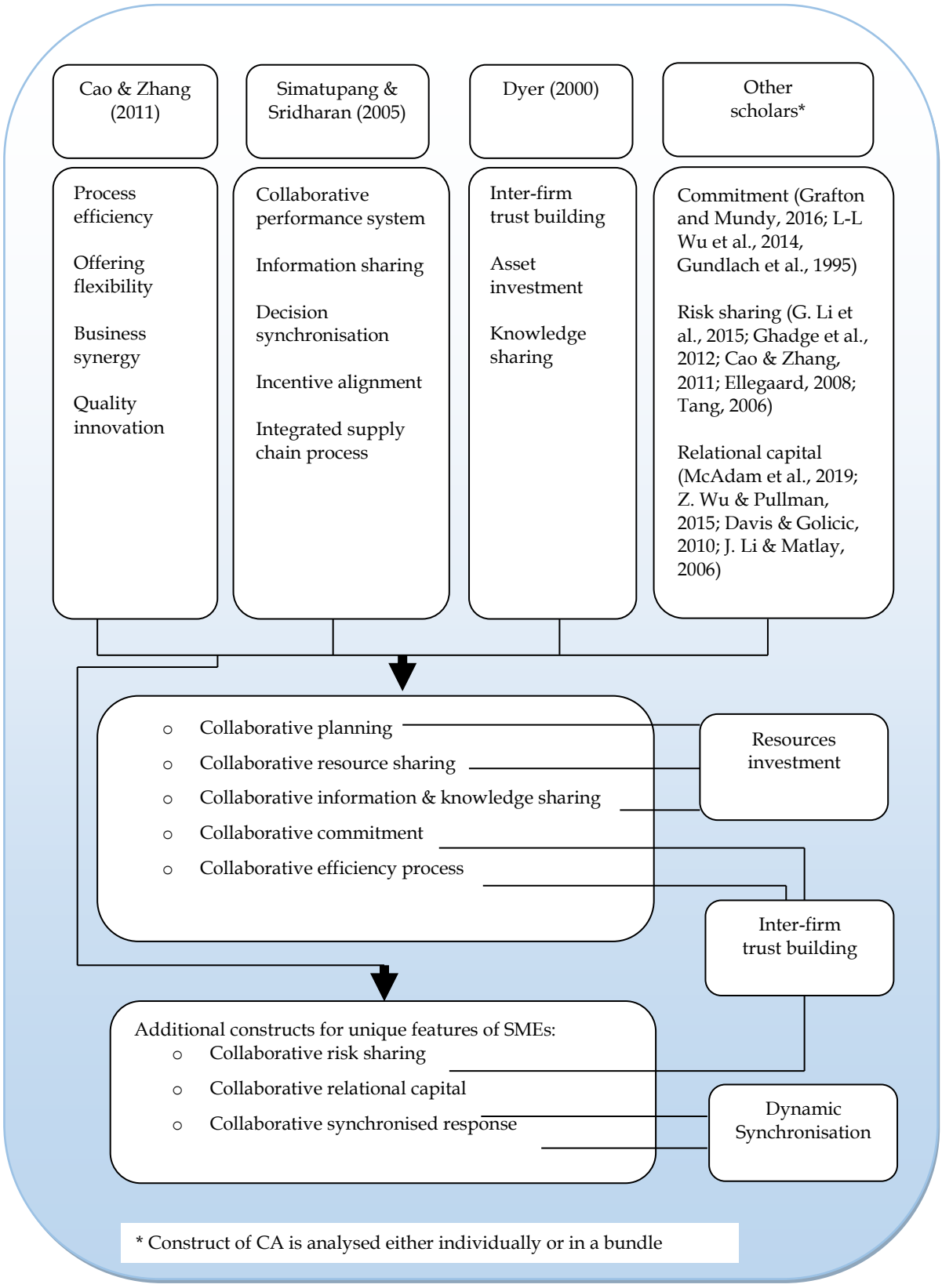


Figure 6.1 Conceptualisation of the Collaborative Advantage Constructs

Table 6.1 Constructs of Collaborative Advantage

Pillars	Constructs	Citations
Inter-firm trust building	Collaborative commitment	Grafton and Mundy (2016), I.-L. Wu et al. (2014), Gundlach, Achrol, and Mentzer (1995); Huxham and Vangen (2005), Angle and Perry (1981); Dwyer, Schurr, and Oh (1987)
	Collaborative efficiency agreement	Cao and Zhang (2011), Huxham and Vangen (2005), Simatupang and Sridharan (2005), Frohlich and Westbrook (2001)
	Collaborative risk sharing	G. Li et al. (2015), Ghadge, Dani, and Kalawsky (2012), Cao and Zhang (2011), Ellegaard (2008), C. S. Tang (2006), M. Christopher and Lee (2004), J. H. Dyer (2000), Lorenzoni and Lipparini (1999)
Resources investment	Collaborative planning	Flynn et al. (2010), Simatupang and Sridharan (2005), Barratt and Oliveira (2001), Frohlich and Westbrook (2001)
	Collaborative resources sharing	Cao and Zhang (2011), Flynn et al. (2010), Doven Lavie (2006b), J. H. Dyer (2000)
	Collaborative relational capital	Lin and Lin (2015); McAdam et al. (2019) Z. Wu and Pullman (2015) Davis and Golicic (2010), J. Li and Matlay (2006), Huxham and Vangen (2005)
Dynamic synchronisation	Collaborative information and knowledge sharing	Cao and Zhang (2011), Sheu et al. (2006), Min et al. (2005), Simatupang and Sridharan (2005), Davenport et al. (2001), J. H. Dyer (2000)
	Collaborative synchronised of responses	Huxham and Vangen (2005)

The explanations for each pillar and construct are as follows.

6.2.3 Inter-Firm Trust Building

Inter-firm trust building is a prerequisite for successful CA (Dania et al., 2018; J. H. Dyer, 2000; Huxham & Vangen, 2005; D. T. Wilson, 1995). J. H. Dyer (2000) states that, without trust, firms will not be willing to share information and invest their assets in the collaboration. Trust will exist in a collaboration if a firm has confidence in their peer's reliability and integrity (Morgan & Hunt, 1994). Thus, willingness to cooperate based on high trust could help to maintain the collaboration in the long term.

Well-established trust among collaborators can also be regarded as an effective instrument to minimise transaction costs, even more effective than legal contracts (J. H. Dyer, 2000). Dyer further mentions that the costs that can be minimised include: a) searching costs to collect information, identify, and evaluate potential peers; b) contracting costs to negotiate and create legal contracts; c) monitoring costs to ensure that peers comply with the agreement; and d) enforcement costs after the contract is signed and sanctions for peers who do not perform well. Furthermore, having high trust could prevent members of a collaboration behaving opportunistically and exploitatively. Therefore, I propose three constructs to support the inter-firm trust building pillar: a) collaborative commitment; b) collaborative efficiency agreement; and c) collaborative risk sharing (see Table 6.1).

Collaborative commitment

Dwyer et al. (1987) define a collaborative commitment as an implicit or explicit pledge of relational continuity between exchange partners. It is an essential

ingredient to establish a well-built and long-term relationship of CA (Gundlach et al., 1995; I.-L. Wu et al., 2014). The heart of the collaborative commitment is the willingness of the collaborators to make short-term sacrifices to realise longer term advantages (Dwyer et al., 1987), to motivate and empower peers (Mowday, Porter & Steers, 1982, as cited in Gundlach et al. (1995) and to be obedient to collaborative policies (Angle & Perry, 1981). It is also evident that collaborative commitment is one of the main concerns of entrepreneurs (Huxham & Vangen, 2005).

Some studies show that having a collaborative commitment would provide benefits to the continuity of CA (Grafton & Mundy, 2016; Gundlach et al., 1995). A collaborative commitment is a basis for firms to determine common goals of the collaboration, which can be a milestone in building inter-firm trust among the collaborators. Gundlach et al. (1995) suggest that collaborative commitment can decrease uncertainties, avoid opportunistic behaviours and reduce transaction costs especially when seeking prospective new buyers or sellers.

Commitment in collaboration also requires firms to act transparently and responsibly by sharing accurate information about their actions and also avoiding any actions that could disadvantage their peers. To protect oneself from such opportunistic behaviours, a collective sanction should be agreed from the beginning. Grafton and Mundy (2016) found that agreeing on a collective sanction demonstrates commitment to the collaboration. This is essential because breaching any commitment could negatively affect the mission to achieve the common goals of the collaboration.

Collaborative Efficiency Agreement

Achieving better efficiency is one of the common goals of inter-firm trust building. Improving efficiency refers to the process by which firms collaborate with their peers to increase their cost competitiveness (Cao & Zhang, 2011; Frohlich & Westbrook, 2001; Simatupang & Sridharan, 2005). Cost competitiveness enables the collaborators to set lower prices than their product competitors. Setting a more affordable price for a product is important for SMEs whose market segment consists of customers who are highly sensitive to price. A firm could improve its efficiency in various ways such as through expansion of production capacity and reducing costs associated with its inventory (Simatupang & Sridharan, 2005).

The efficiency process among the collaborators could be measured by an agreement to maintain level production costs per unit (Cao & Zhang, 2011), maintaining a standard of production time and the standard of packaging (Frohlich & Westbrook, 2001), committing to on-time delivery (Cao & Zhang, 2011; Huxham & Vangen, 2005), committing to achieving a level of productivity, and keeping to a product reject ratio.

Collaborative Risk Sharing

G. Li et al. (2015) define collaborative risk sharing as a situation in which supply chain members use formal policies and arrangements (via agreements or contracts) to share the obligations and responsibilities in activities and/or resources relating to supply chain risk management. Risk sharing between a firm and its peers is part of

incentive alignment under CA (Cao & Zhang, 2011) that needs to be addressed because of uncertainty (Álvarez & Bertin, 2016; Ghadge et al., 2012; C. S. Tang, 2006).

Building trust between suppliers and buyers, especially in an industry filled with risks and vulnerabilities, is a prerequisite for firms to collaborate (J. H. Dyer, 2000). In the automotive industry where thousands of auto components have to be produced together as a system, both buyers and suppliers are at risk if one of the parties behaves opportunistically. J. H. Dyer (2000), however, suggests that suppliers are at a greater risk if buyers request lower prices by renegotiating contracts or threatening to change suppliers. This high risk could occur because the investment committed by suppliers cannot be easily redeployed for other purposes.

Firms could share the risks under collaboration in several ways. Transactional cost economics theory focuses on tangible asset risks (Lorenzoni & Lipparini, 1999). On the other hand, agency theory emphasises intangible asset risks, such as risk information sharing (G. Li et al., 2015). Based on the sources of risk, Martin Christopher and Peck (2004) categorise supply chain risk into three types: (a) internal to the firm (risks from process and control); (b) external to the firm but internal to the supply chain network (risks from demand and supply); and (c) external to the network (risks from the environment). These risks can affect a firm's performance directly and indirectly. C. S. Tang (2006) divides supply chain risks into two categories: operational risks and disruption risks. Operational risks arise because of uncertainties such as uncertainty about increasing or decreasing demand and supply and also uncertainties related to costs. Disruption risks refer to major disruptions

caused by unexpected natural disasters such as earthquakes, floods and hurricanes as well as human-made disasters such as terrorist attacks.

There are three important reasons to include a risk-sharing agreement as part of inter-firm trust building, especially for SMEs. *First*, it affects the relative bargaining positions of buyers and suppliers. J. H. Dyer (2000) believes that a partnership between firms will improve the bargaining position of suppliers. However, there is a possibility that suppliers, especially SMEs, will have a weak bargaining position when they join supply chain networks with large or multinational companies.

Second, a risk-sharing agreement could affect the technology and employees of suppliers. It is evident that in developing countries most SMEs have limited opportunity to upgrade their production technology, to afford high-quality raw materials and to hire skilful employees. Under such circumstances, the production risks of SMEs' suppliers tend to be greater than that of large companies' suppliers.

Third, incorporating risk sharing into inter-firm trust building can contribute positively to firm performance (G. Li et al., 2015) and long-term collaboration (Cooper, Ellram, Gardner, & Hanks, 1997). As suggested by agency theory, under conditions where principals and agents (i.e. suppliers and buyers) have similar goals and risk preferences, a risk-sharing agreement could minimise the agency problem (Eisenhardt, 1989).

6.2.4 Resources Investment

Resources investment is investment allocated by firm in the value chain to increase productivity in the production network. J. H. Dyer (2000) suggests firms should pursue three different types of asset investment, namely, site specialisation, physical specialisation and human specialisation. Site specialisation refers to the type of investment intended to enhance firm efficiency through physical production proximity. Physical specialisation refers to relationship-specific capital investments for the purpose of improving product quality that allows product customisation and product differentiation. Human specialisation refers to relationship-specific know-how investment intended to accumulate specialized information for more effective communication and coordination.

In this study, the pillar of resources investment consists of three constructs: a) collaborative planning; b) collaborative resources sharing; and c) collaborative relational capital.

Collaborative Planning

Collaborative planning refers to the process by which collaboration members are able to orchestrate and integrate critical resources at the initial stage of collaboration. According to Barratt and Oliveira (2001), the planning stage is key to enable a long-term consistent collaboration process. It is important given the fact that collaborators might have different resources, capabilities and expertise to operate their business and to meet buyers' or peers' requirements. Therefore, joint planning enables

collaborators to identify the strengths and weaknesses of their available resources and to evaluate their initial resources deployment.

Having collaborative planning at the initial stage also enables collaboration members to collect more accurate information for efficiency estimation and risks anticipation (Simatupang & Sridharan, 2005). This can help to minimise the agency problem between the collaboration members. Collaborative planning among the members could include various strategic resources in order to make the collaboration work optimally, such as planning and integrating product design (Frohlich & Westbrook, 2001), inventory (Flynn et al., 2010) and delivery time (Frohlich & Westbrook, 2001).

Collaborative Resources Sharing

Collaborative resources sharing is the process of leveraging capabilities and assets and investing them with collaboration members (Cao & Zhang, 2011). Resource sharing is important when each member is unable to achieve the common goals using only their own resources. This is in line with the extended resources-based view (ERBV), which suggests that internal resources (controlled resources) and external resources can be combined to strengthen a firm's competitiveness (Doven Lavie, 2006b).

Many researchers such as Cao and Zhang (2011), Flynn et al. (2010) and J. H. Dyer (2000) suggest that, under a collaboration, members could share their physical assets. These include machinery and related equipment, human resources, technical supports, financial assistance and site specialisation. Resources sharing enables collaboration members to assess inventory-level data (Cao & Zhang, 2011), and to

lower inventory-associated costs, transportation costs and communication costs (J. H. Dyer, 2000).

Collaborative Relational Capital

Researchers such as Cao and Zhang (2011), Simatupang and Sridharan (2005) and J. H. Dyer (2000) have acknowledged the importance of resources investment for CA. While these research has mostly focused on dedicated asset investment in terms of tangible assets (price factors), such as financial, equipment and human resource specialisation, the non-tangible assets (non-price factors) embedded in the price factors have been neglected.

Collaborative relational capital can be regarded as an intangible asset, which can influence organisational ethics, collaboration members' behaviour and/or employees' working style (Davis & Golicic, 2010; Huxham & Vangen, 2005; McAdam, Miller, & McSorley, 2016). The importance of addressing collaborative relational capital in resources investment is strongly related to the working style in the firm collaboration itself, in which the working process involves people from various backgrounds, such as different professional expertise, organisational culture, objectives, cultural norms and values. Under such a circumstance, as Huxham and Vangen (2005) pointed out, people working in collaboration often need to compromise on various types of work practices, diverse organisational cultures and also different working styles.

The power of collaborative relational capital relies on its embedded values, which can affect the dynamics of supply chain networks (Z. Wu & Pullman, 2015). Further,

Z. Wu & Pullman (2015) suggest that since having relational capital does not necessarily mean the collaborative members have same values, collective decisions can be made through timely negotiations among the members.

Collaborative relational capital can also have a strategic role in empowering collaboration members through its intrinsic motivation (McAdam et al., 2019). McAdam et al., (2019) call this a support culture. [30] This study exploits collaborative relational capital in the form of socially supportive culture (SSC). The characteristics of SSC are a high level of humane orientation and a low level of assertiveness (Semrau et al., 2016), a positive social environment in which people support each other (Thai & Turkina, 2014), collective identity, reliance on informal networks and tolerance for failure (House, Hanges, Javidian, Dorfman, & Gupta, 2004). In the context of Indonesia, the country where this research was conducted, it is called "kekeluargaan". It is similar to "guanxi" (personal network relationship) in Chinese terminology (J. Li & Matlay, 2006; Lin & Lin, 2015).

6.2.5 Dynamic Synchronisation

Dynamic synchronisation refers to the process by which collaboration members are able to bring into line the sharing of information among the collaboration members and to synchronise their responses to external shocks. In this study, the pillar of decision synchronisation consists of two constructs: collaborative information and knowledge sharing, and collaborative synchronised responses.

30 According to McAdam et al. (2019) there are four typologies of culture in relation to collaboration empowerment: (a) role culture, which focuses on procedure, hierarchy and status; (b) power culture, which focuses on the dominant and authoritative person in charge with mainly informal rules; (c) achievement culture, which focuses on task and purpose and participatory orientation; and (d) support culture, which focuses on an empowering environment with high levels of intrinsic motivation.

Collaborative Information and Knowledge Sharing

Collaborative information and knowledge sharing is defined as a process by which a firm shares relevant, accurate, complete and confidential information in a timely manner with its supply chain partners (Cao & Zhang, 2011; Min et al., 2005; Sheu et al., 2006; Simatupang & Sridharan, 2005). This is recognised as a "key requirement" (Sheu et al., 2006) and "essential ingredient" (Min et al., 2005) of collaboration. Sharing the information is highly valuable to dynamic synchronisation because it gives firms the ability to make better decisions and take action based on full information (Davenport et al., 2001; Simatupang & Sridharan, 2005).

J. H. Dyer (2000) divides the activities of sharing information and knowledge into two types, namely explicit and tacit knowledge sharing. Explicit knowledge sharing refers to the sharing of information such as production schedules and market information. Tacit knowledge sharing refers to sharing know-how, such as technical knowledge of better manufacturing processes, new innovations, new quality assurance techniques, etc.

Collaborative Synchronised Responses

CA is a dynamic concept in which the stability of collaboration membership to some extent can be affected by external factors (Huxham & Vangen, 2005). The pressure of external factors may come from various sources, include customers, competitors, government policy changes or other factors related to macroeconomic stability, such as interest rate changes and exchange rate volatility.

Each firm might have different information about the changes in external factors that could affect their business operation. The ability of firms to gather external information can be determined by several factors, such as resource capacity to conduct research, access to technology, the number and level of networks with other firms, etc. For various reasons, some firms have more information than others. Under such conditions, the transaction process of each firm could be unbalanced and based on incomplete information if there is no synchronisation of responses to external changes. From the perspective of transaction cost economics, Williamson (1973) calls this phenomenon information impactedness, a condition where one of the members of a collaboration has more or less knowledge than the others.

Williamson (1973) explains that it is difficult to differentiate between firms who disclose the impacted information opportunistically and firms who make representations in good faith. Such a problem could be minimised if collaborators have a synchronised mechanism for responding to external changes. The nurturing process among the members in response to external changes has to be continuous and permanent in order to make the collaboration work.

Hence, I hypothesise:

> ***Hypothesis H3A:*** *(a) collaborative commitment, (b) a collaborative efficiency agreement, (c) collaborative risk sharing, (d) collaborative planning, (e) collaborative resources sharing, (f) collaborative relational capital, (g) collaborative information and knowledge sharing, and (h) collaborative synchronised responses have a positive effect on CA.*

6.2.6 CA and Firm Performance

Cao and Zhang (2011) contend that cooperation under a collaboration framework can lead to a positive sum game. Ehrenhard and Hoffmann (2014), Park et al. (2004), Tanriverdi (2006) and J. H. Dyer (2000) believe that networking helps firms to secure wider access to resources. Handfield (2002), Johnson (2003), Doven Lavie (2006a), Lin and Lin (2015), Sheu et al. (2006) and J. H. Dyer (2000) suggest that having a collaborative relationship with suppliers can reduce transaction costs. Collaboration can also minimise opportunism and monitoring costs as well as incompetence activities that arise in the integration process and market transactions (Cao & Zhang, 2011; Croom, 2001; J. H. Dyer, 2000). These benefits eventually lead to improved firm performance such as efficiency, productivity, sales and profitability.

Many studies show evidence of the positive effect of collaboration on firm performance (Cao & Zhang, 2010, 2011; J. H. Dyer, 2000; Flynn et al., 2010). Flynn et al. (2010) found that, through a configuration approach, CA constructs are related to firm performance. Cao and Zhang (2011) suggest that supply chain collaboration (SCC) can improve CA, which will contribute to both direct and indirect positive effects on firm performance. In the long run, they also found that joining an SCC has a positive impact on a firm's financial performance through expansion to the export market.

In the automotive industry, Joshi et al. (2013) suggest that the contribution of CA is the second largest factor after business environmental factors to improving the Indian automotive components industry. Similar findings were presented by

Ülengin et al. (2014), who found that the quality of suppliers is one of the keys to the success of the Turkish automotive industry. Finally, as J. H. Dyer (2000), Porter (1990) and Cho and Moon (2000) argue, cooperation among industries is one of the important elements for improving efficiency and increasing competitiveness.

Even though many studies support the positive effect of collaboration on firm performance, a collaboration that is not properly designed could also adversely affect firm performance (Eisenhardt & Tabrizi, 1995; Fabbe-Costes & Jahre, 2008; Koufteros et al., 2005; Liker et al., 1996). For instance, a collaboration that is not well designed could affect the effectiveness of product development (Eisenhardt & Tabrizi, 1995) and increase the complexity of coordinating a firm's decisions (Liker et al., 1996). This, in turn, affects a firm's ability to respond effectively to changing market dynamics.

The above two contrasting effects of collaboration on firm performance indicate that the process of achieving better firm performance may require efforts to improve the firm's capability. Helfat and Peteraf (2003) mention two types of capabilities that are catalysts to improve firm competitiveness, namely operational capability and dynamic capability. Operational capability refers to a collection of routines that confers on a firm's management on a set repeated and reliable basis for producing significant outputs of a particular type (Easterby - Smith, Lyles, & Peteraf, 2009; Sidney G. Winter, 2003). Meanwhile, Teece, Pisano, and Shuen (1997) define dynamic capability as a "firm's ability to integrate, build and reconfigure internal and external competences to address rapidly changing environments" (p. 516).

Considering the above-mentioned views, in this study a firm's capabilities are reflected in four indicators: a) the firm's ability to respond to changes in the marketplace (adaptability); b) the firm's ability to fulfil various customer demands efficiently (flexibility); c) the firm's ability to offer product differentiation (differentiation); and d) the firms' ability to produce products at a competitive price (affordability).

In some studies such as Flynn et al. (2010), Beamon (1999), Murphy, Trailer, and Hill (1996) and Venkatraman and Ramanujam (1986), firm capability is indicated by operational performance, which reflects the key operational success factors such as introduction of new products, product quality, marketing effectiveness, technological efficiency, etc. Success in operational performance may lead to better firm performance, especially achieving financial goals. In other words, operational performance can be treated as a mediator variable for achieving better firm performance. Therefore, this study hypothesises:

***Hypothesis H3B**: CA has a positive effect on firm performance.*

***Hypothesis H3C**: CA has a positive effect on firm capability.*

***Hypothesis H3D**: Firm capability mediates a positive relationship between CA and firm performance.*

6.3 Data and Descriptive Statistics

Table 6.2 shows each indicator in every construct, measured using a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). For more details of the indicators and their measurements, see Appendix 6.

Table 6.2 Descriptive Statistics of CA and Firm Performance

Constructs	Indicators		Observations	Mean	St dev	Min	Median	Max
Collaborative commitment	1	CCM 1	177	4.181	0.798	1	4	5
	2	CCM 2	177	4.017	0.980	1	4	5
	3	CCM 3	177	3.616	1.138	1	4	5
	4	CCM 4	177	3.695	1.049	1	4	5
Collaborative efficiency agreement	5	EFA 1	177	4.141	0.817	1	3	5
	6	EFA 2	177	3.028	1.346	1	4	5
	7	EFA 3	177	3.023	1.548	1	3	5
	8	EFA 4	177	2.831	1.388	1	3	5
Collaborative risk sharing	9	RSK 1	177	2.480	1.366	1	2	5
	10	RSK 2	177	2.226	1.150	1	2	5
	11	RSK 3	177	1.384	0.790	1	2	5
	12	RSK 4	177	2.243	1.073	1	1	5
Collaborative planning	13	CPL 1	177	4.107	0.932	1	4	5
	14	CPL 2	177	3.147	1.248	1	4	5
	15	CPL 3	177	3.028	1.130	1	3	5
	16	CPL 4	177	4.023	0.859	1	3	5
Collaborative resources sharing	17	RSS 1	177	2.028	1.189	1	4	5
	18	RSS 2	177	2.644	1.217	1	2	5
	19	RSS 3	177	2.740	0.989	1	3	5
	20	RSS 4	177	2.763	1.252	1	3	5
Collaborative relational capital	21	CRC1	177	3.469	1.163	1	2	5
	22	CRC 2	177	3.774	1.069	1	4	5
	23	CRC 3	177	3.350	1.221	1	4	5
Collaborative information and knowledge sharing	24	IKS 1	177	1.983	1.175	1	4	5
	25	IKS 2	177	2.390	1.220	1	1	5
	26	IKS 3	177	2.802	1.168	1	2	5
	27	IKS 4	177	3.096	1.132	1	3	5
	28	IKS 5	177	2.339	1.196	1	3	5
Collaborative synchronised responses	29	EXR 1	177	2.881	1.366	1	2	5
	30	EXR 2	177	2.401	1.366	1	3	5
	31	EXR 3	177	2.017	1.170	1	2	5
	32	EXR 4	177	2.192	1.166	1	2	5
Firm performance		FPF 1	177	3.232	0.721	1	3	5
		FPF 2	177	3.051	0.848	1	3	5
		FPF 3	177	3.356	0.955	1	4	5
		FPF 4	177	3.260	1.000	1	4	5
Firm capability		FCB 1	177	3.463	0.691	1	4	5
		FCB 2	177	3.311	0.783	1	3	5
		FCB 3	177	3.401	0.848	1	4	5
		FCB 4	177	3.469	0.971	1	4	5

Source: Primary data, 2017

The statistics in Table 6.2 show that the median and mean of the three constructs (collaborative commitment, collaborative efficiency agreement and collaborative risk sharing) under the pillar of inter-firm trust building vary significantly. Collaborative commitment has a median of 4 with an aggregate mean of nearly 4, indicating that

more than 50% of the firms had a high level of agreement that it was important to commit to collaboration. While the firms also looked at collaborative efficiency agreements, especially for production cost per unit (EFA 1) and level of productivity (EFA 2), as important indicators of collaboration with peers, firms expressed less concern about collaborative risk sharing.

Under the pillar of resources investment, firms placed high importance on the collaborative planning construct, with a median and aggregate mean of 3.5 each. This construct measures the planning and integrating of product design, raw material procurements, inspection of plant and delivery time. The importance given to the relational capital construct among the firms was also relatively high, where members of a collaboration build cooperation, resolve conflicts and help each other based on kinship. In the construct of collaborative resources sharing, except for the indicator of extending financial assistance in emergency situations (RSS 2), firms' dedication to investment sharing with their peers was relatively high.

The median and mean for collaborative information and knowledge sharing and collaborative synchronised response under the dynamic synchronisation pillar are at about 2.5, which is the lowest among the 8 CA constructs. The firms on average had good firm capability, with the median of all the indicators nearly 4 and the mean at about 3.4. Moreover, the firms also showed good performance.

6.4 Method of Analysis

This study employed partial least squares-structural equation modelling (PLS-SEM) to model CA. There were several reasons for employing this method. First, PLS-SEM is appropriate for a study in which the goal is to establish new constructs for a new model (J. F. Hair, Jr., Sarstedt, Hopkins, & Kuppelwieser, 2014). This is suitable for addressing one of the objectives of this study, which is to examine the key drivers of the CA model and to apply the drivers in the SME context.

Second, PLS-SEM is suitable to extend an existing theory (Hair, 2010). This study explores the existing well-known collaborative advantage theory proposed by J. H. Dyer (2000). It considers strengthening the concept of inter-firm trust building, incorporating intangible or non-price factors such as relational capital in the resources investment concept, and enhancing the concept of dynamic synchronisation.

In addition, PLS-SEM can accommodate a relatively small sample size. I followed the "10 times rule" of Barclay, Higgins, and Thompson (1995) to determine the eligibility of using PLS-SEM and my sample meets the requirement.[31] As J F. Hair, Hult, Ringle, and Sarstedt (2017) suggest, PLS-SEM is the best approach for examining a model with latent variables. This study involves two subsequent estimations, a measurement model followed by a structural model. The measurement model establishes the latent constructs based on reflective indicators. Subsequently, these

31 The 10 times rule states that the sample size should be: (a) greater than 10 times the maximum number of formative indicators used to measure any latent variable in the model; and (b) greater than 10 times the number of structural paths linked to a particular construct in the structural model (Hair et al., 2017).

latent constructs are used to measure the effect of collaboration on firm performance in the structural model estimation.

The advantage of applying PLS-SEM in the estimation is the ability to solve equations with more than one block of latent constructs (Vinzi, Chin, Henseler, & Wang, 2010). Furthermore, as Fornell and Bookstein (1982) argue, this approach can explain the residual variance of latent constructs as well as their indicator variables. PLS path modelling is a component-based estimation method, and therefore its iterative algorithms can separately solve the blocks of the measurement model and estimate the path coefficients in the structural model (Dijkstra, 2010; Tenenhaus, 2008).

6.4.1 Scale Construction

There are two elements in the scale construction: the Conceptualisation process and the derivation of indicators for constructs.

The Conceptualisation Process

A PLS path modelling analysis consists of two parts, namely (1) measurement model (outer model) and (2) structural model (inner model). The measurement model examines the relationship between the CA constructs and its indicators. The structural model tests the effect of CA on firm performance. While I could examine the effect of the structural model directly, the literature suggests that it could also be examined indirectly through a mediating variable. Flynn et al. (2010) and Venkatraman and Ramanujam (1986) suggest that the effect of collaboration on firm

performance can be mediated by firm capability. The analyses of direct and indirect effects are illustrated in the framework shown in Figure 6.2.

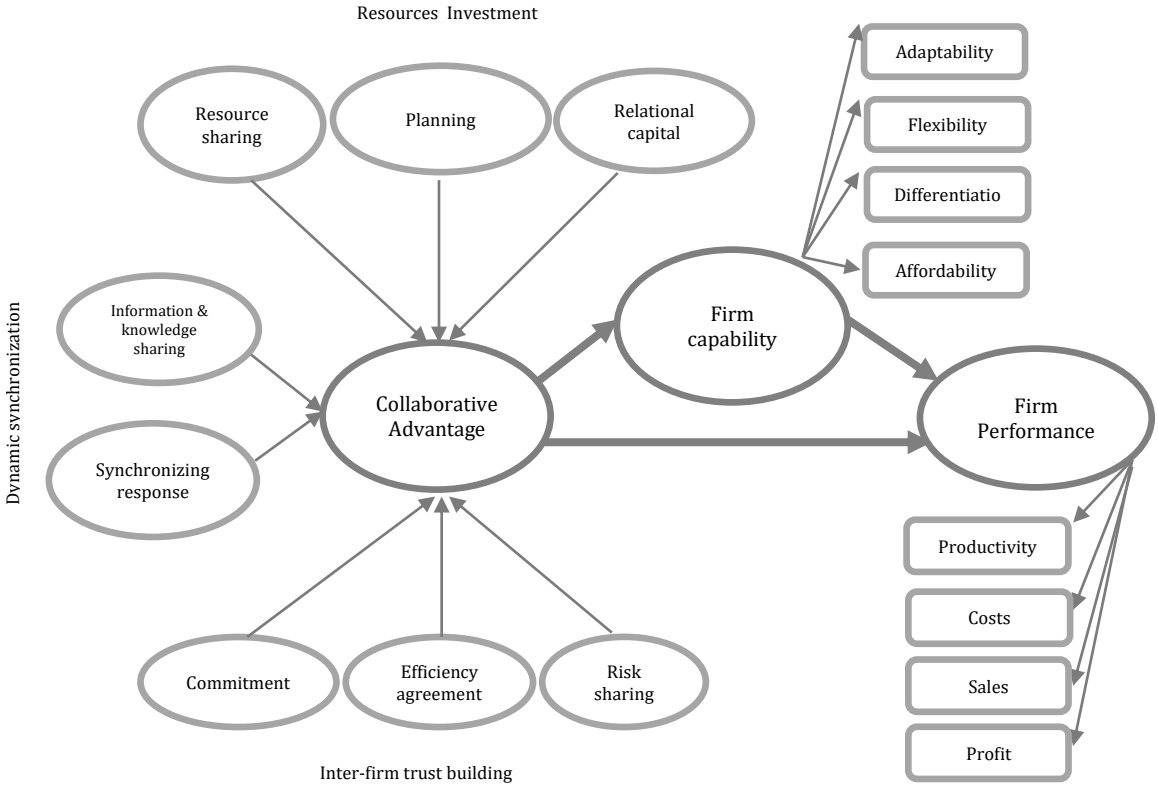


Figure 6.2 Structural and Measurement Model of CA, Firm Capability and Firm Performance

The following are the eight constructs used to measure CA: (a) collaborative commitment, (b) collaborative efficiency agreement, (c) collaborative risk sharing, (d) collaborative planning, (e) collaborative resources sharing, (f) collaborative relational capital, (g) collaborative information and knowledge sharing, and (h) collaborative synchronised responses. These eight constructs are conceptualised as reflective first order. Under this model, the indicators represent the manifestation of each of the constructs.

CA is conceptualised as a formative second order model, in which each indicator captures a specific aspect of the construct domain. In PLS-SEM, conceptualising the eight constructs and the CA either in formative or reflective form is important because it is related to their conceptual meaning (Diamantopoulos & Winklhofer, 2001; Jarvis, MacKenzie, & Podsakoff, 2003; Podsakoff, MacKenzie, Jeong-Yeon, & Podsakoff, 2003; Thornton, Henneberg, & Naudé, 2014).

To measure the effect of CA on firm performance, I used hierarchical component model (HCM). This type of model has two subsequent estimations, namely higher order constructs (HOCs) and lower order constructs (LOCs). CA is positioned as a HOC and the eight constructs serve as LOCs. The literature suggests there are four types of HCM analysis: (1) reflective-reflective, (2) reflective-formative, (3) formative-reflective and (4) formative-formative (J F. Hair et al., 2017; Jarvis, Mackenzie, Podsakoff, Mick, & Bearden, 2003; Ringle, Sarstedt, & Straub, 2012). Considering the nature of the eight constructs and CA, this study uses a reflective-formative measurement model.

When using a reflective-formative model, it is important to use a combination of a repeated indicator approach and latent scores in the HOC (J F. Hair et al., 2017). The benefit of this approach is it avoids over-explaining the variance of HOCs, which can happen if the model is estimated only through a repeated indicator approach.

In the LOC measure, following Becker, Klein, and Wetzels (2012), the repeated indicator approach mode B is used to obtain the latent scores for the LOCs. This is because mode B produces better parameter estimates than mode A in terms of root

mean square error (RMSE) and mean absolute relative bias (MARB).[32] An unbiased result can be achieved if the number of indicators in each construct does not vary greatly (J. F Hair, Marko Sarstedt, Ringle, & Gudergan, 2018). My LOCs measure of the eight constructs fulfils this requirement.

The latent scores obtained from the LOC are used as manifest variables in the HOC measurement model. Prior to measuring the HOC, the LOCs measurement model has to satisfy all the assessment criteria for reliability and validity. If some indicators of LOCs are found to deviate significantly from the assessment criteria, a scale purification process has to be applied to improve the results. Purification is a process of eliminating indicators to improve the reliability and validity of the newly developed LOCs (Churchill, 1979; Wieland, Durach, Kembro, & Treiblmaier, 2017).

Derivation of Indicators for Constructs

Indicators derivation is a process of selecting indicators for measuring CA constructs, particularly those that are specified in the LOC measurement model. Indicators generation is an important process as its main objective is to achieve the content validity of the constructs (Peter, 1981). The technique for indicator derivation involves two processes: (1) literature review of prior research and (2) experience surveys (Sellitz et al., 1976, as cited in (Churchill, 1979). While the literature review has provided support for the content of my constructs, the survey of stakeholders reinforces the choice of indicators in the construct domain.

32 RMSE measures the difference between the predicted value and observed value. MARB is the average of the simple absolute deviations between the true parameter and the estimated parameter divided by the true parameter and the root mean squared error (Becker et al., 2012).

In this study, I created a preliminary list of 32 measurement indicators for the eight constructs of CA. These cover the constructs of collaborative commitment (4 indicators), collaborative efficiency agreement (5 indicators), collaborative risk sharing (4 indicators), collaborative planning (4 indicators), collaborative resources sharing (4 indicators), collaborative relational capital (3 indicators), collaborative information and knowledge sharing (4 indicators), and collaborative synchronised responses (4 indicators). As shown, the number of indicators in each construct is almost the same, except for collaborative efficiency agreement and collaborative relational capital.

6.4.2 Scale Validation

Measurement and Validation of LOCs

The assessment of the LOCs reflective measurement model should meet three types of tests: (1) internal consistency, (2) convergent validity and (3) discriminant validity (J. F. Hair et al., 2017; MacKenzie, Podsakoff, & Jarvis, 2005; Ringle, Sarstedt, Mitchell, & Gudergan, 2018; Vinzi et al., 2010). The threshold score for each of the tests is shown in Table 6.3.

Table 6.3 Assessment for Reflective Measurement

No.	Assessment	Criterion	Threshold
1	Internal consistency	Composite reliability	A value between 0.70 and 0.90 (satisfactory).
2	Convergent validity	The reliabilities of indicators in each scale	The value of outer loading should be statistically significant. The value of indicator loading should be higher than 0.70.
		Average variance extracted (AVE)	The value should be higher than 0.50.
3	Discriminant validity	Indicator cross-loadings on various constructs	An indicator's loadings should be higher than all of its cross-loadings.
		Fornell–Larcker criterion	The AVE of each latent construct should be higher than the construct's highest squared correlation with any other latent construct.
		Heterotrait–monotrait ratio (HTMT)	The value should not exceed 0.9.

Source: (J F. Hair et al., 2017; MacKenzie et al., 2005; Ringle et al., 2018; Vinzi et al., 2010)

Internal consistency refers to how reliable the indicators are when used in the same construct. According to J F. Hair et al. (2017), the criteria for measuring internal consistency is composite reliability. It estimates the extent to which indicators in a set of latent constructs share their measurement of a construct. The threshold value for composite reliability is from 0.60 to 0.70 in exploratory research and from 0.70 to 0.90 for advanced research.

Convergent validity refers to the correlation between an indicator and another indicator in the same construct. There are two criteria for testing convergent validity, namely (1) indicator reliability and (2) the average variance extracted (AVE). Indicator reliability is the size of the outer loading, in which the values of the outer loadings should be significant to be considered reliable. AVE is "the grand mean

value of the squared loadings of the indicators associated with the construct" (J F. Hair et al., 2017, p 114). The construct has adequate validity if the value of AVE is greater than 0.5.

Discriminant validity refers to the extent to which a construct is distinct from other constructs. Discriminant validity is tested by examining (1) indicator cross-loading, (2) the Fornell–Larcker criterion and (3) the heterotrait–monotrait ratio (HTMT). Discriminant validity is established if an indicator's loading on the associated construct is greater than any of its cross-loadings on other constructs. Discriminant validity is established when the HTMT value does not exceed 0.90.

Measurement and Validation of HOC

The assessment of the HOC formative measurement model includes (1) convergent validity, (2) collinearity between indicators, and (3) statistical significance of the indicator weights (J F. Hair et al., 2017; Ringle et al., 2018). However, when measuring a HOC, the convergent validity of the model is established in the nomological network validity (MacKenzie et al., 2005). Therefore, the focus of HOC assessment is only on the collinearity between the manifest variables and the statistical significance of the indicator weights.

Measurement and Validation of the Structural Model

The assessment of the structural model measurement for formative constructs should meet two criteria: (1) path coefficient significance and (2) coefficient of

determination. The structural model results were used to test hypotheses H3B, H3C and H3D. The threshold score for each test is shown in Table 6.4.

Table 6.4 Assessment for Structural Model Measurement

Assessment	Criterion	Threshold
Path coefficients	Standard errors, significance levels, p-values	Empirical t-value > critical value p-value < 0.05 (assuming a significance level of 5%)
Coefficient of determination	R^2	Weak (0.25) Moderate (0.5) Substantial (0.75)
	f^2 effect size	Small (0.02) Medium (0.15) Large (0.35)
	f^2 Effect size in test of moderation	Small (0.005) Medium (0.01) Large (0.025)
Predictive relevance	Q^2 value	Q^2 value > 0

Source: (J F. Hair et al., 2017; Ringle et al., 2018; Ringle et al., 2012; Vinzi et al., 2010)

To examine the effect of CA on firm performance through firm capability as a mediating variable, Nitzl, Roldan, and Cepeda (2016) recommend the following steps: (1) testing the significance of the indirect effect; and (2) determining the type of effect and/or mediation. A significant indirect effect is needed to establish a mediation effect in the first step. The significance of the direct effect is a foundation to determine the type of effect and/or mediation (Carrión, Christian Nitzl, & Roldán, 2017).

To determine the size of the mediating effect, J. F. Hair, Hult, Ringle, and Sarstedt (2013) recommend calculating variance accounted for (VAF). VAF is the ratio between the indirect effects and the total effect. If the value of VAF is between 0 and

0.20, it is concluded that no mediation occurs. If the VAF value is between 0.20 and 0.80, it is identified as partial mediation. If the VAF value is greater than 0.80, it is considered full mediation.

6.5 Results and Discussion

6.5.1 Assessment Results of LOCs

Following Table 6.3, first of all, LOCs with reflective measurement were assessed for internal consistency. The assessment results yielded an acceptable value of composite reliability ranging between 0.8 and 0.9 indicating that the LOCs' internal consistency is fully reliable.

The assessment of convergent validity for the LOCs' indicator reliability test showed that, among 32 indicators, there are 24 indicators with loading value greater than 0.7, which is the cut-off threshold for this indicator reliability test (J F. Hair et al., 2017). There are eight indicators with a loading score below the threshold, in which their scores vary between 0.5 and 0.6. However, bootstrapping estimates show that all 32 indicators' loadings are statistically significant at a 1% level. While indicator reliability is not satisfactory for some, all constructs have an average variance extracted (AVE) greater than 0.5, suggesting an adequate convergent validity.

Yielding LOCs with lower loading indicators is not uncommon in practice, especially for new indicators or newly developed research (Hulland, 1999). Three out of eight indicators with a lower loading value in our model were newly introduced indicators for some constructs of CA. These newly introduced indicators with lower loadings value are: sanctions for breaching a collaborative commitment,

sharing the risk of force majeure and responding to changes in external macroeconomic conditions. Finally, the assessment of discriminant validity shows that the value of the Fornell-Larcker criterion, cross-loading and HTMT validate that discriminant validity is established for the model.

Given that the overall assessment of the reflective measurement model yielded satisfactory results, except for some indicators with lower loading, the literature allows me to retain the indicators in the model and continue the estimation to the second stage. As the literature mentions, to consider content validity, the indicators loading with value 0.4–0.7 can be retained in the model (J F. Hair et al., 2017; Hulland, 1999). However, instead of taking such a shortcut, the LOCs measurement was purified in order to meet the basic assessment criteria of the reflective measurement model.

6.5.2 Assessment Results of LOCs after Purification

Purification of the LOCs was conducted based on statistical and theoretical judgment (Wieland et al., 2017).

After the purification process, the model now has 29 indicators measuring eight constructs of CA. Figure 6.3 illustrates the LOCs model after purification and Table 6.5 shows the assessment results for LOCs after purification.

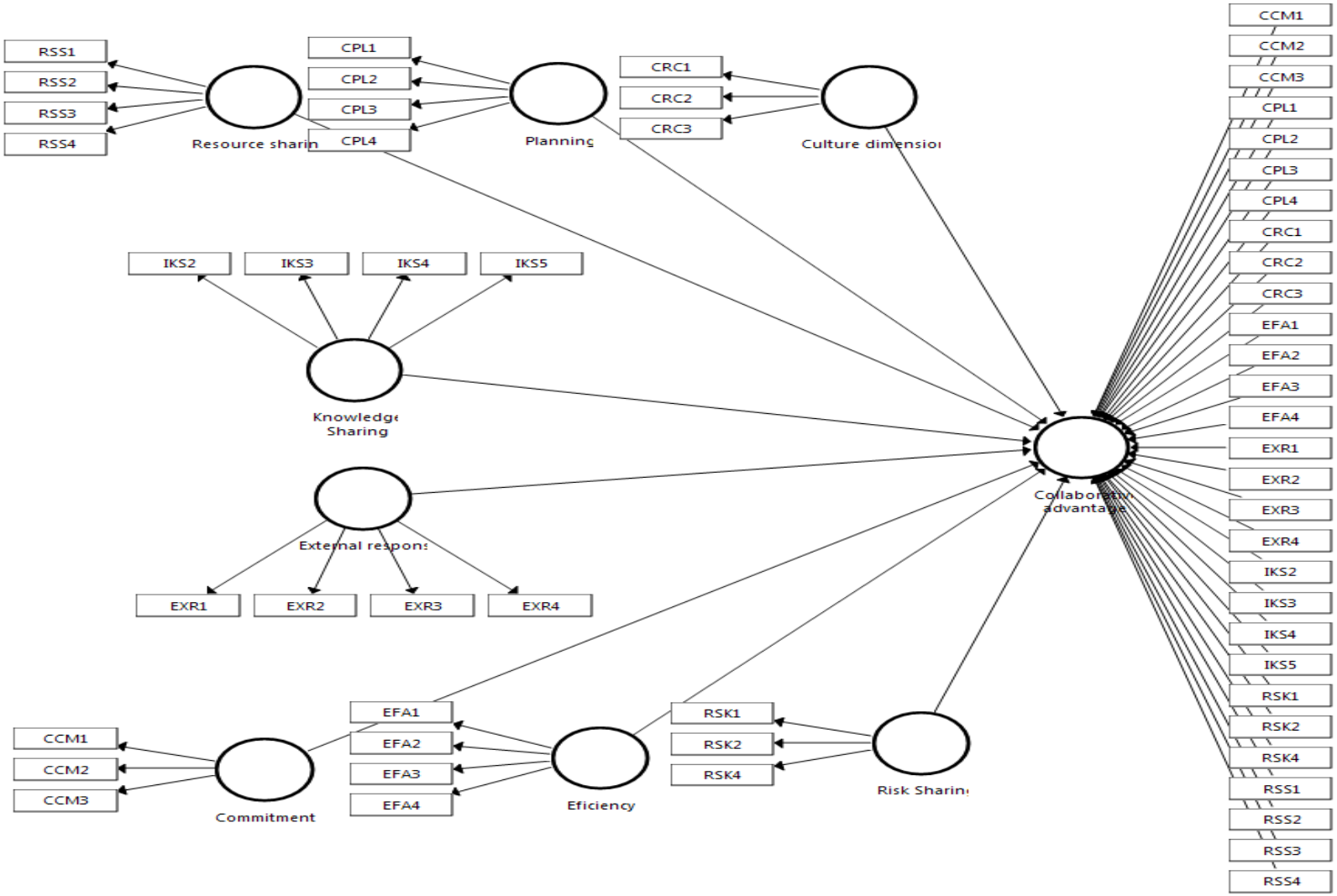


Figure 6.3 LOCs After Purification

Table 6.5 LOCs Results After Purification

Constructs	Indicators		Factor loadings	Internal consistency	Convergent validity	Discriminant validity		
				Composite reliability	AVE	Cross-loading indicator [33]	Fornell-Larcker criterion [34]	HTMT (< 0.9)
Collaborative commitment	1	CCM 1	0.835	0.881	0.711	Yes	Yes	Yes
	2	CCM 2	0.834					
	3	CCM 3	0.861					
Collaborative efficiency agreement	4	EFA 1	0.523	0.858	0.610	Yes	Yes	Yes
	5	EFA 2	0.807					
	6	EFA 3	0.907					
	7	EFA 4	0.833					
Collaborative risk sharing	8	RSK 1	0.888	0.863	0.679	Yes	Yes	Yes
	9	RSK 2	0.865					
	10	RSK 3	0.708					
Collaborative planning	11	CPL 1	0.628	0.816	0.532	Yes	Yes	Yes
	12	CPL 2	0.858					
	13	CPL 3	0.813					
	14	CPL 4	0.586					
Collaborative resources sharing	15	RSS 1	0.552	0.842	0.578	Yes	Yes	Yes
	16	RSS 2	0.813					
	17	RSS 3	0.797					
	18	RSS 4	0.843					
Collaborative relational capital	19	CRC 1	0.882	0.896	0.741	Yes	Yes	Yes
	20	CRC2	0.842					
	21	CRC 3	0.858					
Collaborative information and knowledge sharing	22	IKS 1	0.811	0.908	0.711	Yes	Yes	Yes
	23	IKS 2	0.871					
	24	IKS 3	0.819					
	25	IKS 4	0.869					
Collaborative synchronised responses	26	EXR 1	0.858	0.873	0.636	Yes	Yes	Yes
	27	EXR 2	0.891					
	28	EXR 3	0.783					
	29	EXR 4	0.633					

Statistically, I found that the LOCs after purification met all the assessment criteria. The indicators loading as a measure of indicator reliability shows that 24 out of 29 indicators have a loading value greater than 0.7. The five indicators that are retained in the model have a loading value between 0.5 and 0.6. Estimation through bootstrapping shows that all indicators' loadings are significant at a 1% level.

33 The indicator's outer loading on the associated construct is greater than its cross-loading.

34 The AVE on the associated construct is larger than the squared correlation with any other construct.

The evaluation of internal consistency through composite reliability yielded satisfactory results with a range of 0.8 to 0.9. Evaluation of convergent validity through average variance extracted (AVE) indicated that all constructs have value greater than 0.5. In examining the discriminant validity, the Fornell-Larcker criterion, cross-loading and HTMT validated that discriminant validity is established for the model. The results from the three tests confirm that the LOCs to be used for the next phase are valid and reliable.

6.5.3 Assessment Results of the HOC

The HOC measurement model is conceptualised as a formative model. To estimate CA, the latent scores of each of the eight LOCs are used as manifest indicators in the HOC (Figure 6.4).

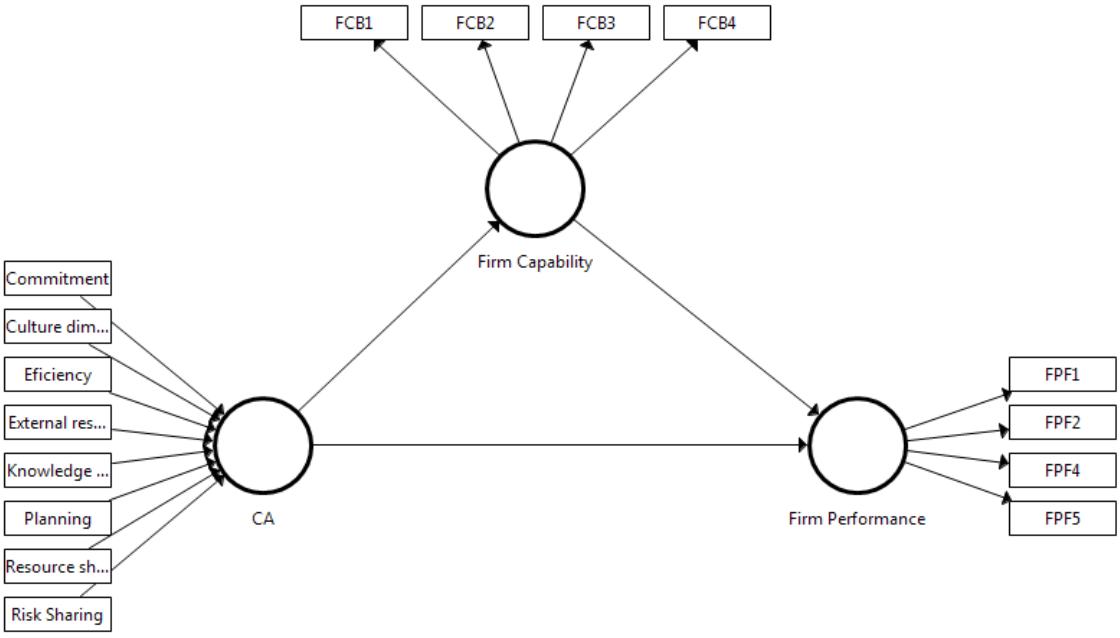


Figure 6.4 HOC Process

All latent constructs from LOCs will now be referred to as manifest indicators.[35] Under the HOC, the manifest indicators are expected to have a low level of indicator correlations with each other. A high level of indicator correlations between manifest indicators will be problematic in terms of methodological issues and interpretation of the path coefficient (J F. Hair et al., 2017) and also lead to difficulties separating the distinct influence of individual indicators (Diamantopoulos & Winklhofer, 2001). Multicollinearity as a result of correlation may also create unstable indicator weights and cause type II errors (the possibility of justification that the indicators correlation is not significant, while it was theorized to be relevant: (Cenfetelli & Bassellier, 2009).

Table 6.6 reports the results of the collinearity and the level of loading weight significance of the HOC measurement.

Table 6.6 Assessment Results of the HOC

Indicators	VIF	Indicator weight			Indicator loading		
		Coefficient		Standard error	Coefficient		Standard error
Collaborative commitment	1.999	0.132		0.103	0.689	***	0.076
Collaborative efficiency agreement	2.443	-0.186		0.137	0.615	***	0.079
Collaborative risk sharing	2.080	0.305	***	0.091	0.773	***	0.050
Collaborative planning	2.226	0.267	***	0.105	0.810	***	0.050
Collaborative resources sharing	1.624	0.208	***	0.082	0.717	***	0.054
Collaborative relational capital	1.994	0.116		0.097	0.691	***	0.059
Collaborative information and knowledge sharing	3.253	0.421	***	0.110	0.886	***	0.042
Collaborative synchronised responses	2.850	-0.048		0.123	0.673	***	0.061

* Significant at 10%, ** Significant at 5%, *** Significant at 1%

35 When estimating a HOC in SMART PLS-SEM software, the constructs from the LOCs are positioned as indicators of the HOC, as pictured in Figure 6.3.

The presence of multicollinearity can be measured by the variance inflation factor (VIF). My estimation results show that the VIF for the manifest indicators range from 1.953 to 3.253, which is below the suggested threshold of 5 for PLS-SEM (J F. Hair et al., 2017). Therefore, the HOC model is free from collinearity problems.

The statistical significance of the indicators' weight provided very useful information in the formative model as it measured the relative importance of each manifest indicator (Cenfetelli & Bassellier, 2009). The bootstrapping[36] estimation with 1000 subsamples revealed that four out of eight manifest indicators (collaborative planning, collaborative risk sharing, collaborative information & knowledge sharing and collaborative resources sharing) have statistically significant weights at a 1% level. However, I also found insignificant weights for the other four manifest indicators (collaborative commitment, collaborative efficiency agreement, collaborative relational capital and collaborative synchronised responses). Even though these four manifest indicators are not significant, the estimation shows that the loading values of these four indicators are above 0.6 and statistically significant at a 1% level of significance.

The insignificant indicators weight of some LOCs indicates that those constructs make a smaller contribution to a formatively measured construct. This, however, should not be interpreted as meaning that the quality of the formative model is poorly established (Cenfetelli & Bassellier, 2009; J F. Hair et al., 2017). Instead, it

36 Bootstrapping is "a non-parametric resampling procedure that assesses the variability of a statistic by examining the variability of the sample data rather than using parametric assumptions to assess the precision of the estimates" (Streukens, S., & Leroi-Wereld, S. p. 2)

can be viewed comprehensively by looking at the absolute contribution[37] of those manifest indicators through their formative indicator's outer loading. Moreover, it is also recommended not to drop formative indicators with lower weight from the model as this may possibly alter the empirical meaning of the construct (MacKenzie et al., 2005). These results support hypothesis H3A (a to h), which posits that collaborative commitment, collaborative efficiency agreements, collaborative risk sharing, collaborative planning, collaborative resources sharing, collaborative relational capital, collaborative information and knowledge sharing, and collaborative synchronised responses have positive effects on CA.

6.5.4 Assessment of the HOC after Purification

The above-mentioned HOC results are evidence that the manifest indicators are sufficient to represent manifest indicators in the CA model for SMEs. However, since some manifest indicators have a relative contribution and some others have an absolute contribution, the aggregation of the CA concept might be in question, especially when connecting it to a firm's capability and performance. Therefore, in explaining the effect of CA on firm capability and firm performance in the structural model, a purification process may be needed to improve the reliability of the structural model.

Cenfetelli and Bassellier (2009) suggest three prescriptions to treat insignificant weights: (1) re-categorise the manifest indicators into two or more constructs,

37 An absolute contribution is the contribution of an indicator to the construct without considering any other indicators (Hair et al., 2017).

resulting in a smaller number of constructs; (2) do the same as above and include an aggregate construct of the HOC; or (3) retain all manifest indicators with insignificant weights but have an acceptable and significant loading value, and analyse its absolute contribution.

In this study, I applied the second prescription to purify the insignificant weights of some manifest indicators (Figure 6.5). The manifest indicators were re-categorised into three different constructs: (1) inter-firm trust building; (2) dynamic synchronisation; and (3) resources investment.[38] This decision is justified by relevant theory. My theoretical framework, as described in section 6.2, explains that eight constructs are grouped into three different pillars, namely inter-firm trust building, resources investment and dynamic synchronisation. Following my framework, the three pillars were constructed. The HOC examines the structural model for hypothesis testing.

38 In Section 6.2, I called (1) inter-firm trust building; (2) dynamic synchronisation; and (3) resources investment "pillars". The term "construct" for these three pillars is used as a technical term when running an estimation using SMART PLS.

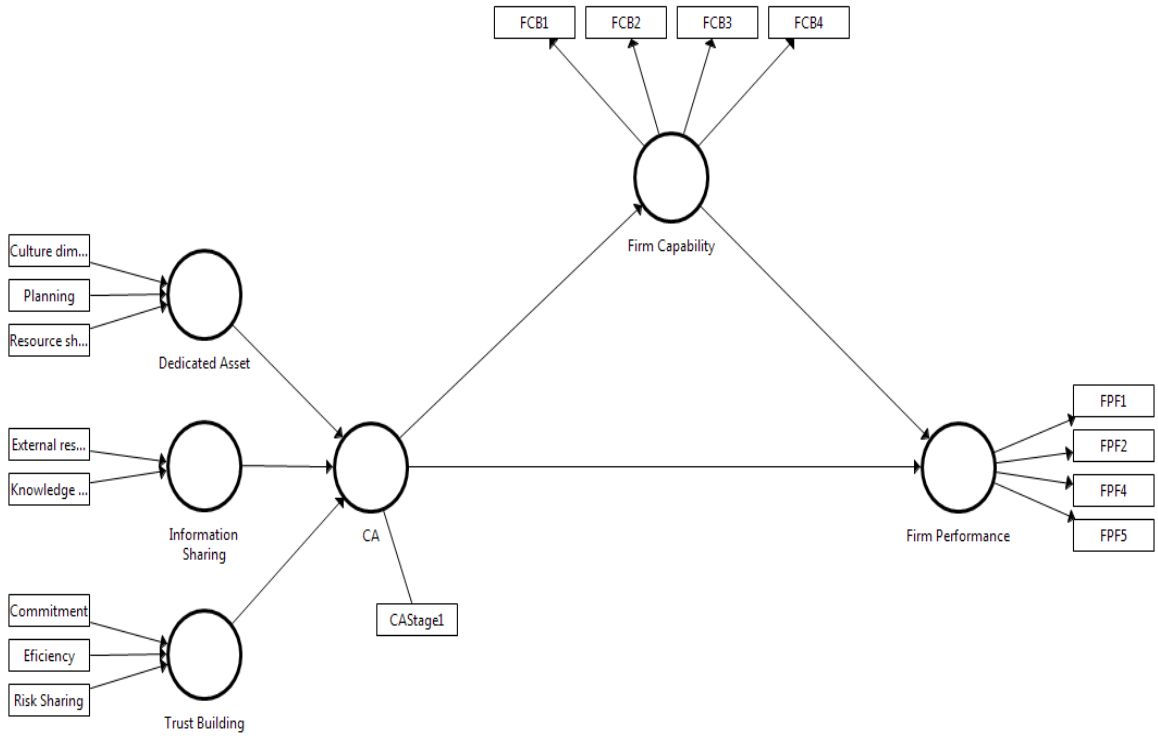


Figure 6.5 HOC Process after Purification

Table 6.7 reports the results of the significant level of the HOC's indicators weight after purification and the significance level of the three pillars as well as their level of collinearity.

The HOC estimation results show that there is no multicollinearity issue in the structural model. This is indicated by VIF values of the outer and inner model that are under the threshold of 5. The VIF values for inter-firm trust building, resources investment and dynamic synchronisation are 3.137, 2.334 and 3.100 respectively. The test results for multicollinearity that are under 3.3 can also be an indication that the model is not contaminated by the common method bias (CMB) problem (Kock, 2015). Common method bias can occur when the data for both

independent and dependent variables are obtained from the same respondent in the same measurement context using similar indicators and characteristics (Podsakoff et al., 2003).

Table 6.7 Assessment Results of the HOC after Purification

Indicator weights				**Constructs**			
	Coefficient		Standard error		Coefficient	Standard error	Inner VIF
Collaborative commitment to Inter firm trust building	0.390	***	0.043	**Inter-firm trust building**	0.378 ***	0.014	3.137
Collaborative efficiency agreement to Inter firm trust building	0.431	***	0.044				
Collaborative risk sharing to Inter firm trust building	0.398	***	0.047				
Collaborative planning to Resources investment	0.517	***	0.049	**Resources investment**	0.387 ***	0.013	2.334
Collaborative resources sharing to Resources investment	0.361	***	0.049				
Collaborative relational capital to Resources investment	0.319	***	0.049				
Collaborative information & knowledge sharing to Dynamic synchronisation	0.678	***	0.056	**Dynamic synchronisation**	0.331 ***	0.014	3.100
Collaborative synchronised response to Dynamic synchronisation	0.392	***	0.058				

* Significant at 10%, ** Significant at 5%, *** Significant at 1%

A bootstrapping estimation on the HOC reveals that all eight manifest indicators after purification have statistically significant weights, as shown in Table 6.7. The four manifest indicators (collaborative commitment, collaborative efficiency agreement, collaborative relational capital and collaborative synchronised responses) that previously had insignificant weights now have significant weights

at a1% level of significance. This indicates that the three pillars as theorized in the literature review are a reliable way to represent CA.

6.5.5 Incorporating Three Unique Features of SMEs in the CA Model

The above-mentioned results show that the Conceptualisation of the proposed CA model has been validated. The proposed CA model consists of eight constructs: (a) collaborative commitment, (b) collaborative efficiency agreement, (c) collaborative risk sharing, (d) collaborative planning, (e) collaborative resources sharing, (f) collaborative relational capital, (g) collaborative information and knowledge sharing, and (h) collaborative synchronised responses. Further, these are categorised into three pillars, namely inter-firm trust building, resources investment and dynamic synchronisation.

Considering that the context of this study is SMEs, I have re-conceptualised the concept of CA by incorporating some unique features of SMEs that have not been adequately addressed in previous research such as by Cao and Zhang (2011), Huxham and Vangen (2005); Simatupang and Sridharan (2005) and J. H. Dyer (2000). In this study, I incorporated the collaborative risk sharing construct into the inter-firm trust building pillar; the collaborative relational capital construct as a non-price factor in the resource investment pillar; and the collaborative synchronised responses construct into the dynamic synchronisation pillar.

6.5.5.1 Collaborative Risk Sharing and Inter-Firm Trust Building

As reported in Table 6.7 on the assessment results of the HOC after purification, the examination of collaborative commitment, collaborative efficiency agreements and collaborative risk sharing under the inter-firm trust building pillar yielded significant positive results. Collaborative risk sharing, collaborative commitment and collaborative efficiency agreement are significant at 1%. This indicates that having collaborative risk sharing together with collaborative commitment and an efficiency agreement builds stronger inter-firm trust. In addition, inter-firm trust building is found to have a significant positive effect on CA (Table 6.7).

Collaborative risk sharing consistently shows a positive effect on CA, both in an earlier estimation of the LOCs measurement model without purification as well as after purification through the inter-firm trust building pillar. Risk sharing is a common practice among large enterprises (Li et al., 2015; Cao & Zhang, 2011). However, incorporating collaborative risk sharing component in a re-conceptualisation of CA for SMEs is relatively new. Collaborative risk sharing in this study is reflected in four indicators, namely sharing the costs of rejected products, sharing the costs of not achieving timely delivery, sharing the costs caused by unexpected events/natural disasters and sharing the costs of product returns.

There are three plausible explanations of the positive effect of collaborative risk sharing on CA in SMEs. First, collaborative risk sharing can be regarded as a hedging instrument from any production failures or inefficiency caused by

internal and external factors. Unlike large and multinational companies, which operate with advanced technology, most SMEs produce their products with limited technology and low-skilled employees. Under such conditions, the probability of production failure or inefficiency tends to be high. In addition, SMEs operating in emerging economies also face many uncertainties caused by external factors, such as less developed public infrastructure to support timely delivery and unexpected natural disasters such as floods and earthquakes.

Second, establishing collaborative risk sharing can increase SMEs' bargaining position when they collaborate with larger firms. Many SMEs in the automotive components industry said that when they are dealing with buyers from large firms, their bargaining position about risk sharing tends to be lopsided. This is because the buyers in their supply chain only focus on the final products without much concern about the whole supply chain process especially the production and delivery risks. Third, collaborative risk sharing can establish long-term business cooperation. G. Li et al. (2015) and Lee and Johnson (2010) suggest that formal and explicit contractual risk sharing agreements tend to create a favourable environment for long-term business relationships.

Furthermore, establishing risk sharing is also a means of having a trusting relationship among collaboration members. It can also be regarded as an effective way to minimise transaction costs, even more effective than legal means (J. H. Dyer, 2000). Having a trusting relationship could also prevent members of the collaboration behaving opportunistically and could minimise opportunistic

exploitation. This finding supports the theory of transaction cost economics, and has enriched the theory on the role of collaborative risk sharing in CA.

6.5.5.2 Collaborative Relational Capital and Resources Investment

As reported in Table 6.7 on the assessment results of the HOC after purification, collaborative relational capital, collaborative planning, and collaborative resources sharing, which form the resources investment pillar, are all significant at 1%. These results suggest that firms in a kinship environment (with collaborative relational capital) are willing to collaborate at the planning stage and also share their resources. This increases the collaborators' dedication to allocate more resources for investment. Further, the resources investment pillar significantly and positively affects CA (Table 6.7).

Without purification, collaborative relational capital shows insignificant weight in the HOC measurement model. However, this does not imply that it has no effect on CA. Instead, after purification, collaborative relational capital shows a significant effect on CA through the resources investment pillar.

Incorporating collaborative relational capital as a non-tangible or non-price factor asset investment in conceptualising CA makes this study distinct from previous research. Previous studies by Cao and Zhang (2011), Simatupang and Sridharan (2005) and J. H. Dyer (2000) focused on tangible assets or price factors, such as financial, equipment and human resource specialisation, in their analysis of resources investment among collaboration members. Collaborative relational capital is reflected in three indicators under a socially supportive culture (SSC)

framework: building cooperation, solving conflicts, and helping supply chain partners in difficult situations.

In the context of SMEs, the reason why collaborative relational capital has a positive impact on resources investment and CA is that relational capital increases the collaborators' intrinsic motivation to seek wider access to resources. It has been widely known that many SMEs in developing countries operate under frugal conditions with limited resources (Agnihotri, 2015; Navi Radjou & Prabhu, 2015). Under such conditions, the feeling of having a supportive culture motivates SME entrepreneurs to dedicate their resources to investment in collaboration.

The role of collaborative relational capital in SMEs' transactions seems to some extent to change a formal collaborative network to an informal network with stronger ties. Under such conditions, as Birley (1985) suggests, informal ties could play a more significant role than a formal network in getting access to resources. Further, a study by Elfring and Hulsink (2003) also suggests that network members with stronger ties are more motivated to provide assistance to other members. In addition, they also found that members with stronger ties can make socially motivated transactions of resources at lower costs than market prices.

6.5.5.3 Collaborative Synchronised Responses and Dynamic Synchronisation

As reported in Table 6.7 on the assessment results of the HOC after purification, collaborative information and knowledge sharing as well as synchronised responses have a significant positive effect on dynamic synchronisation at a 1% level of significance. Further, dynamic synchronisation among collaboration

members has a positive and significant effect on CA. The synchronised responses construct is similar to the culture construct in that it makes an absolute contribution to CA and it has an indirect effect on CA through dynamic synchronisation.

Synchronised responses positively affect CA through the dynamic synchronisation pillar. This result echoes the argument in the literature that the dynamic concept of CA is affected by external factors (Huxham & Vangen, 2005). Incorporating synchronised responses in reconceptualising CA is intended to minimise the adverse effect of external shocks on SME collaboration members' businesses. The synchronised responses construct is reflected in four indicators: responses to changes in macroeconomic conditions (exchange rate, interest rate and inflation), responses to customers' complaints, responses to a competitor's strategy and responses to government policy.

In the context of Indonesia's automotive SMEs, there are two plausible explanations of the positive effect of incorporating collaborative synchronised responses into the CA model. First, action to synchronise responses to external shocks is needed because most raw materials (for example steel) come from abroad, and hence, the price of those materials is affected by the fluctuation of exchange rates. Second, action to synchronise responses is becoming more important because regional economic integration in ASEAN has taken place under the ASEAN Economic Community (AEC) framework since 2015. Under the AEC, collaboration members need updated information to respond to the changing

strategies of competitors operating in ASEAN. In addition, they should also be aware of any changes in government policies that directly or indirectly affect the automotive components industry and its market.

From the perspective of transaction cost economics, synchronizing responses could minimise information impactedness/asymmetric information among the collaboration members. Therefore, every firm in the collaboration will take a similar direction in responding to external changes and taking appropriate actions that suit every collaboration members' needs. As a result, this could minimise transaction costs that might occur in the supply chain process involving collaborators.

6.5.6 CA and Firm Performance

The above-mentioned assessment results of LOCs and the HOC (Tables 6.5 and 6.7) indicate that all the models meet the requirements of the reliability and validity tests. In addition, I also found that the mediator construct meets all the reliability tests (internal consistency, convergent validity and discriminant validity) of reflective measurement. Therefore, I proceeded to evaluate the structural model. The results of the structural model are presented in Table 6.8.

Table 6.8 Results of the Structural Model

Path	Coefficients	Standard error		f^2
CA to firm performance	0.170	0.074	**	0.026
CA to firm capability	0.707	0.032	***	1.001
Firm capability to firm performance	0.541	0.064	***	0.267
Indirect effect of CA to firm capability-firm performance	0.383	0.048	***	
Total effect of CA to firm performance	0.553	0.054	***	
Adjusted R^2 firm capability		0.497		
Adjusted R^2 firm performance		0.446		

* Significant at 10%, ** Significant at 5%, *** Significant at 1%

In the structural model, I found that the path coefficient of CA to firm performance is 0.170, which is statistically significant at the 5% level. This means that increasing CA by 1% is estimated to increase firm performance by 0.170%. This supports the hypothesis that CA has a positive effect on firm performance. Hence, this supports hypothesis H3B. The value of coefficient determination (adjusted R^2) of firm performance of 0.446 indicates that it has a moderate predictive power. The blindfolding test for cross-validated redundancy shows that the predicative power (Q^2) value for all endogenous constructs is above zero. The Q^2 values are 0.969, 0.279 and 0.331 for CA, firm performance and firm capability respectively.

The evidence of the positive direct relationship between CA and firm performance has been validated by the hierarchical component model (HCM) tests. This finding is consistent with previous research that links CA directly to firm

performance (Cao & Zhang, 2010; Chang, Ellinger, Kim, & Franke, 2016; Flynn et al., 2010).[39] I, however, found that the direct effect of CA on firm performance has a small effect size (only 0.026). The path coefficient of CA on firm performance is relatively low (0.170) compared to other path coefficient results. Previous research by Cao and Zhang (2010) found the direct effect is about 0.72.

Interpreting the total effect of CA on firm performance in many cases is not straightforward. CA may also affect firm performance indirectly through the mediating variable of firm capability. My estimation results showing small effect size of CA on firm performance seem to support the importance of the mediating variable in this relationship. I am taking into account this important view and examining the effect of CA on firm performance through firm capability as a mediating variable. Firm capability captures four indicators that address adaptability, flexibility, differentiation and affordability.

I observe that path coefficient of CA to firm capability is 0.707, which is statistically significant at the level of 1%. In comparison to the effect on firm performance, CA's effect on firm capability is substantially higher with an effect size of 1.001. In addition, firm capability has a positive and significant effect on firm performance with a path coefficient of 0.541 and effect size of 0.267. This shows that firm performance is not only affected by CA, but also indirectly by firm capability. These results confirm the hypothesis that CA has a positive effect on firm capability. Hence, hypothesis H3C is confirmed.

39 Chang et al. (2016) found significant direct effects of internal integration and customer integration on firm performance, but not evidence for supplier integration. For the total effects, they found significant positive effects for all integration on firm performance.

A mediating effect is established if the coefficient of indirect effect from CA to firm capability and the coefficient from firm capability to firm performance are both significant. As shown in Table 6.8, both coefficients from CA to firm capability as well as firm capability to firm performance are significant at a 1% level. This confirms the hypothesis that firm capability mediates a positive relationship between CA and firm performance. Hence, hypothesis H3D is confirmed. Referring to the calculation of the VAF value = 0.383 / 0.553 = 0,693, I conclude that firm capability partially mediates the relationship between CA and firm performance.

The estimation results show empirical support for the important mediating role of firm capability in the relationship between CA and firm performance. This implies that firm capability helps to increase the contribution of CA to firm performance. Evidently, the magnitude of the indirect effect of CA on firm performance through the mediator variable (0.383) is twice as large than its direct effect (0.170). Overall, the total effect of CA on firm performance is quite pronounced (0.553).

For Indonesian SMEs, adaptability can be particularly associated with their ability to survive pressure from competitors under regional economic integration. This is particularly related to the implementation of the ASEAN-China Free Trade Agreement (ACFTA) since 2010 and the ASEAN Economic Community (AEC) since 2015. Under ACFTA and AEC, the flow of goods and services within China and ASEAN countries is affected by the very minimum of protective policies such as tariffs. This promotes higher competition in the markets and hence pushes

firms to adjust their competition strategy. The entrepreneurs in automotive component SMEs are some of the market actors who actively adapt to these market dynamics because their products are included as part of a priority integration sector under the AEC framework.

If Indonesian automotive component SMEs are flexible in terms of fulfilling changes in customer requests efficiently, they can adjust to the growing markets in ACFTA and AEC member countries. For the Indonesian market itself, flexibility is required to deal with two demand factors. *First* is flexibility in response to demand from the growing middle class. The middle-class population is growing rapidly in Indonesia and hence pushes a high demand for secondary and tertiary goods including automotive products. The Asian Development Bank (2011) predicts that Indonesia will have a middle class population of about 220 million by 2030 and this is considered the largest number in ASEAN and the third largest number in the world.

Second is flexibility in response to changing seasonal demand. According to the SME entrepreneurs, the peak demand for automotive components occurs at the end of the year. OEMs, car producers, request more automotive components to increase car production at the end of the year to prepare for high car demand in the following year. This happens because they need to adjust the car supply with the behaviour of car buyers who tend to purchase cars in the New Year or several months after, but not at the end of the year. In addition, the interview results with SME entrepreneurs reveal that the demand for automotive components also tends

to increase when approaching the celebration of Eid al-Fitr, an important religious holiday for Muslims, and also one of the major national holidays in Indonesia.

SMEs' ability to produce various products (differentiation) with reasonable prices (affordability) also contributes significantly to CA and firm performance. Improvement of these abilities is crucial for SMEs to compete with various competitors' products especially those entering the market under ACFTA and AEC. Among the participating member countries of these two free trade agreements, China and Thailand are considered the main competitors. While China's automotive component producers are price competitive, Thai producers rely on design and quality as means to compete in the market. On the other hand, Indonesian automotive component SMEs seem to have not strongly established any form of competitive advantage. Empowering SMEs to improve the four capabilities (adaptability, flexibility, differentiation and affordability) would substantially improve the CA and therefore also firm performance.

Since the eight constructs of CA consist of combining resources originating from inside the firm and its networks, these results are in line with the extended resources-based view (ERBV) of D. Lavie (2006). The theory suggests that a firm's internal resources and external resources can be combined to improve firm performance. These findings contribute to the literature on CA as well as the ERBV by incorporating culture as a non-price factor in tandem with mainstream price factors, especially in designing a well-established firm collaboration.

6.6 Summary of the Chapter

In this chapter, I investigated the conceptualisation of collaborative advantage (CA) and examined its effect on SMEs' performance. Empirical testing of a hierarchical component model (HCM) using a two-stage approach validated eight constructs of CA: collaborative commitment, collaborative efficiency agreement, collaborative risk sharing, collaborative planning, collaborative resources sharing, collaborative relational capital, collaborative information and knowledge sharing, and collaborative synchronised responses. The process of producing these constructs was assessed in the LOCs measurement model with purification as suggested by Wieland et al. (2017) and J F. Hair et al. (2017). Since some constructs had insignificant weight in the second step, the eight constructs were classified into three pillars, namely inter-firm trust building, resources investment and dynamic synchronisation. This treatment was taken to increase the reliability of the model, as suggested by Cenfetelli and Bassellier (2009). Reliable constructs in the LOC and HOC measurements established a strong basis for estimating the structural model.

The estimation of the structural model confirmed that CA has a positive direct effect on firm performance. The effect size of this relationship, however, is relatively small, suggesting that the effect of CA on firm performance is not straightforward and is substantially captured through a mediation process. By using firm capability as a mediator, the estimation results showed the important of the mediating role of firm capability. The magnitude of the indirect effect of CA on firm performance through the mediator variable is twice as large as its direct effect. This implies that firm capability helps increase the contribution of CA to firm performance.

CHAPTER 7

THE COMBINED EFFECT OF THE KEY COMPETITIVENESS SOURCES (CREDIT ACCESS, INNOVATION AND COLLABORATIVE ADVANTAGE) ON FIRM PERFORMANCE

7.1 Introduction

The preceding chapters (4, 5 and 6) have shown that each key competitiveness source (credit access, innovation and collaborative advantage/CA) has a significant impact on firm performance. In this chapter, the effect of these three key competitiveness sources on firm performance will be examined simultaneously. Analysing these factors altogether is important because in reality, a firm most likely will rely on the three key competitiveness sources simultaneously to improve their competitiveness. Moreover, those three sources could interact with each other to produce different outcomes. Therefore, it is important to examine the combined effect of those three sources on firm performance.

The importance to examine the combined effect of those three key competitiveness sources is also motivated by the need to develop an alternative model of SMEs competitiveness that suits with Indonesia's business environment condition. The theories to develop this model are discussed in Chapter 3 about the Theory of firm competitiveness by Porter (1985), RBV by Barney (1991) and ERBV by Lavie (2006) as well as the results of the SLR of firm competitiveness factors.

The chapter begins by explaining the method used for the examination and model assessments. This is followed by a discussion of the main findings of the structural model enriched by mapping the firms, grouping the firms and developing the model of key competitiveness sources.

7.2 Method of Analysis

To investigate the effect of key competitiveness sources (credit access, innovation and CA) simultaneously on firm performance, this study employed partial least squares – structural equation modelling (PLS-SEM). The advantages of using PLS-SEM have been explained in detail in Chapter 6, Section 6.4 "Method of Analysis".

The key competitiveness sources were conceptualised as a combination of the three competitiveness factors, namely credit access, innovation and collaborative advantage, as analysed in Chapters 4, 5 and 6. In the PLS estimation, the key competitiveness sources are a function of the indicators that affect those three individual sources. The indicators description and descriptive statistics are provided in Appendix 7.

The indicators from Chapter 4 are grouped into two constructs: (1) demand side factors of credit access (indicators: collateral, risk sharing scheme with peers, networking with peers and sale growth); (2) supply side factors of credit access (access to loan, indicators: cost of borrowing and procedures). The indicators from Chapter 5 are grouped into three constructs: (1) price factors in innovation (indicators: R&D intensity, ICT investment and investment intensity);, (2) non-price factors in innovation (indicators: R&D networking with peers and social

media engagement),, (3) innovation motivation (indicator: motivation to innovate and motivation to compete). For Chapter 6, all indicators are grouped into eight constructs that exactly same as the constructs in examining CA 1) collaborative commitment, (2) collaborative efficiency agreements, (3) collaborative risk sharing, (4) collaborative planning, (5) collaborative resources sharing, (6) collaborative relational capital, (7) collaborative information and knowledge sharing, and (8) collaborative synchronised responses. Overall, there are 13 constructs in the key competitiveness sources.

The effect of the key competitiveness sources on firm performance was estimated directly and indirectly through firm capability, a mediator variable. To capture the impact of dynamic and operational capabilities on firm performance, four indicators were used: a) a firm's ability to respond to changes in the marketplace (adaptability); b) a firm's ability to fulfil various customer demands efficiently (flexibility); c) a firm's ability to offer product differentiation (differentiation); and d) a firm's ability to produce products at a competitive price (affordability).

The effect of key competitiveness sources on firm performance was estimated using hierarchical component models (HCMs). Two subsequent estimations in this model were lower order constructs (LOCs) and higher orders construct (HOC). The 13 constructs served as LOCs and the key competitiveness sources were positioned as a HOC. While the 13 constructs were conceptualised as reflective LOCs, the key competitiveness sources were conceptualised as a formative HOC. As J F. Hair et al. (2017) suggest, under reflective-formative

HCMs, a combination of a repeated indicators approach and latent scores used in the HOC provides an advantage in preventing an over-explained variance of a HOC.

Similar to the HCMs estimation in analysing CA in Chapter 6, this study used a repeated indicators approach mode B to obtain the latent score for the LOCs. This is because a repeated indicator approach mode B produces better parameter estimates than mode A in terms of root mean square errors (RMSE) and mean absolute relative bias (MARB) (Becker et al., 2012). The latent scores for the LOCs were used as manifest variables in the HOC estimation phase.

7.3 Discussion of the LOC and HOC Process

The results and discussion are divided into two sub-sections: results of the assessment of the LOCs and results of the assessment of the HOC.

7.3.1 Results of the Assessment of the LOCs

The assessment of the LOCs' internal consistency yielded an acceptable value of composite reliability ranging between 0.8 and 0.9. This indicates that the LOCs internal consistency results are fully reliable. The assessment of convergent validity for the LOCs' indicator reliability test showed that, among the 47 indicators (before purification), there were 32 indicators with a loading value greater than 0.7, which is the cut-off threshold for this indicator reliability test (J F. Hair et al., 2017). There were 15 indicators with a loading score below the threshold, with scores that varied between 0.4 and 0.6. According to Hulland (1999), in developing a new model, it is normal to have lower loading indicators

for LOCs. Even though some indicators have a lower loading, the bootstrapping estimate shows that all 47 indicators' loadings are statistically significant at the 1% level.

An indicator reliability test found that some indicators were not satisfactory. A convergent validity test found that the constructs have an average variance extracted (AVE) greater than 0.5, suggesting an adequate convergent validity. The values of the Fornell-Larcker criterion, cross loadings and HTMT establish the discriminant validity of the model.

When considering content validity, J F. Hair et al. (2017) and Hulland (1999) suggest that indicators with a loading value of 0.4 to 0.7 can be retained in the model and continue to the HOC stage. Instead of following this process, I prefer to purify the LOCs in order to achieve better assessment criteria results.

7.3.2 Results of the Assessment of the LOCs after Purification

Wieland et al. (2017) suggest that purification of the LOCs should be conducted based on statistical and theoretical judgment. Following J F. Hair et al. (2017), I analysed the impact of removing indicators with a lower loading on internal consistency reliability, and found that there were no significant changes in the results, which suggests that the indicators can be retained.

However, after I examined the level of importance of those indicators in terms of their contribution to the reliability tests, I decided to eliminate R&D networking with government and R&D networking with universities (two indicators in the construct of non-price factors of innovation) because of very low loading. I also

dropped number of employees (an indicator in the construct of price factors of innovation) because that helped to improve the HTMT of the construct. I also removed duration of relationship, an indicator in the construct of credit access, because that helped to increase the AVE value. In addition, I also split the construct of non-price factors of innovation to become two constructs (non-price factors of innovation and innovation motivation), which also helped to improve the AVE value of these two constructs.

After the purification process, the model had 43 indicators measuring 13 constructs of the key competitiveness sources. Figure 7.1 presents the LOCs after purification and Table 7.1 shows the results of the assessment of the LOCs after purification.

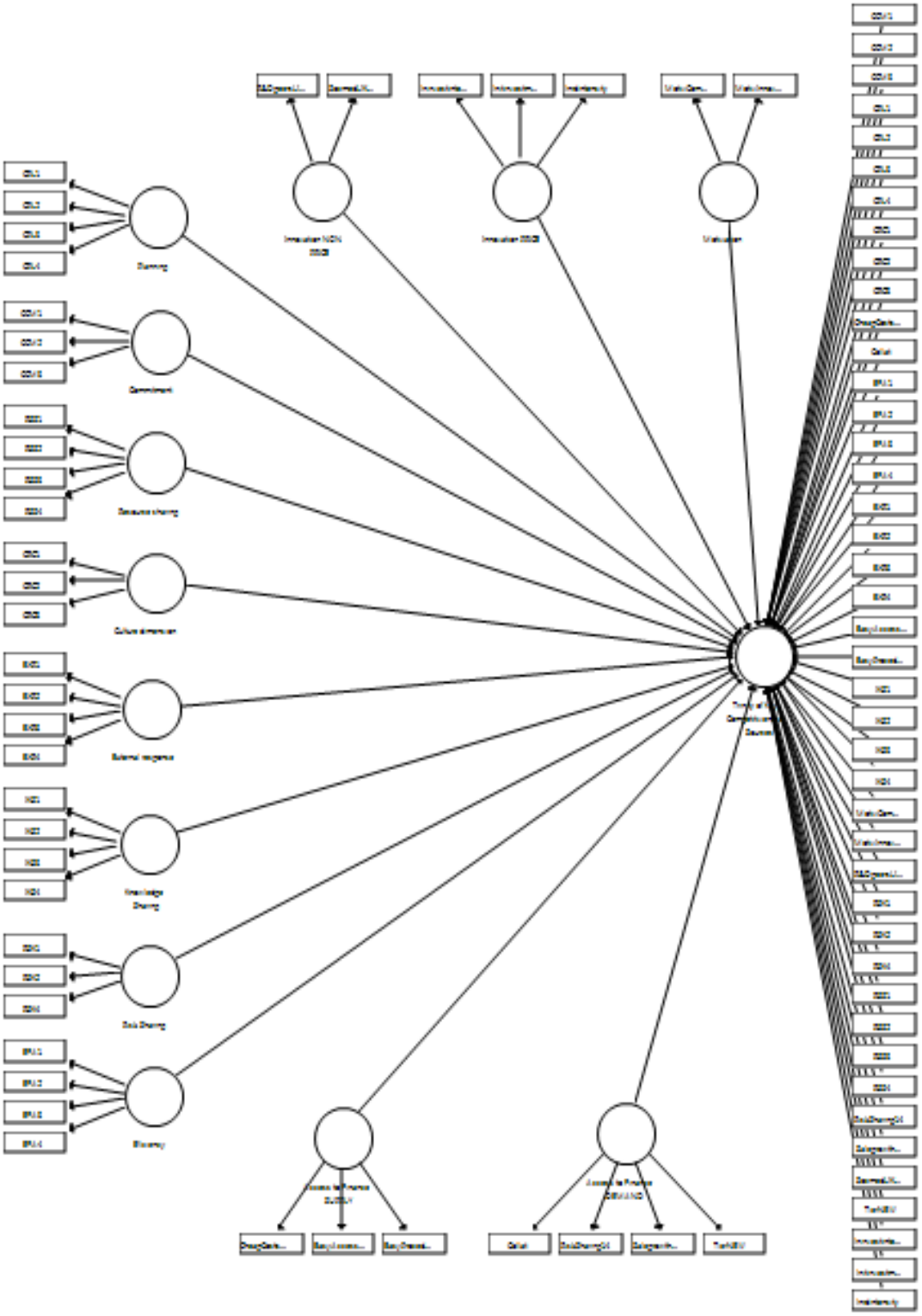


Figure 7.1 LOCs After Purification

Table 7.1 LOCs Results after Purification

Constructs	Indicators		Factor Loadings	Internal consistency Composite reliability	Convergent validity AVE	Discriminant validity Cross-loading indicator[40]	 Fornell-Larcker criterion[41]	HTMT (< 0.9)
Price factors in innovation	1	PFI1	0.934	0.916	0.786	Yes	Yes	Yes
	2	PFI2	0.866					
	3	PFI3	0.856					
Non-price factors in innovation	4	NPF1	0.966	0.698	0.567	Yes	Yes	Yes
	5	NPF2	0.500					
Innovation motivation	6	IMO1	0.532	0.617	0.456	Yes	Yes	Yes
	7	IMO2	0.793					
Demand side factors of credit access	8	DSCA1	0.552	0.766	0.453	Yes	Yes	Yes
	9	DSCA2	0.696					
	10	DSCA3	0.688					
	11	DSCA4	0.742					
Supply side factors of credit access	12	SSCA1	0.609	0.783	0.550	Yes	Yes	Yes
	13	SSCA2	0.756					
	14	SSCA3	0.841					
Collaborative commitment	15	CCM 1	0.830	0.880	0.710	Yes	Yes	Yes
	16	CCM 2	0.828					
	17	CCM 3	0.869					
Collaborative efficiency agreements	18	EFA 1	0.500	0.857	0.609	Yes	Yes	Yes
	19	EFA 2	0.812					
	20	EFA 3	0.908					
	21	EFA 4	0.843					
Collaborative risk sharing	22	RSK 1	0.885	0.864	0.577	Yes	Yes	Yes
	23	RSK 2	0.861					
	24	RSK 3	0.720					
Collaborative planning	25	CPL 1	0.613	0.815	0.531	Yes	Yes	Yes
	26	CPL 2	0.856					
	27	CPL 3	0.825					
	28	CPL 4	0.580					
Collaborative resources sharing	29	RSS 1	0.555	0.842	0.577	Yes	Yes	Yes
	30	RSS 2	0.806					
	31	RSS 3	0.802					
	32	RSS 4	0.839					
Collaborative relational capital	33	CRC 1	0.879	0.895	0.740	Yes	Yes	Yes
	34	CRC2	0.836					
	35	CRC 3	0.865					
Collaborative information and knowledge sharing	36	IKS 1	0.787	0.892	0.673	Yes	Yes	Yes
	37	IKS 2	0.827					
	38	IKS 3	0.864					
	39	IKS 4	0.801					
Collaborative synchronise**d responses**	40	EXR 1	0.845	0.875	0.639	Yes	Yes	Yes
	41	EXR 2	0.879					
	42	EXR 3	0.800					
	43	EXR 4	0.655					

[40] The indicator's outer loading on the associated construct is greater than its cross loading.

[41] The AVE for the associated construct is larger than the squared correlation with any other construct.

The LOCs after purification statistically meet all the assessment criteria. The indicator loadings as a measure of indicator reliability show that, among 43 indicator loadings, 32 indicators have a loading value greater than 0.7 and 11 indicators have a loading between 0.5 and 0.7. All indicator loadings are significant at 1% based on the bootstrapping estimation results.

The composite reliability test to evaluate the internal consistency showed that the model has satisfactory results with a range from 0.8 to 0.9. Evaluation of the convergent validity through average variance extracted (AVE) indicated that all constructs have value greater than 0.5 (except for the construct of innovation motivation and demand side of credit access). Fornell and Larcker (1981) assert that, even if the AVE is 0.4, the convergent validity of the construct is still adequate as long as the composite reliability is higher than 0.6. Examining the discriminant validity, Fornell-Larcker criterion, cross loading and HTMT established the discriminant validity of the model. The results from the three tests confirmed that the LOCs to be used for the next phase were valid and reliable.

7.3.3 Results of the Assessment of the HOC

The HOC measurement model was conceptualised as a formative model. To estimate the key competitiveness sources, the latent scores for each LOC were used as manifest indicators in the HOC phase (Figure 7.2). All latent constructs from LOCs will now be referred to as manifest indicators.

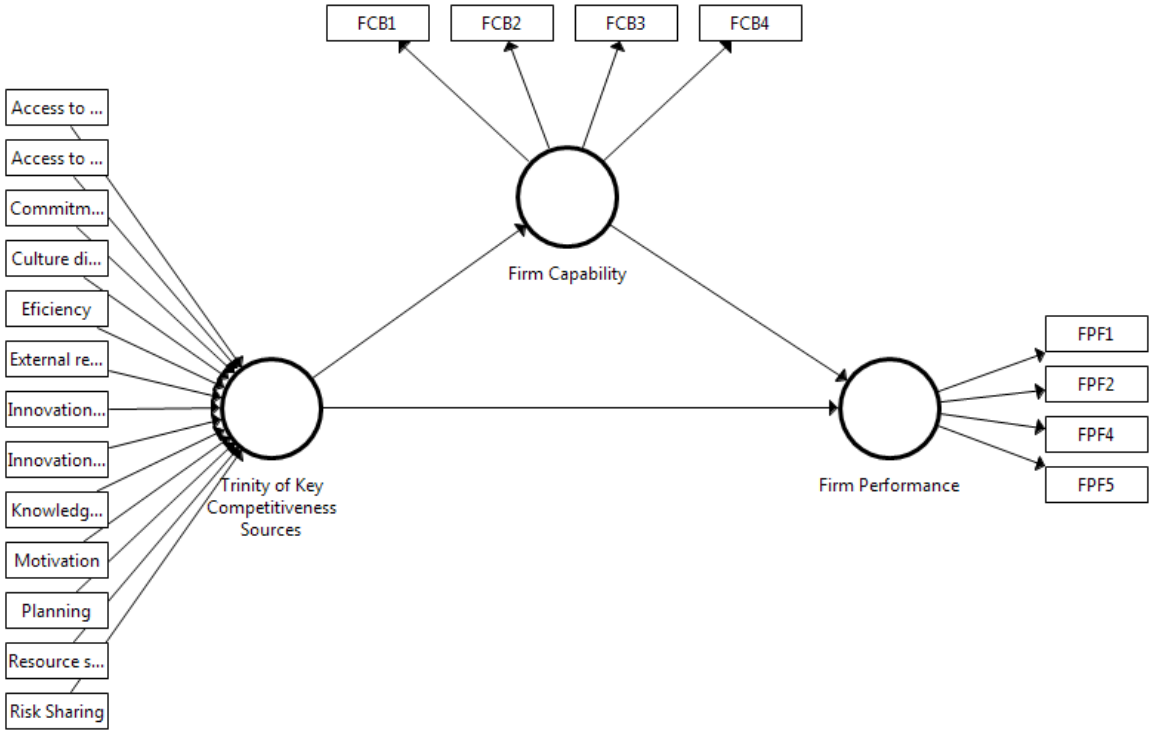


Figure 7.2 HOC Process

The manifest indicators are expected to have a low level of correlation with each other at the HOC phase. According to J F. Hair et al. (2017), a high level of correlation between manifest indicators will be problematic in terms of the methodology and interpretation of the path coefficient. High correlations between manifest indicators also make it difficult to distinguish the individual effect of the indicators (Diamantopoulos & Winklhofer, 2001). Moreover, Cenfetelli and Bassellier (2009) remind us that multicollinearity may also create unstable indicator weights and cause type II errors (the possibility of justification that the indicators correlation is not significant while it was theorized to be relevant). Table 7.2 reports the results of the correlation and the level of loading weight significance of the manifest indicators.

Table 7.2 Results of the Assessment of the HOC

Indicators	VIF	Indicator weight			Indicator loading		
		Coefficient		Standard error	Coefficient		Standard error
Price factors in innovation	1.783	0.133		0.089	0.379	***	0.086
Non-price factors in innovation	1.312	-0.042		0.088	0.261	***	0.097
Innovation motivation	1.199	0.103		0.080	0.232	**	0.094
Demand side factors of credit access	2.302	-0.013		0.098	0.534	***	0.071
Supply side factors of credit access	1.226	-0.097		0.075	0.210	**	0.095
Collaborative commitment	2.094	0.190	*	0.101	0.691	***	0.071
Collaborative efficiency agreements	2.628	-0.170		0.123	0.619	***	0.073
Collaborative risk sharing	2.529	0.370	***	0.097	0.769	***	0.053
Collaborative planning	2.276	0.269	**	0.109	0.814	***	0.050
Collaborative resources sharing	1.684	0.223	***	0.084	0.718	***	0.054
Collaborative relational capital	2.137	0.171	*	0.104	0.696	***	0.057
Collaborative information and knowledge sharing	3.066	0.221	**	0.116	0.821	***	0.047
Collaborative synchronised responses	2.963	-0.040		0.122	0.670	***	0.064

* Significant at 10%, ** Significant at 5%, *** Significant at 1%

The variance inflation factor (VIF) can be used as a measure of the presence of multicollinearity. The estimated VIF showed that the manifest indicators were free from collinearity problems. They ranged from 1.199 to 3.066, which is below the suggested threshold of 5 for PLS-SEM (J F. Hair et al., 2017).

Cenfetelli and Bassellier (2009) suggest that the statistical significance of the indicators' weights provides very useful information in the formative model as it measures the relative importance of each manifest indicator. The bootstrapping

estimation with 1000 subsamples revealed that six out of the 13 manifest indicators have statistically significant weights. Collaborative risk sharing and collaborative resources sharing are significant at the 1% level; collaborative planning and collaborative information and knowledge sharing are significant at the 5% level, and collaborative commitment and collaborative relational capital are significant at the 10% level. However, I also found insignificant weights for seven other manifest indicators (price factors in innovation, non-price factors in innovation, innovation motivation, demand side factors of credit access, supply side factors of credit access, collaborative efficiency agreements, and collaborative synchronised responses). Even though these seven manifest indicators' weights are not significant, the HOC estimation showed that the loading values of these seven indicators are above 0.6 and statistically significant at a 1% and 5% level of significance.

According to J F. Hair et al. (2017) and Cenfetelli and Bassellier (2009), having some manifest indicators with insignificant weight do not necessarily mean that the formative model is of poor quality. Another interpretation is that those constructs make a smaller contribution to a formatively measured construct. The model can be viewed holistically by looking at the absolute contribution of those manifest indicators through their outer loadings. Moreover, MacKenzie et al. (2005) suggest that to avoid the possibility of changing the meaning of the construct, formative manifest indicators with lower weights can be retained in the model.

Considering that some manifest indicators have a relative contribution and some others have an absolute contribution, a purification process may be needed to improve the reliability of the structural model in explaining the effect of the key competitiveness sources on firm performance.

7.3.4 Assessment of the HOC after Purification

Following the suggestion from Cenfetelli and Bassellier (2009), as applied to the CA case in Chapter 6, to purify the insignificant weights of some manifest indicators, the manifest indicators were categorised into different constructs. The manifest indicators originating from credit access (demand side factors and supply side factors) were grouped as credit access; the manifest indicators from innovation (price factors, non-price factors and motivation) were grouped into innovation; and 8 manifest indicators of CA were grouped into three different constructs: inter-firm trust building, dynamic synchronisation and resources investment. The result of the grouping is shown in Figure 7.3.

Unlike the credit access and innovation constructs, the decision to group the 8 CA manifest indicators into three different construct was intended to balance the number of the indicators in each construct. J F. Hair et al. (2017) suggest that the number of indicators in each construct should be equal or not strongly vary to achieve statistically unbiased results. Table 7.3 reports the results of the HOC's indicators' weights after purification.

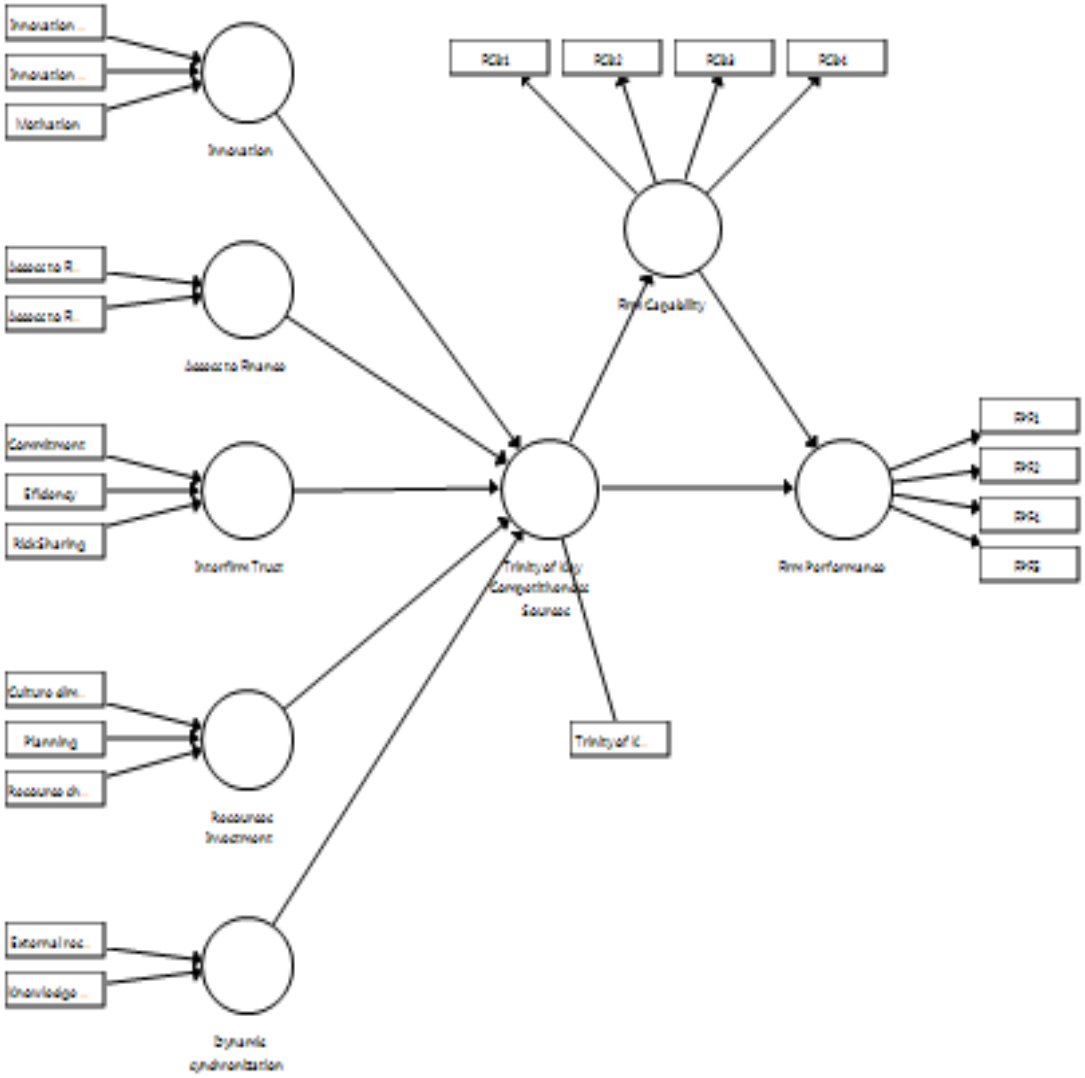


Figure 7.3 HOC Process after Purification

Table 7.3 shows the estimation results of the HOC after purification. It shows that there is no multicollinearity issue in the structural model, as indicated by the VIF values of the outer and inner model, which are under the threshold of 5 (J F. Hair et al., 2017). All the newly grouped constructs (except for inter-firm trust building), have VIF values under 3.3, which can also be an indication that the model is not contaminated by the common method bias problem (Kock, 2015).

Table 7.3 Results of the Assessment of the HOC after Purification

Indicator weights				Constructs				
	Coefficient		Standard error		Coefficient		Standard error	Inner VIF
Price factors in innovation	0.672	***	0.074	Innovation	0.143	***	0.011	1.722
Non-price factors in innovation	0.585	***	0.076					
Innovation motivation	0.318	***	0.092					
Demand side factors of credit access	0.814	***	0.049	Credit access	0.201	***	0.014	1.809
Supply side factors of credit access	0.411	***	0.076					
Collaborative commitment to inter-firm trust **building**	0.368	***	0.044	Inter-firm trust building	0.269	***	0.016	3.473
Collaborative efficiency agreements to inter-firm trust building	0.484	***	0.050					
Collaborative risk sharing to inter-firm trust building	0.361	***	0.055					
Collaborative planning to resources investment	0.528	***	0.058	Resources investment	0.330	***	0.013	2.299
Collaborative resources sharing to resources investment	0.398	***	0.061					
Collaborative relational capital to resources investment	0.268	***	0.060					
Collaborative information & knowledge sharing to dynamic synchronisation	0.641	***	0.058	Dynamic synchronisation	0.267	***	0.015	3.043
Collaborative synchronised responses to dynamic synchronisation	0.433	***	0.060					

* Significant at 10%, ** Significant at 5%, *** Significant at 1%

A bootstrapping estimation for the HOC after purification revealed that all eight manifest indicators after purification have statistically significant weights at the 1% level. The 7 manifest indicators (price factors in innovation, non-price factors in innovation, innovation motivation, demand side factors of credit access, supply side factors of credit access, collaborative efficiency agreements, and collaborative

synchronised responses) that previously had insignificant weights now have significant weights.

In addition to the manifest indicators and the HOC, the mediator variable (firm capability) and dependent variable (firm performance) also meet all the reliability tests (internal consistency, convergent validity and discriminant validity) of reflective measurement.

7.4 Results of the Structural Model

The results of the assessment of the LOCs, HOC, mediator variable and dependent variables, as explained above, showed that all constructs met the requirements of the reliability and validity tests. Therefore, the structural model can now be examined. The results of the structural model are presented in Table 7.4.

Table 7.4 Results of the Structural Model

Path	Coefficients	Standard error		f^2
Key competitiveness sources to firm performance	0.232	0.068	***	0.058
Key competitiveness sources to firm capability	0.654	0.038	***	0.749
Firm capability to firm performance	0.511	0.064	***	0.281
Indirect effect of key competitiveness sources to firm capability-firm performance	0.334	0.044	***	
Total effect of key competitiveness sources to firm performance	0.566	0.051	***	
Adjusted R^2 firm capability	0.425			
Adjusted R^2 firm performance	0.464			

* Significant at 10%, ** Significant at 5%, *** Significant at 1%

In the structural model, I find that the path coefficient (direct effect) of key competitiveness sources to firm performance is 0.232, which is statistically significant at the level of 1%. This means that increasing the level of key competitiveness by 1% is estimated to increase firm performance by 0.232%. The direct contribution of the combination of credit access, innovation and CA on firm performance was found to be higher than the effect of CA on firm performance when it was analysed alone in Chapter 6. The direct effect of CA on firm performance is only about 0.170. This indicates that the three competitiveness sources (credit access, innovation, and CA) may produce a different effect when they are put together.

The value of the coefficient determination (adjusted R^2) of firm performance of 0.464 indicates that the model has a moderate predictive power. The blindfolding test for cross-validated redundancy showed that the predictive power (Q^2) is 0.96, 0.289 and 0.283 for the key competitiveness sources, firm performance and firm capability respectively. This supports the model's predictive relevance with regard to the endogenous latent variable (J F. Hair et al., 2017).

I observe that the path coefficient of key competitiveness sources to firm capability is 0.654 and statistically significant at the level of 1%. In comparison with firm performance, the key competitiveness sources' direct effect on firm capability is almost three times larger, with an effect size of 0.749. In addition, firm capability has a positive and significant effect on firm performance, with a path coefficient of 0.511 and effect size of 0.281. This shows that firm performance is not only

affected directly by the key competitiveness sources, but also indirectly by firm capability.

The significant coefficient of the indirect effect of the key competitiveness sources on firm capability and the coefficient from firm capability to firm performance imply that the mediating effect was found. The estimation results showed that both coefficients (from the key competitiveness sources to firm capability as well as firm capability to firm performance) are significant at the 1% level. The magnitude of the indirect effect of the key competitiveness sources on firm performance through the mediator variable (0.334) is about one and a half times larger than its direct effect (0.232). Overall, at a 1% level of significance, the key competitiveness sources are estimated to affect firm performance at about 0.566, which is slightly higher than the total effect of CA. The ratio of the indirect effects to the total effect (VAF) of 0.590 confirms that firm capability partially mediates the relationship between the key competitiveness sources and firm performance.

Based on the data of the standardised latent variables from the structural analysis, the estimation results can also be displayed in scatter plots. The scatter plots will show individual firm's position based on their key competitiveness sources strength and firm performance acheivement. This will be useful for deriving policy recommendations that target a specific firm or group of firms based on their characteristics. Figure 7.4 shows the scatter plots of the relationship between the key competitiveness sources for each firm and the firm’s performance. The key

competitiveness sources are on the horizontal axis and firm performance is on the vertical axis.

The scatter plots show a positive linear relationship between the key competitiveness sources and firm performance. Scatter plots based on the key competitiveness sources and firm capability also show a positive relationship (Figure 7.5). This indicates that, as firms improve the key competitiveness sources and their capability, their performance tends to increase. The scatter plots are further split into 4 quadrants (quadrant I, II, III, and IV) to identify firms of different levels of competitiveness and performance (Figure 7.6). In explaining each quadrant, the discussion is linked to the credit access, innovation and CA as the three key competitiveness sources. Quadrant I is referred to as superior firms, quadrant II as mediocre firms, quadrant III as inferior firms, and quadrant IV as meagre firms.

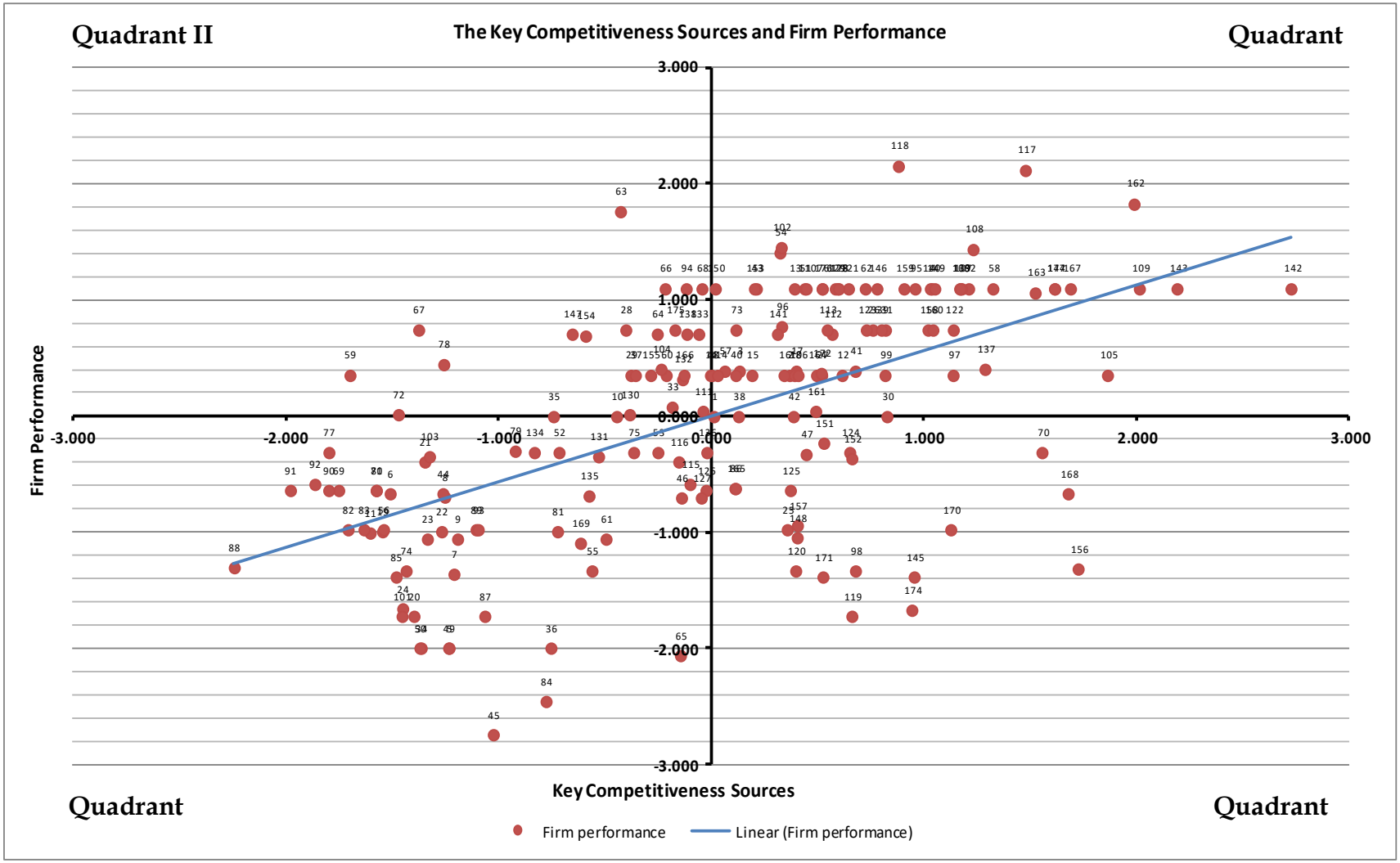


Figure 7.4 Scatter Plot of Latent Variable of the Key Competitiveness Sources and Firm Performance

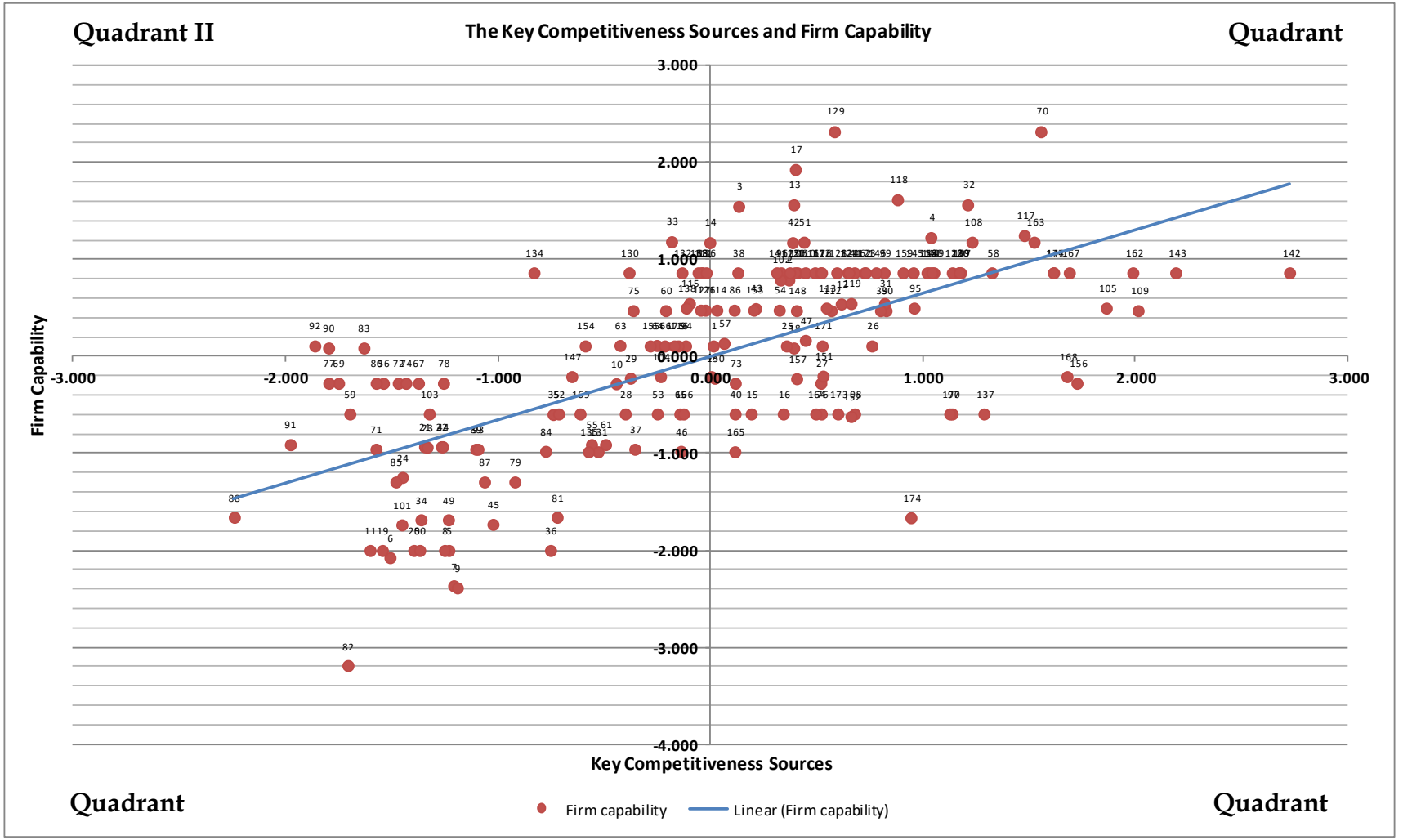


Figure 7.5 Scatter Plot of Latent Variable of the Key Competitiveness Sources and Firm Capability

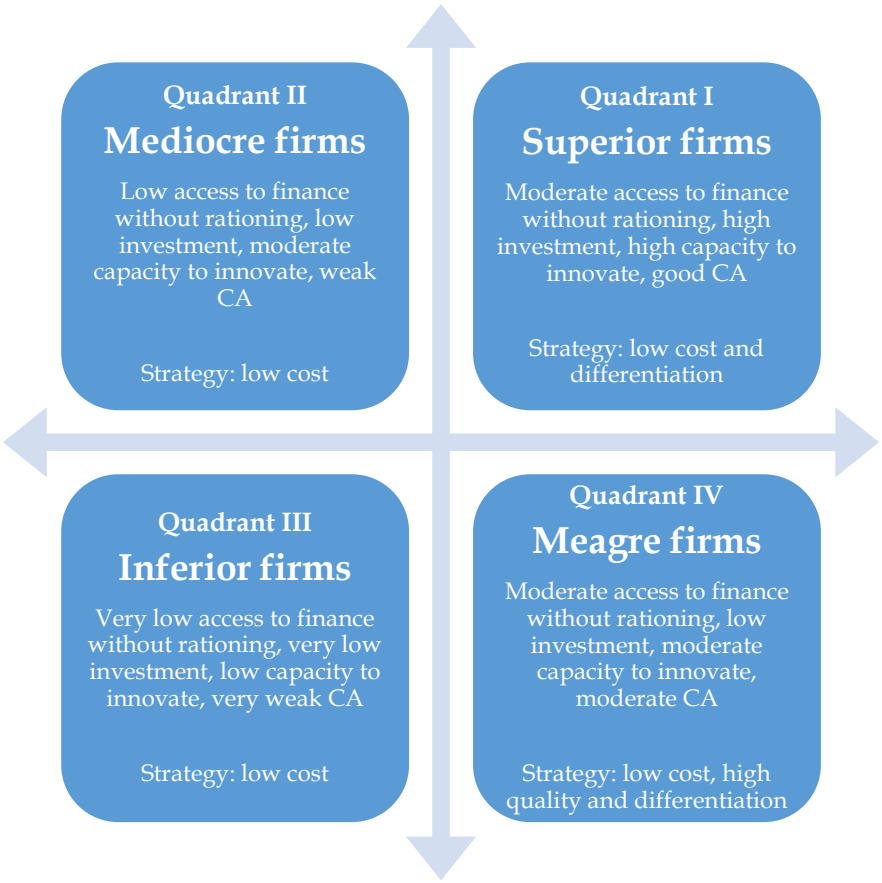


Figure 7.6 Grouping of Firms Based on the Key Competitiveness Sources and Firm Performance

Table 7.5 Some Indicators of Firms' Access to Credit, Innovation and CA

Description		Quadrant			
		I	II	III	IV
Credit access	Number of firms (unit)	70	26	57	24
	Firms with access to credit (%)	52.86	34.60	45.60	54.17
	Firms without access to credit (%)	47.14	65.40	54.40	45.83
	Firms with access to credit without rationing (%)	21.43	7.70	3.50	20.8
	Firms with invest in expansion (%)	46.00	15.40	8.80	33.33
	Firms without invest in expansion (%)	54.00	84.60	91.20	66.67
Innovation	Average R&D intensity expenditure (% to total sales)	4.10	3.00	1.70	3.13
	Average output of process innovation	2.54	1.35	0.84	1.79
	Average output of machinery innovation	2.21	1.81	0.54	1.25
	Average output of product innovation	2.63	1.96	1.14	2.29
Collaborative advantage	Firms with OEMs' networking (%)	47.14	19.20	3.50	41.6
	Firms without OEMs' networking (%)	52.86	80.80	96.50	58.4

Source: Primary data, 2017

7.4.1 Quadrant I (Superior Firms)

Quadrant I consists of firms that have high key competitiveness sources that have successfully transformed them into very good performance. Table 7.5 shows that the number of firms in this quadrant is 70, equalling 39.55% of the total sample. Firms in this quadrant can develop a relatively high level of competitiveness compared to other sample firms in this study because they have good competitiveness sources and have applied appropriate strategies to compete. Firms in quadrant I have moderate access to finance, as 37 firms (52.86%) are borrowers who have access to formal financial institutions. With so many firms having access to finance, it is no surprise that 17 firms in this group (46%) are making new investments for business expansion and/or to open new factories.

Firms in quadrant I engage in innovation activities intensely. They exploit both price and non-price factors in innovation. The average expenditure on R&D of firms in this group was 4.10% of total sales. Their R&D expenditures are higher than the firms in the other three quadrants. Their effort to innovate is also supported by hiring skilled employees. In addition, firms in this group also allocate investment in information and technology of on average about 3.19% of total sales.

Their motivation to innovate has to some extent been influenced by pressure from tougher competition in the market. The firms in this quadrant face tough competition from products imported from China, Japan, Thailand and Taiwan. Their efforts in investing in price factors and incorporating non-price factors have

significantly affected their capacity to produce innovation outputs. The average output of innovation produced by companies in quadrant I for process, machine and product is 2.54, 2.21 and 2.63 respectively. This number of innovation outputs is higher than for the firms in the other three quadrants.

Firms in quadrant I are also very active in networking with their peers. About 33 firms (47.14%) in this quadrant engage in networking with OEMs in Tier 2 or Tier 3. They are active in the following CA activities: collaborative commitment, collaborative efficiency agreements, collaborative planning, collaborative resources sharing, collaborative information and knowledge sharing, collaborative synchronised responses, collaborative relational capital and collaborative risk sharing. The networking has to some extent increased their chance of expanding their business through wider access to finance and also improved their innovation capacity through access to new shared knowledge and innovation as well as new technology.

To compete with their competitors in the market, the majority of firms in quadrant I apply strategies of low cost (74.30%) and differentiation (41.43%). While nearly half of the firms applying the low-cost strategy state that the prices of their products are cheaper than the prices of competitors' products, about 66% of the firms in this quadrant claim that their products are of better quality than their competitors' products.

7.4.2 Quadrant II (Mediocre Firms)

Firms in quadrant II have a lower level of competitiveness than firms in quadrant I, but they achieve fairly good firm performance. The number of firms in this quadrant is 26, which equals 14.70% of the total sample. Most of the firms in this group are non-borrowers (65.40%) who have no access to finance or for some reasons have withdrawn from the formal credit market. Only 9 firms (34.60%) have access to formal financial institutions. Under such conditions, the level of investment in expansion in this group of firms is low. Only 15.40% of firms do invest in expansion.

Firms in this quadrant are moderately involved in innovation and take time to carry out innovation activities. They spend on average about 3% of total sales on R&D expenditure. In addition, they also allocate a budget for IT investment to support innovation of on average 2.58% of total sales. However, firms in this quadrant are found to be lacking in hiring highly skilled employees. Therefore, it is not surprising to find that their capacity to produce innovation outputs is relatively low, on average only 1.35, 1.81 and 1.96 for process, machinery and product innovation respectively.

Networking with peers does not seem to get enough attention in the firms in this quadrant. In general, they have low supply chain linkages with their peers, and on average only 19.20% have affiliations with OEMs in Tier 2 or Tier 3. The firms in this quadrant also give less attention to the aspects of sharing information and

knowledge, dynamic synchronisation of responses to external changes and sharing risk.

With a relatively low level of the key competitiveness sources, firms in quadrant II have successfully managed fairly good firm performance. One of the possible explanations for this unique case is their competitiveness strategy. Their competitiveness strategy seems to be producing goods of mediocre quality and selling them at a low price. This strategy is applied by about 84% of firms in this quadrant. Applying a low-price strategy is one of their survival efforts to balance the tough competition with products imported from China. As many as 88.50% of the firms in this quadrant state that automotive components from China are the toughest competitors that they have to face in the market.

7.4.3 Quadrant III (Inferior Firms)

Quadrant III consists of firms with a deficit in the key competitiveness sources and which tend to perform poorly. The number of firms in this group is 57. In comparison to other quadrants, the firms in quadrant III have the lowest standardised value of the key competitiveness sources. While many firms in this group are getting loans from formal financial institutions, their investment in expansion is low, only 8.80%. The loans obtained from financial institutions were probably used to cover operating expenses, such as purchasing raw materials.

Firms in quadrant III spend less on innovation activities than firms in other quadrants. Firms in quadrant III only allocate a budget for R&D of on average 1.7% of total sales. This is less than half of the R&D expenditure of firms in the

other quadrants. Firms in this quadrant seem to be unable to motivate themselves to innovate. What is more concerning from firms in this group is that only 14% are motivated to innovate, even though they know that their competitors' products' prices are lower than their products' prices. With huge constraints in price and non-price factors, firms in this quadrant struggle to produce innovation outputs: on average, they only produced 0.84, 0.54 and 1.14 for process, machinery and product innovation respectively.

The way firms in quadrant III develop collaboration with their peers can be considered weaker than in other quadrants. On average only 3.50% of firms have affiliations with OEMs in Tier 2 or Tier 3. The firms in this quadrant are very weak in terms of sharing resources, efficiency agreements, sharing risk, sharing information and knowledge, and dynamic synchronisation of responses to external changes.

To compete in the market, the majority of firms in this quadrant (91.20%) focus on a low-cost strategy. About 52.60% of firms stated that their prices are very competitive in the market. However, their level of price competitiveness is unable to lift the firms' performance significantly. One of the reasons is none of the firms in this quadrant have met national certification standards (SNI).

7.4.4 Quadrant IV (Meagre Firms)

Firms in quadrant IV have higher key competitiveness sources than those in quadrant II, but they tend to have poor firm performance. The number of firms in this quadrant is 24, which equals 13.60% of the total sample. While many firms in

this group have moderate access to formal financial institutions, they do not invest their money in expansion. Only 8 firms (33.33%) are investing in expanding their business.

Firms in quadrant IV spend on average about 3.13% of total sales on innovation activities. Their investment in R&D is the second largest after the firms in quadrant I. Because the main competition strategy of firms in this quadrant is to prioritize product quality (79.20% of firms), it seems that their eagerness to spend funding on innovation is to improve product quality. While the firms in quadrant IV are eager to innovate, they pay less attention to the contribution of non-price factors to innovation, such as pressure from their competitors. Only 16.70% of firms have motivation to innovate for better pricing or at least to equalize their products' prices with their competitors' prices. Moreover, the majority of the firms in quadrant IV employ a low number of highly skilled workers. These firms have reduced their capacity to innovate, and hence they are unable to produce innovative outputs that meet their expectations. The average number of innovation outputs produced by firms in this quadrant for process, machinery and product innovation is 1.79, 1.25 and 2.29 outputs respectively.

Firms in quadrant IV have good networking with their peers, as about 10 firms (41.6%) have collaborations with OEMs in Tier 2 and Tier 3. However, they are unable to optimise the benefits from the collaboration. This is mainly caused by their inability to take advantage of collaborative information and knowledge sharing, collaborative risk sharing, collaborative resources sharing and

collaborative synchronised responses. The lack of attention to these is likely to be one of the factors influencing the low achievement of innovation outputs as mentioned above.

To compete in the market, firms in this quadrant rely on strategies of low price (70.80%) but producing high quality (79.20%) and differentiation (37.50%). However, their products' prices cannot be as competitive as the competitors' products. Only 12.50% of these firms stated that the prices of their products are cheaper than their competitors. With limited innovation ability, the differentiation strategy and quality they offer to customers are also in question. The products of firms in this quadrant are facing tough competition from products from China, Japan and Taiwan.

By looking at these four quadrants, a threshold for SMEs in order to operate, to operate, to grow and be competitive sustainably can be set by referring to the characteristics of firms in quadrant 1. These characteristics are linked to the body of knowledge in the three key sources of competitiveness. As a foundation, a firm should have access to credit with very minimum rationings. As a growth factor, a threshold for every firm to succeed in doing innovation is to allocate about 4% or more on R&D activities. In addition, a threshold for output of process, machinery and product innovation is minimum two outputs each. As an expansion factor, a threshold for every firm to succeed in obtaining external benefits from the peers is through active networking, either networking with OEMs or with other firms in the supply chain linkage.

7.5 Summary of the Chapter

The Conceptualisation of the key competitiveness sources and its combined effect on firm performance was examined using a hierarchical component model (HCM). The key competitiveness sources model was constructed based on the indicators used to examine the effect of credit access, innovation and collaborative advantage on firm performance in Chapters 4, 5 and 6 and applied together in this chapter. The estimation results showed that credit access, innovation and collaborative advantage together significantly affect firm performance.

The estimation results also show the effect is stronger when a firm's capability as a mediator is taken into account. The magnitude of the indirect effect of the key competitiveness sources on firm performance through the mediator variable is more than twice as large as its direct effect. This implies that a firm's capability contributes to the key competitiveness sources, and thus improves firm performance.

The scatter plot (based on the standardised latent variables) of the relationship between the three key competitiveness sources and firm performance (Figure 7.4) mapped the firms into four groups, namely superior, mediocre, inferior and meagre. The groups provide an important guide to how SMEs can improve their key competitiveness sources and transform them into good firm performance. It is necessary for every firm to have sufficient resources, both price and non-price, and to allocate them accordingly to expand investment and engage in innovation.

Firms should also mutually exchange and obtain resources from their networking peers. How a firm allocates its resources affects and is affected by its capabilities such as adaptability, flexibility, differentiation, and affordability. In the process of allocating resources and managing a firm's capabilities, a strategy for competing in the market should also be developed in order for the firm to be considered superior. A firm that lacks one of the three key competitiveness sources would fall into one of the remaining three groups (mediocre, inferior, and meagre).

CHAPTER 8

CONCLUSION AND FUTURE RESEARCH

8.1 Introduction

This study aimed to investigate the key competitiveness sources (credit access, innovation, and collaborative advantage) for SMEs producing automotive components. I looked at these three key competitiveness sources separately, reporting on each in its own chapter (Chapters 4, 5 and 6), and also the combined effect (Chapter 7). Prior to discussing these issues, I provided an overview of the context of Indonesia's automotive component SMEs relevant to the three key competitiveness sources. The foundation of each key competitiveness source and variables selected for analysis were underpinned by the theories and relevant previous studies. The empirical findings were examined with robust methodologies that suited the three key competitiveness sources, individually and together. The findings have been discussed in alignment with the research questions by connecting them with the theories, previous research evidence and potential implications.

In this final chapter, I summarise the main findings and provide an oversight of the new contributions of the research to the existing literature. Based on these findings, I also identify some potential research implications both for managers and for policy makers. In addition, I address the limitations of the study and some areas for potential further research.

8.2 Summary of the Research Findings

The three key competitiveness sources for SMEs are derived from the fundamental literature of firm competitiveness theories combined with a systematic literature review (SLR). During the last three decades, among many theories of firm competitiveness, three main theories with strong foundations have been referred to as primary references: a) competitive advantage theory by Porter (1985); b) resources-based view (RBV) by Barney (1991) and the extended ERBV by Lavie (2006); and c) collaborative advantage theory by Dyer (2000).

With the support of these theories and the SLR, this thesis has offered another view of a firm's competitiveness specifically for SMEs in developing countries. I examined how internal firm factors interact with external factors to establish the three key sources of competitiveness: a) credit access; b) innovation; and c) collaborative advantage (CA).

8.2.1 The Effect of Credit Access on Firm Performance

To answer research question one, this study examined the extent to which credit access affects a firm's probability of investing and firm performance in automotive component SMEs. It is evident that SMEs, especially in developing countries, have limited access to credit from formal financial institutions. The approach to examining credit access was based on the analysis of factors affecting credit rationing from the demand side. While prior research has mostly focused only on borrowers' perspectives, I examined the effect of credit rationing on a firm's performance by covering both from borrowers' and non-borrowers' perspectives.

The central hypothesis of the credit access chapter is that credit rationing negatively affects a firm's probability of investing in expansion and firm performance. I found that, for borrowers, regardless of weak and strong rationing, credit rationing significantly reduces a firm's probability of investing in expansion. Strong rationing was found to have a more severe adverse effect than weak rationing. As a result, while firms with weak rationing only face difficulty meeting their capital expenditure, firms facing strong rationing are hardly able to afford both operational and capital expenditures. It is also evident that weak and strong rationings negatively affect firms' profit growth, where the adverse effect on firms with strong rationing is larger than firms with weak rationing. A borrower's probability of weak and strong rationing can be reduced when it is willing to offer a higher ratio of collateral to the proposed loan, achieve higher sales growth and when it establishes a risk-sharing scheme with peers. In addition, increasing competition among banks will also reduce the probability of rationings.

For non-borrowers, I found evidence that credit rationing (quantity, risk, transaction cost and cultural) has a significant negative effect on a firm's probability of investing in expansion. My results also show that firms' internal funds generated through higher sales growth are exploited as one of the main sources of funds for investment in expansion. I also found that non-borrowers are slower to make decisions to invest under the pressure of regional competition are than borrowers. The probability of rationing for non-borrowers will be lower if

they can offer a higher ratio of collateral to the proposed loan and establish a risk-sharing scheme with peers. In addition, having a longer relationship with a bank will also lessen the probability of risk and transaction cost rationings.

8.2.2 The Effect of Innovation on Firm Performance

To answer research question two, this study examined the extent to which innovation affects firm performance in automotive component SMEs. It is a fact that SMEs in emerging economies have a low level of innovation capacity and a lack of resources to invest in innovations. While the existing research mainly focuses on investigating the resources constraints that hinder SMEs innovating through price factors, this thesis offers an alternative perspective by also incorporating non-price factors (i.e., *supply chain linkages, pressure from competition, R&D networking* and *social media engagement*) in tandem with price factors (*i.e., R&D intensity, investment in expansion, tertiary-qualified employees, government support, ICT investment* and *product certification*).

The central hypothesis of the innovation chapter is that innovation outputs (process, machinery, and product) positively affect a firm's performance. Two other hypotheses were examined prior to testing this: (a) Price factors together with non-price factors positively affect a firm's innovation effort; (b) Price factors together with non-price factors positively affect a firm's innovation outputs. The indirect effects of price and non-price factors on firm performance were also examined. These hypotheses were examined using the CDM (Crepon, Duguet,

Mairesse) model. The innovation analysis was segregated into three phases (innovation effort, innovation output and firm performance).

The results provide evidence that both price and non-price factors contribute to the innovation effort phase, though price factors seem to contribute more. For the innovation output phase, I observed similar results, where price factors together with non-price factors dominate process, machinery, and product innovation. For the third phase, while machinery and product innovation significantly affect firm performance, process innovation does not. Even though these findings are consistent with those of Baumann and Kritikos (2016), Bronwyn H. Hall et al. (2012) and Griffith et al. (2006), there is an important point in which my findings differ from their research. While previous studies divided innovation outputs into process and product, I examined it in more detail by separating machinery innovation from those two types of innovations.

Furthermore, I also found that, when the direct effect of product innovation on firm performance was examined, price factors were found to play a crucial role in moderating the relationship. On the other hand, when the indirect effect of product innovation and firm performance was examined, non-price factors were found to critically moderate this relationship.

8.2.3 The Effect of CA on Firm Performance

To answer research question three, this study examined the extent to which collaborative advantage affects firm performance in automotive component SMEs. In an effort to achieve this objective, this research also re-conceptualised the

collaborative advantage (CA) model to fit into SMEs, especially those in developing countries. The central hypothesis of the collaborative advantage chapter is that CA has a direct positive effect on firm performance. In addition, I also tested the hypothesis that CA has an indirect effect on firm performance through firm capability as a mediating variable.

Examination of the CA conceptualisation using PLS-SEM two-stage reflective-formative hierarchical component model (HCM) validated eight constructs of CA for SMEs, namely, (1) collaborative commitment, (2) collaborative efficiency agreements, (3) collaborative risk sharing, (4) collaborative planning, (5) collaborative resources sharing, (6) collaborative relational capital, (7) collaborative information and knowledge sharing, and (8) collaborative synchronised responses. These constructs were re-categorised into three pillars, namely inter-firm trust, dynamic synchronisation, and resources investment.

Empirical testing of the structural HCM showed that CA has a direct positive effect on firm performance. This is broadly in line with previous research of Chang et al. (2016), Cao and Zhang (2010) and Flynn et al. (2010). CA may also affect firm performance indirectly through firm capability as a mediating variable. Firm capability is reflected by a firm abilities to adapt as the market environment changes, the ability to meet changing customer requests efficiently, the ability to differentiate its products and the ability to produce quality products with competitive prices. The results provide evidence that firm capability mediates the relationship between CA and firm performance. The magnitude of the indirect

effect of CA on firm performance through firm capability was found to be higher than its direct effect.

8.2.4 The Combined Effect of Credit Access, Innovation, and CA on Firm Performance

To answer research question four, this study examined the effect of credit access, innovation, and CA simultaneously on firm performance. By employing the PLS-SEM two-stage reflective-formative hierarchical component model (HCM), I found that these three key competitiveness sources significantly affect SMEs' performance. Furthermore, combining the three key competitiveness sources provides a larger direct effect on firm performance. The highest effect is contributed by CA, followed by credit access and then innovation.

The evidence from Chapters 4, 5, 6 and 7, supported by the theories, is sufficient to propose a model of the trinity of key competitiveness sources for SMEs in developing countries. This model is presented in a triangular wheel diagram shown below.

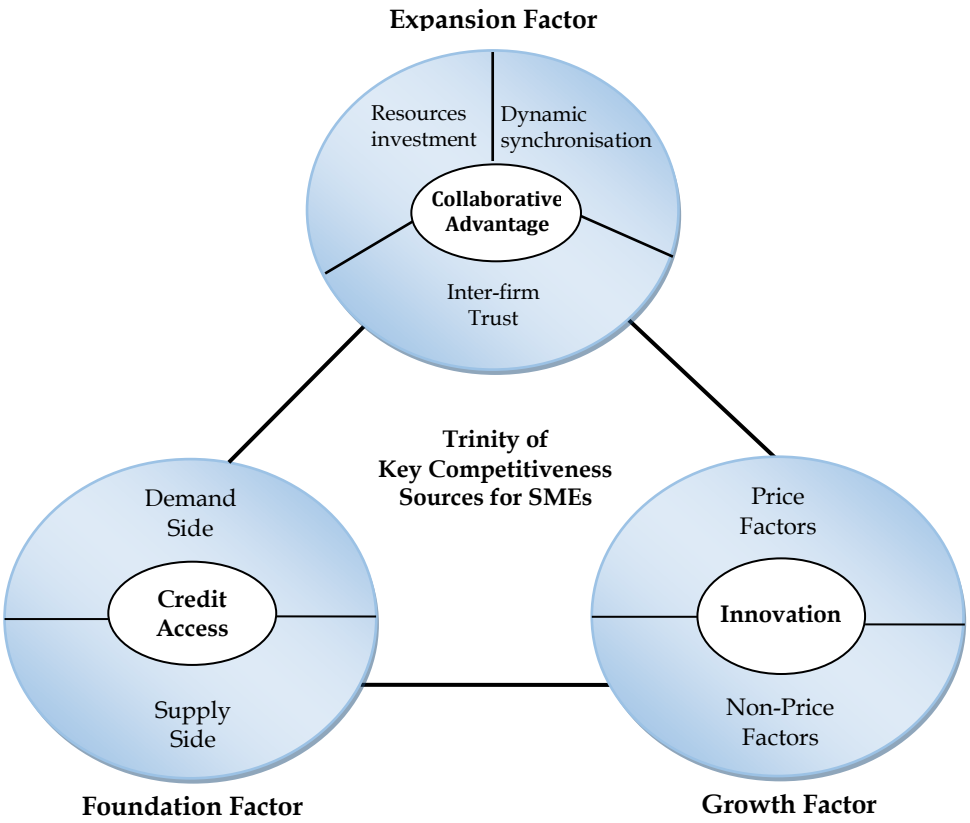


Figure 8.1 The Triangular Wheel of the Trinity of Key Competitiveness Sources

The trinity of key competitiveness sources for SMEs is formed by three critical factors, namely:

(1) **Credit access**, which represents the foundation factor of the competitive sources. It basically looks at the ability of SMEs to access credit from formal financial institutions with constraints (weak, strong, quantity, transaction costs, risk and cultural rationing). In order for SMEs to widen the credit access, firms as borrowers (demand side of funds) should: (1) set aside their firm's assets as collateral for loan; (2) improve the firm's performance and (3) improve networking with peers to support the chance of getting loan. As for the supply side of funds, it is critical for the following agencies: formal financial institutions, government, central bank and financial service authority (FSA) to step up in their

policies to widen the credit access to SMEs. This includes providing affordable loans, imposing less stringent requirements, and improving simple procedures to enable SMEs to obtain loans.

(2) **Innovation**, which represents the growth factor of competitive sources. It basically looks into the SMEs' innovation activities in producing innovation outputs (process, machinery and product). In order for SMEs to increase innovation capacity, firms should invest both in price and non-price factors of innovation. Price factors refer to a firm's eagerness to spend money on engaging in innovative activities including R&D expenditure, information and technology, investment intensity and skilled employees. Non-price factors refer to efforts to internalize any benefits from networking and a competitive environment, such as information and knowledge sharing and motivation to innovate.

(3) **Collaborative advantage (CA)**, which represents the expansion factor of competitive sources. It basically looks at the ability of SMEs to develop networking with their peers and acquire the benefits based on mutual cooperation. In order for SMEs to improve CA, firms have to collaborate in all aspects of CA (collaborative commitment, collaborative planning, collaborative efficiency agreement, collaborative resource sharing, collaborative risks sharing, collaborative information and knowledge sharing, collaborative relational capital, and collaborative synchronised response). Committing to collaborate in these eight CA behaviours would enhance inter-firm trust building, widen access to resources investment, and improve dynamic synchronisation.

8.3 Research Contributions

The research results have produced some significant theoretical contributions. In addition, they also have several potential implications for the business sector (SMEs' owners/managers and banks) and policy makers (at the local or national government level) particularly for the purpose of improving SMEs' competitiveness.

8.3.1 Foundation Factor: Credit Access

This study contributes to asymmetric information theory by examining the impact of risk-sharing schemes on the borrowing behaviour of both borrowers and non-borrowers. Lenders could use risk-sharing schemes as an instrument to reduce ex-ante and ex-post risks of lending by avoiding adverse selection in allocating loans. Borrowers, on the other hand, will perceive risk sharing as an incentive to manage projects under cooperation with peers prudently.

This study also contributes to non-price credit rationing theory by examining the influence of culture (proxied by personal belief) on borrowing behaviour. The findings of this study add to the current literature by examining cultural rationing in a holistic manner with three other types of non-price rationing: quantity, risk and transaction cost.

8.3.2 Growth Factor: Innovation

This study contributes to frugal innovation theory by identifying the impact of non-price factors in tandem with price factors in innovation on firm performance. Furthermore, since the sources of price and non-price factors are internal to the

firm and its peers, the findings also contribute to the extended resources-based view (ERBV) as an important theory to improve firm performance. To my knowledge, the relationship between non-price factors in innovation and firm performance has not been explored adequately in the existing literature.

The second contribution of the innovation chapter is to investigate the importance of SMEs' creativity in producing machinery innovation in order to improve a firm's performance. Separating the analysis of machinery innovation from process and product innovations provides a clear picture of the effect of a firm's technical creativity under frugal conditions on its performance, especially in emerging economies.

8.3.3 Expansion Factor: Collaborative Advantage

By taking into account the unique features of SMEs, my study makes three contributions to CA theory. *First*, it reformulates the CA model for SMEs in developing countries to strengthen inter-firm trust building and to synchronise firms' responses to external factors change. *Second*, it incorporates relational capital as an intangible or non-price factor in resources investment. This offers a new perspective to the existing literature on asset investment that is dominated by a focus on price factors. *Third*, it enriches the dynamic synchronisation literature by examining the synchronisation of collaboration members' responses to external shocks. It is undeniable that synchronisation has a strategic role in making collaboration work effectively. The information shared by collaboration members may include issues related to changes in market and customers, competitors, regulators and macroeconomic conditions.

8.4 Implications of the Findings

8.4.1 Practical Implications

It is evident that risk-sharing schemes among firms reduce the probability of a firm being rationed. With regards to this finding, risk-sharing schemes can be used by lenders (banks) as a complement to existing assessments to reduce the ex-ante risks of credit allocation. Risk-sharing schemes indicate the borrower's track record in relation to business risks from their peers' view. Lenders could also use risk-sharing schemes among firms to prevent borrowers' moral hazard behaviour in the ex-post risk of credit allocation. Firms that establish risk sharing commonly develop an evaluation and monitoring system to avoid any potential misconduct or hazard problem by its members. Therefore, in addition to the bank's regular monitoring, the borrower's peers also indirectly engage in the surveillance of the ex-post risk of credit allocation.

The positive effect of the competition among banks on reducing the probability of credit rationing implies that potential borrowers need wider access to credit, better financial products and services, and more affordable costs of borrowing. Under the fourth industrial revolution where access to digital technology is becoming easier, banks should use the technology as a means to compete with others by offering banking services through financial technology (fin-tech).

The research findings on innovation provide motivation to SMEs' owners/managers to innovate sustainably even though they are constrained by price factors. This study has shown that SMEs can utilise non-price factors in

tandem with price factors to achieve successful innovation. In the absent of abundant financial resources to support innovation, a firm can widen its networks and engage in R&D networking with its peers to increase the probability of success in producing innovation outputs (process, machinery and products). In addition, in the spirit of the fourth industrial revolution, a firm should also actively engage with social media to increase the probability of success in transforming innovation outputs to boost firm performance.

This study provides guidance to firm owners and managers and business association leaders in how to operationalise firm collaboration under the eight proposed CA constructs. Establishing collaboration with peers can stimulate a firm to improve its adaptability, flexibility, differentiation and affordability, which represent firm capability indicators. Under current conditions where interdependency among the firms is high and borderless, establishing collaborations would help SMEs to survive and continuously be competitive amid tighter competition both in the local and international markets, especially markets implementing regional economic integration.

8.4.2 Policy Implications

Affirmative action to widen SMEs' access to formal financial institutions is urgently needed. The research findings suggest that, since most SMEs producing automotive components struggle to meet collateral requirements, the amount of collateral applied by banks to SMEs' loans should be re-examined in order to make them affordable for SMEs. Most SMEs are willing to provide collateral that

has equal or similar value to the amount of the proposed loan. The policy of easing collateral requirements can be combined with a policy of expanding the coverage of credit insurance and credit guarantees for SMEs' loans. In addition to tangible collaterals (price factor), policy makers should also consider incorporating non-price factors in weighing the collateral requirement for SMEs' loans such as evidence of having a risk-sharing scheme with peers under firm collaboration. These recommendations should be taken to the central bank, the financial service authority (FSA) and the Ministry of Cooperative and SMEs.

The positive effect of bank competition on reducing the probability of rationing, as discussed in the findings, implies that SMEs also need a greater supply of credit from formal financial institutions. Therefore, the government and the central bank need to re-examine their policies to promote more affordable funding for SMEs. The current regulation of the Indonesian central bank, which only encourages banks to channel 20% of the total credit to SMEs is showing low political will to support financing for SMEs. SMEs deserve to have a higher portion of the credit allocation given they are the majority of the business entities in Indonesia, equalling 99% of the total number of business entities, and many of them are suffering from weak and strong rationing as well as non-price rationing (quantity, risk, transaction cost and cultural).

Furthermore, in an effort to widen access to credit, to provide better services and a cheaper cost of borrowing, the regulators of the banking system (central bank and FSA) should work out ways to promote the development of banking services including the lending process by utilising financial technology (fin-tech). A

comprehensive regulation of banking services through fin-tech must be established first as a prerequisite of fin-tech development.

Government has an essential role in making the process of innovation achievable for all business entities, especially SMEs. Policy to improve SMEs' innovation capacity can be directed to capitalising on non-price factors, assisted by government policy to widen access to price factors. This will need market-based government interventions of various ways. *First*, to improve SMEs' innovation effort, the government should be aware that SMEs need stimulants to improve their cost competitiveness. SMEs producing automotive components need to acquire their primary raw materials particularly steel at a price equal or close to that of their competitors. This will increase their price competitiveness, resulting in a higher profit margin, which could motivate their innovation effort. Ways that the government can do this are encouraging the existing local steel industry to increase its production capacity and/or inviting new foreign investors to invest in the upstream industry that produce steel and its related products for the raw materials of automotive components.

Second, to improve the probability of success in producing innovation outputs, SMEs need support from experienced research institutes and universities. Therefore, real action from the government to promote linkages between SMEs and universities as well as government research institutes is needed such as providing hard and soft innovation infrastructure. Hard innovation infrastructure can be developed through promoting "SME innovation centres" in the regions where SMEs have the potential to be promoted as the drivers of the economic

sector. Most importantly, these centres should be equipped with soft infrastructure such as highly qualified experts who can provide consultation for SME entrepreneurs to build their technical capability.

Third, to transform innovation outputs into improved firm performance, SMEs need extra support from policy makers especially in the areas of certification and access to information. Policy makers needs to aware that the high cost of product certification pushes SMEs to increase their products' prices, and hence lower their price competitiveness.

Under the fourth industrial revolution, information and knowledge sharing through the internet is expected. Therefore, in an effort to support SMEs to create products with high quality and high uniqueness, I should motivate them to actively seek progressive innovation ideas from around the world. The way that the government can do that is to provide SMEs of smaller size with high-speed internet connections at an affordable price or at best provide them for free. Providing SMEs with better access to the internet would not only benefit the business sector, but also would increase the level of income per capita in the regions where the SMEs are operating (Tambunan & Busnetti, 2019).

If SMEs are to network with other business entities, especially larger enterprises including multinational companies, they will need support or incentive from government through linkage programs that allow SMEs to become routine suppliers without abandoning the principle of efficiency. The government could

establish an automotive industry cluster where the government provides equal support or incentives to all investors.

8.5 Limitations of the Research

The limitation of the analysis of access to credit is while my data set might be the first to analyse the effect of credit rationing on the investment decisions of both SME borrowers and non-borrowers at the same time, the data was limited in other areas, such as information on the existing share capital of the firm and the marginal effects on sales of new investment in expansion. Having this data would be useful to estimate the marginal effect of new investment after obtaining credit.

For the analysis of innovation, two limitations are also noted. First, since this study used cross-sectional data, it implicitly assumed simultaneity in analysing the effect of innovation inputs on innovation outputs and finally on firm performance. Baumann and Kritikos (2016) and Hall B.H. et al. (2009) also note this limitation of many studies using the CDM model. Second, this study only examined the direct and indirect effect of product innovation on firm performance. The limitations of the data on price and non-price moderators that are appropriate for investigating the indirect impact of process and machinery innovations on firm performance prevented me from investigating that impact.

For the analysis of CA, the main limitation is related to the fact that the data were collected from only a single respondent in each firm to represent collaboration that might vary across different divisions or departments of a firm. This may have meant that some biased perspectives were collected.

8.5 Recommendations for Future Research

In future research on the credit access, it would be interesting to investigate the effect of credit rationing on SMEs' investment decisions and its subsequent impact on operating and capital expenditures. Now that regional economic integration especially in the Southeast Asian region and its surrounding countries has taken effect, further study could also investigate the link between credit rationing, the probability of investing and the probability of internationalisation of SMEs under regional economic integration.

In future research on SMEs' innovation, it would be interesting to investigate the role of price and non-price factors in all three innovation outputs (process, machinery, and product) on firm performance, directly and indirectly. In particular, future research should identify appropriate price and non-price moderators for each type of innovation output. Second, because the market for SMEs' products will be borderless in the near future, further study can also investigate the role of price and non-price factors in innovation on exporters compared to inward-looking SMEs. This could advance our understanding of the ways SMEs can improve productivity and efficiency through frugal innovation to compete in wider and tighter market competition. Thirdly, instead of looking at the cross-sectional impact of price and non-price factors, future studies could examine the impact of change on the performance and the contribution of price and non-price factors over time.

In future research on CA, the proposed CA model should be tested using a larger data set collected from multiple respondents in each firm and/or from additional

firms in the same industry. The selection of the sample should cover the characteristics of collaboration members in every section of the supply chain. Furthermore, it would also be useful to examine the validation of the proposed CA model across different industries, both in manufacturing and non-manufacturing sectors.

8.6 Concluding Statement

This thesis has provided new insight into the theory of key competitiveness sources for SMEs, especially those operating in emerging economies. The three key competitiveness sources (credit access, innovation, and collaborative advantage) have been discussed by taking into account the unique features of SMEs. Understanding these three key competitiveness sources could help the government, central bank, FSA and SMEs business associations to work together with other stakeholders to improve SMEs' competitiveness through widening credit access to formal financial institutions, strengthening SMEs' innovation capacity, and enhancing the potential benefits that SMEs can gather from collaboration. In conclusion, I would like to call these three key competitiveness sources the "trinity of key competitiveness sources for SMEs in emerging economies".

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APPENDICES

APPENDIX 1 QUESTIONNAIRE

INSTRUCTION FOR FILLING IN THE QUESTIONNAIRE:
Most questions (95%) are questions with options.
Please provide your answer by ticking ✓ in the given space□.

A. INNOVATION

Innovation is the process of the adoption of internally or externally generated devices, systems, policies, programs, processes, products, or services that are new to the adopting firms (Rosenbusch et al., 2011).

1. Does your firm have an R&D division?
   - □ Yes
   - □ No
2. State the following means/ways of acquiring your existing machinery since 2012?
   (Tick all that apply)
   - □ Produced by own R&D division
   - □ Bought from local producer
   - □ Imported/sourced from abroad
   - □ Grant from government
   - □ Other (please specify) _____

3. a. What type of plant machinery innovation has your firm engaged in since 2012?
   (Tick all that apply)
   - □ Developing totally new machinery
   - □ Modifying and improving the existing machinery
   - □ No machinery innovation
   - □ Other (please specify) _____

   b. How many innovative machines did you produce in 2016?

0	1	2	3	4	5	6	7	8	9	10
□	□	□	□	□	□	□	□	□	□	□

   Please answer here if the amount is more than 10: _____

PROCESS INNOVATION

A process innovation is the implementation of a new or significantly improved production process, distribution method, or supporting activity (European Commission, 2012).

4. a. What type of process innovation has your firm engaged in since 2012?
   (Tick all that apply)
   - □ Methods of goods manufacturing
   - □ Administrative innovation (such as accounting and procurement)
   - □ Warehousing and transporting/delivery innovation
   - □ Marketing innovation with the internet
   - □ No process innovation
   - □ Other (please specify) _____

   b. How many process innovations did you produce in 2016?

0	1	2	3	4	5	6	7	8	9	10
□	□	□	□	□	□	□	□	□	□	□

PRODUCT INNOVATION

A product innovation is the market introduction of new or significantly improved goods or services with respect to their capabilities, user friendliness, components or sub-systems (European Commission, 2012).

5. a. What type of product innovations has your firm engaged in since 2012?

- □ Developing a totally new product
- □ Modifying and improving existing products
- □ No product innovation
- □ Other (please specify) _____

b. How many product innovations did you produce in 2016?

0	1	2	3	4	5	6	7	8	9	10
□	□	□	□	□	□	□	□	□	□	□

Please answer here if the amount is more than 10: _____

6. State the parties involving in developing product innovation.

	Machinery innovation		Process innovation		Product innovation	
	Yes	No	Yes	No	Yes	No
a. The firm itself	□	□	□	□	□	□
b. The firm's partners	□	□	□	□	□	□
c. University/research institutes	□	□	□	□	□	□
d. Government (central & local)	□	□	□	□	□	□

7. How have these external information sources contributed to the innovation activities in this company since 2012?

	No contribution	**Very low**	**Low**	**High**	**Very high**
a. The firm's partners	□	□	□	□	□
b. University/research institutes	□	□	□	□	□
c. Government (central & local)	□	□	□	□	□
d. Social media (such as YouTube, Facebook, Twitter, WhatsApp)	□	□	□	□	□

8. How have these factors MOTIVATED your company to innovate?

	No contribution	**Very low**	**Low**	**High**	**Very high**
a. Having skilful employees	□	□	□	□	□
b. Obtaining sufficient financial support	□	□	□	□	□
c. Partnering with other firms	□	□	□	□	□
d. Obtaining incentive from gov't	□	□	□	□	□
e. Facing tight business competition	□	□	□	□	□
	□	□	□	□	□

9. What type of incentive (besides salaries) does your firm provide to employees involved in innovation? (Tick all that apply)
   - □ Bonus
   - □ Promotion
   - □ No incentive
   - □ Other (please specify) _____

10. What was the percentage (%) of information and technology expenses (internet, phone, software, hardware computer, etc.) to your company's total sales in 2016?

0 %	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
□	□	□	□	□	□	□	□	□	□	□

Please answer here **if the percentage is in decimal or more than 10%:** _____

11. What was the percentage (%) of R&D expenditure to your company's total sales in 2016? (R&D expenditure covers expenses for employees, capital, building, equipment related to R&D activities).

0 %	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
□	□	□	□	□	□	□	□	□	□	□

Please answer here **if the percentage is in decimal or more than 10%:** _____

11a. What was the percentage (%) of expenses for machinery and its restoration to your company's total sales in 2016?

0 %	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
□	□	□	□	□	□	□	□	□	□	□

Please answer here **if the percentage is in decimal or more than 10%:** _____

12. What kind of grants/support has your company received from government for R&D activities? *(*Tick all that apply*)*
   - □ Cash money grant
   - □ Machinery/production equipment
   - □ Employee training
   - □ Tax incentives
   - □ No support
   - □ Other (please specify) _____

13. Have your products been certified by Indonesian National Standard (SNI)?
   - □ Yes, all products
   - □ Yes, not all products
   - □ Not at all

14. If there are products that **have not been certified by SNI**, what are the reasons? (Tick all that apply)
   - □ Lack of enforcement or making sure that products are being certified by SNI
   - □ No awareness of requirement stated in SNI
   - □ The administrative process is highly bureaucratic
   - □ The certification cost is too high
   - □ Other (please specify) _____

INSTRUCTION: Please provide your answer by ticking ✓ in the given space □.

B. CREDIT ACCESS

1. What would be the financial sources that best suit your business?
   - □ Borrowing from banks
   - □ Borrowing from pawnbrokers/cooperatives
   - □ Borrowing from trade creditors
   - □ Borrowing from wealthy family members
   - □ Borrowing from informal creditors (*bank plecit, bank keliling, bank tithil, rentenir, grandong dll*)
   - □ Other (please specify) _____

2. What is **the most important** factor that would influence your decision in selecting financial sources?
   - □ The interest rates are low
   - □ Lenient collateral requirement
   - □ Procedures are simple
   - □ Fits my faith or beliefs
   - □ The creditors are friendly, warm and approachable
   - □ Other (please specify) _____

3. Have you applied for a commercial bank loan between 2012 and 2016?
   - □ Yes
   - □ No, **If No, please go to question No. 9**

4. Was the loan you applied for accepted?
   - □ Yes
   - □ No, **If No, please go to the question No. 13**

5. a. What was the interest rate offered by the bank to you?

   □ 1–9,9% □ 10–19,9% □ 20–29,9% □ 30–49,9% □ 50% and more

   b. Would you have wanted a larger loan at the same interest rate?

   □ Yes □ No

6. a. What was the percentage of credit that you obtained from the total amount of the loan that you applied for?

   □ Less than 25% □ 25–50% □ 51–75% □ 76–99% □ 100%

   b. Would you have wanted more credit than you actually obtained?

   □ Yes □ No

7. What were the reasons that you were unable to get the amount of loan that you applied for?

   (Tick all that apply)

   - □ The current outstanding loan is still high
   - □ The collateral value is not enough to over the loan amount I applied for
   - □ The financial reporting is not convincing
   - □ The business prospect at that time did not seem lucrative (high risk)

- ☐ I am not an ideal borrower
- ☐ Other (please specify) _____

8. In situations where you are still short of funds, what alternative sources of funds/loans would you look at?
   - ☐ Trade creditors
   - ☐ Cooperative
   - ☐ Pawnbroker
   - ☐ Family members
   - ☐ Informal creditors (*bank plecit, bank keliling, bank tithil, rentenir, grandong* dll)
   - ☐ Other (please specify) _____

   Please continue to question No. 14

9. Would the commercial banks lend to you if you applied?
   - ☐ Yes
   - ☐ No **If No, please go to question No. 11**

10. Have these factors caused you not to apply for a loan to the banks?

	Yes	**No**
a. I prefer to use my own liquidity	☐	☐
b. It does not fit my faith or belief/religion/culture	☐	☐
c. The current outstanding debt is still high	☐	☐
d. I fear losing my collateral	☐	☐
e. The collateral is not sufficient to cover my desired loan	☐	☐
f. The interest rate is too high	☐	☐
g. The administration process is expensive & complicated	☐	☐
h. The branch office is too far from my house	☐	☐

11. If you were given a guarantee that a commercial bank would approve your application, would you apply?
   - ☐ Yes, **If Yes, please go to question No. 14**
   - ☐ No

12. Have these factors caused you not to apply for a loan to the banks?

	Yes	**No**
a. I prefer to use my own liquidity	☐	☐
b. It does not fit my faith or belief/religion/culture	☐	☐
c. The interest rate is too high	☐	☐
d. I fear losing my collateral	☐	☐
e. The collateral is not sufficient to cover my desired loan	☐	☐
f. The administration process is expensive & complicated	☐	☐
g. My loan application was rejected by the banks in the past	☐	☐
h. The branch office is too far from my house	☐	☐

   Please continue to question No. 14

13. What were the reasons that your application was rejected? (Tick all that apply)
   - ☐ The collateral value was not enough
   - ☐ The financial reporting was not convincing

- ☐ The business prospect at that time did not look lucrative (high risk)
- ☐ The current outstanding loan is still high
- ☐ I do not know
- ☐ Other (please specify) _____

14. a. How long has your company built a relationship with a bank (for saving or borrowing)?

☐ Less than 1 year	☐ 1–3 years	☐ 4–6 years	☐ 7–9 years	☐ 10 years and more

b. What is the maximum collateral value that you are willing to put in, in relation to the loan?

☐ Less than 100%	☐ 100 %	☐ 200 %	☐ 300 %	☐ More than 300%

15. a. Have you applied for loans from informal creditors (such as *bank plecit, bank keliling, bank tithil, rentenir, grandong)* in the past 5 years (2012–2016) ?

- ☐ Yes
- ☐ No **If No, please go to question No. 17**

b. What was the interest rate offered by informal creditors to you?

☐ 1–9.9%	☐ 10–19.9%	☐ 20–29.9%	☐ 30–49.9%	☐ More than 50%

16. Have these factors caused you to apply for loans to informal creditors?

	Yes	**No**
a. Interest rates are low	☐	☐
b. Fits my faith or belief/religion/culture	☐	☐
c. Lenient collateral requirement	☐	☐
d. Procedures are simple	☐	☐
e. Repayment schedule is flexible	☐	☐
f. The staff can be easily contacted/friendly	☐	☐

17. What is your perception on the following aspects of bank credit?

	Yes	**No**
a. Procedures of bank credit are complicated	☐	☐
b. Administration cost of bank credit is low	☐	☐
c. Bank credit fits my belief/religion/culture	☐	☐
d. The staff of banks can be easily contacted/friendly	☐	☐

18. What were the main uses of the credit you obtained from the bank in 2012–2016?

	Yes	**No**
a. Raw materials procurement	☐	☐
b. Machinery production procurement	☐	☐
c. Factory expansion	☐	☐
d. Marketing expansion	☐	☐
e. Research and development	☐	☐
f. Other (please specify) _____	☐	☐
	☐	☐

INSTRUCTION: Please provide your answer by ticking ✓ in the given space□.

C. COLLABORATIVE ADVANTAGES

How has your firm collaborated with your firm's partners?

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. Our company with supply chain partners built trust in cooperation					
a. We maintain mutual benefits cooperation	□	□	□	□	□
b. We avoid taking any actions that can disadvantage our partners.	□	□	□	□	□
c. We exchange accurate information	□	□	□	□	□
d. We agree on certain sanctions for firms breaching the cooperation agreement	□	□	□	□	□
2. At the initial stage, the following issues are discussed deeply with supply chain partners :					
a.Product designs	□	□	□	□	□
b. Raw material procurements in advance	□	□	□	□	□
c.Inspection of plant and machinery	□	□	□	□	□
d. Delivery time	□	□	□	□	□
3. The following items are shared with the supply chain partners					
a. Sharing plant and machinery	□	□	□	□	□
b. Extending financial assistance in emergency situations	□	□	□	□	□
c. Sharing delivery facilities	□	□	□	□	□
d. Assigning staff for managing cooperation with supply chain partners	□	□	□	□	□
4. Our company with supply chain partners agree on efficiency process:					
a. Production cost per unit	□	□	□	□	□
b.Level of productivity	□	□	□	□	□
c. Level of product reject ratio	□	□	□	□	□
d. The standard of packaging	□	□	□	□	□
e.The standard production time	□	□	□	□	□

5. Our company with supply chain partners share knowledge and managerial skills

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a. Sharing R&D facilities	□	□	□	□	□
b. Sharing technical knowledge among the employees	□	□	□	□	□
c. Sharing market information	□	□	□	□	□
d. Sharing the knowledge of newly innovated products	□	□	□	□	□
e. Sharing knowledge about leadership and management skills	□	□	□	□	□

6. Our company with supply chain partners offer flexibility

a. Responding to market dynamics	□	□	□	□	□
b. Offering product differentiation by matching with certain consumer characteristics	□	□	□	□	□
c. Fulfilling various customer volume requests efficiently	□	□	□	□	□
d. Offering high-quality products at a competitive price	□	□	□	□	□

7. Our company with supply chain partners share the risk

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a. Products reject cost (due to production)	□	□	□	□	□
b. Cost of not achieving on-time delivery	□	□	□	□	□
c. Costs due to unexpected events (natural disasters)	□	□	□	□	□
d. Product return cost (after the sales)	□	□	□	□	□

8. Our company with supply chain partners resolve crucial external issues.

a. Suggestions and complaints from customers	□	□	□	□	□
b. Competitors' strategy changes	□	□	□	□	□
c. Government policy (minimum wage, certification, etc)	□	□	□	□	□
d. Macroeconomic conditions (exchange rate, etc)	□	□	□	□	□

9. **Kinship and cooperation**

a. Our company with supply chain partners build cooperation based on kinship.	□	□	□	□	□
b. Our company with supply chain partners solve conflicts based on kinship.	□	□	□	□	□
c. Our company is always available to help our supply chain partners when they are in a difficult situation.	□	□	□	□	□

10. Hierarchy in cooperation

a. Our company has more power than our supply chain partners in discussing the cooperation contracts.	□	□	□	□	□
b. Our company has more power than our supply chain partners in making cooperation decisions.	□	□	□	□	□
c. Our company has low dependency on our supply chain partners.	□	□	□	□	□

11. Collaborative partners

	Yes	**No**
a. Our firm is a subsidiary company of an original equipment manufacturer (OEMs) (such as Toyota, Honda, Nissan, Mazda dll).	□	□
b. Our firm supplies our products to only one firm partner.	□	□
c. Our firm supplies products aftermarket.	□	□

12. a. How many regular firm partners does your company have in its supply chain in 2016?

□ Less than 5 □ 5–10 □ 11–15 □ 16–20 □ More than 20

b. How many years on average has your company built a relationship with regular firm partners?

□ Less than 5 years □ 5 - 10 years □ 11 - 15 years □ 16 - 20 years □ More than 20 years

D. COMPETITION

1. What is the most important factor that your firm uses to compete in the market?
   - ☐ Price
   - ☐ Quality
   - ☐ Product differentiation
   - ☐ Brand
   - ☐ After-sales service
   - ☐ Others (please specify) _____

2. To the best of your knowledge, what is the comparison between your firm's products and your competitors' in the market?

	Lowest	**Lower**	**Similar**	**Higher**	**Highest**
Price	☐	☐	☐	☐	☐
Quality	☐	☐	☐	☐	☐
Product differentiation	☐	☐	☐	☐	☐
Brand	☐	☐	☐	☐	☐
After-sales service	☐	☐	☐	☐	☐

3. Did your firm put new investment into expanding your business during 2012–2016?
   - ☐ Yes
   - ☐ No

4. a. Did your firm export in 2016?
   - ☐ Yes
   - ☐ No, **If "No", please continue to question No. 5**

   b. Growth of exports in 2015–2016:

0 %	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

   Please answer here **if the percentage is in decimal or more than 10%:** _____

5. Which countries do you consider the main competitors for your products?
   (Tick all that apply)
   - ☐ China
   - ☐ India
   - ☐ Japan
   - ☐ Malaysia
   - ☐ Thailand
   - ☐ Taiwan
   - ☐ Vietnam
   - ☐ Germany
   - ☐ United States of America
   - ☐ Others (please specify) _____

E. FIRM PERFORMANCE

1. a. Total sales in 2016 (in million rupiah)

	2016 (Rp million)
Total sales	

b. Growth of total sales in 2015–2016 (in percentage %):

0% 1% 2% 3% 4% 5% 6% 7% 8% 9% 10%

□ □ □ □ □ □ □ □ □ □ □

Please answer here **if the percentage is in decimal or more than 10%:** _____

c. Growth of profit in 2016: (in percentage %):

0% 1% 2% 3% 4% 5% 6% 7% 8% 9% 10%

□ □ □ □ □ □ □ □ □ □ □

Please answer here **if the percentage is in decimal or more than 10%:** _____

2. In 2016, how did these firm performance indicators change?

	Decrease significantly	Decrease	No change	Increase	Increase significantly
a. Productivity of employees	□	□	□	□	□
b. Cost efficiency	□	□	□	□	□
c. Product quality	□	□	□	□	□
d. Sales	□	□	□	□	□
e. Profit	□	□	□	□	□

3. In 2016, how did these firm flexibility indicators change?

	Decrease significantly	Decrease	No change	Increase	Increase significantly
a. Firm's ability to respond to the changes in market demand.	□	□	□	□	□
b. Firm's capacity to offer product differentiation.	□	□	□	□	□
c. Firm's capacity to fulfil various customer volume requests efficiently.	□	□	□	□	□
d. Firm's competency to produce high-quality products at a competitive price.	□	□	□	□	□

4. In 2016, how do you compare the performance of your firm to other firms in the automotive components industry for these indicators?

	Decrease significantly	Decrease	No change	Increase	Increase significantly
a. Cost efficiency	□	□	□	□	□
b. Sales	□	□	□	□	□
c. Profit	□	□	□	□	□

F. FIRM GENERAL INFORMATION

1. Firm location:
   □ Jakarta □ Banten □ Jawa Barat □ Jawa Tengah □ Jawa Timur
2. Firm age:
   □ Less than 5 years
   □ 5–9 years
   □ 10–14 years
   □ 15–19 years
   □ 20 years or more

3. What is your position in your supply chain networks?
   □ Tier 1 □ Tier 2 □ Tier 3 □ I do not know
4. Firm ownership:
   □ Penanaman Modal Dalam Negeri (PMDN)/family firm
   □ Foreign direct investment (FDI)
   □ Joint venture
   □ Other (please specify) _____

5. a. Number of employees in 2015 and 2016:

Employees	2015	2016
Number of employees (persons)		

b. Percentage of number of employees with tertiary education to the total employees in 2016:

□ 0% □ 1–9 % □ 10–19% □ 20–29% □ 30–49% □ 50% or more

G. RESEARCH RESULT

Are you interested in receiving the results of this research? If "YES", we will send the summary of this research to you via email.

□ Yes (Please write your email below)

□ No

Name of firm : .....
Main product : .....
Email : .....
Contact person : .....

Thank you for your time and effort in completing this survey. It is greatly appreciated. We do hope this research will be useful for knowledge creation as well as government policy formulation to improve the competitiveness of the automotive component industry.

QUESTIONNAIRE (IN BAHASA INDONESIA)

PETUNJUK PENGISIAN KUESIONER:

Sebagian besar (95 persen) pertanyaan adalah pertanyaan dengan pilihan.
Bapak/Ibu hanya menjawab dengan tanda ✓ di dalam KOTAK PILIHAN □.

A. INOVASI

Inovasi adalah proses adopsi perangkat, sistem, kebijakan, program, proses, produk atau layanan baru secara internal maupun eksternal bagi perusahaan (Rosenbusch, et.al, 2011).

1. Apakah perusahaan ini memiliki divisi Riset dan Pengembangan (R & D)?

   □ Ya
   □ Tidak

2. Bagaimana cara perusahaan ini mendapatkan mesin-mesin produksi sejak tahun 2012?(Jawaban boleh lebih dari satu)
   □ Diproduksi oleh perusahaan sendiri
   □ Membeli dari perusahaan yang diproduksi secara lokal
   □ Import dari luar negeri
   □ Hibah/insentif dari pemerintah
   □ Lainnya (Jika ada mohon sebutkan) _____

3. Apa saja inovasi mesin produksi di perusahaan ini sejak tahun 2012?
   (Jawaban boleh lebih dari satu)
   □ Mengembangkan mesin baru
   □ Memodifikasi dan memperbaiki mesin lama
   □ Tidak ada inovasi mesin
   □ Lainnya (Jika ada mohon sebutkan) _____

   b. Berapa banyak inovasi mesin yang dihasilkan pada tahun 2016?

0	1	2	3	4	5	6	7	8	9	10
□	□	□	□	□	□	□	□	□	□	□

   Mohon jawab di sini jika jumlahnya lebih dari 10: _____

<u>INOVASI PROSES</u>

Inovasi Proses adalah implementasi sesuatu yang baru atau perbaikan dalam proses produksi, metode distribusi atau kegiatan pendukung (The Community Innovation Survey, 2012).

4. Apa saja jenis inovasi proses yang telah dihasilkan oleh perusahaan ini sejak 2013?
   (Jawaban boleh lebih dari satu)
   □ Inovasi pengolahan produk
   □ Inovasi administrasi (seperti sistem akuntansi dan pembelian)
   □ Inovasi pergudangan dan pengiriman
   □ Inovasi pemasaran melalui internet/ Sosial media
   □ Tidak ada inovasi proses
   □ Lainnya (Jika ada mohon sebutkan) _____

   b. Berapa banyak inovasi proses yang dihasilkan pada tahun 2016?

0	1	2	3	4	5	6	7	8	9	10
□	□	□	□	□	□	□	□	□	□	□

   Mohon jawab di sini jika jumlahnya lebih dari 10: _____

INOVASI PRODUK

Inovasi produk adalah perbaikan produk secara signifikan sehubungan dengan kemampuannya, kemudahannya, komponennya atau sub sistemnya (The Community Innovation Survey, 2012) .

5. Apa saja jenis inovasi produk yang telah dihasilkan oleh perusahaan ini sejak 2012?*(Jawaban boleh lebih dari satu)*

- □ Mengembangkan produk yang sama sekali baru
- □ Memodifikasi dan memperbaiki produk yang sudah ada
- □ Tidak ada inovasi produk
- □ Lainnya (Jika ada mohon sebutkan) _____

b. Berapa banyak inovasi produk yang dihasilkan pada tahun 2016?

0	1	2	3	4	5	6	7	8	9	10
□	□	□	□	□	□	□	□	□	□	□

Mohon jawab di sini **jika** jumlahnya lebih dari 10: _____

6. Apakah pihak-pihak berikut ini berperan melakukan inovasi mesin, proses dan produk di perusahaan bapak/ibu?

	Inovasi Mesin		**Inovasi Proses**		**Inovasi Produk**	
	Ya	Tidak	Ya	Tidak	Ya	Tidak
a. Internal perusahaan	□	□	□	□	□	□
b. Perusahaan rekanan	□	□	□	□	□	□
c. Universitas/ lembaga riset	□	□	□	□	□	□
d. Pemerintah (pusat/daerah)	□	□	□	□	□	□

7. Sejauhmana pihak luar berikut ini **berperan/ berpengaruh** terhadap kegiatan inovasi di perusahaan ini sejak tahun 2012?

	Tidak Berpengaruh	**Sangat Rendah**	**Rendah**	**Tinggi**	**Sangat Tinggi**
a. Perusahaan rekanan	□	□	□	□	□
b. Universitas/lembaga riset	□	□	□	□	□
c. Pemerintah (Pusat/Daerah))	□	□	□	□	□
d. Social media (seperti Youtube, Facebook, Twitter, Whatsupp)	□	□	□	□	□

8. Sejauhmana faktor-faktor di bawah ini **berperan/ berpengaruh** dalam MEMOTIVASI kegiatan inovasi di perusahaan ini?

	Tidak Berpengaruh	**Sangat Rendah**	**Rendah**	**Tinggi**	**Sangat Tinggi**
a. Tersedianya karyawan terampil	□	□	□	□	□
b. Dana inovasi yang memadai	□	□	□	□	□
c. Kerjasama dengan rekanan	□	□	□	□	□
d. Insentif dari pemerintah	□	□	□	□	□
e. Persaingan bisnis yang ketat	□	□	□	□	□
	□	□	□	□	□

9. Insentif apa (selain gaji) yang disediakan oleh perusahaan ini kepada karyawan yang berperan dalam kegiatan inovasi?

(Jawaban boleh lebih dari satu)

- □ Insentif bonus
- □ Insentif promosi
- □ Tidak ada insentif
- □ Lainnya (Jika ada mohon sebutkan) _____

10. Berapa persen (%) kira-kira biaya untuk informasi & teknologi (internet, telepon, software, hardware computer dll) terhadap penjualan atau omset perusahaan ini pada tahun 2016?

0 %	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
□	□	□	□	□	□	□	□	□	□	□

Mohon jawab di sini **jika angka lebih dari 10 %:** _____

11. Berapa persen (%) kira-kira biaya untuk riset dan pengembangan (R & D) terhadap penjualan atau omset perusahaan ini pada tahun 2016?

(Biaya R & D meliputi pengeluaran untuk gaji pegawai R & D, biaya gedung dan peralatan yang terkait dengan kegiatan R & D).

0 %	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
□	□	□	□	□	□	□	□	□	□	□

Mohon jawab di sini **jika angka lebih dari 10 %:** _____

11a. Berapa persen (%) kira-kira biaya untuk pembelian mesin dan/atau perawatan mesin pada tahun 2016?

0 %	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
□	□	□	□	□	□	□	□	□	□	□

Mohon jawab di sini **jika angka lebih dari 10 %:** _____

12. Bantuan apa yang pernah dterima dari pemerintah untuk riset dan pengembangan?

(Jawaban boleh lebih dari satu)

- □ Dana tunai untuk R & D
- □ Bantuan mesin/ alat produksi
- □ Pelatihan karyawan
- □ Insentif pajak
- □ Tidak pernah mendapatkan bantuan
- □ Lainnya (jika ada mohon sebutkan) _____

13. Apakah produk-produk perusahaan ini SUDAH memiliki sertifikat Standar Nasional Indonesia (SNI)?

- □ Ya, semua produk
- □ Ya, sebagian produk
- □ Belum memiliki SNI sama sekali

14. Untuk produk yang BELUM memiliki sertifikat SNI, apa penyebabnya?

(*Jawaban boleh lebih dari satu)*

- □ Tidak ada sanksi jika produk beredar tanpa SNI
- □ Tidak tahu persyaratan untuk mendapatkan SNI
- □ Proses administrasi SNI rumit
- □ Biaya sertifikasi SNI mahal
- □ Lainnya (Jika ada mohon sebutkan) _____

INSTRUKSI PENGISIAN: Silahkan jawab dengan tanda ✓ di dalam KOTAK PILIHAN □.

B. AKSES KREDIT

1. Apa sumber pembiayaan luar yang **sesuai** untuk perusahaan bapak/ibu?
   (Jawaban boleh lebih dari satu)
   - □ Pinjaman dari bank
   - □ Pinjaman dari perusahaan mitra *(trade creditors)*
   - □ Pinjaman dari koperasi/pegadaian
   - □ Pinjaman dari anggota keluarga
   - □ Pinjaman informal (*bank plecit, bank keliling, bank tithil, rentenir, grandong* dll)
   - □ Lainnya (Jika ada, mohon sebutkan) _____

2. Apa faktor penting bagi bapak/ibu dalam memilih sumber pembiayaan dari luar?
   (Jawaban boleh lebih dari satu)
   - □ Bunga pinjaman rendah
   - □ Persayaratan agunan lunak
   - □ Prosedurnya sederhana
   - □ Sesuai dengan keyakinan/ agama/ budaya
   - □ Pemberi pinjaman sangat bersahabat
   - □ Lainnya (Jika ada, mohon sebutkan) _____

3. Apakah perusahaan ini mengajukan proposal pinjaman ke bank pada tahun 2012 - 2016?
   - □ Ya
   - □ Tidak, **Jika "Tidak", silahkan lanjut ke pertanyaan no. 9**

4. Apakah proposal pinjaman tersebut disetujui?
   - □ Ya
   - □ Tidak, **Jika "Tidak", silahkan lanjut ke pertanyaan no. 13**

5. a. Berapa persen (%) bunga per tahun yang dikenakan terhadap pinjaman bapak/ibu?

   □ Kurang dari 10 % □ 10 - 29,9% □ 30 - 49,9% □ 50 % atau lebih

   b. Apakah bapak/ibu menginginkan pinjaman lebih besar dengan tingkat bunga sama?
   □ Ya Tidak

6. a. Berapa persen pinjaman yang diperoleh dari total pinjaman yang diajukan?

   □ Kurang dari 50% □ 51 - 75% □ 76 - 99% □ 100% atau lebih

   b. Apakah bapak/ibu membutuhkan tambahan pinjaman lebih banyak lagi?
   □ Ya Tidak

7. Jika mendapatkan kredit kurang dari 100%, apa penyebabnya?
   (Jawaban boleh lebih dari satu)
   - □ Masih dalam proses melunasi pinjaman sebelumnya
   - □ Agunan saya tidak mencukupi
   - □ Laporan keuangan perusahaan tidak meyakinkan
   - □ Bisnis yang diusulkan dinilai risiko tinggi
   - □ Saya bukanlah peminjam yang ideal
   - □ Lainnya (jika ada, mohon sebutkan) _____

8. Jika masih mengalami kekurangan dana dari pinjaman bank, apa sumber pembiayaan alternatif utama yang bapak/ibu cari? (Jawaban boleh lebih dari satu)
   - ☐ Perusahaan mitra *(trade creditors)*
   - ☐ Koperasi
   - ☐ Pegadaian
   - ☐ Anggota keluarga
   - ☐ Pinjaman informal (*bank plecit, bank keliling, bank tithil, rentenir, grandong* dll)
   - ☐ Lainnya _____

   Silahkan lanjut ke pertanyaan No. 14
9. Apakah bank akan memberikan kredit kepada bapak/ibu jika mengajukan pinjaman?
   - ☐ Ya
   - ☐ Tidak, **Jika "Tidak", silahkan lanjut ke pertanyaan No. 11**

10. Apakah faktor-faktor di bawah ini menyebabkan bapak/ibu tidak meminjam ke bank? *(Mohon jawab semua pertanyaan)*

	Ya	**Tidak**
a. Saya lebih suka menggunakan dana sendiri	☐	☐
b. Tidak sesuai dengan keyakinan/ agama/budaya	☐	☐
c. Masih dalam proses melunasi pinjaman sebelumnya	☐	☐
d. Saya takut kehilangan agunan	☐	☐
e. Agunan saya tidak mencukupi	☐	☐
f. Bunga bank terlalu tinggi	☐	☐
g. Proses administrasi mahal dan berbelit-belit	☐	☐
h. Kantor cabang bank terlalu jauh dari rumah saya	☐	☐

11. Jika diberikan jaminan bahwa bank akan menyetujui usulan kredit bapak/ibu, apakah akan mengajukan pinjaman?
   - ☐ Ya, **Jika "Ya", silahkan lanjut ke pertanyaan No. 14**
   - ☐ Tidak

12. Apakah faktor-faktor di bawah ini menyebabkan bapak/ibu tidak akan meminjam ke bank? *(Mohon jawab semua pertanyaan)*

	Ya	**Tidak**
a. Saya lebih memilih menggunakan dana sendiri	☐	☐
b. Tidak sesuai dengan keyakinan/ agama/budaya	☐	☐
c. Proposal pinjaman saya terdahulu telah ditolak bank	☐	☐
d. Saya takut kehilangan agunan	☐	☐
e. Agunan saya tidak mencukupi	☐	☐
f. Bunga bank terlalu tinggi	☐	☐
g. Proses administrasi mahal dan berbelit-belit	☐	☐
h. Kantor cabang bank terlalu jauh dari rumah saya	☐	☐

Silahkan lanjut ke pertanyaan No. 14

13. Apa penyebab usulan pinjaman bapak/ibu ditolak oleh bank? (Jawaban boleh lebih dari satu)
   - ☐ Agunan tidak mencukupi
   - ☐ Laporan keuangan perusahaan tidak meyakinkan
   - ☐ Bisnis yang diusulkan dinilai tidak prospektif (risiko tinggi)
   - ☐ Sisa pinjaman yang belum dilunasi masih tinggi
   - ☐ Tidak tahu
   - ☐ Lainnya (Jika ada mohon sebutkan) _____

14. a. Sudah berapa lama bapak/ibu berhubungan dengan bank (menabung atau meminjam)?

□ Kurang dari 1 tahun □ 1 - 5 tahun □ 6 - 10 tahun □ Lebih dari 10 tahun

b. Berapa persen (%) agunan maksimum yang bersedia bapak/ibu berikan kepada bank untuk mendapatkan pinjaman?

□ Kurang dari 100% □ 100 % □ 200 % □ 300 % □ Lebih dari 300%

15. a. Pernahkah bapak/ibu mengajukan pinjaman ke pemberi pinjaman informal (seperti bank plecit, bank keliling, bank tithil, rentenir, grandong dll) pada tahun 2012-2016?

□ Ya

□ Tidak, **Jika "Tidak", silahkan lanjut ke pertanyaan No. 17-18**

b. Berapa persen (%) bunga pinjaman informal per tahun yang harus bapak/ibu bayar?

□ Kurang dari 10 % □ 10 - 29,9% □ 30 - 49,9% □ 50 % atau lebih

Apakah faktor-faktor berikut ini menjadi pertimbangan bapak/ibu ketika memilih kredit dari pemberi pinjaman informal? (Mohon jawab semua pertanyaan)

	Ya	**Tidak**
a. Bunga pinjaman rendah	□	□
b. Sesuai dengan keyakinan/ agama/budaya	□	□
c. Persyaratan agunan lunak	□	□
d. Prosedurnya sederhana	□	□
e. Jadwal pengembalian pinjaman fleksbel	□	□
f. Staf pegawai mudah dihubungi/ bersahabat	□	□

16. Bagaimana penilaian bapak/ibu terhadap pinjaman bank untuk hal-hal berikut ini? *(Mohon jawab semua pertanyaan)*

	Ya	**Tidak**
a. Prosedur kredit di bank berbelit-belit	□	□
b. Biaya administrasi kredit bank murah	□	□
c. Kredit bank sesuai dengan keyakinan/agama/budaya saya	□	□
d. Staf bank untuk urusan kredit mudah dihubungi/bersahabat	□	□

19. Digunakan untuk apa saja dana pinjaman yang didapatkan tahun 2012-2016?

	Ya	**Tidak**
a. Pembelian bahan baku	□	□
b. Membeli mesin produksi	□	□
c. Perluasan pabrik	□	□
d. Perluasan pemasaran	□	□
e. Riset dan pengembangan	□	□
f. Lainnya (Jika ada, mohon sebutkan) _____	□	□

INSTRUKSI PENGISIAN: Silahkan jawab dengan tanda ✓ pada kotak pilihan □

C. KERJASAMA PERUSAHAAN

Kerjasama perusahaan adalah cara perusahaan menciptakan keunggulan kompetitif melalui kolaborasi antar perusahaan yang efektif untuk memperoleh manfaat strategis.

Sejauhmana perusahaan bapak/ibu melakukan kerjasama dengan perusahaan rekanan untuk aspek-aspek berikut ini:

1. **Perusahaan saya dengan perusahaan rekanan membangun kepercayaan yang kuat dalam kerjasama:**

	Sangat Tidak Setuju	Tidak Setuju	Netral	Setuju	Sangat Setuju
a. Perusahaan menjaga kerjasama yang saling menguntungkan.	□	□	□	□	□
b. Perusahaan menghindari tindakan yang merugikan salah satu pihak.	□	□	□	□	□
c. Perusahaan saling memberikan informasi yang akurat.	□	□	□	□	□
d. Perusahaan menyetujui sanksi untuk pelanggaran kontrak kerja.	□	□	□	□	□

2. **Pada tahap awal produksi, perusahaan saya dengan perusahaan rekanan membahas secara mendalam:**

a. Disain produk	□	□	□	□	□
b. Pengadaan bahan mentah	□	□	□	□	□
c. Inspeksi mesin-mesin produksi	□	□	□	□	□
d. Waktu pengiriman	□	□	□	□	□

3. **Perusahaan saya dengan perusahaan rekanan berbagi sumber daya berikut ini**:

	Sangat Tidak Setuju	TidakSetuju	Netral	Setuju	Sangat Setuju
a. Berbagi peralatan dan mesin produksi	□	□	□	□	□
b. Berbagi dukungan keuangan saat darurat	□	□	□	□	□
c. Berbagi fasilitas pengiriman	□	□	□	□	□
d. Menugaskan karyawan untuk mengelola kerjasama dengan perusahaan rekanan	□	□	□	□	□

4. **Perusahaan saya dengan perusahaan rekanan menyetujui proses efisiensi hal-hal berikut ini:**

a. Biaya per unit	□	□	□	□	□
b. Tingkat produktivitas	□	□	□	□	□
c. Tingkat kerusakan produk (*reject ratio*)	□	□	□	□	□
d. Standar pengemasan	□	□	□	□	□
e. Standar waktu pengiriman yang tepat	□	□	□	□	□

5. Perusahaan saya dengan perusahaan rekanan berbagi pengetahuan teknis dan managerial:

	Sangat Tidak Setuju	TidakSetuju	Netral	Setuju	Sangat Setuju
a. Berbagi fasilitas R & D	□	□	□	□	□
b. Berbagi pengetahuan teknis antar karyawan	□	□	□	□	□
c. Berbagi inforomasi pasar	□	□	□	□	□
d. Berbagi pengetahuan inovasi baru	□	□	□	□	□
e. Berbagi pengetahuan kepemimpinan &	□	□	□	□	□
f. keterampilan manajemen					

6. Perusahaan saya dengan perusahaan rekanan menawarkan fleksibilitas

a. Merespon perubahan selera pasar dengan cepat	□	□	□	□	□
b. Menawarkan diferensiasi produk berkualitas sesuai karakteristik konsumen	□	□	□	□	□
c. Memenuhi pemintaan konsumen dengan beragam volume secara efisien	□	□	□	□	□
d. Menawarkan produk berkualitas dengan harga bersaing	□	□	□	□	□

7. Perusahaan saya dengan perusahaan rekanan berbagi risiko dalam hal:

	Sangat Tidak Setuju	TidakSetuju	Netral	Setuju	Sangat Setuju
a. Biaya kerusakan produk akibat proses produksi	□	□	□	□	□
b. Biaya akibat ketidaktepatan waktu pengiriman	□	□	□	□	□
c. Biaya kerusakan akibat bencana alam	□	□	□	□	□
d. Biaya akibat retur produk pasca jual.	□	□	□	□	□

8. Perusahaan saya dengan perusahaan rekanan bekerjasama memecahkan masalah terkait faktor luar:

a. Saran dan komplain dari konsumen	□	□	□	□	□
b. Perubahan strategi pesaing	□	□	□	□	□
c. Kebijakan pemerintah terkait upah & sertifikasi produk	□	□	□	□	□
d. Kondisi ekonomi makro terkait nilai tukar Rupiah, tingkat bunga dan inflasi	□	□	□	□	□

9. Kekeluargaan dalam kerjasama

	Sangat Tidak Setuju	Tidak Setuju	Netral	Setuju	Sangat Setuju
a. Perusahaan saya dengan perusahaan rekanan membangun kerjasama atas dasar kekeluargaan.	□	□	□	□	□
b. Perusahaan saya mengedepankan penyelesaian kekeluargaan jika ada masalah dengan rekanan.	□	□	□	□	□
c. Perusahaan saya selalu siap membantu perusahaan rekanan yang mengalami kesulitan.	□	□	□	□	□

10. Hirarki dalam kerjasama

	Sangat Tidak Setuju	Tidak Setuju	Netral	Setuju	Sangat Setuju
a. Perusahaan saya memiliki kewenangan lebih tinggi dibandingkan rekanan dalam membahas kontrak kerjasama.	□	□	□	□	□
b. Perusahaan saya memiliki kewenangan lebih tinggi dibandingkan rekanan dalam pengambilan keputusan kerjasama.	□	□	□	□	□
c. Perusahaan saya memiliki ketergantungan yang rendah terhadap perusahaan rekanan.	□	□	□	□	□

11. Perusahaan

	Ya	Tidak
d. Kepemilikan perusahaan ini **satu group** dengan pabrikan mobil/OEM.	□	□
e. Perusahaan ini memasok produk hanya kepada **satu** perusahaan rekanan.	□	□
f. Perusahaan ini memasok produk di ***after market.***	□	□

12. a. Berapa jumlah perusahaan rekanan tetap yang dimiliki oleh perusahaan ini tahun 2016?

□ Kurang dari 5 □ 5 - 10 □ 11 - 20 □ Lebih dari 20

b. Rata-rata sudah berapa tahun jalinan kerjasama dengan rekanan tetap telah terbangun?

□ Kurang dari 5 tahun □ 5 - 10 tahun □ 11 - 20 tahun □ Lebih dari 20 tahun

D. PERSAINGAN USAHA

1. Apa faktor penting yang digunakan oleh perusahaan ini untuk bersaing di pasar?

(Jawaban boleh lebih dari satu)

□ Harga □ Variasi produk □ Layanan purna jual

□ Kualitas □ Merk □ Lainnya (jika ada) _____

2. Sepengetahuan bapak/ibu, bagaimana tingkat perbandingan produk perusahaan ini dengan produk pesaing di pasaran?

	Paling Rendah	**Lebih Rendah**	**Sama**	**Lebih Tinggi**	**Paling Tinggi**
Harga	□	□	□	□	□
Kualitas	□	□	□	□	□
Variasi Produk	□	□	□	□	□
Merk	□	□	□	□	□
Layanan Purna Jual	□	□	□	□	□

3. Apakah perusahaan ini melakukan INVESTASI perluasan dan/ atau pembukaan pabrik/proyek baru pada tahun 2012 - 2016?
   - □ Ya
   - □ Tidak

4. a. Apakah perusahaan ini melakukan EKSPOR (penjualan ke luar negeri) pada tahun 2016?
   - □ Ya
   - □ Tidak, **Jika "Tidak", lanjut ke pertanyaan No. 5**

   b. Berapa persen (%) PERTUMBUHAN EKSPOR tahun 2016?

0 %	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
□	□	□	□	□	□	□	□	□	□	□

   Mohon jawab di sini **jika minus atau lebih dari 10 %:** _____

5. Produk dari negara mana saja yang menjadi pesaing utama di pasar?

□ China □ India □ Japan □ Malaysia □ Thailand

□ Lainnya _____

□ Taiwan □ Vietnam □ Jerman □ Amerika

E. KINERJA PERUSAHAAN

1. a. Berapa nilai PENJUALAN/ OMSET Tahun 2016 (dalam Juta Rupiah)?

	2016 (Rp Juta)
Nilai Penjualan (OMSET)	

b. Berapa persen (%) PERTUMBUHAN PENJUALAN/OMSET tahun 2016?

0 %	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
□	□	□	□	□	□	□	□	□	□	□

Mohon jawab di sini **jika minus atau lebih dari 10 %:** _____

c. Berapa persen (%) PERTUMBUHAN LABA USAHA tahun 2016?

0 %	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
□	□	□	□	□	□	□	□	□	□	□

Mohon jawab di sini **jika minus atau lebih dari 10 %:** _____

2. Pada tahun 2016, sejauhmana perubahan terjadi pada indikator kinerja berikut ini?

	Sangat Menurun	**Menurun**	**Tidak Berubah**	**Meningkat**	**Sangat Meningkat**
a. Produktivitas tenaga kerja	□	□	□	□	□
b. Efisiensi biaya	□	□	□	□	□
c. Kualitas produk	□	□	□	□	□
d. Penjualan	□	□	□	□	□
e. Laba usaha	□	□	□	□	□

3. Pada tahun 2016, sejauhmana perubahan terjadi pada indikator kinerja berikut ini?

	Sangat Menurun	**Menurun**	**Tidak Berubah**	**Meningkat**	**Sangat Meningkat**
a. Kemampuan merespon perubahan produk sesuai selera pasar.	□	□	□	□	□
b. Kemampuan menawarkan diferensiasi produk dengan kualitas tinggi.	□	□	□	□	□
c. Kemampuan memenuhi permintaan konsumen dengan beragam volume.	□	□	□	□	□
d. Kemampuan membuat produk dengan harga bersaing.	□	□	□	□	□

4. Pada tahun 2016, bagaimana pertumbuhan kinerja perusahaan ini dibandingkan dengan kinerja rata-rata perusahaan lain di industri komponen otomotif?

	Paling Rendah	**Lebih Rendah**	**Sama Saja**	**Lebih Tinggi**	**Paling Tinggi**
a. Efisiensi biaya	□	□	□	□	□
b. Penjualan	□	□	□	□	□
c. Laba usaha	□	□	□	□	□

F. INFORMASI UMUM PERUSAHAAN

6. Lokasi Perusahaan:
   □ Jakarta □ Banten □ Jawa Barat □ Jawa Tengah □ Jawa Timur

7. Usia perusahaan:
   □ Kurang dari 5 tahun □ 5-9 tahun □ 10-20 tahun □ Lebih dari 20 tahun
8. Dalam kerjasama rantai pasok (*supply chain*), perusahaan ini berada pada Tier berapa?
   □ Tier 1 □ Tier 2 □ Tier 3 □ Tidak tahu
9. Kepemilikan perusahaan:
   - □ Penanaman Modal Dalam Negeri (PMDN)/ Perusahaan Keluarga
   - □ Penanaman Modal Asing (PMA)
   - □ Joint Venture
   - □ Lainnya (Jika berbeda dengan kategori di atas) _____

10. a. Jumlah Tenaga Kerja di perusahaan ini tahun 2015 dan 2016:

Tenaga Kerja	Tahun 2015	Tahun 2016
Jumlah tenaga kerja total (orang)		

b. Persentase jumlah tenaga kerja berpendidikan **Universitas/Perguruan Tinggi** tahun 2016:

□ Kurang dari 10% □ 10 – 19% □ 20 -29% □ 30 – 49% □ 50% atau lebih

G. HASIL PENELITIAN DAN HADIAH SURVEY

Sebagai apresiasi atas partisipasi bapak/ibu, kami menyediakan **hadiah 3 PAKET UANG TUNAI masing-masing Rp 1 juta**. Hadiah akan diundi pada bulan Mei dan pemenangnya akan dihubungi melalui email atau telepon.

Email :.....
Telp/HP : .....
Nama : .....
Nama Perusahaan : .....
Produk Utama Perusahan: .....

Terimakasih atas partisipasi dan waktu bapak/ibu dalam mengisi kuesioner ini. Semoga hal ini bisa bermanfaat bagi pengembangan ilmu pengetahuan dan perumusan kebijakan yang lebih baik untuk meningkatkan daya saing industri komponen otomotif nasional.

APPENDIX 2 INTERVIEW

INTERVIEW FOR SMES AND BUSINESS ASSOCIATION

A. INNOVATION

1. What types of innovations (machinery, processes and products) have your firm introduced since 2012?
2. What are the main factors (internal and external) that **motivate** your firm to innovate?
3. What are the main factors (internal and external) that **hinder** your firm from innovating?
   What has your firm done to reduce the unsuccessful innovation activities?
4. What are the specific aspects of your community culture that affect your firm's innovation?
5. How would you want the government to encourage innovation in SMEs?

B. CREDIT ACCESS

1. What have your experiences been like when getting funding from formal creditors (such as banks, cooperatives, pawnbrokers, etc) or informal lenders (such as *bank plecit, bank keliling, bank tithil, rentenir, grandong,* etc)?

- Institution, credit amount, collateral, insurance
- Interest rate, administration cost, repayment
- Loan utilisation

2. What were the main considerations when you applied for a loan from either formal institutions or informal lenders?
3. How have your personal beliefs/religion/culture affected your decision to choose the types of creditors (formal or informal)?
4. How would you want the government to ease the credit constraints on SMEs?

C. COLLABORATIVE ADVANTAGE

1. What are the factors that you consider in selecting collaboration partners?

2. How do you build trust with your supply chain partners?

3. How do you and your supply chain partners manage business risks?
   - Type of risk-sharing model
   - Determinants and sharing mechanisms for every risk determined

4. How do you and your supply chain partners respond to the dynamics of competition in the market?
5. How would you want the government to encourage collaboration among SMEs and between SMEs and large companies?

D. BUSINESS COMPETITION

1. What kind of strategies have you applied to compete in the market since 2012?
2. What is your prediction for business competition in the next 5 to 10 years?
3. What kind of strategies have your firm applied to compete in ASEAN under a single market ASEAN Economic Community?
4. What kind of strategies have you prepared to face business competition in the next 5 to 10 years?

E. FIRM PERFORMANCE

1. How was your firm performance in 2016 on the indicators of employees' productivity, cost efficiency, sales and profit?

RESEARCH RESULTS

Are you interested in receiving the results of this research? If "YES", we will send the summary of this research to you via email.

☐ Yes (Please write your email below)

☐ No

Name of firm : .....
Email : .....
Contact person : .....

Thank you for your time and effort in participating in this interview. It is greatly appreciated. We do hope this research will be useful for knowledge creation as well as government policy formulation to improve the competitiveness of the automotive component industry.

INTERVIEW FOR GOVERNMENT OFFICIALS

1. What kind of policies has the government adopted to improve SMEs' innovation capacity, in particular SMEs producing automotive components? How have these policies been implemented?

2. What kind of policies has the government adopted to strengthen the linkage between automotive component SMEs and large enterprises/OEMs? How have these policies been implemented?

3. What kind of policies has the government adopted to widen credit access for SMEs? How have these policies been implemented?

4. What kind of policies has the government adopted to support SMEs in facing the ASEAN Economic Community (AEC)? How have these policies been implemented?

5. What kind of strategy has the government prepared to improve SMEs' competitiveness in facing tight market competition in ASEAN for the next 5–10 years?

RESEARCH RESULTS

Are you interested in receiving the results of this research? If "YES", we will send the summary of this research to you via email.

☐ Yes (Please write your email below)

☐ No

Name of institution : .....
Email : .....
Contact person : .....

Thank you for your time and effort in participating in this interview. It is greatly appreciated. We do hope this research will be useful for knowledge creation as well as government policy formulation to improve the competitiveness of the automotive component industry.

APPENDIX 3 LIST OF COMPETITIVENESS CONCEPTS

DISCUSSED IN CHAPTER 3

Classification	Scope		Determinants of competitive advantage
Competitiveness based on sources	Firm	Porter (1985)	Cost leadership and differentiation
		Barney (1991)	Internal resources (valuable, rare, imperfectly imitable and non-substitutable).
		Doven Lavie (2006b)	Combination of internal and external resources
		Jeffrey H. Dyer (2000)	Collaborative advantage
		Joshi et al. (2013)	Main determinants of automotive firm competitiveness: buyer–supplier relationship, cost, technology, flexibility, quality, delivery and customer demand.
		Sirikrai and Tang (2006)	Government roles, managerial resources, and technological capabilities.
		Ülengin et al. (2014)	The quality of local suppliers, taxation, the ease of access to loans, innovation capacity, companies' spending on R&D, the availability of the latest technologies and research networks between university and industry.
	Industry	Lipovatz, Mandaraka, and Mourelatos (2000)	Labour productivity, vertical integration, technological innovation, size of enterprises
		Guan et al. (2006)	Learning R&D, manufacturing, marketing, organising, resource, market share, sales growth, export rate, profit growth, productivity, new product rate
	Nation	Porter (1990)	Diamond model consisting of factor inputs, demand condition, supporting industry, context for cooperation and rivalry, and government policy
		Cho and Moon (2000)	Porters' diamond model + groups of human factors (politicians and bureaucrats, entrepreneurs and professionals) and chance events as external factor
		Hamalainen (2003)	Productive resources, technological innovation and diffusion, organisational efficiency, product market characteristics, international business activities, institutional framework, government role
Competitiveness based on performance	Firm	Schoemaker (1990)	Systematically creating above average returns
		Sydney G. Winter (1995)	Superior financial performance (above normal returns, high quasi-rents, value creation)
		Grant (2014)	A persistently higher rate of profit

APPENDIX 4 ROBUSTNESS CHECK OF CREDIT RATIONING IN CHAPTER 4

Appendix 4.1 Robustness Test of Credit Rationing as Exogenous Variable using Probit Model

Dependent variable: **Investing in expansion**	**Types of Credit Rationing**					
Independent Variables	Weak	Strong	Quantity	Risk	Transaction Cost	Cultural
Credit rationing	-0.575	-0.495	-0.180	0.525	-0.885	0.115
Sales growth	0.021	0.023	0.340***	0.367***	0.354***	0.352***
Firm networking with peers	0.986**	1.022**	1.499**	1.748**	1.517**	1.543**
Competition with ASEAN	0.831**	0.911**	-0.039	-0.177	0.142	-0.122
Competition with China	-0.137	-0.157	0.931	0.768	1.483*	0.920
Firm size (ln)	0.319*	0.331*	-0.290	-0.299	-0.359	-0.328
Firm age (< 10 years)	-0.701*	-0.758*	-0.526	-0.391	-0.648	-0.448
Constanta	-1.772*	-1.952**	-4.723***	-5.248***	-4.953***	-4.870***

* Significance at 10%, ** Significance at 5%, *** Significance at 1%

Appendix 4.2 Robustness Test of Probability of Investing in Expansion Using a Recursive Bivariate Probit

	Weak credit rationing			Strong credit rationing		
Dependent variable: Investing in expansion	**Investing in expansion**			**Investing in expansion**		
	Coefficient (std. error)		Average marginal effects	Coefficient (std. error)		Average marginal effects
Independent Variables	(1)		(2)	(3)		(4)
Credit rationing	-1.398	***	-0.487***	-1.605	***	-0.557***
Sales growth	0.011		0.003	0.004		0.001
Firm size (ln)	0.292	**	0.094**	0.262	*	0.094*
Firm age (< 10 years)	-0.660	**	-0.213**	-0.589	*	-0.210*
	Weak credit rationing			**Strong credit rationing**		
Dependent variable: Credit rationing						
Independent Variables	(5)		(6)	(7)		(8)
Sales growth	-0.066	*	-0.019	0.088	**	-0.034*
High collateral value	-1.868	***	-0.615***	-1.206	***	-0.453***
Competition among banks	-0.982	*	-0.296*	-1.064	**	-0.415**
Risk sharing with peers	-0.459		-0.136	-.451	*	-0.174*
Firm age (< 10 years)	-0.363		-0.108	-0.576	*	-0.221*
Wald test (X^2)	85.91			77.45		
p-value for Wald test	0.000			0.000		
LR test (X^2)	13.060			12.377		
p-value for LR test	0.000			0.000		
Number of observations	85			85		

* Significance at 10%, ** Significance at 5%, *** Significance at 1%

Appendix 4.3 Robustness test of The Probability of Non-Borrowers Investing and Factors Affecting Credit Rationing

Dependent variable: Investing in expansion	Quantity rationing			Risk rationing			Transaction cost rationing			Cultural rationing		
	Investing in expansion			Investing in expansion			Investing in expansion			Investing in expansion		
Independent Variables	Coefficient (std. error)		Average marginal effects	Coefficient (std. error)		Average marginal effects	Coefficient (std. error)		Average marginal effects	Coefficient (std. error)		Average marginal effects
	(1)		(2)	(3)		(4)	(5)		(6)	(7)		(8)
Credit rationing	-1.915	***	-0.482***	-1.153	***	-0.216***	-1.867	***	-0.453***	-1.516	***	-0.324***
Sales growth	0.191	***	0.047***	0.231	***	0.052***	0.183	***	0.043***	0.153	**	0.035**
Firm size (ln)	0.122		0.029	0.130		0.029	0.189		0.044	0.286		0.066
Firm age (< 10 years)	-0.672		-0.146	-0.408		-0.084	-0.177		-0.041	-0.333		-0.072
	Quantity rationing			**Risk rationing**			**Transaction cost rationing**			**Cultural rationing**		
	(9)		(10)	(11)		(12)	(13)		(14)	(15)		(16)
Sales growth	0.010		0.004	-0.0156		-0.005	0.018		0.007	-0.096	**	-0.037**
High collateral value	-1.249	***	-0.440***	-2.403	***	-0.367***	-1.268	***	-0.441***	-1.489	***	-0.424***
Competition among banks	-0.033		-0.013	-0.154		-0.049	-0.463		-0.184			
Competition among sharia bank										-0.167	**	-0.065**
Risk sharing with peers	-0.656	**	-0.257**	-1.044	***	0.313***	-0.532	**	-0.210**	-0.709	**	-0.267**
Firm age (< 10 years)	-0.173		-0.069	0.230		0.075	0.214		0.085	-0.09		-0.003
Wald test (X^2)	57.91			48.87			58.76			52.00		
p-value for Wald test	0.000			0.000			0.000			0.000		
LR test (X^2)	7.394			8.831			6.013			5.243		
p-value for LR test	0.000			0.000			0.000			0.000		
Number of observations	92			92			92			92		

* Significance at 10%, ** Significance at 5%, *** Significance at 1%

Appendix 4.4 Robustness Test of Credit Rationing and Firm Performance

	2SRI	
Dependent variable: profit growth (ln)	**Weak rationing**	**Strong rationing**
Independent variables	Coefficient (std. error)	Coefficient (std. error)
Credit rationing	-0.943 ***	-1.119 ***
Productivity	0.099	0.0065
Firm networking with peers	0.011	0.134 ***
Competition with ASEAN	-0.097 *	-0.009
Competition with China	-0.127 **	-0.152 ***
Firm size (ln)	-0.022	-0.068 **
Firm age (< 10 years)	0.004	-0.159 ***
R^2	0.763	0.894
Root MSE	0.314	0.289
AIC	0.621	0.454
BIC	-330.145	-331.302
Number of observations	85	85

* Significance at 10%, ** Significance at 5%, *** Significance at 1%

	2SRI	
Dependent variables: profit growth (ln)	**Weak rationing**	**Strong rationing**
Independent variables	Coefficient (std. error)	Coefficient (std. error)
Credit rationing	-0.853 ***	-0.962 ***
Sale growth	0.003 ***	0.003 ***
R^2	0.886	0.902
Root MSE	0.291	0.270
AIC	0.412	0.265
BIC	-353.018	-353.948
Number of observations	85	85

* Significance at 10%, ** Significance at 5%, *** Significance at 1%

APPENDIX 5 INNOVATION IN CHAPTER 5

Appendix 5.1 Heckman Selection Model of Innovative Effort Phase

Variables	Coefficient (robust std. error)	
Dependent variable: R&D intensity		
Price factors		
Number of employees	0.224	*
	(0.119)	
Tertiary-qualified employees	0.643	***
	(0.238)	
Investment in expansion	0.336	*
	(0.186)	
Government support	-0.157	
	(0.149)	
Non-price factors		
Supply chain linkages	0.638	***
	(0.234)	
Competition in cost	0.318	*
	(0.175)	
Competition in price	0.048	
	(0.206)	
Firm age (< 10 years)	-0.012	
	(0.153)	
Dependent variable: R&D selection		
Price factors		
Number of employees	0.545	
	(0.419)	
Tertiary-qualified employees	0.670	
	(0.672)	
Investment in expansion	0.118	
	(0.682)	
Government support	0.149	
	(0.424)	
Non-price factors		
Supply chain linkages	-0.043	
	(0.234)	
Competition in cost	0.534	
	(0.651)	
Competition in price	0.002	
	(0.607)	
Firm age (< 10 years)	-0.534	
	(0.456)	
Lambda	**-0.359**	
	(0.785)	
Observation	177	
LR test (X2)	0.10	
p-value for LR test	0.749	

* Significance at 10%, ** Significance at 5%, *** Significance at 1%

Note: The Heckman selection test given above is based on the maximum likelihood. Testing the Heckman selection using a two-step procedure yields consistent results, in which the inverse Mills ratio is not significant. This means that there is no sample selection bias in estimating the innovation effort (equation 2A).

Appendix 5.2 Robustness Check of Innovation Output Phase By omitting some price factors (ICT investment and investment intensity) from the equation

	Process innovation		Machinery innovation		Product innovation	
	Coefficient (robust std. error)	Average marginal effects (robust std. error)	Coefficient (robust std. error)	Average marginal effects (robust std. error)	Coefficient (robust std. error)	Average marginal effects (robust std. error)
Price factors						
Predicted R&D intensity	0.762***	0.228***	1.037***	0.300***	-0.085	-0.030
	(0.195)	(0.050)	(0.274)	(0.064)	(0.157)	(0.055)
Non-price factors						
Competition with China	0.634**	0.190**	0.216	0.063	-0.217	-0.076
	(0.303)	(0.090)	(0.268)	(0.077)	(0.292)	(0.101)
Competition with Thailand	-0.434	-0.130	-0.826**	-0.239**	0.611**	0.214**
	(0.274)	(0.081)	(0.316)	(0.085)	(0.300)	(0.123)
R&D networking	0.961***	0.287***	0.338	0.098	0.415**	0.145**
(with peers)	(0.241)	(0.063)	(0.253)	(0.074)	(0.203)	(0.068)
R&D networking	-0.455	-0.136	0.306	0.089	0.281	0.098
(with universities)	(0.326)	(0.096)	(0.327)	(0.096)	(0.405)	(0.142)
R&D networking	-0.290	-0.087	-0.194	-0.056	0.376	0.131
(with gov't research institutes)	(0.385)	(0.115)	(0.563)	(0.163)	(0.434)	(0.151)
Firm age (<10 years)	0.287	0.064	0.309	0.089	0.006	0.002
	(0.236)	(0.068)	(0.253)	(0.071)	(0.213)	(0.075)
Wald test (X^2)	79.39					
p-value for Wald test	0.000					
Observations	177					

* Significant at 10%, ** Significant at 5%, *** Significant at 1%

The set of standard errors given above are robust standard errors, which means they are free from heteroskedasticity.

Appendix 5.3 Robustness Check of Firm Performance Phase by changing firm performance variable from sales per employee to profit growth

Row	Variables	Price factors				Non-price factors			
		Product certification		Government support		Supply chain linkages		Social media engagement	
		Direct effect (1)	Indirect effect (2)	Direct effect (3)	Indirect effect (4)	Direct effect (5)	Indirect effect (6)	Direct effect (7)	Indirect effect (8)
	Panel A								
	Dependent variable: number of product innovations								
	Product innovation (PI)	1.947**		2.421*		1.290		0.608	
		(0.977)		(1.352)		(1.007)		(1.000)	
	Moderator	2.184		0.638		-0.577		-1.448	
		(1.796)		(1.282)		(1.169)		(1.490)	
	Interaction between product innovation & moderator	-1.433		-0.941		3.704**		3.917*	
		(2.585)		(1.904)		(1.798)		(2.175)	
	Panel B								
	Dependent variable: firm performance (FP) (profit growth, in ln)								
a	Product innovation (PI)	0.674***		0.640*		1.402***		1.102***	
		(0.253)		(0.336)		(0.298)		(0.286)	
b	Moderator	-1.426**		-0.607*		0.641**		-0.138	
		(0.431)		(0.321)		(0.317)		(0.384)	
c	Interaction between product innovation & moderator	2.457***		0.906*		-1.104**		0.020	
		(0.617)		(0.478)		(0.495)		(0.566)	
d	Process innovation	-0.219		-0.184		-0.177		-0.196	
		(0.214)		(0.224)		(0.229)		(0.225)	
e	Machinery innovation	1.030***		1.081***		1.098***		1.075***	
		(0.257)		(0.270)		(0.279)		(0.272)	
	Tertiary-qualified employees	0.017		0.025		0.009		-0.013	
		(0.110)		(0.118)		(0.1158)		(0.118)	
	Age < 10 years	-0.028		-0.001		0.007		0.003	
		(0.071)		(0.074)		(0.074)		(0.075)	
	Panel C								
f	Mediator (M) (number of product innovations)		0.130***		0.133***		0.142***		0.143***
			(0.021)		(0.022)		(0.022)		(0.022)
g	Conditional direct effect of PI at moderator with binary value of 0	0.674***		0.640*		1.402***		1.102***	
		(0.253)		(0.336)		(0.298)		(0.286)	
h	Conditional direct effect of PI at moderator with binary value of 1	3.131***		1.547***		0.298		1.122**	
		(0.588)		(0.366)		(0.419)		(0.507)	
i	Conditional indirect effect of PI on FP through M at moderator with binary value of 0		0.254**		0.321**		0.183**		0.087
			(0.129)		(0.164)		(0.085)		(0.098)
j	Conditional indirect effect of PI on FP through M at moderator with binary value of 1		0.067		0.196		0.710**		0.645**
			(0.374)		(0.146)		(0.308)		(0.332)
k	Index of moderated mediation		-0.187		-0.125		0.526**		0.558*
			(0.395)		(0.203)		(0.207)		(0.342)
	Adjusted R2 Panel B	0.504		0.454		0.458		0.449	
	p value of F-test Panel B	0.000		0.000		0.000		0.000	
	Observation	177							
	Bootstrap reps	1000							

* Significant at 10%, ** Significant at 5%, *** Significant at 1%

Appendix 5.4 Robustness Check of Firm Performance Phase by omitting one covariate variable (Tertiary-Qualified Employees)

Row	Variables	Price factors				Non-price factors			
		Product certification		Government support		Supply chain linkages		Social media engagement	
		Direct effect (1)	Indirect effect (2)	Direct effect (3)	Indirect effect (4)	Direct effect (5)	Indirect effect (6)	Direct effect (7)	Indirect effect (8)
	Panel A								
	Dependent variable: number of product innovations								
	Product innovation (PI)	1.947**		2.421*		1.290		0.608	
		(0.977)		(1.352)		(1.007)		(1.000)	
	Moderator	2.184		0.638		-0.577		-1.448	
		(1.796)		(1.282)		(1.169)		(1.490)	
	Interaction between product innovation & moderator	-1.433		-0.941		3.704**		3.917*	
		(2.585)		(1.904)		(1.798)		(2.175)	
	Panel B								
	Dependent variable: firm performance (FP) (profit growth, in ln)								
a	Product innovation (PI)	0.952***		0.765**		1.342***		1.307***	
		(0.277)		(0.352)		(0.314)		(0.303)	
b	Moderator	-1.115**		-0.820**		0.602*		0.175	
		(0.471)		(0.335)		(0.332)		(0.406)	
c	Interaction between product innovation & moderator	1.763***		1.109**		-0.631		-0.354	
		(0.675)		(0.499)		(0.522)		(0.599)	
d	Process innovation	0.040		0.068		-0.041		0.057	
		(0.233)		(0.234)		(0.241)		(0.238)	
e	Machinery innovation	1.324***		1.374***		1.166***		1.325***	
		(0.278)		(0.279)		(0.292)		(0.284)	
	Age < 10 years	-0.102		-0.093		-0.059		-0.085	
		(0.077)		(0.077)		(0.078)		(0.078)	
	Panel C								
f	Mediator (M) (number of product innovations)		0.122***		0.120***		0.121***		0.128***
			(0.022)		(0.022)		(0.023)		(0.023)
g	Conditional direct effect of PI at moderator with binary value of 0	0.237***		0.765**		1.342***		1.307***	
		(0.121)		(0.352)		(0.314)		(0.303)	
h	Conditional direct effect of PI at moderator with binary value of 1	2.715***		1.874***		0.711		0.953	
		(0.644)		(0.383)		(0.442)		(0.536)	
i	Conditional indirect effect of PI on FP through M at moderator with binary value of 0		0.237**		0.291**		0.156**		0.078
			(0.120)		(0.140)		(0.078)		(0.090)
j	Conditional indirect effect of PI on FP through M at moderator with binary value of 1		0.063		0.178		0.605**		0.578**
			(0.350)		(0.144)		(0.258)		(0.309)
k	Index of moderated mediation		-0.175		-0.113		0.449**		0.500*
			(0.367)		(0.192)		(0.261)		(0.331)
	Adjusted R2 Panel B	0.497		0.515		0.510		0.497	
	p value of F-test Panel B	0.000		0.000		0.000		0.000	
	Observation	177							
	Bootstrap reps	1000							

* Significant at 10%, ** Significant at 5%, *** Significant at 1%

APPENDIX 6 COLLABORATIVE ADVANTAGE IN CHAPTER 6

Constructs and Measurements of Collaborative Advantage

The constructs of collaborative advantage are measured using a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree).

Collaborative advantage		Measurements
Inter-firm trust building		
Collaborative commitment		Our company and supply chain partners build trust in cooperation:
	CCM1	a. Maintain mutual benefits cooperation
	CCM2	b. Avoid taking any actions that can disadvantage our partners
	CCM3	c. Exchange accurate information
	CCM4	d. Agree on certain sanctions for firms breaching the agreement
Collaborative efficiency agreements		Our company and supply chain partners agree on efficiency process:
	EFA1	a. Production cost per unit
	EFA2	b. Level of productivity
	EFA3	c. Level of product reject ratio
	EFA4	d. The standard of packaging
Collaborative risk sharing		Our company and supply chain partners share the risks of:
	RSK1	a. Products reject cost (due to production)
	RSK2	b. Cost of not achieving on-time delivery
	RSK3	c. Cost due to unexpected events (natural disasters)
	RSK4	d. Product return cost (after sale)
Resources investment		
Collaborative planning		At the initial stage, the following issues are planned and integrated with supply chain partners:
	CPL1	a. Product designs
	CPL2	b. Raw material procurements in advance
	CPL3	c. Inspection of plant and machineries
	CPL4	d. Delivery time
Collaborative resources sharing		The following items are shared with supply chain partners:
	RSS1	a. Sharing plant and machinery
	RSS2	b. Extending financial assistance in emergency situations
	RSS3	c. Sharing delivery facilities
	RSS4	d. Assigning staff for managing cooperation
Collaborative relational capital		Kinship and cooperation:
	CRC1	a. Building cooperation based on kinship
	CRC2	b. Solving conflicts based on kinship
	CRC3	c. Helping supply chain partners in a difficult situation

Dynamic synchronisation		
Collaborative information and knowledge sharing		Our company and supply chain partners share information and knowledge and managerial skills:
	IKS1	a. Sharing R&D facilities
	IKS2	b. Sharing technical knowledge among employees
	IKS3	c. Sharing market information
	IKS4	d. Sharing knowledge of newly innovated products
	IKS5	e. Sharing knowledge about leadership and management skills
Collaborative synchronised responses		Our firm with supply chain partners resolves crucial external issues:
	EXR1	a. Suggestions and complaints from customers
	EXR2	b. Competitors' strategy changes
	EXR3	c. Government policy (minimum wage, certification, etc.)
	EXR4	d. Macroeconomic conditions (exchange rate, etc.)
Firm capability and firm performance		
Firm capability		How did the firm flexibility indicators change? (1=decrease significantly, 2=decrease, 3=no change, 4=increase, 5=increase significantly)
	FCB1	a. Adaptability (firm's ability to respond to marketplace changes)
	FCB2	b. Flexibility (firm's ability to fulfil various customer volume requests efficiently)
	FCB3	c. Differentiation (firm's ability to offer product differentiation)
	FCB4	d. Affordability (firm's ability to produce valuable products with competitive prices)
Firm performance		How did these firm performance indicators change? (1=decrease significantly, 2=decrease, 3=no change, 4=increase, 5=increase significantly)
	FPF1	a. Employee productivity growth
	FPF2	b. Cost efficiency
	FPF3	c. Sales growth
	FPF4	d. Profit growth

APPENDIX 7 COMBINED EFFECT OF CREDIT ACCESS, INNOVATION AND CA ON FIRM PERFORMANCE IN CHAPTER 7

Appendix 7.1 Indicators Description of Chapter 7

Indicators		Measurements
Access to finance		
High collateral value	DSCA1	Binary value = 1 if firm is willing to offer higher collateral value than proposed credit amount, and value = 0 otherwise
Risk-sharing scheme with peers	DSCA2	Binary value = 1 if firm has risk-sharing scheme with its supply chain linkage peers in production process and product return, and value = 0 otherwise
Sales growth	DSCA3	Binary value = 1 if firm has sales growth above average, and value = 0 otherwise
Firm networking with peers	DSCA4	Binary value = 1 if firm takes part as original equipment manufacturers (OEM) supplier either in Tier 2 or Tier 3, and value = 0 otherwise
Cheap cost	SSCA1	Binary value = 1 if firm states that the cost of borrowing from the bank is low, and value = 0 otherwise
Easy access	SSCA2	Binary value = 1 if firm states that the bank staff can be easily contacted/friendly, and value = 0 otherwise
Easy procedure	SSCA1	Binary value = 1 if firm states that the procedure to obtain loans is easy, and value = 0 otherwise
Innovation		
R&D intensity	PFI1	Spending on R&D per employee (in ln)
ICT investment intensity	PFI2	Spending on ICT (internet, telephone, computer software & hardware) per employee (in ln)
Investment intensity	PFI3	Spending on machinery (new purchase and repair) per employee (in ln)
R&D networking (with peers)	NPF1	Binary value = 1 if firm has R&D cooperation with peers to support innovation, and value = 0 otherwise
Social media engagement	NPF2	Binary value = 1 if firm engages in social media to gather ideas for innovation, and value = 0 otherwise
Motivation to innovate	IMO1	Binary value = 1 if firm is under cost competition pressure, producing their products at higher cost than their competitors, and value = 0 otherwise
Motivation to compete	IMO2	Binary value = 1 if firm is under price competition, selling their products at a higher price than their competitors, and value = 0 otherwise

Appendix 7.2 Descriptive Statistics of Chapter 7

Constructs	Indicators		Observation	Mean	St. dev	Min	Max
Demand side factors of credit access	1	DSCA1	177	0.220	0.416	0	1
	2	DSCA2	177	0.486	0.501	0	1
	3	DSCA3	177	0.424	0.496	0	1
	4	DSCA4	177	0.282	0.451	0	1
Supply side factors of credit access	5	SSCA1	177	0.449	0.499	0	1
	6	SSCA2	177	0.709	0.456	0	1
	7	SSCA3	177	0.303	0.461	0	1
Price factors in innovation	8	PFI1	177	14.291	1.122	12.2	18.6
	9	PFI2	177	14.189	0.995	12.2	17.9
	10	PFI3	177	14.334	0.809	12.8	16.3
Non-price factors in innovation	11	NPF1	177	3.305	1.256	1	5
	12	NPF2	177	3.181	1.234	1	5
Innovation motivation	13	IMO1	177	2.938	0.658	1	4
	14	IMO2	177	2.729	0.822	1	5
Collaborative commitment	15	CCM 1	177	4.181	0.798	1	5
	16	CCM 2	177	4.017	0.980	1	5
	17	CCM 3	177	3.616	1.138	1	5
Collaborative efficiency agreements	18	EFA 1	177	4.141	0.817	1	5
	19	EFA 2	177	3.028	1.346	1	5
	20	EFA 3	177	3.023	1.548	1	5
	21	EFA 4	177	2.831	1.388	1	5
Collaborative risk sharing	22	RSK 1	177	2.480	1.366	1	5
	23	RSK 2	177	2.226	1.150	1	5
	24	RSK 3	177	2.243	1.073	1	5
Collaborative planning	25	CPL 1	177	4.107	0.932	1	5
	26	CPL 2	177	3.147	1.248	1	5
	27	CPL 3	177	3.028	1.130	1	5
	28	CPL 4	177	4.023	0.859	1	5
Collaborative resources sharing	29	RSS 1	177	2.028	1.189	1	5
	30	RSS 2	177	2.644	1.217	1	5
	31	RSS 3	177	2.740	0.989	1	5
	32	RSS 4	177	2.763	1.252	1	5
Collaborative relational capital	33	CRC 1	177	3.469	1.163	1	5
	34	CRC2	177	3.774	1.069	1	5
	35	CRC 3	177	3.350	1.221	1	5
Collaborative information and knowledge sharing	36	IKS 1	177	1.983	1.175	1	5
	37	IKS 2	177	2.390	1.220	1	5
	38	IKS 3	177	2.802	1.168	1	5
	39	IKS 4	177	3.096	1.132	1	5
Collaborative synchronised responses	40	EXR 1	177	2.881	1.366	1	5
	41	EXR 2	177	2.401	1.366	1	5
	42	EXR 3	177	2.017	1.170	1	5
	43	EXR 4	177	2.192	1.166	1	5
Firm capability		FCB 1	177	3.463	0.691	1	5
		FCB 2	177	3.311	0.783	1	5
		FCB 3	177	3.401	0.848	1	5
		FCB 4	177	3.469	0.971	1	5
Firm performance		FPF 1	177	3.232	0.721	1	5
		FPF 2	177	3.051	0.848	1	5
		FPF 3	177	3.356	0.955	1	5
		FPF 4	177	3.260	1.000	1	5

Source: Primary data, 2017