

Support Mechanisms for SMEs and Subcontracting in Indonesia

平成13年3月

国際協力事業団
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要 約

開発途上国の中小企業（SMEs）は、潜在的な可能性を秘めながらも、数多くの困難のために、工業化や経済発展に十分寄与できないことがある。一般に、中小企業は、人的・資金的な面で内部資源に乏しく、従って外部資源を有効に活用することが求められている。本レポートは、インドネシアの中小企業に焦点を当て、それらの発展を支援してくれる仕組み（サポート・メカニズム）について、特にサブコントラクティング（下請け）取り引きに内在されているであろう力に注意を払いながら研究を行なっている。

まず第 1 章では、1) インドネシアの中小企業は自らの能力を高めるためにどのような外部資源をサポート・メカニズムとして利用しているのか、2) それら外部資源は企業能力向上にどの程度有効なのか、3) 企業間リンケージ、特にサブコントラクティングのリンケージは企業能力および生産性を向上させているのか、そして 4) 親企業とのサブコントラクティング取り引きを促進しているのはどのような要因なのか、という 4 つの大きな質問を設定した。それに続く章で、インドネシアにおける金属加工・機械分野の中小企業（従業員 299 人以下）のマイクロ・レベル・データを定性的、定量的に分析しながら、第 1 章で掲げた質問に回答を与えようと試みている。

第 2 章では、本研究に使用されているオリジナルな企業データの収集方法を説明した後、サンプル中小企業の実際に抱えている問題点を概観した。続いて、本研究の中核部分である第 3 章では、自動車・オートバイ用部品の製造、加工に携わっている 61 社の金属加工・機械関連中小企業に対するインタビュー調査に基づき、彼らがどのような外部サポートのチャンネルを利用し、それらがどの程度有効であったのかを定性的に評価している。同じく本研究の主要部分を構成する第 4 章では、自動車・オートバイだけではなく、農業機械、自転車関連の部品製造・加工に従事する中小企業も対象に加えた。サンプル企業 60 社からの質問票回答に基づいて、生産関数の測定と全要素生産性（TFP）インデックスの計算を行い、サブコントラクティング取り引きが生産性に影響を与えているのかどうか統計的に検証を試みた。

最終の第 5 章は、本研究の結論部分にあたる。分析結果を総括した後、サブコントラクティングに関する日本の経験をコンパクトにまとめた。最後に、研究結果のインプリケーションとして、JICA をはじめとする援助機関がインドネシアの中小企業支援に対してどのような分野でかかわっていくことが可能なのかを示した。

本研究の調査結果を要約すると、次のようになる。まず、企業間リンケージ、例えば、同業他社、親企業、生産機械・設備業者、商人・商社などとの関係を通じたサポート・メカニズムが、最も多くの中小企業に利用され、最も有効に機能していたことがあげられる。企業間リンケージ、特にサブコントラクティング取り引きを通じた民間のチャンネルが、サンプル中小企業の技術面、販路確保を強化する際に、最も主要な役割を演じていた。国、地方自治体などの公的機関、商工会議所、工業組合、協同組合などの準公的機関のチャンネルに比べると、民間部門の企業間リンケージ、特にサブコントラクティングのネットワークは、中小企業の技術習得、販路確保におけるサポート・メカニズムとして有効に機能していたことが特筆される。もちろん、インドネシアのサブコントラクティングによる親

企業・子企業のつながりの強さは、日本のそれと比べれば限定的でしかない。しかし、本研究では、ビジネスを通じたこの企業間のネットワークが、インドネシアの金属加工・機械中小企業に対するサポート・メカニズムとして間違いなく機能していることを確認することができた。

ただし、この企業間リンケージ、サブコントラクティングも、技術、販路確保への支援に比べると、金融面の支援では十分に機能していなかった。ほとんどのサンプル企業は、フォーマルな金融機関へのアクセス、そこからの借り入れに制約があるため、自己ファイナンス、あるいは親類、兄弟、友人などからのインフォーマルな資金に多くを依存していた。1997年、1998年の金融危機とその後の経済構造改革の中、中小企業金融のプログラムはほぼ消失し、しかも金融機関そのものの体力も衰え、貸し出し額の少ないわりには手間がかかり、信用度も低い中小企業に向けたクレジットをいかに確保するのか、大きな問題になっている。

サンプル企業から技術習得、販路支援で高く評価されたサブコントラクティングは、企業の労働生産性を実際に向上させる効果も有していた。我々の計測した生産関数、全要素生産性（TFP）インデックスの結果から、金属加工・機械の中小企業が、サブコントラクティング取り引きによる企業間リンケージを通じて、生産性を上昇させていることが示唆された。この定量分析により、労働者の教育レベルの高さ、外部の金融資源（非自己金融）に対するアクセスの良さが、中小企業の労働生産性に好影響を与えているであろうことも確認された。

それでは、企業の生産性向上に寄与しているサブコントラクティング取り引きを拡大するための要因はどのようなものが考えられるのであろうか。生産関数に続き、サブコントラクティング関数を計測したところ、外部の金融資源に対するアクセスの良さを取り引きの長期継続が、サブコントラクティング取り引き拡大の誘因になるであろうことを確認した。この結果は、親企業が、信頼度が高く、投入財の購入に窮せず安定的生産を行うことができ、ある程度近代的な生産設備を持つ下請け中小企業と取り引きしたいと考えていることの反映であろう。

上述の結果は、しかしながら、中小企業の種類、タイプによって違いがあった。規模の大きな中小企業、非プリブミ系中小企業（華人系企業）は、小規模、プリブミ系の企業に比べて、民間のサポート・メカニズム、特にサブコントラクティングへのアクセスがよい。定量的分析も、非プリブミ系企業は、プリブミ系企業に比べて、サブコントラクティングを拡大しやすい傾向があることを示している。TFPインデックスの比較からは、大規模中小企業、非プリブミ系中小企業、自動車・オートバイ用部品製造の中小企業は、一般に、小規模中小企業、プリブミ系中小企業、農業機械・自転車用部品製造の中小企業に比して、高い全要素生産性（TFP）を持つであろうことがわかった。中小企業とはいえ、規模、民族、セクターの違いによって、サポート・メカニズムへのアクセス、生産性の水準も異なっているのである。

これまでの説明では、主に民間で機能しているサブコントラクティングを中心とする企業間リンケージを通じたサポート・メカニズムについてのみ触れてきた。それでは、民間以外の支援はインドネシアの中小企業振興において意味がなかったのであろうか。先にも述べたように、企業の規模、民族、セクターなどによって、各サポート・メカニズムへのアクセスは異なっている。公的、準公的支援は、民間チャネルの支援を補完し、小規模中小企業、プリブミ系中小企業が、技術、販路確保の能力を向上させる際、効果を発揮している。例えば、活力のある、しかし極小の中小企業を育成するには、公

的技術センターの技術支援が未だ重要なのである。このような公的部門からの支援が、それら未成熟中小企業の技術、マーケティング面における能力を向上させ、サブコントラクティングなど民間で機能しているサポート・メカニズムにアクセスするきっかけを与えてくれるのである。公的部門の他の役割は、構造改革などを通じて取り引き費用を低減し、情報ネットワークを整備することによって、サブコントラクティング・ビジネスの発展を促すことである。取り引き費用が低下し、情報インフラが整ってくれば、中小企業は、より簡単に、より効果的に民間部門のサポート・メカニズムを利用して、発展していくことが可能となるのである。

最後に、前述の研究結果に基づいて、JICA を含む援助機関が今後どのような分野で支援に加わることができるのか、3つのアイデアを示した。今回のテーマは、中小企業のサポート・メカニズムとサブコントラクティングであったため、提案内容もその分野に限定している。本テーマはビジネスと直結しているため、ODA 支援ではありながら、公的部門だけではなく、準公的部門、民間部門に対する柔軟で直接的な支援が望まれるところである。また、技術支援だけでは十分でなく、金融支援だけでも十分でない。援助機関の連携した支援、行動が求められている。

第1に、中小企業、サブコントラクティングに関連する情報システムと知識基盤の強化に関する分野を提案している。具体的には、1) サブコントラクティング促進を目指したマッチ・メイキング用企業情報データ・ベースの整備、2) 中小企業の必要とする技術・経営分野における国内、海外の人的資源データ・バンク整備、3) 中小企業に対する情報システム、情報技術利用訓練とマッチ・メイキング、人材データ・バンクの産業界に対するキャンペーン、4) 中小企業およびサブコントラクティング関連の統計データ整備、5) 中小企業およびサブコントラクティングの実態解明を目指したマイクロ・レベル調査の積極的実施の5つから構成されている。

第2の提案は、中小企業振興に関連する組織の制度改革支援である。今回のテーマの主役は、確かに民間部門ではあるが、その主役たちが働きやすいようなビジネス環境を作るためにも、公的、準公的部門の制度改革が求められている。これは、1) インドネシア商工会議所、地方商工会議所、工業組合など準公的機関の制度能力向上、2) 公的部門の技術支援、トレーニング機関の能力向上、3) 政府内中小企業担当部局の制度能力強化から成っている。

3番目、最後に、中小企業金融の再構築に関連した分野を掲げている。現在の金融セクター再編の流れの中で、中小企業金融の特別な制度、仕組みは姿を消そうとしている。このままでは、インドネシア中小企業が、十分な資金確保をすることができなくなる可能性もある。そこで、1) 金融機関における中小企業貸し付けの実務能力向上、2) 信用保証制度の再構築、3) 金融機関に対する中小企業貸し付けインセンティブの供与の3点を提案した。

Chapter 1

Introduction

1-1 SMEs in Developing Economies

Although the roles of small- and medium-scale enterprises (SMEs) may vary largely by different settings such as type of economy, stage of economic development and sector of industry, there generally exist the following basic reasons for the importance of SMEs across developing countries (Berry and Mazumdar 1991: 35-39):¹

- (1) the dominant share of SMEs in economies in terms of the number of establishments, the number of employees, the value of output, etc.;
- (2) the contribution of SMEs to the favorable combination or utilization of production factors (i.e., labor and capital) through the adoption of technologies appropriate to the conditions of resource endowments and through the participation in inter-firm division of labor;²
- (3) the contribution of SMEs to the establishment of solid foundations for industrialization; and
- (4) the contribution of SMEs to a more equal income distribution through a larger share of their labor earnings.

However, it has also been observed that SMEs with attractive features mentioned above have often faced several impediments to their successful development. Schmitz (1982: 430-441) points out that insufficient entrepreneurial and managerial skills are typically internal constraints of

¹ Berry and Mazumdar (1991) also raised some other reasons such as their flexibility in the period of changing economic situations, their promotion of exports, their contribution to decentralization and their fostering of entrepreneurship. Apart from them, a large number of studies have already indicated that SMEs has played various kinds of important roles in the successful development of many of developing economies. See, for example, Bruch and Hiemenz (1984), Hill (1995), Little, Mazumdar and Page (1987), Meyanathan (ed.) (1994), Ohkawa and Kohama (1989: 136-151), Park (ed.) (1995), Staley and Morse (1965), and Whittaker (1997).

² Ohkawa and Tajima (1976) and Tajima (1978) suggest, based on their extensive analysis on Japan's experience in the postwar period, that SMEs can coexist with LEs by choosing labor-intensive technology and realizing high capital productivity. According to Stigler (1951), if the entire production process is undertaken within a single company, the cost of coordination for a wider range of operations rises and some resources may be underutilized. He states that, therefore, the participation of SMEs in the specialization of production processes generates benefits for the individual firms involved and the economy as a whole through the appropriate use of resources. This kind of inter-firm division of labor can improve the overall efficiency of production, when the size of markets expands. Also, Hondai (1992) observes in his empirical study on Japan's machinery industry that contract-out by LEs to SMEs in the 1930s resulted in an increase in the efficiency of capital through substitute by material inputs, while that in the 1960s reduced LEs' labor cost through substitute for labor.

SME growth, while limited access to technologies, markets and credits and government policies in favor of large-scale enterprises (LEs) are commonly external constraints. Similarly, Berry and Mazumdar (1991: 54-58) summarize that many of SMEs in Asian developing economies have suffered from their insufficient capabilities of technology, management, marketing and financing and the lack of access to effective systems for supporting such weak areas peculiar to them.

In this way, the important roles of SMEs have been recognized widely, while there are lots of tough obstacles which prevent them from contributing to the processes of industrialization and economic development. This is probably one of the reasons why, among several other major industrial policy subjects, the SME issue has continuously provided us with a great many controversial topics and policy interests.

1-2 SMEs in Indonesia

For Indonesia as one of the East Asian developing economies and a case study country in this study, the development of small- and medium-scale enterprises (SMEs) is an important issue to revitalize the economy after the recent period of economic crisis.³ It is also of relevance to efforts aimed at promoting industrialization and economic development in the long-term.

LEs and very small or micro-scale enterprises have enjoyed a large part of incentives and subsidies from the Indonesian government and occupied a considerable share of output and workforce. On the other hand, viable and growing SMEs have received limited attention and opportunities and contributed to a modest share of production and employment (Berry and Levy 1999: 31). Since this study identifies SMEs as a driving force in the process of industrialization in Indonesia, rather than as part of a social safety net (SSN), special attention is paid to the “missing middle” or potential and dynamic small-medium enterprises. Therefore, a special definition of small- and medium-scale enterprises (SMEs) is applied in this study.

In Indonesia, different definitions of SMEs or small-scale enterprises are used. The Central Bureau of Statistics (BPS) defines firms with four or less workers, those with 5 to 19 workers and those with 20 to 99 workers as household, small-scale and medium-scale enterprises, respectively. The Indonesian Ministry of Industry and Trade (MOIT) defines manufacturing SMEs on the basis of the value of assets (excluding land and buildings). Firms with assets of less than Rp 200 million are small-scale enterprises and those with assets of Rp 200 million to Rp 5 billion are small- and medium-scale enterprises. Bank Indonesia, the central bank, and the former Ministry of Cooperatives and Small & Medium Enterprises (the current State Ministry of

³ For general surveys on SMEs in Indonesia, refer to Braadbaart (1994), Bruch and Hiemenz (1984), Mizuno (1996), Pangestu (ed.) (1996), Saleh (1986), Suhartono (1988), Tambunan (2000) and van Diermen (1997).

Cooperatives and Small & Medium Enterprises) define small-scale enterprises as firms with assets of less than Rp 200 million or with sales of less than Rp 1 billion.

Except for MOIT's definition, the size of companies in the other definitions is too small to deal with the above-mentioned "missing middle." Our study defines SMEs as firms with 299 or less workers. This definition takes account of: (1) the conventional identification; (2) the "missing middle" or SMEs as a driving force of industrialization; and (3) comparability with other countries, particularly Japan.

Advocating the importance of SMEs in many official statements, the Indonesian government has formulated and launched various types of policies and measures for the development of the SME sector. In Repelita VI (its Sixth Five-year Development Plan during 1994/95-1998/99), the government emphasized the promotion of SMEs, aiming mainly at 1) creating employment and 2) improving huge imbalances of income distribution, region and ethnicity. Table 1-1 chronologically depicts policies, programs and organizations relevant to the promotion of SMEs in Indonesia.

The BIPIK (Small Industries Development) program was introduced in 1974 and carried out as one of the main technical support programs for small-scale industry, under which technical assistance was extended to small enterprises through UPTs (Technical Service Units) staffed by TPL (Extension Field Officers). After the BIPIK program was finished in 1994, the PIKM (Small-scale Enterprises Development Project) was subsequently launched and has been executed until now. However, due to budget constraints and institutional problems, the UPTs-TPL system has not functioned well and, consequently, the PIKM has not been able to provide small industry with sufficient technical support.⁴ As financial support programs, the government initiated KIK (Credit for Small Investment) and KMKP (Credit for Working Capital) in 1973 and continued them until the 1980s. In 1990, however, because of high default rates and budget constraints of the government, such subsidized credit programs were abolished and, instead, non-subsidized KUK (Credit for Small Business) scheme was established (Thee 1994: 101-104).⁵

For around 15 years from the late 1970s, the government attempted to foster small-medium parts manufacturers through the implementation of Deletion (Localization) programs for some import-substitution products such as commercial vehicles, motorcycles and diesel engine. All of them ended by the early 1990s, and Incentive systems for vehicles were newly set up in 1993.

⁴ UPTs are public technical institutions specializing technical support for small industry. In the middle of the 1990s, the Indonesian Ministry of Industry and Trade (MOIT) stopped to allocate budget to UPTs and, since then, they have faced serious financial difficulties. The number of UPTs declined from more than 160 in the peak period of the 1980s to around 80 in 1997. When the author visited UPT in PIK Pulogadung of Jakarta, it had six staff members and managed their operations on a very limited budget of Rp. 2,000,000 (around US\$ 300) per month.

⁵ Apart from KUK, there are 17 credit schemes for small businesses. However, they basically aim not at small-medium manufacturing enterprises but at farmers, cooperatives, micro enterprises or consumers.

Based on information from a Japanese-affiliated supplier firm, local contents for automotive parts and components in Indonesia started to substantially increase after the Deletion program was finished. Recognizing inter-firm linkages as a key to the development of SMEs, the Indonesian government initiated forced subcontracting programs, which was known as Bapak Angkat (Foster-Father) programs. However, many successful cases have not been reported.

Table 1-1 Policies, Programs and Organizations for the Development of SMEs in Indonesia

1. <i>Technology</i>	1969	MIDC (Metal Industry Development Center or Institute for R&D of Metal and Machinery Industries) was established.	
	1974	BIPIK (Small Industries Development) Program was formulated as a technical support program for small industry.	
	1979	Under BIPIK program, LIK and PIK (Small Industrial Estates) were constructed and technical assistance was extended to small industry in or near LIK/PIK mainly through UPT (Technical Service Units) staffed by TPL (Extension Field Officers).	
	1994	BIPIK program was finished and PIKM (Small-scale Enterprises Development Project) was launched.	
2. <i>Marketing</i>	1979	Reservation Scheme was introduced as protection measures of markets for small industry.	
	1999	Anti Monopoly Law was enacted.	
3. <i>Financing</i>	1971	PT. ASKRINDO was established as a state-owned credit insurance company.	
	1973	KIK (Credit for Small Investment) and KMKP (Credit for Working Capital) were introduced as government subsidized credit programs for small-scale industry.	
	1973	PT. BAHANA was founded as a state-owned venture capital company.	
	1974	KK (Small Credit) administered by BRI (Indonesian People's Bank) was launched and later (1984) changed to KUPEDES scheme (General Rural Savings Program) aimed at promoting small business.	
	1989	SME Loans from state-owned enterprises (1 to 5 % benefits) were introduced.	
	1990	Government subsidized credit programs for small industry (KIK and KMKP) were abolished and unsubsidized KUK (Credit for Small Business) scheme was introduced.	
	1999	The function of directed credit programs was transferred from Bank Indonesia (the central bank) to PT. PNM (State-owned Corporation for SMEs) and Bank Export Indonesia.	
	2000	Government credit programs for SMEs including KUK are abolished.	
	4. <i>General</i>	1973	Ministry of Light Industry and Ministry of Heavy Industry were merged into Ministry of Industry.
		1976	Deletion (Localization) Programs for the commercial vehicles were introduced (motorcycle in 1977 and some other products such as diesel engine and tractors later on).
1978		Directorate General for Small-scale Industry was established (in Ministry of Industry)	
1984		Foster Father (Bapak Angkat) Program was introduced to support small industry.	
1991		Foster Father-Business Partner Linkage was extended to a national movement.	
1991		SENTRAs (groups of small-scale industry) in industrial clusters were organized as KOPINKRA (Small-scale Handicraft Cooperatives).	
1993		Deletion Programs for the commercial vehicles were finished and Incentive Systems were adopted.	
1993		Ministry of Cooperatives started handling small business development.	
1995		Basic Law for Promoting Small-scale Enterprises was enacted.	
1997		Foster Father (Bapak Angkat) Program was changed into Partnership Program.	
1998	Ministry of Cooperatives and Small Business added medium business development.		
1998	SME promotion was emphasized in People's Economy as a national slogan.		
1999	New Automobile Policy was announced and Incentive Systems were finished.		

Sources: Based on Thee (1994: 101-111), documents prepared by the Indonesian Ministry of Industry Trade, and author's interview survey.

As illustrated above, even though the government has experimented various kinds of programs for the promotion and protection of SMEs, most of them were ineffective or did not

function well. This is likely to be a consequence of insufficient institutional capabilities of the government sector as well as inadequate designs of policies and programs (Thee 1994). This implies that it has been difficult for the SME sector to rely much on support programs provided by the public sector.

1-3 Main Research Questions

As stated in the above, the strengthening of SME sector is a central issue for developing economies, particularly Indonesia in this study. Of course, self-reliance of SMEs is indispensable for their growth and modernization. In fact, the Indonesian SMEs themselves have recently made various kinds of efforts to cope with a sudden shrinking of the markets or even take advantage of changing economic circumstances.⁶

However, as indicated by Schmitz (1982) and Berry and Mazumdar (1991), it seems difficult for SMEs with limited human and financial resources to acquire technology, develop markets and arrange financing by themselves. Different from large-scale counterparts, SMEs cannot rely much on their internal resources and have to take advantage of external resources effectively.

There is another argument that SMEs in developing economies can grow through the transactions with LEs in vertically dis-integrated production system (Hondai 1996: 25-27; Mead 1984: 1095-1106).⁷ In general, with the progress of economic development, the manufacturing process tends to be divided into more stages of processing or a number of separable activities.⁸ This specialization of production processes provides SMEs with an opportunity to take part in such separable production stages through subcontracting transactions, and the division of labor generates benefits for the individual firms involved and the national economy as a whole through the flexible or appropriate use of production factors under the given resource endowments.⁹

This study, therefore, raises the following main research questions:

- (1) What kind of external sources have SMEs utilized as support mechanisms to enhance

⁶ For example, a case study conducted by Sandee, Andadari and Sulandjari (2000) indicates that the furniture industry in Jepara on the north coast of Central Java has done well in flexibly adjusting to changes in economic conditions. Small-scale furniture producers in Jepara have even expanded their production through the promotion of exports since the outbreak of the economic crisis. Peneliti (1999) analyzes factors to maintain stable subcontracting transactions in the crisis period, using cases of heavy equipment, food, rattan furniture and telecommunication equipment subsectors.

⁷ According to Mead, 'vertically dis-integrated' production system means that enterprises purchase raw materials and intermediate goods from outside to complete particular products, whereas 'vertically integrated' production system indicates that manufacturers undertake in-house production in various processes from raw materials or intermediate inputs to final products.

⁸ This is the case for machinery industry, which requires production or processing of a variety of parts and components as intermediate inputs.

⁹ See Stigler in the above footnote 2.

their capabilities ?;

- (2) How effective or useful are such external sources for SMEs in upgrading their capabilities ?;
- (3) Do subcontracting linkages enable SMEs to develop their capabilities and improve their productivity ?; and
- (4) What are the major factors for promoting subcontracting transactions with parent firms ?

Using the qualitative and quantitative methods, this study attempts to answer the above questions, present the possible ways to enhance SMEs in Indonesia and draw some policy implications for the future direction of ODA in this field. Even though SMEs in Indonesia are the main topic in this study, Japan's experience in this field is always taken into account explicitly and implicitly.

1-4 Structure of the Study

This study is organized as follows. Chapter 2 gives an overall explanation of survey methods and general characteristics of sample SMEs. Chapter 3 investigates support mechanisms for SMEs in Indonesia, focusing on the automotive and motorcycle parts industry. Based on the findings in Chapter 3, Chapter 4 analyzes the role of subcontracting transactions in labor productivity of SMEs, using the estimation results of production functions. The chapter also calculates TFP indices and discusses some related issues. Chapter 5 as a conclusion of this study presents a set of answers to the main research questions, together with the essence of Japan's experience and some policy implications for ODA institutions.

Chapter 2

Survey Methods and Sample Firms in Indonesia

2-1 Field Survey in Indonesia

During August 1999-March 2000 in the aftermath of the economic crisis, our field survey in Indonesia was carried out to obtain firm-level data and information on SMEs, in cooperation with Japan International Cooperation Agency (JICA) and the Indonesian Ministry of Industry and Trade (MOIT). Primary data for this study were collected in that period by the purposive sampling method.

2-2 Framework of Sample Survey in Indonesia

As stated in the previous chapter, this study focuses on small- and medium-scale metalworking and machinery firms which have supplied their products or processing services to automobile/motorcycle, agricultural machinery and bicycle producers. This is a consequence of considerations about: 1) the divisibility of production processes; and 2) comparison among different levels of quality required for products and services. The metalworking and machinery industry tends to have many production processes and can easily be divided into several operation stages. In general, automobile and motorcycle assembler firms require higher quality than agricultural machinery and bicycle assembler firms.

From the above subsectors, firms were selected according to three criteria: employment size (less than 300 employees); investment status (mainly domestic investment); and location (Jakarta, Sukabumi, Bandung and Surabaya).¹⁰ For the selection of sample firms, the following

¹⁰ Different from definitions of SMEs used in Indonesia, this study included not only micro- or small-scale enterprises but also viable medium-scale enterprises with up to 300 employees, because of our emphasis on SMEs as a driving force in the process of industrialization (Hayashi 2000: 275). Also, since joint-venture companies have usually received strong support from their headquarters abroad besides assistance from domestic sources, the study aimed to look mainly at Indonesian local firms without such intensive help from abroad. In addition, this study needed to cover both urban and rural areas within a limited time. In consideration of locational concentration of both assembler and supplier firms in the subsectors, sample metalworking and machinery firms were selected in areas in metropolitan JABOTABEK (greater Jakarta area consisting of Jakarta, Bogor, Tangerang and Bekasi), Sukabumi (a town in the rural area of West Java) Surabaya (including its surrounding areas) and Bandung. Some SMEs located in Bandung were dealt with in our interview survey, but none of them returned our full questionnaire. These are the main reasons for applying the above criteria.

information sources were mainly used: 1) Capricorn Indonesia Consultant's directories such as *Indonesian Machinery Industry Directory* (1998), *Indonesian Manufacturers Directory 1997/1998* (1997) and *Automotive Parts and Components Industry Directory in Indonesia* (1996); 2) BPS's *Manufacturing Directory Indonesia 1998* (1999); 3) directories issued by industrial associations such as Indonesian Automotive Parts and Components Industries Association's *GIAMM Directory 97* (1997) and Federation of Associations of Indonesian Metalworks and Machinery Industries (GAMMA)'s *Metalworks & Machinery Industry Directory 1998-1999* (1997); 4) Infomedia Nusantara's *Telephone Guide in Jakarta 1999: Industry and Commerce (Yellow Pages)* (1999); and 5) direct information from industrial associations, assembler firms, higher-tier subcontractors and firms in similar business lines.

Based on such criteria and information sources, around 205 firms were identified by the purposive sampling method and they were contacted by telephone or facsimile. Subsequently, interview surveys with owners (or at least directors) were carried out among 97 (93 local owned and 4 foreign affiliated) SMEs.¹¹ Of the 97, 61 local enterprises engaging in the automobile and motorcycle industry are used as sample firms for our analysis in Chapter 3. Also, after such a 2- to 3-hour interview together with a close look at production facilities, our full questionnaire was submitted to owners (or directors). Of the 97, 60 (57 local and 3 foreign) firms filled in statistical parts of questionnaires in a usable form. These 60 metalworking and machinery firms for the automobile, motorcycle, agricultural machinery and bicycle industry are used in Chapter 4.

In collecting the questionnaires, the author and/or his research assistants checked main items and confirmed incomplete, inconsistent or unclear answers. Our efforts through this kind of intensive and face-to-face contact were made to increase confidence in the data and the information collected.

2-3 Main Difficulties of Sample Firms in Indonesia

Table 2-1 shows main problems which our 73 sample SMEs have experienced since establishment. Figures in the table are average scores on a five-point Likert-type scale, where "5" represented the highest degree of seriousness and "1" the lowest.

At the start of operations, problems with respect to market access and market competitiveness were rated at the highest average scores of 4.5 and 4.1. Technical problem was raised as the second most serious problem, with an average rating of 4.3. Then, financial access

¹¹ In addition to SMEs, interviews were conducted with six automobile assembler firms (including one large-scale components producer), two motorcycle assembler firms, three agricultural machinery assembler firms, four bicycle assembler firms and around 20 government agencies, industrial associations, financial institutions and other organizations responsible for SME development.

and management problems were cited, with average scores of 4.1, respectively.

At present, the most important problem relates to financing, which was rated at the highest score of 4.5. This may reflect the unfavorable general financial situation as a consequence of the economic crisis in recent years. Next, the sample SMEs assigned market related problems the very high scores of 4.4 (market access) and 4.1 (market competitiveness). Technological problem was also ranked high, with an average rating of 4.3. Problems with respect to raw materials or intermediate inputs were very serious, which may also result from the adverse effects of the economic crisis. High costs of raw materials and intermediate inputs may have been caused by the drastic depreciation of the Indonesian currency and the associated deteriorated payment conditions for imported goods.¹² In the following chapter, this study shows how SMEs have utilized external sources to overcome such key problems, in particular technology, marketing and financing ones.

Table 2-1 Main Problems of Sample Firms at the Initial Stage and at the Present¹⁾²⁾

Problems	Initial Stage Mean Scores	Present Mean Scores
1. <i>Market Access</i>	4.5	4.4
2. <i>Input Materials</i>	3.8	3.9
3. <i>Skilled Labor</i>	4.0	3.7
4. <i>Production Technology</i>	4.3	4.3
5. <i>Financial Sources</i>	4.1	4.5
6. <i>Management</i>	4.1	3.9
7. <i>Access to Technical Institutions</i>	3.1	2.7
8. <i>Infrastructure</i>	3.4	2.8
9. <i>Production Capacity</i>	3.3	1.9
10. <i>Expensive Machinery & Equipment</i>	3.5	1.9
11. <i>Market Competitiveness</i>	4.1	4.1
Number of Sample Firms	73	73

Notes: 1) Figures in this table are the average of scores indicated by firms' ranking from 1 (the lowest score as very small) to 5 (the highest score as very large).

2) 73 sample firms consist of 54 automobile/motorcycle and 19 agricultural machinery/bicycle parts manufacturers.

Source: Based on author's interview survey during 1999-2000.

¹² One of the fundamental reasons why this raw material and intermediate input problem arises is that the Indonesian automobile and motorcycle subsectors remain heavily dependent on imported inputs. These subsectors and the Indonesia economy as a whole have a built-in structure of high import-dependency. An increase in demand induces a large increase in imported intermediate goods through direct and indirect linkages. For more details, see the Hayashi's study employing an I-O analysis (1996: 14-15).

Chapter 3

Support Mechanisms for SMEs in Indonesia

For Indonesia, the development of SMEs is an important issue in order to revitalize the economy and promote industrialization and economic development. Through our direct observation of 61 local and metalworking/machinery SMEs in the automobile and motorcycle industry, this chapter attempts to clarify channels and usefulness of external support for SMEs. Our findings confirm the positive roles of inter-firm linkages, particularly subcontracting relationships, in developing technological and marketing capabilities. However, the contribution of inter-firm linkages varies according to the firm size and the ethnicity of entrepreneurs. Also, subcontracting linkages cannot provide SMEs with sufficient financial support. The chapter finally emphasizes the roles of inter-firm linkages as support mechanisms for SMEs, together with the necessity for supplementary support from the public sector.

3-1 Introduction

This chapter investigates the existing support mechanisms for the development of SMEs, using the case study of metalworking and machinery industry in the automotive and motorcycle parts and components subsectors in Indonesia.¹³ The following research questions are examined in this chapter:

- (1) What kind of external sources have SMEs utilized as support mechanisms to enhance their technological, marketing and financing capabilities ?;
- (2) How effective or useful are such external sources for SMEs in upgrading the technological, marketing and financing capabilities ?;
- (3) Do inter-firm linkages or subcontracting linkages in the private sector enable SMEs to

¹³ There have been some similar studies on support mechanisms for SMEs. Kojima and Okada (1997) examine the institutional factors contributing to the improvement of the technological capabilities of Japanese casting industry consisting mainly of SMEs. A series of studies in Levy, Berry, Nugent; with Escandon (et al.) (1999) documents and evaluates government involvement in support systems for export-oriented SMEs, covering a wide range of subsectors such as garments, leather products, furniture, silverware, machinery and automotive components in Indonesia, Colombia, Korea and Japan. Marsden (1984) presents problems SMEs in Thailand have encountered in their businesses and sources of assistance or information they have obtained to cope with such difficulties, focusing on the metal-processing industry.

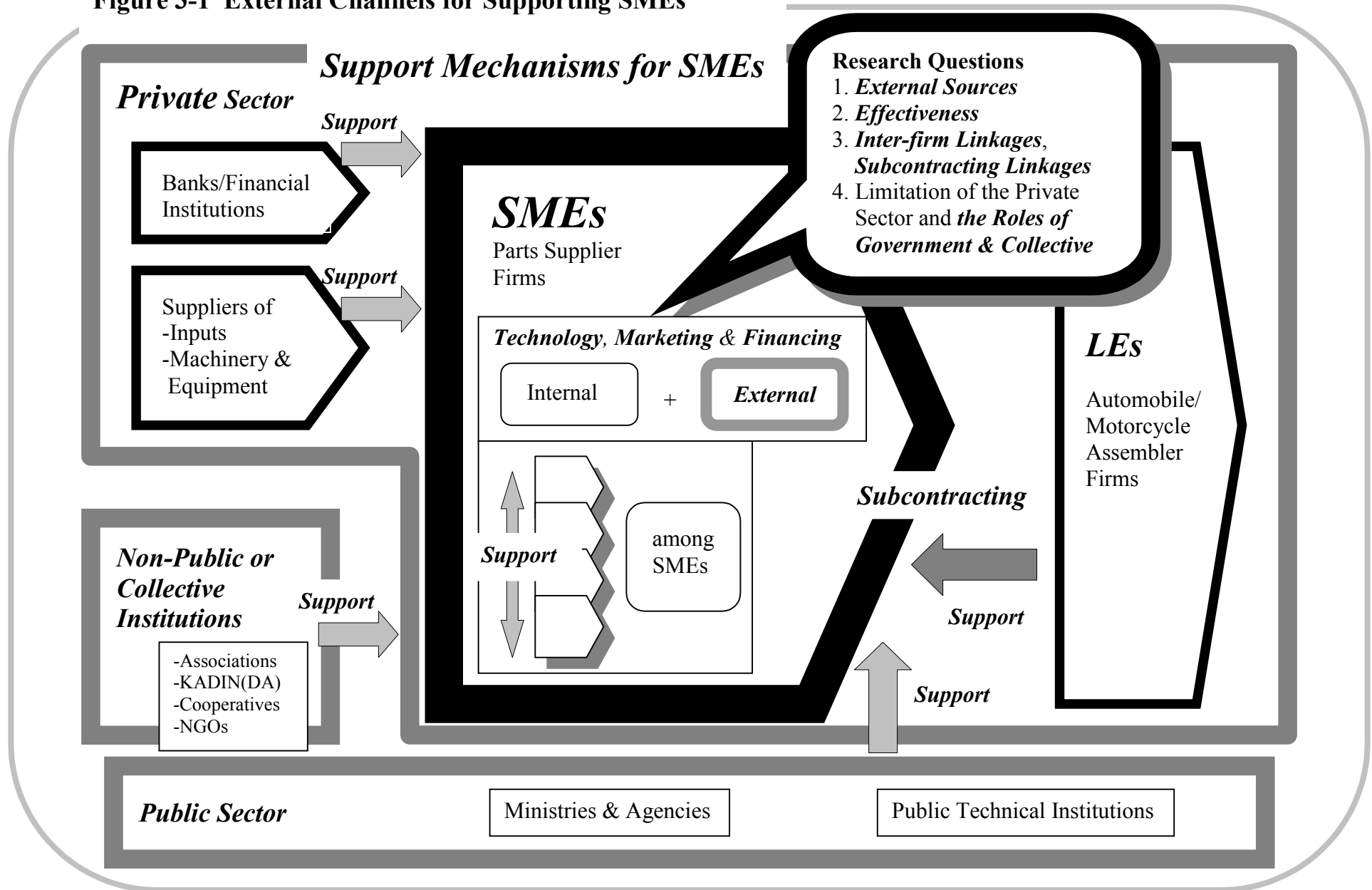
- develop their technological, marketing and financing capabilities ?; and
- (4) Are there areas where the private channels do not work well in improving SMEs' capabilities and where the public sector or collective sources can or should support the development of SMEs in supplementary ways ?

To clarify how or from which sources SMEs has ensured such key factors for corporate management as technology, marketing and financing would suggest what kind of future policies or strategies Indonesia should prepare and adopt to support SMEs which can potentially stimulate industrialization and economic development. As schematically indicated in Figure 3-1, major external sources for supporting small-medium enterprises are broadly classified into the following three channels: (1) the private sector (e.g., assembler or parent firms, firms in similar businesses, machinery and equipment suppliers, input suppliers, and banks and financial institutions); (2) non-public collective institutions (e.g., industrial associations, chambers of commerce and industry, cooperatives, NGOs); and (3) the government or quasi-government sector (e.g., government ministries and agencies and public technical institutions).

Taking into account 1) pro-large-scale-industry bias of economic policies, 2) weak institutional capabilities of the government and 3) experiences of other East Asian countries, this study pays attention to the functions of inter-firm or subcontracting linkages in the private sector as one of the main sources for supporting SMEs.¹⁴ Accordingly, our analysis in this chapter carefully looks at whether or not SMEs can solve some of the technological, marketing and financial problems peculiar to them through such inter-firm linkages with LEs or with other SMEs, in the Indonesian automobile and motorcycle subsectors.

¹⁴ Bruch and Hiemenz (1984: 57-93) state that economic policies of the government have generated biases in favor of LEs and created constraints to profitability and growth of SMEs. With regard to inefficient Indonesian bureaucracy, see, for example, Hill (1996: 118-119). Concerning East Asian experiences, Hondai (1992) and Kojima and Okada (1997) indicate that subcontracting networks in Japan help SMEs improve their technological capabilities. Kim and Nugent (1999) show that large-small linkages in Korea have functioned as technological support mechanisms for SMEs, while Levy (1991) explains active and helpful horizontal networks among SMEs in Taiwan.

Figure 3-1 External Channels for Supporting SMEs



3-2 Survey Method and Sample Firms

Primary data in this study were collected through a purposive sampling of SMEs in Indonesia, which was conducted during the period of August 1999-March 2000. This chapter focuses on small- and medium-scale metalworking and machinery firms which have been locally owned and supplied their products or processing services to the automobile and motorcycle industry.

As explained in the previous chapter, a series of interviews and questionnaire survey was carried out with 61 local SMEs which accepted our visit. In addition, interviews were conducted with six automobile assembler firms (including one large-scale components producer), two motorcycle assembler firms and around 20 government agencies, industrial associations, financial institutions and other organizations responsible for SME development. In consideration of locational concentration of both assembler and supplier firms in the subsectors, sample metalworking and machinery firms were selected in areas in metropolitan JABOTABEK (greater Jakarta area consisting of Jakarta, Bogor, Tangerang and Bekasi), Sukabumi (a town in the rural area of West Java) and Surabaya (including its surrounding areas).

Table 3-1 presents some of the key features of the sample of metalworking and machinery SMEs in the automobile and motorcycle subsectors. The number of the firms in the sample is distributed almost evenly over the size category in terms of the number of workers. Roughly one-third of the sample producers are managed by Pribumi (indigenous Indonesian) entrepreneurs and the remaining two-thirds are run by their non-Pribumi counterparts. Seven percent and three percent of the small-medium firms we surveyed are sampled from Sukabumi and Surabaya, respectively, and 90 percent are from JABOTABEK, because of the locational concentration of automobile and motorcycle businesses. Almost half of the small and medium suppliers in the sample began operations before 1989, and most of the other half of them established their firms during 1990-1996, which was a period of high economic growth. Approximately half of the surveyed entrepreneurs had acquired some kinds of higher education at polytechnic schools or universities. More than 70 percent of the entrepreneurs in the sample had engaged in a similar business line before starting their current establishments.

Table 3-1 Characteristics of Sample SMEs: Automobile/Motorcycle Subsectors

	Sample SMEs:
<i>1. Size: the number of workers</i>	
1) 1-19	23%
2) 20-49	23%
3) 50-99	25%
4) 100-299	29%
<i>2. Ethnic Group of Entrepreneurs</i>	
1) Pribumi	34%
2) Non-Pribumi	66%
<i>3. Location</i>	
1) JABOTABEK	90%
2) Sukabumi	7%
3) Surabaya (& surrounding areas)	3%
<i>4. Year Established</i>	
1) - 1979	16%
2) 1980 - 1989	33%
3) 1990 -	51%
<i>5. Education of Entrepreneurs</i>	
1) High School or Less (including D3) ¹⁾	54%
2) University	43%
3) No Answer/Not Available	3%
<i>6. Previous Occupation of Entrepreneurs</i>	
1) Similar Occupation	72%
2) Different Occupation	8%
3) Only the Current Company	13%
4) No Answer/Not Available	7%
Number of Sample Firms	61

Note: 1) D3 represents polytechnic (or equivalent level) graduates.

Source: Based on author's interview and questionnaire survey.

3-3 Support Mechanisms of Technology Acquisition for SMEs

Due to the lack of internal resources, SMEs, in general, have to use various kinds of external resources in learning technology and improving production efficiency.¹⁵ Table 3-2 depicts several external sources of technical support available to small- and medium-scale automotive and motorcycle parts producers in Indonesia.

¹⁵ The meaning of technology varies largely according to the ways of definition. For example, Thee (1997: 126-131) focuses on innovative technology in his study dealing with the motorcycle industry in Indonesia. This study, however, considers technology broadly as factors which can improve production efficiency. Therefore, technology includes not only purely technical matters but also production management skills such as quality control and delivery time control. Similarly, it encompasses not only innovative and new technologies but also adaptive and even basic operational technologies.

Table 3-2 Channels and Effectiveness of Technology Support for SMEs:

Automobile/Motorcycle Subsectors

Channels of Technology Acquisition	Firm Size & Ethnic Group ¹⁾	Users/ Respon- dents	Number of Firms Indicating a Score ²⁾ of		Average Score	
			4	5		
<i>1. Parent (Assembler) Firms</i>	All	50/61	9	20	3.7	
	1-19	12/14	2	2	2.9	
	20-49	11/14	0	3	3.2	
	50-99	11/15	3	5	4.0	
	100-299	16/18	4	10	4.5	
	P	17/21	2	4	3.2	
<i>2. Firms in Similar Business</i>	NP	33/40	7	16	4.0	
	All	42/61	15	5	3.4	
	1-19	12/14	3	2	3.5	
	20-49	12/14	5	2	3.4	
	50-99	8/15	3	0	2.9	
	100-299	10/18	4	1	3.5	
<i>3. Machinery & Equipment Suppliers</i>	P	18/21	6	3	3.3	
	NP	24/40	9	2	3.4	
	All	54/61	14	6	3.0	
	1-19	12/14	2	0	2.5	
	20-49	14/14	3	2	3.1	
	50-99	13/15	5	1	3.1	
<i>4. Input (Raw Materials, Parts, etc.) Suppliers</i>	100-299	15/18	4	3	3.4	
	P	19/21	3	4	2.8	
	NP	35/40	11	2	3.1	
	All	4/61	0	0	2.8	
	<i>5. NGOs</i>	P	5/21	0	0	1.8
		NP	0/40	0	0	-
All		5/61	0	0	1.8	
<i>6. Industrial Associations, KADIN & Cooperatives</i>	All	15/61	2	0	2.8	
	1-19	6/14	1	0	2.5	
	20-49	4/14	0	0	2.8	
	50-99	1/15	0	0	3.0	
	100-299	4/18	1	0	3.3	
	P	8/21	1	0	2.5	
<i>7. Technical Literature</i>	NP	7/40	1	0	3.1	
	All	23/61	3	1	2.5	
<i>8. Universities</i>	All	12/61	0	1	2.3	
<i>9. Public Technical Institutions</i>	All	22/61	0	4	2.7	
	1-19	6/14	0	2	3.5	
	20-49	2/14	0	2	5.0	
	50-99	6/15	0	0	1.8	
	100-299	8/18	0	0	2.1	
	P	11/21	0	4	3.2	
<i>10. Other</i>	NP	11/40	0	0	2.2	
	All	14/61	2	2	3.4	

Notes: 1) Firms size here represents the number of employees. Ethnic affiliation of owners: P = Pribumi firms and NP = non-Pribumi firms.

2) As indicated by firms' ranking from 1 (the lowest score as ineffective, not useful, insignificant or insufficient) to 5 (the highest score as effective, useful, significant or sufficient).

Source: Based on author's interview survey during 1999-2000.

According to the table, more than 80 percent of the 61 sample SMEs acquired technologies

from parent firms through subcontracting transactions.¹⁶ Interactions with subcontracting principals were ranked the highest, averaging 3.7 on a scale of 1 (the lowest as ineffective or not useful) to 5 (the highest as effective or useful), although the evaluation varied widely according to firm size and ethnic affiliation.

For Pribumi entrepreneurs and smaller SMEs with 49 or less employees, such subcontracting linkages have played a relatively modest role in the development of technological capabilities, with an average score of 2.9 to 3.2. In general, smaller Pribumi firms are often second- or third-layer subcontractors. They, therefore, do not directly deal with assembler firms but with higher-layer subcontractors who cannot necessarily offer reliable technical guidance. Besides, smaller firms are sometimes not able to learn and take advantage of hints or suggestions which their parent firms (assembler or higher-tier client firms) have provided, because of their limited capacity to absorb.

Different from the smaller Pribumi SMEs, non-Pribumi entrepreneurs and larger SMEs with over 50 employees gave a score of 4.0 to 4.5 on average to technical support from parent firms. In particular, 15 of the 27 firms with 50 or more employees assigned the highest score of 5 to their subcontracting principals as a useful source of technology acquisition. This appreciation may result from the fact that, as part of efforts to ensure sufficient QCD (quality, cost and delivery), the parent firms help their subcontractors build sufficient technological capabilities.

Roughly two-thirds of the sample SMEs reported that various kinds of technical support were extended to them by assembler firms.¹⁷ The most popular type of support is, according to the automotive and motorcycle parts producers interviewed, the so-called QC audit, through which their quality management and production management are periodically assessed at the factory by experts dispatched from assembler firms.¹⁸ They give supplier firms recommendations on how to improve the quality and delivery time of the products.

More than half of the sample SMEs have taken part in training programs or lectures on a variety of topics offered by assembler firms such as dies-making, quality control, production management, ISO and JIT systems. In addition to such classroom-type training programs, one-third of the subcontractors surveyed have received practical technical guidance at their factories from experts sent by the assembler firms or have executed projects aimed to improving their production systems supported by the assembler firms. Highly appreciated by some respondents is the plant-tour-type training program. It is designed to let subcontractors pay a mutual visit

¹⁶ Parent firms or subcontracting principals here include both automobile or motorcycle assembler firms and higher-layer vendors which contract out to the respondents through subcontracting business.

¹⁷ Some respondents, on the other hand, pointed out that in Indonesia even assembler firms themselves have not necessarily had sufficient technological expertise in every field. Therefore, it is necessary to recognize that technical support from parent firms are, in some cases, very limited or not available.

¹⁸ Sato (1998b) illustrates the processes of transfer of QC (Quality Control) and TQC (Total Quality Control) activities from Toyota (Japan) to core Japanese-affiliated joint venture companies of the Astra group and further locally owned companies in the group.

among a group consisting of five local suppliers and five foreign-affiliated suppliers, and to let them exchange ideas on how to improve their production systems, under the supervision of one motorcycle assembler firm.¹⁹

When new automobile or motorcycle models were introduced, many of the sample suppliers received intensive technical guidance on how to produce new parts and components. Such technical support has often been extended to subcontractors through a cooperation group organized by an assembler firm.²⁰ Besides automotive and motorcycle assembler firms, several of the first-layer, larger subcontractors (including both local and foreign-affiliated) have emerged as an important source of technical support.²¹

In addition to the above subcontracting relationships, two other inter-firm mechanisms for technology acquisition have proved useful. Information from similar firms and support from machinery and equipment suppliers were both cited as sources of technology by respectively nearly 70 percent and 90 percent of the respondents. The former was ranked high, with an average score of 3.4 and smaller SMEs with 49 or less employees have relied more on this channel than larger ones with over 50 employees (85 percent versus 55 percent).

The contribution of the latter channel was moderate on average, with a rating of 3.0, while it was identified as less useful by very small firms with 19 or less workers, with a score of 2.5. Since production machinery and related items purchased by smaller SMEs are very simple and not so expensive, equipment suppliers may not have many things to teach or they may not be willing to provide detailed technical information for such small-scale customers. Another inter-company networks through suppliers of raw materials and intermediate inputs have not made significant contributions to strengthening technological capabilities of the respondents of small-medium automotive and motorcycle parts producers.

Next to such private channels, public technical agencies were referred to as a source of technological capabilities by more than one-third of the sample firms. Universities were cited as a channel of technical support by only 20 percent of the respondent firms. The contribution of public technical centers was moderate on average, with a score of 2.7, while support from universities was ranked the second lowest, with an average score of 2.3. Four smaller Pribumi firms gave the highest score of 5 to public technical institutions. However, the remaining, especially non-Pribumi owners, rated their value extremely low. It is necessary, here, to recognize that different types of SMEs have utilized different kinds of public technical institutions

¹⁹ This program has been organized by PT. Yamaha Indonesia Motor Manufacturing.

²⁰ One of the typical and famous groups is Toyota Manufacturers Club, which was founded in 1987 and has been open to vendors of P.T. Toyota Astra Motor (TAM). There are 89 member firms as of August 1999. Its main objective is to promote mutual benefits of members (supplier firms) and TAM by improving their technological capabilities through several activities such as providing education and training, organizing QC competition among member firms, hosting seminar and conference, planning plant tour and so on.

²¹ For example, after the acquisition of ISO 9002 in May 1999, one local and first-tier sample firm has started giving lectures on QCD to around 15 second-layer subcontractors.

for different purposes.

Among the public technical institutions, Serpong research institutes, SUCOFINDO and the University of Indonesia, which are equipped with sufficient facilities, have been used mostly for testing and training purposes by the larger respondent firms in JABOTABEK.²² UPTs (Technical Service Units) and other universities, which are local institutions with very limited facilities and budgets, have been identified as sources of technical information by the smaller Pribumi firms in rural areas.

For instance, despite its insufficient human and physical resources, UPT in Sukabumi has played an important role in disseminating technical information to smaller Pribumi SMEs by hosting seminars and introducing guests from Jakarta or foreign countries. In this sense, it functioned as a local information center. However, due to its severe resource constraints, UPT Sukabumi cannot meet a high demand of local SMEs for testing of materials and products, training on basic technology and day-to-day technical guidance or consultation to industries.

Industrial associations, chambers of commerce and industry and cooperatives, as the collective channels, were cited by less than a quarter of the sampled SME producers and rated at 2.8 on average. Apparently, technical support from these channels was not often used and scored low. Larger or urban SMEs have used national-level associations such as GIAMM (Indonesian Automotive Parts and Components Industries Association) and APLINDO (Association of Indonesian Metal Foundry), whereas smaller or rural SMEs have utilized local- or grass-roots-level organizations such as APIKS (Association of Small-scale Metalworking Industries in Sukabumi) and PT. Usbersa Mitra Logam.²³

Very few firms pointed out the contribution of KADIN Indonesia (the Indonesian Chamber of Commerce and Industry) or KADINDA (the Regional Chambers of Commerce and Industry) as sources of technical information. This may result from the fact that they do not have any effective tools to absorb voices from and disseminate national policies to local industries.²⁴ NGOs,

²² At Serpong in the southwestern boundary of Jakarta, more than 10 advanced research institutes have been established under the coordination of the National Center for Science and Technology Development (Puspiptek). Some of these laboratories at Serpong cover automotive and motorcycle parts technology. PT. SUCOFINDO, a state owned enterprise (BUMN), provides automotive and motorcycle parts producers with various kinds of technical and managerial services such as material testing, mechanical testing, chemical analysis, products inspection and QC management training. As will be illustrated later in this , SUCOFINDO also lends money to small-scale enterprises under the special financial scheme. The University of Indonesia (Faculty of Technology) can render parts manufacturers technical advices, testing services and research opportunities in metallurgy and mechanical fields.

²³ PT. Usbersa Mitra Logam (UML, originally Usaha Bersama Kelompok Logam) was founded in 1992 at SUIK Pulogadung (industrial facilities for small-scale industries in Pulogadung), with the assistance of Yayasan Dharma Bhakti Astra (Astra Foundation). This private group, which consists of 10 small-scale metalworking and machinery firms in SUIK, aims to function as an industrial cooperative through collective activities. UML intends to jointly acquire technology and enhance access to market and financing sources. For further details, see Sato (1998a: 137-140).

²⁴ For instance, the local chambers of commerce and industry in Japan usually have permanent experts specializing in instructing corporate management. The experts also function well in giving MITI's new policies and programs to and receiving needs from firms in local areas. In the case of Indonesia, there is no such intermediate device under KADINDA.

as also one of the collective sources, were utilized by a limited number of sampled Pribumi firms and ranked very low.²⁵

Information from technical literature was cited by around one-third of the sample SMEs, but with an average rating of only 2.5. Other sources in Table 3-2 include foreign technology licensors, foreign experts (advisors) mostly arranged by foreign organizations and exhibitions sponsored by the government. All of these were appreciated as sources of learning technologies, with an average rating of 3.6, 3.5 and 3.0, respectively. Many respondents expressed their interest in contracting technical assistance agreements with foreign licensors and employing foreign expatriates, although they did not have sufficient financial resources and information on these matters.

The interview results indicate that private channels through subcontracting principals, peer firms in similar businesses and machinery and equipment suppliers have been the main sources for the improvement of the technological capabilities of small- and medium-scale metalworking and machinery manufacturers in the Indonesian automobile and motorcycle industry. The survey data confirm that particularly assembler firms and higher-tier supplier firms in the subcontracting chain have appeared as the most important channel of learning technology and that inter-firm spillovers through such subcontracting transactions have been very effective.

This observation seems different from the prevailing ideas that subcontracting linkages have been very weak and limited in Indonesia and that parent firms have not often extended effective technical support to their small- and medium-sized supplier firms (e.g., Goeltom 1997: 170-171; Hill 1997: 214-215; Thee 1985). Our findings reveal that inter-firm linkages through subcontracting networks in automobile and motorcycle subsectors have started to create opportunities for SMEs to build technological capabilities, although the effectiveness differs greatly according to the firm size and ethnic affiliation. On the other hand, public and collective channels in the form of public technical institutions and industrial associations are clearly less important than their counterparts, the private channels.

There is a significant contrast between the sources of technical support of smaller and larger SMEs, or of Pribumi and non-Pribumi SMEs. Such differences indicate that approaches to the acquisition of technological capabilities differ according to firm size and ethnic affiliation. Small Pribumi firms use and appreciate support from firms in similar lines of business rather than from subcontracting principals and machinery suppliers. They have also taken advantage of the services provided by public technical institutions in order to obtain technical information.

In contrast, large SMEs preferred the suggestions of parent firms and equipment suppliers.

²⁵ Sato (2000) reports that the technical assistance of NGOs (private institutions such as the Astra Foundation) was evaluated as the most effective way by the sample SMEs in Ceper, a rural metal-casting cluster in Central Java. This difference may be a consequence of the different characteristics of the sample firms in these two studies, for example, level of product quality required, type of customers, and access to or relationships with other sources (for technical support). Further consideration would be required.

These results imply that public technical support may supplement private support and help small Pribumi firms to upgrade their capabilities and then enable them to have better access to private channels of technical support and to acquire technology through inter-firm linkages. Public technical institutions may also support large SMEs in terms of providing testing facilities.

3-4 Support Mechanisms of Marketing for SMEs

Table 3-3 illustrates the channels and effectiveness of marketing support for small- and medium-sized metalworking and machinery manufacturers in the automobile and motorcycle industry.²⁶ Similar to the case of technology support, private channels have played a key role in linking to markets.

Among the private sources, subcontracting relationships have provided the most dominant marketing channel. The table shows that nearly 100 percent of the sample SMEs have linked their products to markets through subcontracting relationships and subcontracting transactions were rated at the highest average score of 4.0 in the possible ways of channeling their markets. It is likely that this is a consequence of the following characteristics of the automobile and motorcycle industry: the necessity to ensure a considerable number of high quality parts through assembler-supplier networks (e.g., Odaka, Ono and Adachi 1988: v); and the dominance of subcontracting-oriented Japanese manufacturers in the Indonesian market.

Supplier firms in the subsectors have been organized in a subcontracting chain starting from assembler firms. However, the evaluation on the effectiveness of marketing channels through subcontracting varies remarkably according to the size of firms. The average score of usefulness is highest for the largest sample SMEs with 100 to 299 employees (a rating of 4.6), and decreases to 3.4 as firm size decreases. This implies that the larger respondent firms have relied more on sales from subcontracting business or the smaller counterparts have relied less on those, in a relative sense.

Support from peer firms in similar fields has also been important in developing markets. Nearly 90 percent of the sample SMEs cited information from similar firms as a marketing channel and ranked it relatively high, with an average score of 3.3. There was no significant difference in the utilization of similar firms between small and large SMEs and between Pribumi and non-Pribumi firms. The latter suggests that Pribumi networks function as well as the well-

²⁶ Marketing support here means the provision of market information, intermediary functions or markets themselves.

known ethnic Chinese networks in this business field.²⁷

Table 3-3 Channels and Effectiveness of Marketing Support for SMEs:
Automobile/Motorcycle Subsectors

Channels of Marketing	Firm Size & Ethnic Group ¹⁾	Users/ Respon- dents	Number of Firms Indicating a Score ²⁾ of		Average Score	
			4	5		
<i>1. Parent (Assembler) Firms</i>	All	60/61	15	28	4.0	
	1-19	14/14	4	4	3.4	
	20-49	13/14	3	5	3.8	
	50-99	15/15	5	6	4.1	
	100-299	18/18	3	13	4.6	
	P	21/21	4	8	3.6	
<i>2. Firms in Similar Business</i>	NP	39/40	11	20	4.3	
	All	54/61	16	6	3.3	
	1-19	13/14	4	1	3.2	
	20-49	13/14	4	1	3.5	
	50-99	13/15	4	1	3.1	
	100-299	15/18	4	3	3.5	
<i>3. Traders or Trading Houses</i>	P	19/21	4	1	3.2	
	NP	35/40	12	5	3.4	
	All	32/61	3	3	2.8	
	1-19	8/14	0	0	2.4	
	20-49	7/14	0	1	2.9	
	50-99	7/15	1	0	2.3	
<i>4. Input (Raw Materials, Parts, etc.) Suppliers</i>	100-299	10/18	2	2	3.4	
	P	11/21	0	1	2.5	
	NP	21/40	3	2	2.9	
	All	2/61	0	0	2.0	
	<i>5. NGOs</i>	All	6/61	0	0	1.7
		P	5/21	0	0	1.8
NP		1/40	0	0	1.0	
<i>6. Industrial Associations, KADIN & Cooperatives</i>	All	22/61	3	0	2.9	
	1-19	7/14	1	0	3.1	
	20-49	3/14	0	0	3.0	
	50-99	4/15	1	0	2.8	
	100-299	8/18	1	0	2.6	
	P	10/21	1	0	2.8	
<i>7. Government</i>	NP	12/40	2	0	2.9	
	All	18/61	0	0	2.1	
	1-19	6/14	0	0	1.7	
	20-49	2/14	0	0	2.5	
	50-99	2/15	0	0	3.0	
	100-299	8/18	0	0	2.1	
<i>8. Other</i>	P	8/21	0	0	1.6	
	NP	10/40	0	0	2.5	
	All	1/61	1	0	4.0	

Notes: 1) Firm size here represents the number of employees. Ethnic affiliation of owners: P = Pribumi firms and NP = Non-Pribumi firms.

2) As indicated by firms' ranking from 1 (the lowest score as ineffective, not useful, insignificant or insufficient) to 5 (the highest score as effective, useful, significant or sufficient).

Source: Based on author's interview survey during 1999-2000.

²⁷ Since markets for automotive and motorcycle parts are mainly domestic, Pribumi's network can function in linking products to markets. However, if export-oriented products are selected, Pribumi's and non-Pribumi's networks work very differently. For export marketing, international connections obtained by Indonesian Chinese seem much more effective (Berry and Levy 1999: 43).

Among the private channels, the contribution of traders or trading houses in finding and developing markets is moderate. Around half of the respondent SMEs have utilized these trader channels for marketing and gave them an average score of 2.8. The role of traders may be less important, in part, due to the special patterns of trading in the automobile and motorcycle subsectors.²⁸

Industrial associations, chambers of commerce and industry and cooperatives, as collective sources of support, have played a moderate role in promoting marketing. More than 35 percent of the sample firms have used marketing services provided by these organizations and assigned them a score of 2.9 on average. Smaller SMEs tend to appreciate these types of collective support more highly than larger ones. The smaller respondents have taken advantage of marketing information and joint marketing functions provided by local or grass-roots organizations such as the aforementioned APIKS and PT. Usbersa Mitra Logam. The larger respondents have utilized information on new business opportunities and assistance to take part in exhibitions given by national-level associations such as GIAMM and APLINDO. The marketing assistance of NGOs was used by a small number of Pribumi firms surveyed, with an average rate of 1.7.

The government sector also assisted SMEs in linking their products to markets, mainly through the organization of exhibitions and trade fairs. Table 3-3 shows that 30 percent of the sample establishments have used the government channels and gave them the very low score of 2.1. However, six of the larger non-Pribumi SMEs with 50 or more workers rather appreciated such government activities, assigning them a score of 3.

Private channels have played a significant role in establishing market linkages for SMEs. In particular, subcontracting relationships are the most helpful and influential channels among the various forms of marketing support available to automotive and motorcycle parts suppliers. Public and collective sources have, in contrast, provided limited marketing support, although some types of support are to an extent useful. Examples are joint marketing and information dissemination provided by local associations to smaller SMEs, and exhibitions and trade fairs organized by national associations and central government agencies for the larger SMEs.

3-5 Support Mechanisms of Financing for SMEs

As already observed above, access to capital is one of the largest constraints SMEs have faced in initiating their business and enhancing their production efficiency. Table 3-4 shows how the

²⁸ The OEM (Original Equipment Manufacturing) parts tend to be supplied in the subcontracting chain without trading agents. However, traders or trading houses can play an active role in channeling non-OEM products to aftermarket.

sample metalworking and machinery firms in the automotive and motorcycle subsectors have financed their business and how they evaluated such financing sources.

Table 3-4 Channels and Effectiveness of Financing Support for SMEs:
Automobile/Motorcycle Subsectors

Channels of Financing	Firm Size & Ethnic Group ¹⁾	Users/ Respondents	Number of Firms Indicating a Score ²⁾ of		Average Score
			4	5	
<i>1. Parent (Assembler) Firms</i>	All	19/61	0	3	2.5
	1-19	7/14	0	0	2.3
	20-49	4/14	0	0	2.0
	50-99	3/15	0	1	2.3
	100-299	5/18	0	2	3.4
	P	9/21	0	1	2.3
	NP	10/40	0	2	2.7
<i>2. Input (Raw Materials, Parts, etc.) Suppliers</i>	All	3/61	0	0	2.0
<i>3. State and Private Banks or Financial Institutions</i>	All	48/61	6	1	2.7
	1-19	7/14	0	0	1.7
	20-49	12/14	0	0	2.3
	50-99	14/15	3	0	2.9
	100-299	15/18	3	1	3.1
	P	13/21	0	0	2.2
	NP	35/40	6	1	2.9
<i>4. Financing from Abroad</i>	All	5/61	1	4	4.8
<i>5. Informal Financing (e.g. from friends)</i>	All	17/61	4	5	3.6
	1-19	5/14	0	2	3.4
	20-49	2/14	1	1	4.5
	50-99	7/15	1	2	3.4
	100-299	3/18	2	0	3.7
	P	4/21	0	3	4.5
	NP	13/40	4	2	3.3
<i>6. Government Credit Programs</i>	All	10/61	3	4	4.0
	1-19	7/14	2	4	4.4
	20-49	1/14	1	0	4.0
	50-99	2/15	0	0	2.5
	100-299	0/18	0	0	-
	P	8/21	2	4	4.1
	NP	2/40	1	0	3.5
<i>7. Self-financing</i>	All	61/61	12	35	4.3
	1-19	14/14	2	8	4.3
	20-49	14/14	1	11	4.6
	50-99	15/15	5	6	3.9
	100-299	18/18	4	10	4.3
	P	21/21	2	14	4.3
	NP	40/40	10	21	4.3
<i>8. Other</i>	All	2/61	1	0	3.5

Notes: 1) Firm size here represents the number of employees. Ethnic affiliation of owners: P = Pribumi firms and NP = Non-Pribumi firms.

3) As indicated by firms' ranking from 1 (the lowest score as ineffective, not useful, insignificant or insufficient) to 5 (the highest score as effective, useful, significant or sufficient).

Source: Based on author's interview survey during 1999-2000.

In contrast to technological and marketing support, subcontracting principals have not extended sufficient financial assistance to their supplier firms. One-third of the sample SMEs received financial support from parent firms, but they assigned it the lowest average value of 2.5

among the possible sources. Financial assistance provided by parent companies has been limited mostly to the setting of better payment conditions (i.e. down payment) and the provision of raw materials or dies and molds.

There were, however, exceptional cases. One automobile assembler firm assisted in the establishment of some supplier firms through equity participation. The same assembler firm gave a guarantee for bank loans to one of its supplier firms.²⁹ These supplier firms, of course, gave the highest score of 5 to such financial support from the parent firms. However, subcontracting linkages have, on the whole, not necessarily worked well in providing SMEs with satisfactory financial support. Input suppliers also did not provide the respondents with sufficient financial arrangements.

The survey found that 78 percent of the sampled parts producers have had access to state and private commercial banks or financial institutions.³⁰ However, loans from these banks and financial institutions were rated low at 2.7 on average, even though the evaluation was different according to the firm size and ethnic group.

SMEs with 19 or less employees, those with 20 to 49 employees and Pribumi-run firms gave them low average scores of 1.7, 2.3 and 2.2, respectively. For the smallest SME group in particular, these financial sources were not easily accessible. Many of these smaller and Pribumi SMEs reported that they have faced a lack of information on banks and their financial services. They also mentioned problems of extremely high financial transaction costs, including high interest rates (especially in the last few years), high collateral rates (100 to 200 percent) and high unofficial commissions.³¹

At the same time, under an increased pressure of greater prudential soundness, it has been difficult for banks and financial organizations to lend money to such SMEs with less credibility, without any institutional devices like a credit guarantee system or special targeted programs. These observations correspond with Akatiga's study (1999), which concludes that the main issues of SME financing are 1) the limited information regarding formal financial institutions and available services from them and 2) inability of SMEs to gain access to formal financial institutions due to low credibility of SMEs and complex and time-consuming lending procedures set by formal financial institutions.

Compared with such smaller-scale groups, larger and non-Pribumi SMEs have had relatively better access to and better services from banks and financial institutions, with average scores of

²⁹ Both examples are financial assistance extended by P.T. Krama Yudha Tiga Berlian Motors. The former case is called *establishment linkages*, which is classified by Lall as one of the ten main categories of linkages based on his field survey in India (1980: 208-209 and 214-215).

³⁰ Among these are 10 firms which have used banks primarily for receiving credit funds under government programs. Apart from such directed credit programs, they seem not to have had access to banks.

³¹ Due to the lack of information, financial institutions also need to bear high transaction costs. The costs include the assessment on financial capabilities of SME borrowers, preparations of voluminous documents and monitoring of business performance. These costs are, therefore, high relative to loan size.

2.9 to 3.1. Some of them have mobilized their capital from abroad, although such cases are rare.

The above finding implies that smaller and Pribumi SMEs in the automobile and motorcycle subsectors have restricted access to financial services from the formal banking sector, compared to their larger and non-Pribumi counterparts. However, this does not necessarily mean that access of larger and non-Pribumi SMEs has been sufficient. They also require loans or capital from efficient and reliable financial sources, with reasonable transaction costs. Information asymmetries and high transaction costs prevent them from access to such sources of finance.

In addition to the above channels in the private sector, 16 percent of the sample supplier firms have utilized government credit programs designated for SMEs. Due to the government's definition of SMEs, the companies that have ever used directed credit schemes are mostly the smaller Pribumi SMEs.³² Half of the enterprises employing 19 or less workers in the sample received some finance through targeted credit programs and they gave such government programs a very high average score of 4.4.³³ The main credit programs used by the sample firms are: loans under the obligation of state-owned enterprises (SOEs or BUMN) who have been required to put aside 1 to 5 percent of their net profits to help SMEs; and loans under KUK (Credit for Small Business) scheme, in which banks in Indonesia are required to allocate 20 percent of their lending to small-scale firms.³⁴

Non-Pribumi firms in the sample have relied more on informal financing in the form of borrowing from friends than their Pribumi counterparts (33 percent versus 19 percent). This is likely to reflect the fact that Chinese networks are well organized. All of the sample firms have financed part or all of their business operations by themselves. This form of financing was given the highest score of 4.3 on average, except for the rare financing tool of foreign finance. This indicates that SME owners have mainly met their financial demand with their own resources.

These results show that financial support from parent firms through subcontracting linkages did not significantly contribute to the development of small and medium parts supplier firms in the automobile and motorcycle industry. Commercial loans from banks and financial institutions have been popular among larger SMEs, while government credit programs have been appreciated by smaller Pribumi SMEs. However, both of the financing sources were not

³² With regard to credit programs, the definition used by the Ministry of Finance and Bank Indonesia (the central bank) has mainly been used. They define SMEs as those companies whose production assets (excluding land and building) are less than Rp 200 million, with some preference given to Pribumis. This is the reason why loans through targeted credit programs have hardly been used by larger and non-Pribumi SMEs.

³³ Bolnick and Nelson (1990) estimate the direct impact of the government credit programs on employment, output and income. Based on their results, the KIK (credit for small investment)/KMKP (credit for working capital) program had a positive impact on small business, although the impact varied according to the sectors and target variables.

³⁴ Significant among BUMN is the role of PT. SUCOFIND in lending money to SMEs. 70 percent of the sample SMEs used government programs have been financed by it. As an intermediate, APLINDO (Association of Indonesian Metal Foundry) played a crucial role in channeling potential and reliable member firms as borrowers to SUCOFINDO as a lender. In the latter case, commercial conditions, not preferential ones, were applied to KUK loans.

sufficient. The former imposed high transaction costs even on larger SMEs and did not serve micro Pribumi firms well.³⁵ The latter tended not to be available to larger and non-Pribumi SMEs. Informal financing and self-financing have, to an extent, supplemented the shortcomings of such formal and external financial support.

To combat the financial consequences of the economic crisis since the middle of 1997, the Indonesian government has currently accelerated the restructuring of banks and other financial institutions. Such streamlining may rebuild the Indonesian banking sector, reduce high transaction costs and make it reliable and efficient. In promoting the reconstruction, it seems necessary, at the same time, to pay attention to some adverse effects on SME financing.

According to information from reliable sources, most of the government credit programs for SMEs (manufacturing sector in particular) including KUK are scheduled to be swept away in the coming years, based on the memorandum between the Indonesian government and the IMF (January 2000). As Berry and Levy pointed out (1999: 69), it will be difficult for banks and other private financial organizations, particularly in the aftermath of the economic crisis, to allocate their lending to the SME sector in the absence of directed credit programs or special devices for guaranteeing low financial confidence of SMEs. Without any considerations, financial access of the SME sector, smaller Pribumi SMEs in particular, may deteriorate.

3-6 Inter-firm Linkages as Support Mechanisms for SMEs and the Roles of Private and Public Sectors

Table 3-5 shows how assembler firms view subcontracting transactions with their small- and medium-scale counterparts. Our interviews confirm that all of the eight automobile and motorcycle assembler firms prefer to purchase parts and components from outside rather than produce in-house. In the case of purchasing intermediate inputs from outside, they prefer long-term subcontracting with their supplier firms to spot or short-term transactions.

The main reasons why they engaged in subcontracting business with local supplier firms are: (1) to utilize SMEs' lower labor costs; (2) to save capital through the reduction of machinery and equipment and to concentrate on assembling activities; and (3) to secure better products and services from parts and components producers. The main costs associated with subcontracting transactions between the assembler firms in the sample and Indonesian metalworking and machinery manufacturers are: (1) losses from unstable delivery time; (2) costs of the provision of technical assistance to their supplier firms; and (3) losses from high defect rates caused by lower

³⁵ As McLeod (1991: 209) emphasizes, it is also necessary to recognize that "lack of entrepreneurial ability makes access to finance difficult, rather than that lack of access to finance holds back entrepreneurship."

or unstable quality.

Table 3-5 Views on Subcontracting Transactions: Automobile and Motorcycle Assembler Firms

<i>Make or Buy</i> ²⁾	<i>Spot or Long-term</i> ³⁾	<i>Main Reasons for Subcontracting</i> ⁴⁾	<i>Main Burdens for Subcontracting</i> ⁵⁾
Buy: Outsourcing	Long-term: Subcontracting	1. Utilizing SMEs' Lower Wages 2. Saving Capital through Reduction of Machinery 3. Securing Better Parts & Components	1. Unstable or Late Delivery Time 2. Provision of Technical Assistance 3. High Defect Rates (low Quality)

Notes: 1) n = 8 automobile/motorcycle assembler firms (including one very large-scale supplier firm)

2) Assembler firms' preference on the production system: vertical integration (in-house production) or vertical dis-integration (purchasing from outside).

3) Assembler firms' preference on the type of transactions: spot market transactions or subcontracting transactions.

4) The three most important reasons for having subcontracting relationships with local supplier firms.

5) The three largest costs or burdens for conducting subcontracting transactions with local supplier firms.

Source: Based on author's interview and questionnaire survey.

Taking into account the findings in the previous sections as well as these ideas of assembler firms' on subcontracting, this study presents some sets of concluding remarks about support mechanisms for SMEs in the Indonesian automobile and motorcycle industry. Table 3-6 and Figure 3-2 summarize the findings in this chapter.

First, this study confirms the positive contribution of inter-firm linkages in the development of SMEs. Private channels through inter-firm linkages, in particular subcontracting transactions, have played a significant role in improving technological capabilities and linking to markets. This is consistent with the fact that, as observed before, assembler firms themselves intend to foster and strengthen viable supplier firms based on their commercial motivations. Compared with the public and collective sources, inter-firm linkages or subcontracting relationships in the private sector have functioned well as effective technology and marketing support mechanisms for SMEs.

Certainly, subcontracting networks in Indonesia are not so strong and relatively limited in comparison with those in, for instance, Japan (e.g., Thee 1985). However, such inter-firm linkages through the commercial transactions in the automobile and motorcycle industry have started to provide the SME sector with a great chance to upgrade technological and marketing capabilities. Private and public sectors can support the evolution of subcontracting linkages by reducing transaction costs and improving information flows through restructuring of the business sectors and institutional reforms of the government sectors so that SMEs can more easily and effectively take advantage of such private support mechanisms.

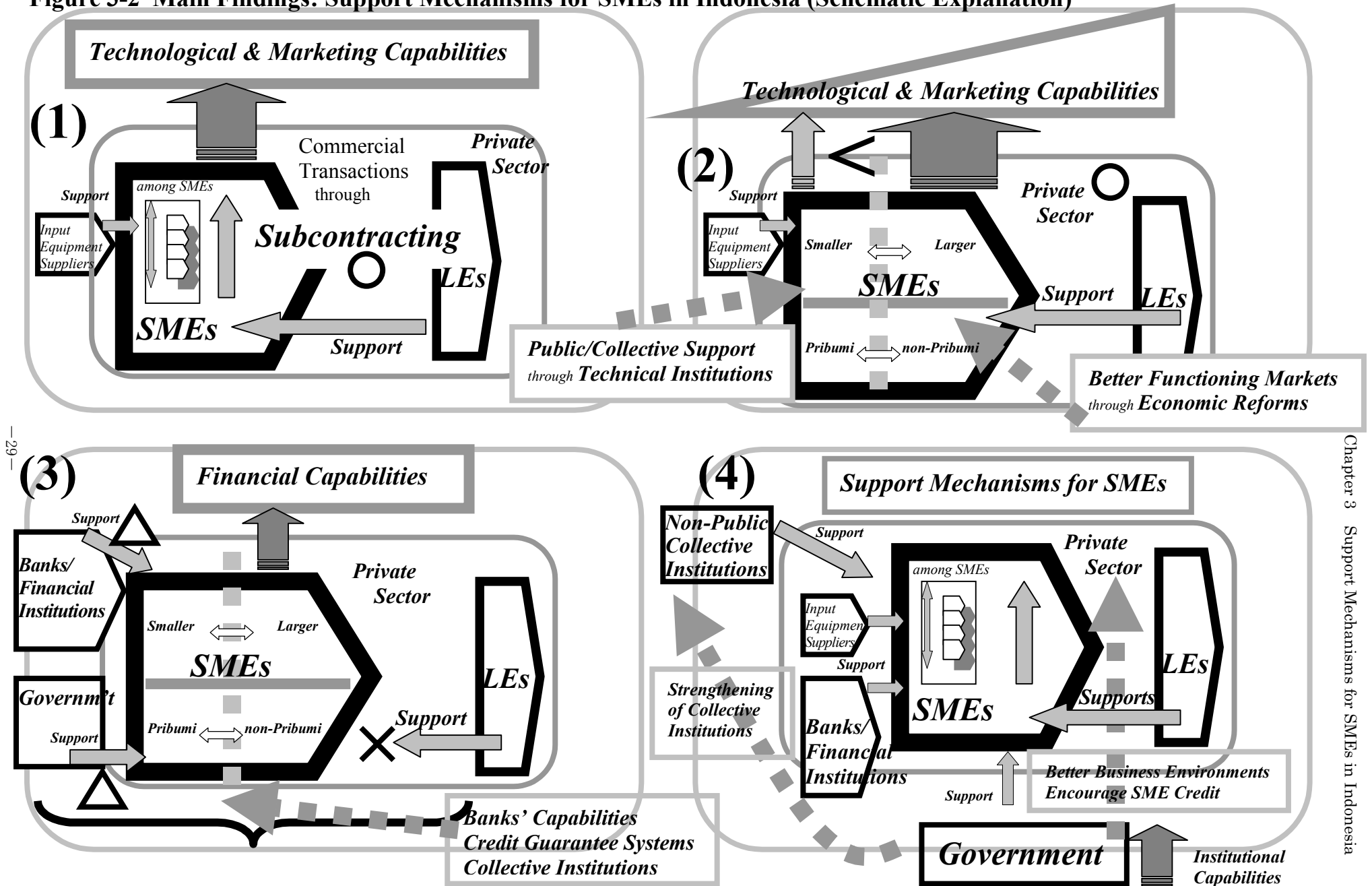
Table 3-6 Main Findings: Support Mechanisms for SMEs in Indonesia

	<i>Technological Support</i>	<i>Marketing Support</i>	<i>Financing Support</i>
<i>Private Channels</i>	<ul style="list-style-type: none"> - Private Channels through subcontracting principals, peer firms and equipment suppliers were the main sources. - Assembler/higher-tier supplier firms in subcontracting chain were most important. - The effectiveness differed greatly, according to firm size and ethnic affiliation. 	<ul style="list-style-type: none"> - Private channels played a significant role in establishing market linkages for SMEs. - Subcontracting relationships were most helpful. 	<ul style="list-style-type: none"> - Support from parent firms through sub-contracting linkages did not function well. - Commercial loans from banks/ financial institutions were utilized, but they imposed high transactions costs even on larger SMEs and did not serve smaller firms well. - Informal financing and self-financing supplemented formal and external financial support.
<i>Non-Public/Collective Channels</i>	<ul style="list-style-type: none"> - Associations, KADIN, coope's and NGOs were not often utilized and they were not so effective. - Different types of SMEs utilized different kinds of organizations. 	<ul style="list-style-type: none"> - Public/collective sources provided limited marketing support. - However, useful were joint marketing and information dissemination provided by local associations for smaller SMEs, and exhibitions and trade fairs organized by national associations and central government agencies for the larger SMEs. 	
<i>Public Channels</i>	<ul style="list-style-type: none"> - Public technical institutions were utilized by more than one-third of the sample firms, but they were not so effective. Their contribution differed largely, according to firm size and ethnic affiliation. - Different types of SMEs utilized different kinds of institutions for different purposes. 		<ul style="list-style-type: none"> - Government credit programs were appreciated by smaller Pribumi SMEs, but they tended not to be available to larger and non-Pribumi SMEs.

Secondly, there is an interesting contrast in the sources of technical and marketing support between smaller and larger SMEs or between Pribumi and non-Pribumi SMEs. Larger or non-Pribumi SME entrepreneurs can better take advantage of technical and marketing support mechanisms in the private sector than their smaller or Pribumi counterparts. This implies that different types of support for the acquisition of technological and marketing capabilities are required, according to the firm size and ethnic affiliation. As suggested above, the obstacles in markets have to be removed through ongoing economic reforms. Better functioning markets have to be developed for the “missing middle” or dynamic larger SMEs.

Our findings indicate the possibility that public and collective technical and marketing support may supplement private support and help smaller or Pribumi firms to upgrade their capabilities. The provision of technological support through public technical institutions is, for instance, still important for the development of viable but smaller SMEs. Such support may, then, enable them to improve access to private channels of technical and marketing support and to acquire technology through useful inter-firm linkages.

Figure 3-2 Main Findings: Support Mechanisms for SMEs in Indonesia (Schematic Explanation)



Thirdly, financial support mechanisms for SMEs through inter-firm or subcontracting linkages have not worked well, compared with technological and marketing support. Access to formal financial institutions has still to be improved for the SME sector, by reducing transaction costs and bettering information infrastructure.

For example, the following programs may be considered as measures to reduce transaction costs and improve a lack of information: (1) the improvement of banks' capabilities to assess financial credibility of SME borrowers and to monitor their business performance; (2) the establishment of better-functioning credit guarantee systems; and (3) the strengthening of existing collective institutions such as KADIN(DA) and industrial associations as intermediary organizations or catalysts of information between the private and government sectors and between the real and financial sectors. Since smaller SMEs have had less access to commercial financial sources, some considerations are required to meet their needs. The current movement to the elimination of government credit programs implies a possibility that financial access deteriorates for smaller Pribumi SMEs.

Finally, the capabilities of the Indonesian public sector have to be improved in order to further enhance the SME support mechanisms working in the private sector. The public sector should also carry out some important activities that supplement the insufficient functions in the private sphere. The public sector is required to prepare better business environments in which the private sector can perform well without any worries. The government needs to encourage private financial institutions to distribute credits to SMEs by providing incentives. The government also has to encourage KADIN(DA) or industrial associations to develop their capabilities of disseminating and collecting technological, marketing and financing information for SME support. Public and collective sources may provide the SME sector with support for improving technological, marketing and financial capabilities as a supplement to the private sector's efforts, if their institutional capabilities can be fostered and strengthened.

Chapter 4

SME Development and Subcontracting in Indonesia

This chapter attempts to prove that subcontracting linkages are an important support mechanism for the development of Indonesian SMEs, by estimating production functions and calculating indices of total factor productivity (TFP) based on micro-level data from 60 metalworking and machinery firms supplying their products to automobile/motorcycle, agricultural machinery and bicycle producers. The estimation results confirm our main hypothesis that inter-firm cooperation through subcontracting ties can increase productivity for Indonesian SMEs. This study implies that the situation where subcontracting ties did not function well in supporting SMEs has been recently changing. Our findings also indicate that better financial access and business continuity are important in facilitating subcontracting transactions, which can provide SMEs with support necessary for improving labor productivity. In addition, the comparison of TFP indices suggests the existence of differences in productivity between different firm groups, showing that larger SMEs, non-Pribumi SMEs and SMEs producing automotive/motorcycle parts have, in general, higher TFP than their counterparts.

4-1 Introduction

As illustrated in Chapter 1, there are common reasons for the importance of SMEs across developing countries. However, it is difficult for SMEs with limited human and financial resources to acquire technology, develop markets and arrange financing by themselves. Unlike LEs, SMEs cannot rely much on their internal resources. Given such internal constraints, how can developing economies foster SMEs ?

According to Berry (1997: 7), such limitations for SMEs make the assistance from and collaboration with LEs imperative, and the typical economic logic for inter-firm cooperation between LEs and SMEs is found in the fact that LEs can do some things better than SMEs. Berry (1997: 6) pointed out that one of the main determinants for the success of SME development is, apart from the fostering of entrepreneurial capabilities, the establishment of useful linkages between LEs and SMEs through subcontracting arrangements. He emphasized

that this kind of “linkage-inducing” policy is, for the most part and in the most places, a new and experimental issue, with considerable potential.

Hondai (1992: 176-178) specified the following main benefits which SMEs obtain from subcontracting transactions with large-scale parent (assembler or higher-tier supplier) firms: 1) the reduction of information and transaction costs through subcontracting ties, which includes easy and cheap acquisition from large-scale parent firms of new technologies, new product designs, production processes, management methods, marketing and input materials; 2) the reduction of risks and uncertainty and an increase in expected rate of profit, which mean guarantee of stable orders and better payment conditions; and 3) the improvement of creditworthiness (e.g. debt guarantee by parent firms).³⁶

Chapter 3 in this study clarified channels and usefulness of external support for SMEs, based on an interview survey of 61 local companies in Indonesia. The qualitative analysis of metalworking and machinery enterprises in the Indonesian automobile and motorcycle industries found that vertical inter-firm cooperation through commercial transactions in these subsectors were perceived as the most effective source of support to SMEs. The finding indicated the positive role of subcontracting ties in improving technological and marketing capabilities of SMEs.

By implication, it is possible to hypothesize that subcontracting transactions contribute to the improvement of production efficiency of SMEs. This chapter attempts to answer the following questions and to prove that subcontracting linkages are an important support mechanism for the development of SMEs in Indonesia, by estimating production functions and calculating indices of total factor productivity (TFP) based on micro-level data:

- (1) Are there any positive impacts from subcontracting linkages on raising labor productivity and TFP for SMEs ?:
- (2) What are the major factors for facilitating subcontracting businesses with large-scale parent firms ?:
- (3) Are there any differences in labor productivity and subcontracting between different firm groups within each firm category in terms of firm size, ethnic affiliation of ownership and subsector ?

According to Kalirajan, Obwona and Zhao (1996: 331-335), the TFP growth, the growth in output not explained by input growth, can be decomposed into technical progress and technical efficiency improvement. The former, technological progress, is either capita-intensive or labor-

³⁶ In addition to Hondai (1992), Kojima and Okada (1997) indicated that subcontracting networks in Japan help SMEs improve their technological capabilities. Kim and Nugent (1999) showed that large-small linkages in Korea have functioned as technological support mechanisms for SMEs.

intensive. For economies like Indonesia, it is better to be labor-intensive because it is a heavily populated country. The latter, technical efficiency change, concerns the efficient allocation of all inputs, and labor is very crucial. Labor productivity is, therefore, a very important component of TFP. This is the reason why this study employs labor productivity as a scale of the contribution of subcontracting to the efficiency improvement of SMEs.

By answering the above questions, this chapter will indicate that the situation where, as Thee and his colleagues (1985) observed in the 1980s, subcontracting ties in Indonesia did not function well in supporting SMEs has been recently changing.³⁷ Similarly, it will provide a new type of evidence based on a quantitative analysis, in contrast to most of the previous literature on the Indonesian SMEs, which dealt with this subcontracting issue in a qualitative way.³⁸

For our analytical purpose, subcontracting in this study is defined as a type of business transaction in which one party (subcontractors or supplier firms) is commissioned by another party (parent firms, assembler firms or higher-tier supplier firms) to provide intermediate products or processing services necessary for products manufactured by the latter. Subcontracting differs from mere market transactions of ready-made parts/components or standardized services in that such products or services supplied by subcontractors are based on specifications (quality, function, shape, design, etc.) issued by parent firms.³⁹

The rest of this chapter is organized as follows. 4-2 gives a brief explanation of the sampling procedures and an overview of the characteristics of sample SMEs. 4-3 sets forth our analytical framework and 4-4 analyzes the role of subcontracting transactions in labor productivity of SMEs based on the estimation results of production functions. 4-5 compares TFP indices among different types of sample firms and also discusses the relationships between TFP and subcontracting. Finally, 4-5 answers the three questions raised above.

4-2 Survey Method and Sample SMEs

Our field survey in Indonesia was carried out during August 1999-March 2000 in the aftermath of the economic crisis. Its aim was to obtain firm-level data and information on SMEs, in cooperation with Japan International Cooperation Agency (JICA) and the Indonesian Ministry

³⁷ Based on case studies of diesel machine industry, Thee and his colleagues (1985) concluded generally that subcontracting networks in Indonesia were not so strong and relatively limited in extending assistance to SMEs. Hill (1997: 214-215) overviews the past literature on subcontracting issues in Indonesia.

³⁸ Some recent studies documented the positive role of subcontracting linkages in the development of SMEs in Indonesia through their qualitative analyses. See, for example, Berry and Levy (1999), Harianto (1996), Hayashi (2000) and Sato (1998 and 2000).

³⁹ With regard to characteristics of subcontracting system in machinery industry, see Odaka (1978).

of Industry and Trade (MOIT).⁴⁰ Primary data for this study were collected in that period using the purposive sampling method.

This chapter focuses on small- and medium-scale metalworking and machinery firms which have supplied their products or processing services to automobile/motorcycle, agricultural machinery and bicycle producers. The focus on this industry is a consequence of considerations about: 1) the divisibility of production processes; and 2) comparison of different levels of quality required for products and services. The metalworking and machinery industry tends to have many production processes and can easily be divided into several operation stages. Usually, automobile and motorcycle assembler firms require products of a higher quality than agricultural machinery and bicycle assembler firms.

From the above subsectors, firms were selected according to three criteria: employment size (less than 300 employees); investment status (mainly domestic investment); and location (Jakarta, Sukabumi, Bandung and Surabaya). For the selection of sample firms, the information sources described in Chapter 2 were mainly used.

Based on such criteria and information sources, around 205 firms were identified by the purposive sampling method and they were contacted by telephone or facsimile. Subsequently, interview surveys with owners (or at least directors) were carried out among 97 (93 local owned and 4 foreign affiliated) SMEs. After a 2- to 3-hour interview together with an inspection of the production facilities, our full questionnaire was submitted to owners (or directors). Of the 97 firms, 60 (57 local and 3 foreign) firms filled in statistical parts of questionnaires in a usable form.

In collecting the questionnaires, the author and/or his research assistants checked main items and confirmed incomplete, inconsistent or unclear answers. The purpose of this intensive and face-to-face contact was to increase confidence in the data and the information collected.

Table 4-1 presents some of the key features of the sample of metalworking and machinery SMEs in the automobile/motorcycle, agricultural machinery and bicycle subsectors in 1998. The number of the firms in the sample is distributed almost evenly over the size categories in terms of employment. 42 percent of the sample producers are managed by Pribumi (indigenous Indonesian) entrepreneurs and the remaining 58 percent are run by their non-Pribumi counterparts.⁴¹ 23 percent of the firms were located in Surabaya (including surrounding areas), five percent in Sukabumi, and 72 percent in Jakarta (or its surrounding areas). This reflects the locational concentration of the automobile/motorcycle, agricultural machinery and bicycle businesses. Almost half of the firms began operations before 1989, and half of them were

⁴⁰ Since our benchmark years included 1998, the midst of crisis, many of data in Table 4-2, for instance, did not show stable growth trends between 1993 and 1998. Data trends in 1998 are different from those in 1993 and 1996. However, in order to overcome this problem, we attempt to analyze SMEs and subcontracting issues in each benchmark year rather than over time. As regards the impact of the crisis on SMEs, See Tambunan (2000: 141-166)

⁴¹ In this study, despite different wording, this kind of expressions saying that “.....firm is *owned, directed, run, managed, etc.* by” refers to ethnic affiliation of ownership of the firm.

established in the 1990s. Approximately a quarter of the surveyed entrepreneurs had acquired some kind of higher education at polytechnic schools or universities. Three quarters of the firms were in the automobile/motorcycle industry and the rest in agricultural machinery and bicycle industries.

Table 4-1 Profile of Sample SMEs: 1998

		Sample SMEs:
<i>1. Size: the number of workers</i>		
1)	1-19	25%
2)	20-49	30%
3)	50-99	23%
4)	100-299	22%
<i>2. Ethnic group of entrepreneurs</i>		
1)	Pribumi	42%
2)	non-Pribumi	58%
<i>3. Location</i>		
1)	Jakarta (& surrounding areas)	72%
2)	Surabaya (& surrounding areas)	23%
3)	Sukabumi	5%
<i>4. Subsector</i>		
1)	automotive/motorcycle	75%
2)	agricultural machinery	18%
3)	bicycle	7%
<i>5. Year established</i>		
1)	- 1979	15%
2)	1980 - 1989	33%
3)	1990 -	52%
<i>6. Education of skilled employees (average)</i>		
1)	high school or less	73%
2)	university (including D3) ¹⁾	27%
Number of Sample Firms		60

Note: 1) D3 represents polytechnic (or equivalent level) graduates.

Source: Based on author's interview and questionnaire survey.

Table 4-2 indicates average labor productivities (Y/L), average capital-labor ratios (K/L) and average subcontracting ratios in 1993, 1996 and 1998 by different categories of sample SMEs. Y stands for value added, L the number of employees, and K capital stock in terms of tangible fixed assets consisting of machinery/equipment and buildings for productive use based on the book value of balance sheets.⁴² The subcontracting ratio represents the share of sales through subcontracting transactions in the total turnover.

Average labor productivities (Y/L) are described as nominal value added per employee by firm size, ethnic affiliation of owners, and subsector. In 1993 and 1996, SMEs with over 50 employees achieved higher productivity than those with 49 or less employees. In 1998, even though firms

⁴² In this section, value added and capital stock are expressed in current prices. In the latter part of Chapter 4, however, this study measures them in constant prices.

with 100 to 299 employees were still the most efficient, those with 19 or less employees attained the second highest productivity. Labor productivity in SMEs with 49 or less employees showed an upward trend over time, relative to productivity of those with 50 or more employees. This may imply that smaller firms suffered less during the 1997-98 crisis period than larger ones.

With regard to ethnic category, SMEs run by non-Pribumi entrepreneurs had a higher labor productivity than Pribumi-owned enterprises. Firms producing parts for automobile and motorcycle industries had a higher labor productivity than those in the agricultural machinery and bicycle industries. Stagnation of labor productivity among firms in the automobile and motorcycle industries suggests that they suffered more during the crisis than those in agricultural machinery and bicycle industries.

Average capital-labor ratios (K/L) in Table 4-2 are presented in terms of nominal values of tangible fixed assets per employee. SMEs with more than 50 employees had a higher capital intensity during the observed period than smaller ones with 49 or less employees, except for the special case of firms with 20 to 49 employees indicating the highest average ratio in 1998. Probably, large investments in plant and equipment in response to a high demand before the crisis resulted in an increase in capital intensity among all size categories in 1998. In this sample survey, SMEs managed by non-Pribumi owners and engaged in automobile and motorcycle industries had higher capital-labor ratios throughout the benchmark years than those managed by Pribumi owners and engaged in agricultural machinery and bicycle industries.

It is not easy to generalize relationships between capital-labor ratios and labor productivity in the different groups in Table 4-2. There are some exceptional cases, but firm groups with higher capital intensity tend to have higher labor productivity. Roughly speaking, SMEs employing over 100 workers, owned by non-Pribumi entrepreneurs and engaged in automobile and motorcycle subsectors recorded higher labor productivity possibly due to a more efficient utilization of capital.

Table 4-2 also contains the average subcontracting ratio. Between 1993 and 1998, larger manufacturers with 50 or more employees relied more on subcontracting businesses than those with 49 or less employees. Similarly, firms run by non-Pribumi owners and producing automotive and motorcycle parts had a higher subcontracting ratio than those managed by Pribumi entrepreneurs and those processing agricultural machinery and bicycle parts. On the whole, the subcontracting ratio increased between 1993 and 1996, while it declined between 1996 and 1998. The trend seems to reflect drastic changes in demand and market situations before and after the economic crisis in the Indonesian economy.

Table 4-2 Average Labor Productivity, Average Capital-Labor Ratio and Average Subcontracting Ratio by Firm Size, Ethnic Affiliation of Entrepreneurs and Subsector (Current Prices): 1993, 1996 and 1998

	1993	1996	1998
<i>Labor productivity (Y/L)</i>			
<i>(Rp thousand/person)</i>			
<i>size</i>			
1-19	10,656.8	13,071.4	17,259.3
20-49	6,543.8	9,406.9	13,610.9
50-99	16,672.9	14,422.9	16,876.0
100-299	27,336.4	30,117.6	25,256.9
<i>ethnicity</i>			
Pribumi	14,363.3	14,489.5	14,459.6
non-Pribumi	17,705.2	18,032.0	20,200.0
<i>subsector</i>			
automobile/motorcycle	20,328.2	18,956.3	19,820.8
agricultural machinery/bicycle	7,298.3	7,711.7	11,770.4
<i>Capital-labor ratio (K/L)</i>			
<i>(Rp thousand/person)</i>			
<i>size</i>			
1-19	12,541.7	18,063.4	62,154.7
20-49	10,092.3	22,837.1	96,987.8
50-99	41,400.4	31,207.5	70,937.0
100-299	29,689.0	34,942.4	67,406.9
<i>ethnicity</i>			
Pribumi	13,323.0	18,798.0	42,211.0
non-Pribumi	32,867.5	32,434.4	99,778.1
<i>subsector</i>			
automobile/motorcycle	27,151.4	28,834.2	88,443.2
agricultural machinery/bicycle	22,012.5	17,762.3	37,837.5
<i>Subcontracting ratio (%)</i>			
<i>size</i>			
1-19	66.0	71.8	66.3
20-49	53.3	62.0	74.1
50-99	77.5	84.9	80.1
100-299	85.9	88.7	81.3
<i>ethnicity</i>			
Pribumi	60.0	66.3	65.2
non-Pribumi	79.8	83.9	82.2
<i>subsector</i>			
automobile/motorcycle	81.4	82.0	78.0
agricultural machinery/bicycle	51.3	55.4	66.7

Source: Based on author's interview and questionnaire survey.

Table 4-3 illustrates average annual wages (ω), average factor proportion of labor (wL/Y) and average rate of returns to capital (π) in 1998 by firm size, ethnicity and subsector. Annual wages and factor share of labor reveal clear trends. Larger SMEs provided their workers with higher compensation, whereas smaller SMEs had lower average labor costs which enabled them to offer

their products at competitive prices. Firms by non-Pribumi entrepreneurs and dealing with automotive and motorcycle parts had a higher wage rate per worker than their counterpart groups. The indicator (wL/Y) shows the opposite tendency to the average annual wages (ω). Smaller and Pribumi firms in the sample had a higher factor proportion of labor than their larger and non-Pribumi counterparts, despite paying lower average wages.

Table 4-3 Average Annual Wages, Average Income Share of Labor and Average Rate of Returns to Capital by Firm Size, Ethnic Affiliation of Entrepreneurs and Subsector: 1998

	(1) (ω) ¹⁾ (Rp thousand/person)	(2) (wL/Y) ²⁾ (%)	(3) (π) ³⁾ (%)
<i>size</i>			
1-19	5,102	52.1	41.2
20-49	5,586	50.7	30.5
50-99	6,003	48.9	36.3
100-299	8,714	42.5	65.1
<i>ethnicity</i>			
Pribumi	5,796	59.9	38.4
non-Pribumi	6,557	41.0	44.6
<i>subsector</i>			
automobile/motorcycle	6,975	49.8	39.2
agricultural machinery/bicycle	4,033	46.0	50.4

Notes: 1) (ω) indicates average annual wages (only monetary portion) per worker.

2) (wL/Y) indicates average income share of labor in value added.

3) (π) indicates average rate of returns to capital.

Source: Based on author's interview and questionnaire survey.

This study uses the following formula as an indicator to measure profitability for SMEs:

$$\pi = \frac{(Y - wL)}{K} \quad (4-2-1)$$

where π , Y , wL , and K stand for the rate of returns to capital, value added, wage costs and capital stock, respectively. Rate of returns to capital (π) represents the degree of profitability with regard to capital stock for productive use.⁴³ Table 4-3 shows that larger SMEs tend to have a higher rate of return than smaller SMEs. However, the smallest firms with 19 or less employees recorded the second highest rate. Manufacturers directed by non-Pribumi entrepreneurs had a higher profitability than those managed by Pribumi entrepreneurs. In relation to the differences of subsectors, the rate of return for SMEs processing agricultural

⁴³ This figure does not exactly represent rate of returns to capital, because capital limits only capital stock such as machinery & equipment and buildings. However, it can be used to compare the levels of profitability in terms of capital stock between different firm groups. See Hondai (1992: 133).

machinery and bicycle parts was higher than for SMEs processing automotive and motorcycle parts. On the whole, larger and non-Pribumi companies are likely to have built high-profit structure in terms of the rate of returns to capital, compared with their smaller and Pribumi counterparts.

4-3 Framework of Statistical Analysis: Estimates of Production Functions

In order to confirm the effects of subcontracting transactions on production efficiency, this study estimates production functions that include the subcontracting ratio as one of the explanatory variables. Based on the approach taken by Murakami, Liu and Otsuka (1996), we use the following Cobb-Douglas form as the production function:

$$Y = AK_{it}^{\alpha} L_{it}^{\beta} \cdot \exp(\gamma (SUBCON)_{it} + \sum_{j=1}^m \delta_j (EF)_{it}^j) \quad (4-3-1)$$

where small-medium firm i produces value added Y , using capital stock K and labor (the number of employees) L as the set of inputs in year t (hereinafter i and t are not used due to conventional expression). Also, $SUBCON$ represents subcontracting ratios and EF^j ($j = 1, 2, \dots, m$) refers to m kinds of other factors which are likely to affect the level of labor productivity of SMEs. This EF includes the following dummy variables:

- 1) *EDU-Worker*: educational level of skilled workers (0 = firms that have skilled workers with senior high school education or less on average, 1 = firms that have skilled workers with university education including D3 level);⁴⁴
- 2) *FINANCE*: access to financial sources except for their own (0 = firms which face problems in having access to financial sources, 1 = firms which do not face difficulties in having access to financial sources);
- 3) *SECTOR*: a subsector dummy (0 = firms which supply their products mainly to automobile and motorcycle industry, 1 = firms which supply their products primarily to agricultural machinery and bicycle industry); and
- 4) *AREA*: a locational dummy (0 = firms located in urban areas, 1 = firms located in rural areas).

⁴⁴ Since K/L (capita-labor ratio), factor allocation, may reflect the influence of educational level of entrepreneurs, this study does not include owner education in explanatory variables.

Higher educational levels of skilled workers and better access to financial sources may enable SMEs to improve productivity. SMEs producing automotive/motorcycle parts, which usually have better production facilities and higher awareness of quality, are expected to show higher productivity. Firms located in urban areas, which are generally in more favorable circumstances in terms of markets for outputs and inputs, communication and transport and other infrastructure, may have higher productivity. Through these dummy variables, the study attempts to consider differences in productivity between firms with different human resources (*EDU-Worker*), between those with different financial conditions (*Finance*), between those in different subsectors (*SECTOR*) and between those in different areas (*AREA*). Parameters α and β indicate production elasticity of capital and labor, respectively, and A , β , and α_j are other parameters of the production function to be estimated.

By dividing both sides of equation (4-3-1) by L and taking the logarithm with some modification, the Cobb-Douglas production function can be written as:

$$\ln(Y/L) = \ln A + \alpha \ln(K/L) + (\alpha + \beta - 1) \ln(L) + \gamma (SUBCON) + \delta_1 (EDU-Worker) + \delta_2 (FINANCE) + \delta_3 (SECTOR) + \delta_4 (AREA) \quad (4-3-2)$$

In this equation (4-3-2), if $(\alpha + \beta - 1) > 0$, increasing returns to scale seem to exist; $(\alpha + \beta - 1) = 0$ indicates constant returns to scale; and $(\alpha + \beta - 1) < 0$ suggests decreasing returns to scale. The coefficient of labor, $(\alpha + \beta - 1)$, is expected to display the existence of scale economies (diseconomies) in metalworking and machinery SMEs.

Our hypothesis is that the effects of inter-firm networks on production performance are positive, because subcontracting ties with large-scale parent firms will provide SMEs with not only commercial chances but also day-to-day stimulation and guidance in upgrading technological and marketing capabilities (Hayashi 2000). In the above equation, coefficient γ tests this hypothesis. A positive sign of δ_1 will illustrate the effects of human resources measured by average educational levels of employees on firms' productivity. Also, $\delta_2 > 0$ indicates an important role of financial access to external sources in SME operation. $\delta_3 < 0$ will suggest higher productivity of SMEs engaged in the automobile/motorcycle industry than SMEs in the agricultural machinery and bicycle industry, while $\delta_4 < 0$ will explain locational advantages of urban compared to rural SMEs.

Equation (4-3-2) is first estimated, using the ordinary least squares method (OLS). However, there is a possibility that simultaneous equation biases will appear, if the subcontracting ratio (*SUBCON*) is an endogenous variable. In addition, because our focus is on inter-firm linkages, we would like to identify the factors that explain the establishment and expansion of subcontracting transactions for SMEs. Taking these into account, we also estimated a production function in which the subcontracting ratio (*SUBCON*) is an endogenous variable by

applying the two-stage least squares method (2SLS). At the first stage, the subcontracting ratio function is estimated as follows:

$$\begin{aligned}
 (SUBCON) = & b_0 + b_1 \ln(K/L) + b_2 \ln(L) + b_3 (EDU-Worker) \\
 & + b_4 (FINANCE) + b_5 (SECTOR) + b_6 (AREA) \\
 & + b_7 (ETHNICITY) + b_8 (SUBCON)_{(t-1)}
 \end{aligned} \tag{4-3-3}$$

where $(ETHNICITY)$ is a dummy variable that takes a value of 0 for Pribumi entrepreneurs and a value of 1 for non-Pribumi counterparts, $(SUBCON)_{(t-1)}$ indicates a lagged variable of subcontracting ratio, and b_k ($k = 1, 2, \dots, 8$) refers to parameters to be estimated.⁴⁵

In equation (4-3-3), $b_4 > 0$ suggests that stable production and reasonably equipped facilities through better financial access can increase subcontracting orders from assembler or higher tier supplier firms. $b_3 > 0$ implies that the educational levels of skilled workers are positively associated with subcontracting activities. This may reflect assemblers' preference of supplier firms which have higher levels of human resources and, therefore, have the potential to supply products of sufficient quality on time.

Similarly, $b_5 < 0$ shows that subcontracting networks in the agricultural machinery and bicycle industries are less developed than those in the automobile and motorcycle industry. $b_6 < 0$ indicates that SMEs located in rural areas face difficulties in building close relationships with assembler firms, compared with their counterparts in urban areas. Also, $b_7 > 0$ shows that non-Pribumi firms are likely to have a chance to get large subcontracting orders through their strong business networks, in comparison with those of Pribumi entrepreneurs. If $b_8 > 0$, the continuity of transactions with clients would be an important factor in the expansion of subcontracting businesses.

Based on the above specifications and primary data obtained from our questionnaire and interview survey, this study estimates Equation (4-3-2) in 1993, 1996 and 1998 and Equation (4-3-3) in 1996 and 1998. In estimating the production functions and subcontracting ratio functions, we use real value added and capital stock, even though our adjustment to real values is not complete, due to the data limitations, which include the lack of adequate deflators and of annual data for fixed capital investment (see Appendix).

⁴⁵ This lagged variable, $(SUBCON)_{(t-1)}$, is the subcontracting ratio in the previous benchmark years. $(SUBCON)_{(t-1)}$ in 1998 refers to subcontracting ratio in 1996 and $(SUBCON)_{(t-1)}$ in 1996 refers to that in 1993. For firms which do not have a subcontracting ratio in 1996 or 1993, we used the data in the nearest and available years to such particular benchmark years. If firms started their operations just in 1998 or 1996 and did not conduct subcontracting businesses before them, this study used 0 as the subcontracting ratio in the previous benchmark years.

4-4 Results of Statistical Analysis

Column (1) in Table 4-4 summarizes the statistical results of production function in 1998 that is based on Equation (4-3-2) and estimated with the ordinary least squares (OLS) method. The values in parentheses below the coefficients are t-values, whereas adjusted R^2 represents the coefficient of determination adjusted for the degrees of freedom.

Column (1) in Table 4-4 shows a high adjusted R^2 , which indicates that the model accounts for more than 68 percent of the variation in labor productivity, $\ln(Y/L)$. All of the coefficients, except for that of subsector (*SECTOR*), indicate the same direction of signs as this study expected a priori and four of them are statistically significant at the 1 percent level.

Table 4-4 Estimation Results of Production Functions and Subcontracting Ratio Function: 1998

	(1) (4-3-2) $\ln(Y/L)$ OLS	(2) (4-3-3) <i>SUBCON</i> OLS	(3) (4-3-2) $\ln(Y/L)$ 2SLS
Constant	6.58*** (10.28)	0.28 (1.04)	6.59*** (10.25)
$\ln(K/L)$	0.16*** (2.93)	0.00 (0.20)	0.16*** (2.91)
$\ln(L)$	-0.04 (-0.63)	-0.05* (-1.77)	-0.04 (-0.65)
Subcontracting ratio (<i>SUBCON</i>)	1.50*** (5.92)		1.42*** (3.75)
Worker education (<i>EDU-Worker</i>)	0.22+ (1.40)	-0.01 (-0.16)	0.23+ (1.42)
Financial access (<i>FINANCE</i>)	0.55*** (3.44)	0.19*** (2.96)	0.57*** (3.32)
Subsector (<i>SECTOR</i>)	0.08 (0.44)	0.10 (1.34)	0.08 (0.46)
Location (<i>AREA</i>)	-0.04 (-0.21)	0.06 (0.86)	-0.04 (-0.23)
Ethnicity (<i>ETHNICITY</i>)		0.13** (2.23)	
Subcontracting ratio ₍₋₁₎ (<i>SUBCON</i> ₍₋₁₎)		0.59*** (6.14)	
<i>N</i>	60	60	60
<i>Adjusted R</i> ²	0.689	0.532	

Note: Figures in parentheses are t-values. *** indicates significance at the 1% level.
 ** indicates significance at the 5% level. * indicates significance at the 10% level.
 ++ indicates significance at the 15% level. + indicates significance at the 20% level.

Source: Based on author's interview and questionnaire survey.

The parameter of capital-labor ratio ($\ln(K/L)$) is statistically significant at the 1 percent level. However, the estimated value, 0.16, which represents the production elasticity of capital, is very

small. On the other hand, the coefficient of labor ($\ln(L)$) is statistically insignificant and close to zero, suggesting that, after controlling other variables, the production processes in the sample SMEs are not subject to scale economies or diseconomies. The value of -0.04 as the parameter of labor means that the production elasticity of labor is 0.80 (or 80 percent). This is, however, not consistent with the average factor share of labor (around 50 percent) shown in Table 4-3.⁴⁶

Griliches and Ringstad (1971) stated that the estimated production elasticity of labor largely exceeded the average factor share of labor in the Norwegian manufacturing industry. They concluded that measurement errors in capital stock caused underestimation of capital elasticity and overestimation of labor elasticity. Our study also shows differences between the production elasticity of labor (80 percent) and the income shares of labor (50 percent). The differences imply the possibility that, similar to Griliches and Ringstad, our production elasticity of labor is overestimated, whereas production elasticity of capital is underestimated, because of measurement errors in capital stock caused by the lack of annual investment data and the incomplete calculation of real values. It is necessary to be aware that such measurement errors in capital stock would result in biases in the estimates of production functions through underestimation of capital elasticity.

The coefficient of subcontracting ratio (*SUBCON*) is positive and highly significant at the 1 percent level. In column (1), the proportion of subcontracting orders in total sales (*SUBCON*) is the dominant variable in explaining variation in labor productivity. This outcome supports our hypothesis that SMEs can upgrade their labor productivity through subcontracting businesses with LEs. It is consistent with the observation in Chapter 3 that a large share of sample SMEs mentioned subcontracting linkages with clients as the most effective way to improve their technological and marketing capabilities

The human resource variable (*EDU-Worker*) indicates some positive effects of school education for skilled employees on production performance. In our field survey, many entrepreneurs expressed the need to have well-educated employees in order to develop production technology within each firm and take advantage of technical support from outside. The coefficient of external financial access (*FINANCE*) is positive and statistically significant. This means that firms capable of financing investment show better production performance than those not capable of obtaining finance.

The coefficient of subsector (*SECTOR*) is positive and not significant. This positive sign is different from our expectation that SMEs producing automotive/motorcycle parts are more efficient than those handling agricultural machinery/bicycle parts in the light of differences of

⁴⁶ Under the assumption of competitive equilibrium in factor markets (labor and capital), the wage rate should be equal to labor's marginal productivity and the profit rate equal to capital's marginal productivity. This means the equivalence between factors' production elasticities and income shares. For practical purpose, the income shares of labor and capital are conventionally regarded as equivalent with production elasticities of labor and capital. See, for example, Hayami (1997: 118-119).

characteristics, in particular quality, of products required by each subsector. This may be due in part to the special business circumstances in 1998, when the crisis damaged the automobile and motorcycle industries more seriously than the agricultural machinery and bicycle industries. The parameter of location (*AREA*) is negative as was expected, suggesting that SMEs located in rural areas tend to find increasing labor productivity more difficult than their counterparts in urban areas. However, this variable is statistically insignificant.

Using the subcontracting ratio (*SUBCON*) as an endogenous variable and applying the 2SLS method, the simultaneous equation model in 1998 given by Equations (4-3-2) and (4-3-3) is estimated. Column (2) in Table 4-4 as the subcontracting ratio function explains 53 percent of the variation in subcontracting transactions for sample SMEs. The coefficient of capital-labor ratio ($\ln(K/L)$) is zero and not statistically significant, and that of labor ($\ln(L)$) is very small. These indicate that capital intensity and scale effects do not have a large impact on the expansion of subcontracting transactions with assembler or higher-tier supplier firms.

According to the results of column (2), the variable of external financial access (*FINANCE*) is positive and significant at the 1 percent level. This implies that SMEs with sufficient financing capabilities can more easily exploit subcontracting relationships with LEs than those without such capabilities. This is consistent with findings in our firm-visit survey that sample SMEs with poor financial access often faced difficulties in stabilizing production and having sufficient production facilities, both of which are usually required by clients as necessary conditions for long-term business relations. As a consequence of these problems, such firms often lost chances to increase subcontracting orders from assembler firms.

The lagged variable of subcontracting ratio ($SUBCON_{(1)}$) in column (2) is also positive and statistically significant at the 1 percent level. This suggests that the continuity of relationships is very important to keep and further expand subcontracting transactions with customers. SMEs have to gain trust from and build long-term relationships with assembler or higher-layer supplier firms, when they need to develop cooperative subcontracting ties.

The coefficient of owners' ethnic affiliation (*ETHNICITY*) in column (2) is positive and statistically significant at 5 percent level. This implies that, because of their Chinese connections, non-Pribumi entrepreneurs tend to establish subcontracting relationships more easily than their Pribumi counterparts. The parameters related to human resources (*EDU-Worker*) and location (*AREA*) are, however, statistically insignificant, and their signs are not consistent with our expectations.

The statistical results of column (3) in Table 4-4 are similar to those of column (1). Equation (4-3-2) is reestimated by using subcontracting ratio (*SUBCON*) as an instrumental variable and applying the two-stage least squares (2SLS) method. Such similar results imply that serious simultaneous biases do not exist in Equation (4-3-2) estimated with OLS.

However, as was also observed in column (1), the coefficient of capital-labor ratio ($\ln(K/L)$) in

column (3) is statistically significant but small (0.16), suggesting that measurement errors in capital stock cause biases in our estimates. The value of the labor coefficient ($\ln(L)$) implies that there are no scale economies or diseconomies in this production function.

Despite a slight decrease in statistical significance, the coefficient of subcontracting ratio (*SUBCON*) is positive and still significant at the 1 percent level. Thus, the estimation results using 2SLS confirm our hypothesis that SMEs can improve their labor productivity through subcontracting linkages with LEs. Similarly, financial access (*FINANCE*) and worker education (*EDU-Worker*) seem to positively affect labor productivity of SMEs.

Table 4-5 presents the estimation results of production function and subcontracting ratio function in 1996, when the Indonesian manufacturing sector was expanding rapidly. Column (1) explains 77 percent of the variation in labor productivity ($\ln(Y/L)$) in 1996. The adjusted coefficient of determination and most of t-values in column (1) of 1996 are higher than those of 1998. This is partly because normal economic activities of manufacturers in a growing market are reflected in the production function for 1996. The signs of all coefficients in the 1996 model are consistent with our a priori expectations. Five parameters are statistically significant at the 5 percent level.

In column (1), the coefficient of capital-labor ratio ($\ln(K/L)$), which means the production elasticity of capital, is positive and statistically significant at the 1 percent level. However, similar to the results in 1998, its value is small (0.20), due probably to measurement errors in fixed capital assets. The coefficient of labor ($\ln(L)$) is zero and statistically insignificant, suggesting that, controlling other variables, scale economies or diseconomies do not exist in this production function.

The coefficient of subcontracting ratio (*SUBCON*), which is our focal point, also has a positive and statistically significant value. Column (1) in Table 4-5 indicates that subcontracting ratio (*SUBCON*) is the key variable in explaining the variation in labor productivity. This may answer our question on the power of inter-firm networks between LEs and SMEs.

The parameter of formal education for skilled labor (*EDU-Worker*) is positive and significant at the 5 percent level. The result indicates that higher educational levels of SME workers may result in higher labor productivity. The statistical results also reveal that financial access (*FINANCE*) would be positively related to the level of labor productivity.

Subsector (*SECTOR*) and locational (*AREA*) variables are not statistically significant. The signs of their coefficients imply that firms engaged in agricultural machinery and bicycle industry and firms located in rural areas experience some disadvantages in raising labor productivity, compared with their counterparts in the automobile and motorcycle industry and in urban areas.

Column (2) in Table 4-5 displays the estimated results of subcontracting ratio function of 1996, similar to those of 1998. The parameters of capital-labor ratio ($\ln(K/L)$) and labor ($\ln(L)$) suggest that firms with higher capital intensity tend to have higher subcontracting ratios, while

scale economies or diseconomies are not relevant to the expansion of subcontracting transactions.

In column (2), the coefficient of lagged subcontracting ratio ($SUBCON_{(-1)}$) is positive and statistically significant at the 1 percent level. This result implies that a continuous relationship promotes subcontracting businesses with large-scale parent firms. The parameters of worker education ($EDU-Worker$), external financial access ($FINANCE$) and the ethnic affiliation of owners ($ETHNICITY$) are positive. Their signs are all consistent with our expectations that human capital, financing capabilities and networking among the ethnic Chinese would have the positive impacts on the development of vertical inter-firm linkages.

Table 4-5 Estimation Results of Production Functions and Subcontracting Ratio Function
(1998 constant prices): 1996 and 1993

	1996		1993	
	(1) ln (Y/L) OLS (4-3-2)	(2) $SUBCON$ OLS (4-3-3)	(3) ln (Y/L) 2SLS (4-3-2)	(4) ln (Y/L) OLS (4-3-2)
Constant	6.71*** (10.09)	-0.18 (-0.54)	6.71*** (10.05)	6.98*** (6.58)
ln (KL)	0.20*** (2.82)	0.07** (2.15)	0.20*** (2.49)	0.20* (1.70)
ln (L)	-0.00 (-0.06)	-0.02 (-0.86)	-0.00 (-0.06)	-0.03 (-0.29)
Subcontracting ratio ($SUBCON$)	1.34*** (5.36)		1.35*** (2.88)	1.56*** (3.56)
Worker education ($EDU-Worker$)	0.32** (2.35)	0.12* (1.67)	0.32** (2.16)	0.01 (0.03)
Financial access ($FINANCE$)	0.40*** (2.91)	0.10+ (1.39)	0.40*** (2.69)	0.51** (2.20)
Subsector ($SECTOR$)	-0.04 (-0.27)	-0.14** (-1.64)	-0.04 (-0.25)	-0.20 (-0.63)
Location ($AREA$)	-0.07 (-0.50)	0.07 (0.89)	-0.07 (-0.50)	-0.03 (-0.10)
Ethnicity ($ETHNICITY$)		0.01 (0.14)		
Subcontracting ratio $_{(-1)}$ ($SUBCON_{(-1)}$)		0.36*** (4.24)		
N	54	54	54	27
Adjusted R ²	0.771	0.513		0.750

Note: Figures in parentheses are t-values. *** indicates significance at the 1% level.
** indicates significance at the 5% level. * indicates significance at the 10% level.
++ indicates significance at the 15% level. + indicates significance at the 20% level.

Source: Based on author's interview and questionnaire survey.

Column (3) in Table 4-5 exhibits the results of production function in 1996, using the estimated value of subcontracting ratio ($SUBCON$) in column (2) as an endogenous variable. The estimation results obtained from this 2SLS model are similar to those from OLS in column

(1). The similarity suggests that there are no serious simultaneous equation biases for 1996, as for 1998.

Statistically significant in column (3) are the coefficients of the capital-labor ratio ($\ln(K/L)$), subcontracting ratio (*SUBCON*), educational attainment of employees (*EDU-Worker*) and financial access to external sources (*FINANCE*), all of which show almost the same values and signs as those of column (1) in Table 4-5.

The subcontracting ratio function by using OLS and production function by using 2SLS in 1993 could not be estimated, due to insufficient data. Column (4) in Table 4-5 illustrates the estimation results of production function by OLS in 1993, which yields results similar to those in 1996 and 1998. Although the t-values for several variables are low, the adjusted coefficient of determination is still 0.75.

The results in 1993 demonstrate statistical significance in the parameters of the capital-labor ratio ($\ln(K/L)$), subcontracting ratio (*SUBCON*) and financial access dummy (*FINANCE*). The results also reconfirm the considerable roles of subcontracting linkages in raising labor productivity for metalworking and machinery SMEs.

4-5 Comparison of Total Factor Productivity

Using the results of our production functions, this section estimates indices of total factor productivity (TFP) and compares differences in production efficiency among different firm groups within each firm category by size, ownership and subsector. Based on TFP indices, relationships between TFP and subcontracting linkages are also examined. First, we estimate differences in the levels of TFP for sample SMEs as a whole between the benchmark years of 1993, 1996 and 1998, by using the following formula:

$$\begin{aligned} \ln(TFP)_t = & (\ln(Y/L)_t - \ln(Y/L)_0) - \alpha (\ln(K/L)_t - \ln(K/L)_0) \\ & - (\alpha + \beta - 1) (\ln(L)_t - \ln(L)_0) \end{aligned} \quad (4-5-1)$$

where subscript 0 depicts the base year of comparison, subscript t illustrates other years to be compared, and (*TFP*) represents differences in the levels of total factor productivity (TFP) between year 0 and year t . Next, similar to (4-5-1):

$$\begin{aligned} \ln(TFP)_g = & (\ln(Y/L)_g - \ln(Y/L)_0) - \alpha (\ln(K/L)_g - \ln(K/L)_0) \\ & - (\alpha + \beta - 1) (\ln(L)_g - \ln(L)_0) \end{aligned} \quad (4-5-2)$$

where subscript 0 is the base of comparison (i.e. firms with 100 or more workers, firms of

non-Pribumi owners or firms producing automotive/motorcycle parts) in each SME category, subscript g displays other firm groups to be compared, and (TFP) here is differences in the levels of total factor productivity (TFP) between group 0 and group g in each category in each benchmark year.

According to our OLS estimates of production functions in Tables 4-4 and 4-5, coefficients of α are 0.20, 0.20 and 0.16 in 1993, 1996 and 1998, respectively, while those of $(\alpha + \beta - 1)$ are -0.03 , 0 and -0.04 in 1993, 1996 and 1998, respectively. Geometric means are used to calculate average values of variables in the above equations (4-5-1) and (4-5-2).

Then, the relationships between differences in TFP and those in subcontracting are investigated, by applying the following formula (Murakami, Liu and Otsuka 1996: 274-275):

$$\ln (TFP^*)_g = \gamma ((SUBCON)_g - (SUBCON)_0) \tag{4-5-3}$$

where (TFP^*) is a difference in the levels of TFP between group 0 and group g in each category in each year due only to differences in the degree of subcontracting linkages. Coefficients of the subcontracting ratio $(SUBCON)$ in Tables 4-4 and 4-5, which are 1.56, 1.34 and 1.50 in 1993, 1996 and 1998, respectively, are used for the above equation (4-5-3).

Table 4-6 compares TFP indices, which are calculated as 1998 equal to 100 based on the results of the above (4-5-1). The comparison over time reveals that TFP for sample firms as a whole did not grow in the benchmark years from 1993 to 1998. However, in consideration of negative effects caused by the crisis in 1998, the stagnant situation between 1996 and 1998 seems understandable.

Table 4-6 Comparison of Index of Total Factor Productivity (TFP) over time: 1993, 1996 and 1998¹⁾

	1993	1996	1998
<i>Comparison over time</i>			
<i>TFP Index (1998 = 100)²⁾</i>	102.3	100.2	100.0

Note: 1) This index is calculated based on 1998 constant prices.

2) 1998 is used as the base of comparison between different years.

Source: Based on author’s interview and questionnaire survey.

The first three columns in Table 4-7 compare TFP indices, which are calculated as the base group equal to 100 within each firm category in each year based on the results of (5-2). This indicates that larger SMEs, non-Pribumi SMEs and SMEs in the automobile/motorcycle subsector have generally recorded higher TFP than their counterparts, smaller SMEs, Pribumi SMEs and SMEs in the agricultural machinery/bicycle subsector, in each year. These results may suggest that the former SME groups have produced their parts and components more efficiently than the latter groups.

The next three columns in Table 4-7 illustrate indices of contribution of subcontracting to

TFP, which are calculated as the base group equal to 100 within each firm category in each year based on the results of (4-5-3). This comparison of TFP attributable to the dependence on subcontracting businesses between different firm groups shows almost the same trends with the results of the first three columns. SMEs with a larger share of orders from subcontracting tend to have higher total factor productivity. These observations also imply that subcontracting transactions may play an active role in improving the productivity of SMEs.

Table 4-7 Comparison of Indices of Total Factor Productivity (TFP) and Indices of Contribution of Subcontracting to TFP by Firm Size, Ethnic Affiliation of Entrepreneurs and Subsector: 1993, 1996 and 1998¹⁾

	Indices of Total Factor Productivity			Indices of Contribution of Subcontracting to TFP		
	1993	1996	1998	1993	1996	1998
<i>Comparison within each category in each year</i>						
<i>size</i> (100 - 299 = 100) ²⁾						
1-19	87.9	92.6	93.1	73.3	79.7	80.0
20-49	86.2	88.5	93.1	60.1	69.9	89.7
50-99	91.9	92.9	95.4	87.7	95.0	98.2
100-299	100.0	100.0	100.0	100.0	100.0	100.0
<i>ethnicity</i> (non-Pribumi = 100) ³⁾						
Pribumi	93.1	95.9	94.1	73.4	79.0	77.5
non-Pribumi	100.0	100.0	100.0	100.0	100.0	100.0
<i>subsector</i> (automobile/motorcycle = 100) ⁴⁾						
automobile/motorcycle	100.0	100.0	100.0	100.0	100.0	100.0
agricultural machinery/bicycle	89.1	91.0	95.4	62.5	70.0	84.4

Note: 1) The indices in this table are calculated based on 1998 constant prices (see Appendix).

2) The group of firms with 100 or more employees is used as the base of comparison between different size of SMEs in each year.

3) The group of firms owned by non-Pribumi entrepreneurs is used as the base of comparison between different ethnic affiliation of SMEs in each year.

4) The group of firms producing automotive/motorcycle parts is used as the base of comparison between different subsector of SMEs in each year.

Source: Based on author's interview and questionnaire survey.

4-6 Roles of Subcontracting in Indonesia

As illustrated in the above, due to measurement errors in capital stock, the production elasticity of capital may be underestimated in this study, and this results in biases in the estimated production functions. Besides, some of the data obtained from our field survey were affected by the crisis and the sample size was relatively small. Despite these shortcomings, our micro-level evidence from the metalworking and machinery industry can indicate the following findings that answer the three questions set forth in the introduction of this chapter.

With regard to the first question, this study found that the role of subcontracting linkages in improving labor productivity of SMEs is pivotal. According to the estimated production functions, the subcontracting ratio is the dominant variable in explaining variation in labor productivity. Also, indices of TFP have almost the same trends as those of contribution of subcontracting to TFP. These findings confirm our hypothesis that inter-firm cooperation through subcontracting ties can increase productivity in small-medium metalworking and machinery firms in Indonesia.

Earlier research by, for example, Goeltom (1997), Thee and his colleagues (1985) and Witoelar (1983) all argued that subcontracting networks in the Indonesian machinery industry were weak and did not provide SMEs with opportunities to improve the efficiency of production. However, our findings point to a different conclusion, indicating that subcontracting linkages are strengthening and are beneficial to SMEs in improving their productivity. This quantitatively supports recent studies by, for instance, Berry and Levy (1999), Harianto (1996), Hayashi (2000) and Sato (1998), which observed the development of subcontracting networks and the provision of support to SMEs through such linkages in the process of industrialization in Indonesia.

The estimated production functions provided additional findings in relation to factors for increasing labor productivity. Higher levels of formal education and better financial access are positively related with labor productivity of SMEs.

Concerning our second question, the analysis with the estimation of production functions reveals that better financial access and business continuity are important in facilitating subcontracting transactions, which can provide SMEs with support necessary for improving productivity. These findings imply that financial capabilities and creditworthiness are required to expand subcontracting transactions. Parent firms are likely to prefer supplier firms that are reliable, are able to maintain production stable and have reasonably modern production facilities.

On the last question, the estimation results of production and subcontracting ratio functions illustrate that non-Pribumi owners conduct subcontracting businesses more intensively than their counterparts, while different firm groups in other firm categories (firm size and subsector) did not significantly affect the levels of labor productivity and subcontracting transactions. Most of the signs of the coefficients related to such firm categories were consistent with the initial expectations. Based on the comparison of TFP indices, larger SMEs, non-Pribumi SMEs and SMEs supplying automotive/motorcycle parts have, in general, higher TFP than smaller SMEs, Pribumi SMEs and SMEs producing agricultural machinery and bicycle parts. The results indicate that there are differences in the level of total factor productivity between the former and the latter SME group in each firm category of firm size, ethnic affiliation of entrepreneurs and subsector.

These differences are consistent with the conclusions of Chapter 3 in this study and the previous study by Berry and Levy (1999: 70). They pointed out that, compared with their

counterparts, larger SMEs and non-Pribumi SMEs have better access to support mechanisms, in particular subcontracting linkages, in the private sector, which provide SMEs with low transaction costs. Different SME groups have uneven access to subcontracting networks and this may result in differences in the efficiency of production.

Appendix: Description of the Main Data

Our questionnaire survey provides data and information on input and output variables in 1993, 1996 and 1998: expenditures on intermediate inputs and direct costs; employment; book value of fixed assets; and sales. Using such data and information in the following way, this study estimated the production functions and subcontracting ratio functions at firm level.

The data on expenditures for productive use include 1) raw materials and intermediate inputs, 2) utilities (water, fuel, electricity and gas), and 3) other direct costs (spare parts, rent of machinery and equipment, consumable materials, packaging materials, and depreciation expenses). Raw materials and intermediate inputs are deflated by a composite wholesale price index of metal and machinery, which was calculated from the *Monthly Statistical Bulletin* published by the Indonesian Bureau of Statistics (BPS). Expenditures on utilities are deflated by a consumer price index of fuel, electricity and water from *Monthly Statistical Bulletin*. Due to a lack of adequate price indices, other direct costs are deflated by a general wholesale price index of the manufacturing sector from *Monthly Statistical Bulletin*. These three expenditures are aggregated into total firm expenditures.

Total firm sales are deflated by a composite producer price index of machinery and transport equipment, which are calculated from *Monthly Statistical Bulletin*. Value added (Y) as output data in this study is defined as total firm sales minus total firm expenditures, both of which are deflated by different price indices under the double-deflation method.

The subcontracting ratio (*SUBCON*) is defined as the share of sales through subcontracting transactions in total firm sales. The labor input (L) is measured as the number of production and non-production employees.

Capital stock is measured based on the data for tangible fixed assets for productive use consisting of 1) machinery & equipment and 2) buildings in 1993, 1996 and 1998 in terms of nominal book value on firms' balance sheets. Assuming that annual fixed capital investments were made equally in each year between 1993 and 1996 and between 1996 and 1998, yearly investment values for machinery & equipment and buildings during 1993-1998 can be calculated. Annual investment values for machinery & equipment are deflated by a wholesale price index of machinery from *Monthly Statistical Bulletin*. Those for buildings are also deflated by a wholesale price index of construction materials for other buildings from the same source. Under

the assumption of no price change in capital goods before 1993, we add up such real values of annual investment on nominal values of fixed capital assets in 1993, and finally have real values of capital stock (K) for analytical purpose in this study.⁴⁷

It is acknowledged that biases may arise from measurement errors caused by this kind of conventional way to measure capital stock in constant prices and the calculation of capital stock without exact data on annual investment. Incomplete price adjustment to capital stock, in particular before 1993, may result in underestimation of production elasticity of capital and, therefore, lead to biases of not only the coefficients for capital-labor ratio (α and b_i) but also those for other variables in Equations (4-3-2) and (4-3-3).

⁴⁷ In the case of firms which were established after 1993 or whose data were available only after 1993, this study adopts the similar procedure: assuming that nominal fixed investments were made equally in each year during the period when the data were available, such annual investment values are deflated by the above price indices and added to tangible fixed asset values in the year available.

Chapter 5

Support Mechanisms for SMEs and Subcontracting in Indonesia

5-1 Support Mechanisms for SMEs and the Roles of Subcontracting in Indonesia

Despite their great potential, SMEs in developing economies have faced difficulties and cannot often contribute to the processes of industrialization and economic development. In general, SMEs cannot rely much on their internal resources and have to utilize external resources effectively. This study focuses on SMEs in Indonesia and explores support mechanisms for them with special attention to subcontracting linkages.

We set forth the four main research questions in Chapter 1 and have attempted to answer them in the latter chapters based on the analyses of micro-level evidence from the metalworking and machinery industry in Indonesia by the qualitative and quantitative methods. Specifically, Chapter 3 examined channels and usefulness of external support for SMEs through our direct observation of 61 local and metalworking/machinery SMEs in the automobile and motorcycle industry. Chapter 4 investigated whether subcontracting linkages are an important support mechanism for the development of Indonesian SMEs. It estimated production functions and calculated indices of total factor productivity (TFP) based on the data from 60 metalworking and machinery firms supplying their products to automobile/motorcycle, agricultural machinery and bicycle producers.

Here, we answer the four research questions, referring to our findings in the previous chapters. However, this section reorganizes the way to answer them, considering that all of them, in particular the first three questions, highly interrelate with each other. In addition, some related findings are also pointed out.

(1) Power of Inter-firm Linkages

Inter-firm linkages are utilized most frequently and effectively as support mechanisms for SMEs. Private channels through inter-firm linkages, in particular vertical subcontracting linkages, have played a pivotal role in strengthening technological and marketing capabilities. Compared with other sources such as the public and collective channels, inter-firm linkages and

particularly subcontracting networks in the private sector have functioned well as effective technology and marketing support mechanisms for SMEs. Even though vertical inter-firm networks in Indonesia are still limited, such linkages through the commercial transactions in the metalworking and machinery industry have started to provide the SME sector with a great opportunity to upgrade technological and marketing capabilities.

(2) *Difficult Financial Support*

Financial support mechanisms for SMEs through inter-firm or subcontracting linkages have not worked well, compared with technological and marketing support. Access to formal financial institutions has still to be improved for the SME sector. Beneficiaries for directed credit schemes under the government programs are mostly limited to the smaller Pribumi SMEs. Sample SMEs relied heavily on self-financing or informal-financing

(3) *Subcontracting and Productivity Improvement*

The role of subcontracting linkages in improving labor productivity of SMEs is crucial. Our estimated production functions and indices of TFP indicate that inter-firm linkages through subcontracting ties can increase productivity in small-medium metalworking and machinery firms in Indonesia. The estimated production functions provided us with additional findings that higher levels of worker education and better financial access contribute to the improvement in labor productivity of SMEs.

(4) *Facilitators of Subcontracting*

Our quantitative analysis reveals that better financial access and business continuity are important in facilitating subcontracting transactions, which can provide SMEs with support necessary for improving productivity. Financial capabilities and creditworthiness are required to expand subcontracting transactions. Parent firms have a tendency to prefer supplier firms that are reliable, are able to keep production stable and have reasonably modern production facilities.

(5) *Distinctions between Different Groups in Different Firm Categories*

Compared with their counterparts, larger SMEs and non-Pribumi SMEs have better access to support mechanisms, in particular subcontracting linkages, in the private sector. The estimation results of our statistical analyses also indicate that non-Pribumi entrepreneurs carry

out subcontracting businesses more largely than their counterparts. The comparison of TFP indices shows that larger SMEs, non-Pribumi SMEs and SMEs supplying automotive/motorcycle parts have higher TFP than smaller SMEs, Pribumi SMEs and SMEs producing agricultural machinery and bicycle parts. There are these differences in access to subcontracting transactions and the level of productivity between the former and the latter SME group in each firm category of firm size, ethnic affiliation of entrepreneurs and subsector.

(6) *Not only Support through the Private Sector*

As described above, different SME groups have uneven access to subcontracting networks. Different types of support for the acquisition of technological and marketing capabilities are required, according to the firm size, ethnic affiliation and subsector. This implies that public and collective technical and marketing support may supplement private support and help smaller or Pribumi firms to upgrade their capabilities. The provision of technological support through public technical institutions is, for instance, still important for the development of viable but smaller SMEs. Such support may, then, enable them to improve access to private sources of technical and marketing support and to acquire technology through subcontracting linkages. The public sector is also required to promote the evolution of subcontracting linkages by reducing transaction costs and improving information flows through restructuring of the business sectors and institutional reforms of the government sectors so that SMEs can more easily and effectively utilize private support mechanisms.

5-2 Subcontracting in Japan: Its Experience

Japan's historical experience shows that the evolution of the division of labor in association with extensive and close linkages between firms raised the production efficiency and strengthened SMEs. The wide-ranging network of subcontracting transactions is, indeed, one of the main features of industrial organizations in Japan.

According to Hondai (1995: 79-84), in the 1930s of Japan, LEs started to contract out many stages of their production processes to SMEs through subcontracting in order to meet the growing demand and increase the efficiency of capital through substitution by intermediate inputs. In the early 1930s, markets and SMEs had not been sufficiently prepared. After that, however, SMEs were fostered through specialization, economies of scale and various kinds of assistance from their parent firms and were able to improve their technological levels.

During the high economic growth period in the 1950s and the 1960s, Japanese automobile assembler firms responded to the rapid expansion of the demand for car production, by

contracting out parts and components to small-medium supplier firms. In the process of transactions, both parties established very intimate relationships. Through such subcontracting linkages between LEs and SMEs, the latter obtained various kinds of support from the former and upgraded their technological capabilities.

Apart from institutional capabilities in the public sector, Itoh and Urata (1998: 322-323) raised the following three points as the main reasons for the existence of extensive subcontracting network in Japan: 1) homogeneity of population; 2) high economic growth during the period from the 1950s to the early 1970s; and 3) geographical concentration of population and firms.

Most of the conditions in Japan are not consistent with those in Indonesia. Because of the above differences, automatic transplantation of Japanese-style subcontracting systems to Indonesia is not practical. However, there would be many things that Indonesia can learn from Japan's experience.

5-3 Lessons for ODA Institutions: Areas of Possible Involvement

Based on the findings in the previous chapters, this section presents some areas of possible involvement for ODA institutions. The following ideas we recommend are intended to focus on activities which encourage support mechanisms for SMEs in the private sector, promote subcontracting linkages beneficial to SMEs or enable SMEs to enter into subcontracting businesses.

Due to the business-oriented issues, the programs are required to deal with not only the public sector but also the private and collective sectors directly. Also, as the author has continuously emphasized, a close coordination of involvement among donor agencies would be essential for the effective implementation of the following ideas (Hayashi 1997: 24-25).⁴⁸

(1) Strengthening of Information Systems and Knowledge Base for SMEs

Better information systems would help SMEs reduce transaction costs and obtain important information so that they can have better access to subcontracting businesses. Benefits from good information arrangement are also important to large-scale parent firms. LEs cannot often contract out their orders to supplier firms simply due to the lack of information on potential SMEs, even if the former are willing to do so. Furthermore, comprehensive information base with respect to SMEs and subcontracting would allow policy makers to formulate adequate policies

⁴⁸ In the paper, the author recommended the comprehensive way to support the Indonesian industrial and trade sector as a whole.

and policy measures.

1) Information system for SMEs: promotion of subcontracting

Some public and private institutions in Indonesia (e.g., MOIT and KADIN) have started to establish database systems which list SMEs and try to make business opportunities. However, such existing systems are still primitive and not sufficient in terms of the number of listed SMEs, the range of information items and the degree of recognition by both supplier and parent firms. Donor agencies can assist the strengthening of the existing database system(s) technically and financially. Comprehensive database which involves LEs and has sufficient information would promote subcontracting transactions between SMEs and LEs. Although IT-based method is important, this information system should also prepare another tool to provide matchmaking information for SMEs unavailable to electronic data.

2) Information system for SMEs: HRD matchmaking

SMEs which have less access to subcontracting networks or need support unavailable from parent firms have to find technological and managerial assistance from different sources. An information system designed to link SMEs with local and foreign sources of expertise (e.g., local consultants, local technical/training institutions and foreign experts) would be very convenient. This HRD matchmaking information system can be incorporated into the above business matchmaking idea.

3) Better knowledge of and access to information systems: training and dissemination

The successful execution of the above ideas requires us to ensure better knowledge of and better access to the information systems. The existence of these information systems should be disseminated to SMEs, LEs and related parties. Also, potential users, in particular SMEs, have to know how to obtain such business and HRD data from the information systems technically. ODA institutions can support these training and campaign activities.

4) Data and information base for SME and subcontracting-related policy

Statistical data on the manufacturing sector in Indonesia, in particular the SME sector (small firms with less than 20 workers), are still weak. Improvement in the quality of industrial data as a whole and on the SME sector and new entry of specific data (e.g., subcontracting ratio) are useful to assess the overall impact of SME and subcontracting-related policy and programs.

5) Better Understandings of SMEs and subcontracting through micro-level studies

For the formulation of effective policy and programs, better understandings of SMEs are necessary. Micro-level Case studies can draw very detailed pictures of SMEs and subcontracting linkages. However, as this study covers only limited areas, each of the existing SME case

studies consists of a piece of the very large patchwork. More micro-level case studies on this field supported by ODA institutions are crucial to help understand complicated SME and subcontracting issues in Indonesia.

(2) *Institutional Improvements*

SMEs and parent firms in the private sector are the main players in promoting subcontracting businesses and cooperation. However, the institutional capabilities of the Indonesian public sector and collective sources have to be improved in order to encourage the SME support mechanisms working in the private sector. The collective and public institutions should also supplement the insufficient functions in the private sphere. They are required to prepare better business conditions in which the private sector can perform well without any worries. ODA institutions can help the Indonesian public and collective institutions provide the SME sector with support for upgrading their capabilities as a supplement to the private sector's efforts.

1) Collective institutions

KADIN (The Indonesian Chamber of Commerce and Industry), KADINDA (local chambers of commerce and industry) and industrial associations have not displayed their full skills. The collective institutions have the potential to disseminate and collect technological, marketing and financing information for SME support. It is meaningful to strengthen such existing collective institutions as intermediary organizations or catalysts of information between the private and government sectors and between the real and financial sectors.

2) Technical and training institutions (including restructuring of technical service units with extension services)

There are many technical and training institutions in Indonesia. However, those which can properly meet the needs of SMEs are still limited. Projects and programs (e.g., JICA MIDC project) which are intended to enable the existing (sometimes new) technical and educational institutions to satisfy the demands of SMEs should be encouraged by donor agencies. The scheme of UPT (technical service units) with extension services, in general, has not functioned well, even though it has a high potential to serve SMEs which cannot receive support through inter-firm linkages in the private sector. Re-building of this scheme is a tough but very exciting project for both the Indonesian government and donor agencies.

3) Public Institutions responsible for the formulation of SME and subcontracting-related policy

MOIT and some other Indonesian government organizations responsible for SME and subcontracting issues are highly required to improve their institutional capabilities. Donor agencies need to continuously provide such public organizations with advisory and technical support. For example, under assistance from donor agencies, preparation for some SME-related publications like “*SME White Paper*,” “*Study on the Structure of SMEs under Subcontracting Businesses (Shitauke Kigyo Kozo Chosa)*” and “*Detailed Study on Manufacturing Industry (Kogyo Jittai Chosa)*”, all of which have been issued in Japan, would be useful as a training for upgrading institutional capabilities and as a tool of better understanding of SMEs and subcontracting transactions described above. Similarly, the capabilities of public organizations and officials can be enhanced practically in the process of the formulation of frameworks for the sound development of SMEs under subcontracting transactions, such as “the Law on the Prevention of Delay of Payment for Subcontracting Businesses” and “the Law on Promotion of SMEs under Subcontracting Businesses.” This effort may also ensure sound subcontracting transactions and invigorate subcontracting businesses beneficial to SMEs.

(3) *Restructuring of SME Financing*

The current movement to the elimination of government credit programs may worsen financial access for SMEs. According to our findings, better financial access is one of the factors in expanding subcontracting businesses, but SMEs have less access to commercial financial sources. Some considerations are, therefore, required to meet their needs. What this study recommends here is to: 1) improve banks’ capabilities to assess financial credibility of SME borrowers and to monitor their business performance; and 2) reform the current credit guarantee systems. At present, it seems difficult for banks and other private financial organizations to allocate their lending to the SME sector in the absence of directed credit programs or special devices for guaranteeing low financial confidence of SMEs. The government needs to encourage private financial institutions to distribute credits to SMEs by providing some incentives. These reforms are also areas of possible involvement for donor agencies.

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