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IMPORTANCE OF SME DEVELOPMENT IN CAMBODIA

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ABSTRACT

This research is concentrated mainly on Cambodian Small and Medium Enterprises (SMEs). SMEs are said to play a vital role in economic development and income growth in Cambodia, as they have been the primary source of job creation, not only in urban areas but also in rural areas. However, there are still considerable controversies over whether SMEs are more efficient than large enterprises (LEs) in contributing to economic development in Cambodia.

The purpose of this study is to investigate the importance of SMEs in development taking Cambodia as a case study. Three hypotheses are investigated to reveal SMEs' advantages relative to LEs: (1) SMEs are more labour-intensive than LEs and SMEs provide more jobs for women than LEs; (2) SMEs are as productive as LEs or even more productive than LEs; and (3) SMEs are more equitable in distributing the income they generate than LEs. Most of the previous researchers have provided empirical evidences to support the three hypotheses.

In this study, however, SMEs were found to possess many undesirable characteristics, including the uneconomic use of capital, the inequitable distribution of the income they generate, the low productivity of SMEs, especially in provincial areas, and employing less female labour. Thus, Cambodia experiences the low efficiency of SMEs' performance. This is due to the government's ability to implement an enabling environment for business remaining weak. In particular, the legal framework for supporting SME activity remains weak, infrastructure and communication in rural areas are poor, and labour productivity is relatively low.

Therefore, in order to improve SMEs in Cambodia, the government has to improve the efficiency of SMEs, implementation an action plan of the market-oriented framework for SME development, reduce the cost of doing business and related to bureaucratic red tape, improve the access to finance for SMEs, and improve market access for SMEs.

TABLE OF CONTENTS

CHAPTER IV: METHODOLOGY OF THE STUDY

CHAPTER V: RESEARCH PROCESSES

LIST OF TABLES AND FIGURES

TABLES

FIGURES

LIST OF APPENDICES

ABBREVIATIONS

ADB	Asian Development Bank
BDS	Business Development Service
CDC	Council for the Development of Cambodia
CDRI	Cambodia Development Research Institutes
CI	Capital Investment
CIS	Credit Information System
CPI	Consumer Price Index
CV	Coefficient of Variation of Wage
DEC	Electricité du Cambodge (Electricity of Cambodia)
EFPD	Economic and Public Finance Policy Department
ENSR	European Network for SME Research
EU	European Union
FC	Fixed Capital
FEM	Fixed Effect Model
GCS	Gross Capital Stock
GDP	Gross Domestic Product
GRP	Gross Regional Product
GRPP	Gross Regional Product per Capita
ILO	International Labour Organization
IMF	International Monetary Fund
ISIC	International Standard Industrial Classification
JICA	Japan International Cooperation Agency
KIET	Korean Institute for Industry and Trade
LDCs	Less Developed Countries
LEs	Large Enterprises
MAFF	Ministry of Agriculture, Forestry, and Fisheries
MEF	Ministry of Economy and Finance
MOAFF	Ministry of Agriculture, Forestry, and Fisheries
MOC	Ministry of Commerce

MOP	Ministry of Planning
MIME	Ministry of Industry, Mines and Energy
MPDF	Mekong Private Sector Development Facility
MSMEs	Micro, Small, and Medium Enterprises
NBC	National Bank of Cambodia
NISC	National Institute of Statistics of Cambodia
NPRS	National Poverty Reduction Strategy
NSDP	National Strategic Development Plan
OECD	Organization for Economic Cooperation and Development
REM	Random Effect Model
RPED	Regional Program on Enterprise Development
SMEs	Small and Medium Enterprises
SMFE	Small and Medium Forest Enterprise
SOEs	State Owned Enterprises
SPSS	Software Package for Social Science
SSMEs	Share of SMEs
SEDP	Social-Economic Development Plan
TFP	Total Factor Productivity
UNIDO	United Nations Industrial Development Organization
USD	US dollar
WB	The World Bank

BACKGROUND AND MOTIVATION

Paul Krugman (1990) emphasizes the three most significant elements for the economic development, including productivity, income distribution and unemployment. Landmann (2004) states "to overcome widespread poverty, you need to maintain full employment, foster productivity growth and eliminate the outer left-hand tail of income distribution." (p. 11). All over the world governments and international and national aid agencies relying on empirical literatures are extolling the virtues of stimulating and supporting a healthy Small and Medium Enterprise (SME) sector, to achieve the above objectives. As the President of the World Bank Group, James D. Wolfensohn, states "SMEs are the private sectors for employment generation and sustainable growth" (World Bank, 2004, p.19).

Small and Medium Enterprises (SMEs) have had a privileged treatment in the development literature, particularly in the less developed countries (LDCs). Arthur Lewis (1954) hypothesized the ability of the modern sector to absorb excess labour from the traditional sector. In the Lewis two-sector model, the shift of labour from the traditional sector to the modern sector can therefore augment the total output of the economy. The abundance of cheap labour leads to increased profit in the modern sector and the continuous reinvestment of this surplus in the modern sector is an important source of investment and capital formation (Islam and Yokota, 2006). The growing importance of cheap labour as a source of development has been paralleled by the increasing share of not only male but also female employment. Two factors associated with the increasing share of female employment are "worsening real incomes" (Ozler, 1999) and "lower wage" of female labour (Elson and Pearson, 1981). The employment of a high proportion of the surplus labour (unskilled workers) by the modern sector, especially labour intensive industries, can have positive effects on incomes of the poor (Kniivila, 2006). In the well-known Kuznets' inverted U-shape, although inequality in income distribution is greater at the initial stages of economic development, the expansion of industrialization activities at the later stages could reduce income inequality (Mbaku, 1997). Furthermore, since the industrial sector is important for job creation and income distribution, the productivity growth of this sector has been emphasized in many studies as a fundamental measure of economic health and as a main source to drive output growth (Liao, Holmes, Jones and Llewellyn, 2002).

SMEs encompass a very broad range of firms, some very dynamic and growth enhancing, down to the survivalist self-employed from the poorest layers of the population (informal micro-enterprises). Their number is large and are scattered widely throughout the rural areas and their roles have achieved a consensus by all parties involved. Therefore, during the last two decades several studies hypothesize three most significant contributions of SMEs to economic growth. First, SMEs have better ability to employ cheap labour forces in countries with large surplus of labour than large enterprises (LEs). For instance, SMEs are found to be relatively more labour-intensive than LEs many countries, including Indonesia, Japan, Korea, Taiwan, and Thailand.[1] Second, SMEs are often more productive compared to LEs; many productivity studies show higher productivity level in SMEs than LEs, including Korea, Thailand.[2] Third, SMEs may promote a more equitable distribution of income than LEs; for example, SMEs are found to help equalize income in many developing countries, including Thailand and Korea.[3]

Despite their contribution to employment, productivity, and income distribution, SMEs are said to be subject to market failures arising from high transaction cost, asymmetric information, and institutional failures. Transaction costs such as obtaining information, making decisions on business and enforcing contracts impede SMEs, particularly in their access to private and public sources of data and advice on training, financial resources, technology, or export market.[4] For example, transaction costs drive a wedge between funding costs of capital of financial institutions and the lending rate they change borrowers (Beck, 2007). Furthermore, moral hazard and adverse selection originated by information asymmetry are the causes of credit rationing for firms.[5] Institutional failures, including poorly defined property rights, weak labour laws and regulation, poor competition laws and regulations, and weak contract enforceability, also constrain SMEs in the path of employment generation, improved productivity and income equality.[6]

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[1] See Hayashi (2002), Abdullash and Beal (2002), Nugent and Yhee (2001), Sinha (2003), Huang (2003), and Paitoon (2001)
[2] See Oh, I., Heshmati, A., Baek, C., and Lee, J., (2005), and Huang (2003)
[3] See Huang (2003), and Nugent and Yhee (2001)
[4] See Hughes (2000)
[5] See Stiglitz and Weiss (1981)
[6] See Das and Kalita (2009), World Bank (2004), Kayanula and Quartey (2000), and Beck, Demirguc-Kunt, and Maksimovic (2003)

However, the ramification of market and institutional failures, arising from asymmetric information, high transaction costs, ineffective contract enforcement and legal framework, and incomplete property rights or other forms of institutional and market failure provides an important role for government intervention. The main justification for government intervention for the development of SMEs is directly related to the positive potential contributions of SMEs in terms of labour intensity and hence employment creation, income equality and productivity. Moreover, the ideology behind the promotion of SMEs comes from the perceived failure of large enterprises in creating adequate productive jobs to absorb a significant share of the rapidly growing labour force in many developing countries. Furthermore, many researchers argue that SMEs are not the same across countries. In many countries, SMEs play a large structural role and contribute highly to the share of economic activity.[7] This perception inspired emphasis on the development of SMEs by stressing benefits such as employing more workers per unit of capital than large enterprises, higher productivity than large enterprises, and their contribute towards achieving a more equal income distribution in society.

Although increasing attention started to be paid to SMEs elsewhere in the world in the last two decades, it is only in recent years that SMEs have become a center of attention in Cambodia and inspired more serious studies and government policies with respect to their true contribution to the economy.[8] Looking at the industrial structure of Cambodia by size, SMEs occupy about 99 per cent of the total industrial establishments, and contribute around 66 per cent of the country's employment.[9] However, the majority of Cambodian SMEs are still in a very early stage of development. The sector is dominated by family businesses with fewer than 10 employees, processing primary products for the domestic market. Cambodian SMEs typically use very basic technology and have low total factor and labour productivity. Their total factor and labour

[7] For instance, in Vietnam, SMEs are not only creating job, but help to narrow development gaps among localities of the countries. SMEs are export-oriented industries in China, Korea and Taiwan. In advanced countries (such as US, Japan, and South Korea), SMEs are innovative, technology based and operate in new or high technologies, while SMEs in developing countries (such as Thailand) generally operate in traditional sectors, and look for easier access to technology elsewhere.

[8] The government of Cambodia has emphasized the important role SMEs play only in the 2000s. For instance, various government policies and strategies for private sector development were designed only after 2000 including Socio-Economic Development Plan (SEDP), National Poverty Reduction Strategy, and Government's Rectangular Strategy. And, it is only in recent years the strategy that emphasizes specifically the importance role of SMEs were set up. Also, the government established the department of SMEs in 2002.

[9] Ministry of Industry Mines and Energy, in Cambodian department of Statistics Yearbook, 2006

productivity are relatively low compared to neighboring countries. By both measures, productivity of Cambodian firms lags behind enterprises in almost all other Asian nations (World Bank, 2004).[10] Thus, as globalization deepens, Cambodian SMEs are struggling to compete with imported goods manufactured by SMEs in neighboring countries. Moreover, there are three key factors impeding the development of Cambodian SMEs: the country's weak regulatory and legal framework, difficulties faced by SMEs in gaining access to financing, and lack of SME support facilities. These weaknesses and constraints create a doubt as to why SMEs need to be brought to the attention of the public and why they have been strongly emphasized by the Cambodian government since the 2000s. As a result, there are still considerable controversies over whether it is necessary to promote SMEs vis-à-vis LEs. The second concerns the manner in which SMEs contribute to economic development, or in other words, whether SMEs contribute to the enhancement of both equity and productivity. All this motivates the discussion on whether or not to support the promotion of SMEs in Cambodia.

OBJECTIVES OF THE STUDY

The objective of this study is to introduce arguments for and against the contribution of SMEs to economic growth taking Cambodia as the base for analysis. The contribution of SMEs to economic growth is usually based on the expectation that they are more labour intensive, more productive, and more equitable in distributing the income that they generate. Therefore, the objective of this paper is threefold:

- First, it aims to discuss the arguments for the importance of SMEs in the context of economic development.
- Second, it aims to assess the role and impact of Cambodian SMEs in development using establishment-level data from available data and surveys. Specifically, three hypotheses are tested to see whether SMEs perform more desirably vis-à-vis large enterprises (LEs). ***(1)- SMEs are more labour-intensive than LEs; (2)- SMEs are as***

[10] A 2004 World Bank (WB) study shows Cambodian firms to have total factor productivity 18 percentage points below those of India and 24 percentage points below those of China. Labour productivity is 65 percentage points below that of India, and almost two thirds below that of China.

productive as LEs or more productive than LEs; (3)- SMEs are more equitable in distributing the income they generate than LEs.

- Third, it aims to conclude policy implications for SMEs in Cambodia.

OUTLINE OF THE STUDY

This study consists of 7 chapters as follows:

Chapter 1 focuses on the important roles of SMEs in the process of economic development .It discusses empirical literature on the positive contributions of SMEs in terms of employment creation (including female employment), income equality distribution, and productivity improvement. This chapter also provides a brief revision of the skeptical view of SMEs. However the main objective of this chapter is to sketch the theoretical underpinnings for the promotion of SMEs in the light of their potential positive contribution. The issues discussed include market and institutional failures that impede the growth of SMEs. Furthermore the discussion focuses on the theory underpinning the development of SMEs in developing countries. The discussion is centred on the issue of labour intensity and the role of cheap labour as a source of capital formation. The discussion also focuses on the potential contribution of SMEs to productivity and improved income equality.

Chapter 2 makes an attempt to analyze key characteristics of and challenges to Cambodia's SMEs development. As the main feature of enterprise sector consists of small and medium size enterprises (SMEs), the first part of this chapter reviews the evolution of the Cambodian private sector in the macroeconomic environment. Subsequently, the chapter discusses the key role of SMEs in the Cambodian economy, highlights the country's SMEs development characteristics, and discusses key factors of Cambodia's SMEs promotion policies and strategies. Although SMEs face many difficulties in their development in different countries, a number of surveys have indentified a similar set of barriers impeding the development of Cambodian SMEs. Thus, the last part of this chapter discusses major factors constraining SMEs' development in Cambodia.

Chapter 3 provides empirical results, methodologies and methods of previous work on the contributions of SMEs in economic development relative to LEs in terms of labour intensity, productivity level, and the equitable distribution of income. Since SME covers a wide range of definitions and measures, the first part of the chapter discusses different definitions of SME in various countries and sources, especially in South Asia countries, EU, and East and South-East Asia. The rest of this chapter discusses empirical evidences on whether SMEs are more labour intensive, more productive as LEs, and more equitable in distributing the income they generate. Variables which have been defined and measured by other studies are also discussed in this chapter.

Chapter 4 identifies and defines models or methodologies that are useful to study on the labour intensity of SMEs (including the employment of female labour), productivity of SMEs, and equal income distribution of SMEs. The last part of this chapter describes how each variable is measured and calculated in the study.

Chapter 5 discusses the overall processes of this research. This research methodology chapter will give a definition of SME as it is applied in Cambodia in order to collect accurate data for SMEs and LEs. Afterward, it illustrates how this study emerges. The research design indicates the methods and procedures for collecting and analysing data. The sampling procedure specifies the classification of respondents, sample size, and sampling unit. The instrument provides the questionnaire and the process of gathering primary and secondary information and sampling techniques. The data processing and analysis provide and explain the statistical techniques that are used for testing the hypotheses. A description of data collected from the field is also presented. Data are presented in pie, charts, percentages and words. Research constraints are also discussed, and are associated with problems encountered during data collection.

Chapter 6 discusses and presents results of the research. In order to investigate whether SMEs do contribute to Cambodia's economic development more than LEs or not and to provide policy implications for the improvement of Cambodian SMEs, three hypotheses will be tested in this chapter. The three hypotheses are that: SMEs are relatively more labour intensive than LEs and

employ more women compare to LEs, SMEs are as productive as LEs or more productive than LEs, and SMEs are more equitable in distributing income than LEs.

Chapter 7 is the conclusion and summary chapter. It concludes the findings from testing the three hypotheses and compares this study with other previous studies. The weaknesses and strengths of Cambodian SMEs' performance are identified, so that policy implications to improve SMEs in Cambodia will be provided in this chapter.

CHAPTER I

THE ECONOMIC RATIONALE FOR SME PROMOTION

1.1 INTRODUCTION

There is no single definition of SMEs. The issue of definition has been tackled in chapter 2 where SME is defined for this study.

Available studies suggest a very diverse performance of SMEs that can be broadly summarized as a dualistic pattern. While some successful SME growth and exporting is visible in developing countries (whereby a small, relatively dynamic SME sector plays an important role in the process of economic development), there is also a large under-performance of the SME sector. The former have taken advantages of the new opportunities offered by globalization and invested in their manufacturing capabilities to bring them up to world standards of price, quality and delivery. Some have even formed industrial clusters with other SMEs or multinationals to stimulate the emergence of production networks among firms and increase value addition. Dynamic SMEs have expanded their existing domestic market shares, broken into new export markets and continuously upgraded their products and processes. Having developed a solid base of competitive capabilities, dynamic SMEs seem well set to reap new market and technological opportunities. East Asian developing countries seem to have a higher proportion of dynamic SMEs in their SME base than other developing regions.

In contrast, the majority of SMEs in developing countries (particularly in Sub-Saharan Africa) have been slow to reap the benefits of globalisation. They have not made the require investments in export capabilities nor have they attempted to engage in industrial clustering and their export performance has suffered as a result. Furthermore, such SMEs are also increasingly under threat on domestic markets from cheap imports and the entry of foreign firms. Hence, the firm-level strategies undertaken by SMEs themselves are a fundamental ingredient of the export success of SMEs (Wignaraja, 2003).

Given the diversity in the performance of SMEs it is not surprising that there are supporters and opponents for policy intervention for promoting SMEs.

This chapter consists mainly of five sections. The first section provides a brief discussion on the

positive contribution of SMEs as well as the skeptical views of SMEs in developed and developing countries. In section two the discussion is centered on the issue of labour intensity and the role of "cheap labour" as a source of capital formation. There is evidence that SMEs in many countries are more labour intensive than LEs. In section three and four the discussion focuses on the potential contribution of SMEs to productivity and improved income equality. Section five focuses on market and institutional failures that may inhibit the growth of SMEs.

1.2 PERFORMANCE OF SMEs IN DIFFERENT COUNTRIES: CONTRIBUTION AND CONTROVERSY

This section provides a brief reference to the empirical literature on the performance of SMEs. It includes a discussion on the positive contributions of SMEs as well as the skeptical views on SME.

Several studies emphasize the importance of SMEs, including their ability to employ cheap labour forces in countries with large surplus of labour (Sugihara, 2007), to reduce income inequality of workers (Mbaku, 1997 and Li and Luo, 2008), and to promote economic growth as they are more productive compared to large enterprises (Liao, Holmes, Jones and Llewellyn, 2002). As their ability to employ more labour forces, SMEs also create new opportunities for wage employment for women, especially young and low skilled female employment (Yu, 2007; Lee, 1997; Koo, 1987; and Mahmud, 2003).

1.2.1 Labour intensive production

One of the popular arguments in favor of SMEs is that they are able to create job opportunities as SMEs are supposedly more labour intensive than large enterprises (LEs) (Nazdrol, Breen and Josiassen, 2009). Thus, SMEs may employ more labour than otherwise. For instance, a study on Malaysian SMEs shows that fixed asset per worker rises significantly with employment size[11] (Salleh, 1991). This reflects that SMEs tend to use less capital per worker compared to LEs.

[11] Fixed asset per worker in establishments employing 100 full-time workers and above is more than forty times higher than those establishments with less than 100 full-time workers (Salleh, 1991).

Based upon this evidence, Abdullah and Baker (2000) explains that since SMEs use less capital, a given amount of capital will create more jobs if it is spread over a large number of SMEs than if it is focused on a few large ones.

SMEs were found to be relatively more labour-intensive than LEs by many studies in different countries.[12] Huang (2003) found most of Thai SMEs (except for tobacco and basic metal industry) use higher proportion of labour relative to capital inputs. This is confirmed that Thai SMEs tend to utilize more labour for a given amount of capital than do LEs (See also Paitoon, 2001). Labour intensity was also found to be decreasing with firm size for Indonesian SMEs (Hayashi, 2002). Taiwanese SMEs generally focused on labour intensive activities that employed more low-skilled workers than did large enterprises during 1970s, 1980s, and 1990s (Aw, 2001; Sinha, 2003; and Ho, 1980). The role of South Korean SMEs in employment is increasingly important, while the role of large enterprises in employment weakens. Labour intensity of production in SMEs is greater than LEs in Korea, especially from the 1970s to 1990s (Nugent and Yhee, 2001; Ho, 1980; and Suh and Chung, 1998). Throughout the period, Korean SMEs where were classified as the less capital-intensive industries are: textiles, clothing and footwear, electrical goods, and transport equipment. The highly capital-intensive are heavy industries, such as iron and steel and industrial chemicals (Dollar and Sokoloff, 1989). We will discuss more detail on labour intensive industries in developed and developing countries in Chapter 3, section 3.3.

Apart from SMEs' role in job creation, SMEs also raise the participation of women in income generating activities. United Nations Industrial Development Organization (UNIDO) report showed that women have traditionally played an important role in the SMEs sector as workers in many developing countries (UNIDO, 2000). In African countries, women dominated three important subsectors, making up over 80 per cent of the employees in textile, clothing and leather production, 75 per cent in food, beverage and tobacco production, and over 60 per cent in wood and wood processing (UNIDO, 2000). In South East Asian countries, for instance in Malaysia, female participation in the workforce of SMEs in Malaysia in 2003 was 36.8 per cent of total

[12] See Table 3.3 (summary of all studies on Labour or capital intensive of SMEs) in Chapter 3: Literature review and theoritical analysis.

employment (Aris, 2007). Furthermore, female labour forces were found to share a greater portion of total employment among SMEs than large enterprises in Korea (Lee, 2007), and Indonesia (Tambunan, 2008). We will discuss the important role of women in labour forces in many different countries in Chapter 3, section 3.3.

1.2.2 Productivity

As productivity (growth) appears to be the single most important determinant of a nation's living standard, it is important to better understand the sources of productivity growth (Mahamat, 2009).

Another aspect of the contribution of SMEs to economic development is associated with their productivity. Several studies made serious attempts to analyze the performance of SMEs in developed and developing countries in terms of their productivity contribution (see Little, Mazumdar, John and Page, 1987; Snodgrass and Biggs, 1996; Chenery, Robinson and Syrquin, 1986; Karlsson, Johannisson and Storey, 1993; and Sjoholm, 1999[13]) (see section 3.4 in Chapter 3).

Oh, Heshmati, Baek and Lee's (2005) study, for instance, presented the development of total factor productivity (TFP) levels for LEs and SMEs in Korea. For most of the 1993-2002 period, TFP level of the SMEs was higher than the LEs. TFP level was similar for both LEs and SMEs in 1994, however, the gap widened from 1996 to 1998, narrowing again from 2000 to 2002. Similarly, Snodgrass and Biggs (1996) studied the productivity of several East Asian countries and showed that SMEs, especially medium size firms, had the highest productivity level. Paitoon (2001) studied the productivity of 59 manufacturing enterprises in Thailand during 1997 showed that SMEs had higher productivity level than LEs. Although Huang's (2003) study shows Thai SMEs are not more productive than LEs in all industries, majority of SMEs are more productive than LEs (see section 3.4.4 in Chapter 3). These findings provide an argument for SMEs not just as a source of improving social welfare, but also as a source of productivity stimulating industrial development. Such productivity growth in SMEs was confirmed in many studies such as Miwa (1996), MOEA (1998), Huang (2003), and Oh, Heshmati, Baek and Lee (2005) where the source

[13] Sjoholm (1999) uses Indoneasian Establishment data to study on productivty.

of growth came from SMEs in Japan, Taiwan, Thailand, and South Korea, respectively. In those countries, SMEs were found to actively engage in acquiring and upgrading new technologies and sustaining their competitiveness in the international market.

1.2.3 Income distribution

Due to their regional dispersion and their labour intensity, small-scale production units can promote a more equitable distribution of income than large firms (Kayanula and Quartey, 2000). SMEs offer a better regional distribution of industry and more variety and diversity in term of products and services, choices and preferences to the local customers (Abor and Quartey, 2010). This is due mainly to their number is large, especially small enterprises, and they are scattered widely throughout the regions (Kayanula and Quartey, 2000, Abdullah and Baker, 2001, and Hallberg, 1999).

Abdullah and Beal (2003) listed several contributions of SMEs. One of their contributions is that SMEs are able to boost regional growth and promote more equitable income distribution. According to them, large and giant firms normally tend to produce an elite number of high wage income earners whereas SMEs produce a significantly large number of relatively low wage earners. Furthermore, it is worth noting that many countries focused on developing SMEs so as to generate jobs that helped equalize incomes. For example, after the mid-1970s, the income gap in Korea declined significantly as the country paid greater attention to creating jobs and developing SMEs. In their earlier stage of development, China and Taipei chose to develop SMEs for equalizing income distribution (Li and Luo, 2008).

SMEs are found to help equalize income distribution in many countries, especially in Thailand (Huang, 2003) and Korea (Nugent and Yhee, 2001)[14]. Other than these two studies, Mao and Schive (1998) provide evidence that SMEs, which give rural families an opportunity to supplement their incomes with non-agricultural employment, help to improve income distribution more equally in Taiwan (see also Table 3.5 in Chapter 3). We will discuss more on SMEs'

[14] See Table 3.3 (summary of all studies on equal income distribution of SMEs) in Chapter 3: Literature review and theoritical analysis.

contribution on equal income distribution in different countries in section 3.5, Chapter 3.
Since SMEs are labour intensive, mainly located in smaller urban centers and rural areas, increasing their productivity growth is the basis for improvements in real incomes and welfare (OECD paper, 2001 and 2004). Because of their regional dispersion and labour intensity, and their efficient use of scarce resources, SMEs can promote a more equitable distribution of income than large enterprises (Kayanula and Quartey, 2000). For many developing countries, the promotion of SMEs has been a powerful engine of more equal income distribution or wealth creation (Liu and Yu, 2008). It is argued that income disparity between urban and rural areas has increased significantly mainly because of insufficient development of nonagricultural industries in rural areas. A focus on promoting the development of SMEs in rural areas could help reduce urban-rural and regional income inequality (Liu and Yu, 2008, and Altenburg and Eckhardt, 2006).

1.2.4 Skeptical views of SMEs

There are skeptical views questioning the efficacy of SME support policies. First, some authors argue that large firms benefit from economies of scale and create more stable and higher quality jobs. SMEs are neither more labour intensive, nor better at job creation than large firms. Little, et al (1987) and Snodgrass and Biggs (1996) suggest that firm size is not a good predictor of labour intensity, and that labour intensity varies more across industries than across firm-size groups within industries. Many small firms are more capital intensive than large firms in the same industry. This suggests that SMEs are not necessarily more suited to the labour abundance and capital shortage characteristics of developing countries.

A wide array of evidence rejects the view that small firms are the engines of job formation. Small firms exhibit high birth rates and high death rates, and many small firms fail to grow. Davis, Haltiwanger and Schuh (1993) show that while the gross rate of job creation and destruction are higher in small firms, there is no systematic relationship between net job creation and firm size. Small manufacturing firms in the United States between 1973 and 1988 did not consistently create more jobs on a net basis (after allowing for jobs eliminated and firms that went out of business) than large firms (Nasar, 1994) (cited in Snodgrass and Biggs (1996, p. 10). Biggs,

Ramachandran and Shah (1998) find that large firms were the dominant source of net job creation in the manufacturing sector in Sub-Saharan Africa.

Second, SMEs are not better than large firms at innovating and boosting productivity. In particular, large enterprises can exploit economies of scale and more easily undertake the large fixed costs associated with research and development (R&D). Pagano and Schivardi (2001) find that a larger average firm size is associated with faster innovation rates within Europe. Many other studies show SMEs contribute less than large firms to economy-wide production growth. Most studies of developing countries show that the smallest firms are the least productive (Little, Mazumdar, and Schuh, 1993, p. 313) (see Table 3.4 in Chapter 3). The relative contribution of SMEs than LEs in term of productivity growth is discussed in more detail in section 3.4.4 in Chapter 3.

Many small firms bring innovations to the marketplace, but the contribution of innovations to productivity often takes time, and large firms may have more resources to adopt and implement them (Acs, Morck, and Young, 1999). In developing countries, there is little R&D activity, so that technology transfers from abroad and imitation drive productivity improvement (Rosenberg, 1976; Baumol, 1994). Large exporting firms in these developing countries are typically the primary mechanism through which technologies are adapted from abroad to local circumstances (See Biggs, Shah, and Srivastava, 1996 for Africa; Pack, 1992[15] and Pack and Westphal, 1986 for Asia). Thus, from a developing country perspective, the firm level evidence does not favor SME subsidization as a mechanism for boosting innovation and productivity growth.

1.3 LABOUR INTENSITY AND DEVELOPMENT LITERATURE

In this section I provide a brief literature review on the role of the labour and labour intensity in the process of economic growth. It is argued that although technological progress has increased labour productivity, nevertheless this development combined with rising wages in many industries, countries and regions has led to a reduction of labour demand in affected industries, countries and regions. However in contrast to the increasing role of technology and machinery to

[15] Pack, H. (1992) studies about new perspective on industrial growth in Taiwan.

replace labour in rich countries, and those with rapidly rising wages, labour can be used (in the context of development literature) as a source of investment and capital formation. Reallocation of labour, in countries endowed with cheap and abundant labour, from low productivity traditional sectors to the modern sector can substitute for the shortfall in savings and hence speed up the process of transition to sustained economic growth. It is worth noting that the discussion of labour intensity is relevant to the supposed higher labour intensity of SMEs.

1.3.1 Labour in the process of economic growth

The use of human labour as a factor of production was gradually put to test as advances were recorded in technology in the last two centuries. The invention of machines in the 19th century, the introduction of labour saving devices and the development of high capacity production equipment had a revolutionary effect in all production industries (Dunkerley, 1996). Labour-saving production technique leading to technological progress was considered as an important factor to facilitate improvement in labour productivity (Kaldor, 1960).

Robotic technology and computerization, however, have forced the problem of unemployment even more prominently into the forefront (Dunkerley, 1996). For example, Burange (1999) studies found that the proportion of expenditure on investment, especially equipment, increased substantially during the period from 1980 to 1995 while that of labour decreased in the US.[16] During the period, the labour-intensive industries such as food products, cotton textiles, wool, silk and synthetic fiber, wood and wood products, and basic metal and alloy industries recorded a decline in employment (Burange, 1999).

Dunkerley (1996) explained that the capital-intensive nature of industry means that in order to generate more employment per expenditure unit, the scope of operations has to be expanded. However, labour intensive methods offer an opportunity to increase employment (Dunkerley, 1996).

[16] Burange's (1999) study found that a high growth in fixed capital in the manufacturing sector of the US resulted in decrease in employment over the period from 1980 to 1995.

Thus, in the context of development literature labour can be used as a source of investment and capital formation to substitute for the scarcity of capital and machinery. The theoretical basis of the use of labour as an investment in countries with a large surplus labour were put forward by R. Nurkse in 1953 and Arthur Lewis in 1954. Development literatures have emphasized the importance of the availability of cheap labour in terms of low wages in countries with *"unlimited supply of labour"* as a main source of capital formation. Arthur Lewis's (1954) dual-sector model is a know example.[17] In this model, reallocation of labour from low to high productive activities is the essence of economic development.[18] This occurs when surplus labour from the traditional agricultural sector, characterized by low wages and low productivity, is transferred to the modern industrial sector whose growth over time absorbs the surplus labour.[19] The importance of this reallocation lies in the availability of cheap and abundant labour in the traditional sector that keep the wages low in the modern sector. The abundance of cheap labour in the model leads to increased profit in the modern sector and the continuous reinvestment of this surplus in the modern sector is an important source of investment and capital formation.[20] According to Garnaut (2010) and Islam and Yokota (2006), the rising modern sector share of the economy contributes to a rising profit share in the economy as a whole.

The ability of the modern sector to absorb the excess cheap labour from the traditional sector or the high labour intensity of the modern sector is an important assumption of the model. The model has been extensively used, with appropriate modifications, in analysing the process of modern economic growth in Japan and the newly industrializing economies in East Asia. It was elaborated and applied in an East Asian context by Fei and Ranis (1964) and Jorgenson (1966) (cited in Fields, 2004). It was embedded in Minami's influential book on Japanese postwar economic development (Minami, 1973) (cited in Garnaut, 2010). Islam and Yokota (2006) used the Lewis growth model to study on China's industrialization.

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[17] The labour surplus economy of the model is dualistic, with a highly dynamic modern or urban or industrial sector, and a relative unproductive and stagnant traditional or rural or village sector (see Garnaut, 2010).

[18] The shift of labour from the tranditional sector to the modern sector can therefore augment the total output of the economy (see also Islam and Yokota, 2006).

[19] The traditional sector is characterised by the presence of "surplus labour", in the sense that withdrawal of tis labour does not lead to a reduction in the total output of the traditional sector (see also Islam and Yokota, 2006).

[20] Rapid expansion can proceed in the modern sector without increases in real wages. The improvements in infrastructure, labour culature and management practices that raise productivity with the passing of time are reflected in a rising rate of return on investment and an increasing profit share of mondern sector income (see Garnaut, 2010).

Accordingly labour intensive schemes are not only aimed at short or medium term employment of those who have no jobs but they are also designed to alleviate the shortage of capital (Costa et al, 1977). The shortage of saving and hence investment in low income poor countries impede economic growth. However, the reallocation of cheap and abundant supply of labour to the modern sector can provide a substitute for the shortfall in saving. According to Berry et al (2002), it is good economic practice to save the scarce and expensive factor by substituting the abundant factor for the scarce factor. This solution is to follow a capital-saving and labour-intensive production technique.

However, this is in turn depends on whether enterprises are more labour-intensive and therefore likely to employ unskilled labour, and whether they are able to provide a skill upgrading process (Barry, 2002). Sugihara (2007) explains that in principle it is likely that high wage economies would develop capital-intensive industries, while low-wage economies labour intensive ones. According to him, heavy and chemical industries usually require institutional development, such as banks and the stock and bond market, to finance large fixed investment, while the more labour intensive industries pay more serious attention to the recruitment and training of labour, especially unskilled labour.

The contribution of labour intensity and cheap labour in accelerating economic development is highlighted in several empirical studies. Loayza and Raddatz (2006) find that growth in unskilled intensive sectors contributed to poverty reduction. The World Bank (2005) finds that access to non-farm rural development and informal urban employment emerged as an important factor in some of a sample of 14 countries, which experienced pro-poor growth in the 1990s (cited in Hull, 2009).

Several Asian countries with high population density and cheap labour in their early phase of economic development turned into producers of labour intensive manufactured goods. According to Sugihara (2007), this form of labour intensive industrialization took root in Japan first and was followed by a number of other Asian countries, particular after 1945. Labour absorption in Japan began in the form of labour intensive agriculture and after the second half of the eighteenth century it was fully extended to rural industries (Sugihara, 2007). According to Sugihara, the

majority of world manufacturing employment is located in developing countries of Asia, especially in China and India. Labour intensive production techniques were pursued by Malaysian economy during 1980s. It happened after agricultural sector was no longer able to absorb the growing labour force, leading to rising levels of unemployment. This put enormous pressure on the government to change its colonial patterns of production (Taylor, 2004).

China began its era of market reform and sustained strong growth in the early 1970s as a labour surplus[21] economy (Garnaut, 2010 and Athukorala, Fukao, and Yuan, 2008). The supply of unskilled labour at a more or less steady real wage, supported by continuing large-scale movement of people from agriculture to industry and from the countryside to the cities, was the main factor of the rapid growth of the modern industry economy (see Garnuat, 2010, Athukorala et al, 2008).[22] Furthermore, Indian manufacturing SMEs growth in the 1990s was accompanied by significant growth in employment (Thomas, 2002) and the slowdown in growth of real wages (Goldar, 2000). As I discussed earlier on a number of empirical studies indicate that SMEs are more labour intensive than LEs.

1.3.2 Female employment

The growing importance of cheap labour as a source of capital accumulation and development has been paralleled by the increasing share of not only male but also female employment. The expansion of the export-oriented manufacturing sector which give rise to wage employment for women, and the considerable growth of female employment in several Asian countries since 1960s are well documented. The classic article by Elson and Pearson (1981), "Nimble fingers make cheap workers: An analysis of women's employment in third world export manufacturing." is a good example. Elson and Pearson observed that "since the late 1960s a new type of wage employment has become available to women in many third world countries: work in world market factories producing manufactures exclusively for export to the rich countries." In these factories the vast majority of employees are usually young women between the age of fourteen

[21] Athukorala et al (2008) explaine that surplus labour' exists when roughly the same level of output can be maintained by a smaller labour force with some organizational reform and very little investment.

[22] However, in recent years there have been growing concerns in China as the economic transition fueled by surplus labour is rapidly coming to an end. This concern is based on steep wage increases in urban sector and labour scarcity in rural areas (see Garnaut and Huang 2006, Seibert 2007, and Islam and Yokoda 2006).

and twenty-four or -five. The attractiveness of female workers, as empirical studies show, lies in their even lower wages than men in these countries (Elson and Pearson, 1981). Also, Standing (1989) argues that under the pressure of global competition to keep unit costs down, employers substitute men's labour by cheap female labour. Other than low wages of female labour, in the Asian context evidence indicates that "worsening real incomes" lead women from poor households to seek paid employment to complement inadequate family incomes (Ozler, 1999).

The gender stereotype of Elson and Pearson still hold in contemporary China, as Yu's (2007) study shows that most employers like to employ females from the countryside, in particular unmarried and young girls, whom they believe to be docile and dexterous. Since the late 1970s, export-led and labour intensive manufacturing sector growth in China have brought about an unprecedented surge in internal rural to urban migration (Yu, 2007). According to the China Labour Statistical Yearbook (2005), manufacturing is the largest sector to employ women, absorbing 13.9 million in 2004 and about 44 per cent who work in the sector are female (NBS, 2005). This pattern of female employment challenges the U-shape form of female labour force participation.[23]

The rapid growth of female employment in several export-oriented Asian countries appears to contradict the well known U-shape hypothesis of female employment. Accordingly, at low levels of income when agriculture is the dominant form of economic activity, female labour force participation is high, and women work mainly in family farm or non-farm family business. However, economic opportunities for women decrease when there is economic development that comes in the form of new manufacturing sector (see Tansel, 2002; Durand, 1975; and Standing, 1978).[24]

There is ample evidence from several developing countries and emerging markets that with industrialization in 1960s and 1970s the agricultural population including female labour shifted

[23] In the U-shaped pattern, women's participation rates first fall and then rise during the latter stages of the developmental process. The initial drop in participation is due to a decline in agricultural work, while the latter rise occurs as the modern sector expands (Mammen and Paxson, 2000). As countries continue to develop, women's education levels rise, and women move back into the labour force as paid employees holding mainly white-collar jobs (Tansel, 2002).

[24] Stell (1981) shows that Ghana's experience in the 1960s as its economy modernized does not confirm the U-shaped model in the female labour force participation.

rapidly to manufacturing sector. For example, in the South Korean case, young women from rural areas swarmed into factory jobs (Koo, 1987). The manufacturing sector created large scale job opportunities for Korean women. In 1970, female labour in the manufacturing sector, with a mostly low level of education, comprised around 37 per cent of the total nonagricultural female labour force (Kim and Shim, 1984). They worked long hours with low wages in poor working conditions (Koo, 1987). According to Kim and Shim, women with higher education tended to enter professional positions.

Similarly to China and Korea, in Bangladesh, the comparative advantage of cheap female labour[25] urged employers to draw upon the reserve female workforce for new forms of jobs in manufacturing industry (Mahmud, 2003). Women were docile, did not unionize and were cheaper to hire under flexible news modes of production, such as outsourcing, contract work, and easy entry and exit. The study shows that although the female share of agricultural employment grew the fastest, female share of industry employment remained the highest at one third. Within the industry sector female share of manufacturing employment was even higher at 41 per cent.

With related to the size of manufacturing, SMEs are an important source of employment for women. Women participation in the workforce of SMEs is high in many countries, especially Korea (31 per cent) (Lee, 2006), Malaysia (37 per cent) (Aris, 2007), and in Cambodia (about one third of employees) (ADB, 2004).

1.4 INCOME EQUALITY AND DEVELOPMENT LITERATURE

The theories of income distribution are concerned with the distribution of income between primary factors of production, land, labour and capital and between different sectors and different modes of production.[26] However in the context of development literature it is the relationship

[25] It refers not only to low wages but all other conditions of labour contributing to low cost of labour (Mahmud, 2003)

[26] Adelman and Robinson (1989, pp. 964-972) distinguish three different concepts of income distribution. These include: 1) the functional distribution that is concerned with the share of national income accruing to factors of production, land, labour and capital, 2) The extended functional income distribution, which disaggregates income by sector and mode of production such as subsistence and commercial farmer, capitalists and workers in rural as well as urban areas, etc. and 3) The size distribution that depict the share of national income accruing to each quintile of population. Classical economists such as Ricardo and Marx focused on the functional distribution of income

between economic growth and income inequality which has been the focus for policy analysis. This relationship which was popularized by Kuznets (1955, 1966) is concerned with the impact of economic growth on income equality. This is based on empirical data depicting the per capita distribution of income or the share of national income accruing to each quantile of population or households over time (Adelman and Robinson, 1989). Kuznets (1955, 1966) using data on long term relationship between income distribution and economic growth in developed countries concluded that in the early stage of economic growth and industrialization income inequality increased. This was primarily due to the rapid rural-urban migration and an influx of cheap labour to the cities while urban elite and firms' owners in the cities were the main beneficiaries.

Hence in his inverted-U hypothesis, Kuznets (1955) argued that at the initial stages of economic development, as per capita income rises, inequality may increase as a result of the shift of labour from the agricultural to industrial sectors where wages are much higher (Mbaku, 1997). However as industrialization expanded on a large scale there was a growing reduction in the supply of cheap rural labour to the cities. This trend combined with modernization and the rise of middle classes reduced income inequality.

This inverted U-shape can be also understood in the context of the Lewis model to which I referred on the earlier section. According to Li and Luo, whether we introduce the assumption of unlimited labour supply of the Lewis model into Kuznets' inverted-U hypothesis, or introduce the assumption of the industrial wage rate being higher than the agricultural wage rate into the Lewis model, the result is the same: inequality in income distribution is greatest at the early stages of economic development, and falls eventually as the country achieves higher levels of development (see also Mbaku, 1997). During the first stage, the development of labour-intensive industries, especially manufacturing, absorbs surplus labour from agriculture in large numbers, thereby reducing unemployment (Li and Luo, 2008).

During the second stage, income inequality begin to fall as the rapid development of the

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analysing the share of income by labour and capital in the context of the theory of value. A detailed discussion of classical, neo-classical and the neo-Keynesian approach is presented in Adelman and Robinson (1989, pp. 949-1003) "Income distribution and development" in *Handbook of development economics, Vol 2* (eds) Hollis Chenery and T.N Srinivasan.

manufacturing sector and the sharp rise in employment (no surplus labour left) in the industrial urban sector increases the rate of rural-to-urban migration and thus shrinks the rural labour force (Mbaku, 1997, and Li and Luo, 2008). With the shrinkage of surplus, labour wages rise. Similarly, a labour intensive growth pattern will create more job opportunities, leading to lower unemployment, which is faster reduction in surplus labour.[27]

The well-known Kuznets' inverted U-shape curve, however, has been challenged by several empirical studies, particularly in the context of data for developing countries. For instance, an early study by Adelman and Morris (1973) based on data for 44 less developed countries found that while at the early stage of development the share of income accruing to the poorest section of population declined, this share for the poorest 60 percent of population continued to decline at a higher level of development. Hence they concluded that in the absence of policy intervention the relationship between economic growth and income distribution might be J-shaped. In other words economic development under market forces does not necessarily leads to increased income equality.

However, Stiglitz (1996) with reference to nine Asian countries including Japan, South Korea, Taiwan, Taipei, Hong Kong, Singapore, Malaysia, Indonesia and Thailand maintained that the process of rapid economic growth in these countries spread widely among the population. Referring to Kuznets (1955), Stiglitz pointed out that "Previous theories suggested that rapid growth was associated with rapid capital accumulation, which in turn was associated with high degrees of inequality; and that growth would in fact be accompanied by an increase in the degree of inequality (Kuznets, 1955). Not only did this assumption prove to be false, but there are reasons to believe that government policies that promoted greater equality contributed in no small measure to the remarkable growth of these countries." (Stiglitz, 1996, p.3).

While Stiglitz's article is focused on the role of the state including export promotional policies to foster growth and equality in these countries, several authors have focused on the labour intensity

[27] No unemployment, there will be no income differentials; and no surplus labour, income differentials is low and eventually vanish. Furthermore, greater demand for labour will push up the wage rate which will help narrow the income differentials between urban formal sector workers and migrant farmer labourers, and between the skilled and unskilled. This will increase the share of wage incomes in GDP, further reducing income inequality (Li and Luo, 2008).

of several manufacturing processes and manufactured exports as an important ingredient to enhance income equality in these countries.

It is well known that these countries have experienced high economic growth while keeping inequality low (see Cleveland, 2003 and Li and Luo, 2008).[28] These countries' industrial development has had an important role in their economic growth (Kniivila, 2006). According to Kniivila, industries which employ a high proportion of unskilled workers with labour intensive technologies can have positive effects on incomes of the poor. Before the 1980s, Taipei, China shifted the focus on agricultural sector to industrial sector (dominated by SMEs) that helped generate more jobs and equalize income (Li and Luo, 2008). According to Li and Luo, the rapid growth in employment in the secondary industry (dominated by manufacturing) narrowed the income gap as evidenced by the decline in the Gini coefficient from 0.33 in the early 1960s to 0.27 in 1980.[29]

Similarly, before the late 1970s the income gap in Korea declined significantly as the country paid greater attention to creating jobs and developing the manufacturing sector. The fast growth in the manufacturing industry, where SMEs played an important role, created more employment opportunities and reduced income inequality gap (Li and Luo, 2008). Li and Luo's study shows that throughout the 1970s, manufacturing wages grew by 15 per cent or more each year, and in some years, they rose by as much as 30 per cent. From the mid-1960s to 1980s, income inequality in Taiwan had declined noticeably due to low inequality of wage income as a result of rapid growth of employment in labour intensive manufacturing industries (Kniivila, 2006). According to Kniivila, demand for all types of labour was expanding at the faster rate, especially demand for low skill workers.[30] As I mentioned earlier on the higher presumed labour intensity of SMEs can play a positive role in reducing income inequality.

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[28] See also the World Bank's (1993) development literature on "The East Asain Miracle", and Kuznets' (1988) new model of Asian economic development.

[29] However, after the 1980s the income gap in Taipei widened while the share of manufacturing in the economy decreased and the rate of employment growth slowed down (Li and Luo, 2008).

[30] Unlike Korea and Taipei, however, income disparity had increased noticeably in China since 1980s. The widening urban-rural income gap was due to the insufficient development of nonagricultural industries and township and village enterprises in rural areas (Liu and Yu, 2008).

1.5 PRODUCTIVITY AND DEVELOPMENT LITERATURE

Solow (1956) emphasized the role of primary factor endowments (labour and capital) and productivity.[31] The latter is measured as the difference between the growth of real output and the weighted growth of factor inputs. In this growth accounting approach, technical progress (TP) is considered to be the unique source of TFP growth (Lee and Pyo, 2007). The notion of total factor productivity (TFP) developed by Solow is still in extensive use in many studies on the sources of economic growth in economies, including Asian countries as well as other developed countries (Jeon, 2007).

There is a close relationship between productivity and economic growth. However there are different sources of productivity growth. In the literature distinction has been made between growth induced by the accumulation of the factors of production, namely capital and Labour and growth arising from investment in R&D, innovation and technical progress. In this section I refer to the former as factor accumulation growth and to the latter as total factor productivity.

Regardless of the sources of productivity growth productivity is a fundamental measure of economic health and higher productivity growth appears to be associated with higher output growth (Liao, Holmes, Jones and Llewellyn, 2002). According to Liao et al (2002), many papers focus on measurement within the manufacturing sector level since manufacturing is the prominent factor in a country's process of industrialization and modernization. Empirical studies on TFP growth for manufacturing industries in Asian countries have been investigated by many authors. Such studies include Kim and Han (2001) for Korea; Oguchi, Amdzah, Zainon, Abidin, and Shafii (2002) for Malaysia; Koh, Rahman and Tan (2002) for Singapore; and Timmer (1999) and Margono and Sharma (2004) for Indonesia. However, according to Austria (1998), for developing countries, the contribution of factor inputs to growth has been much more important than that of TFP. Many other studies for East Asia economies believe that the increased use and accumulation of inputs rather than the increases in productivity explain all growth, especially

[31] Solow (1956) used growth accounting framework to estimate the rate of productivity growth in the manufacturing sector in the American economy for the period 1909-1949. He found that productivity growth accounted for over 80 per cent of overall growth in the U.S. manufacturing sector during the period (Felipe, 1997).

Young (1992, 1995), and Krugman (1994).[32] Many one-sector aggregate growth accounting exercises have concluded that the high rates of output growth are mostly accounted for by capital accumulation (Liao et al, 2002).

Although input factor accumulation is an important source for East Asian economies' growth, the assessment of the contribution of productivity (TFP) gains to economic growth has aroused great interests among researchers and has been widely discussed in Asian countries (Margono and Sharma, 2004). Dollar and Sokoloff's (1990) study found that there is a positive relationship between TFP growth and labour intensive manufacturing industries in Korea during the period 1963-1979. These results suggest that development in the labour-intensive industries were primarily responsible for the extraordinary record of total factor productivity growth in South Korean manufacturing. Liao et al (2002) using both single country and cross-country regression to study TFP growth for East Asian countries during 1963-1998 found that productivity growth is a main source to drive the output growth in China, Taiwan, Korea, and Singapore. Margono and Sharma's (2004) study on TFP growth in food, textile, chemical and metal products industries during 1993 to 2000 in Indonesia shows the positive relationship between industrial growth and TFP. Most studies on China (Chow, 1993; Borensztein and Ostry, 1996; Hu and Khan, 1998; Chow and Li, 2002; OECD, 2005), infer a significant contribution of TFP to economic growth during the reform period. Using growth accounting, Jha and Sahni (1994) showed that TFP growth has contributed substantially to Hong Kong's economic growth, but almost zero for Singapore.

Most growth accounting studies on the East Asian newly industrialized countries (NICs) (Kim and Lau, 1994; and Young, 1992 and 1995) inferred that the great success of the East Asian "Tigers" has been largely driven by massive factor accumulation, rather than innovative activities and technological progress. In a seminal study, Nelson (1981) found output growth for Singapore manufacturing industry for the period 1970-79 to be mainly due to growth of factor inputs. Furthermore, a recent study by Han, Kalirajan, and Singh (2001) on 20 manufacturing sectors in Hong Kong, Singapore, Japan and South Korea during the period 1987-1993 shows that input growth has been the primary source of East Asian growth. Many studies, including Kim and Lau

[32] See Liao, Holmes, Jones and Llewellyn (2002)

(1994), Young (1992, 1995), and Krugman (1994) have emphasized the crucial role played by capital accumulation in the high performing East Asian economies. Productivity growth, which is measured as an increase in output per worker, results from increases in the amount of capital per worker, or capital accumulation (Han et al, 2001). Young's (1992) study on Singapore and Hong Kong concluded that capital accumulation explained essentially all of the increase in output per worker during the period 1970 to 1990. Ozyurt's (2005) study concludes that capital accumulation has been the driving force of the economic performances in Chinese industry, between 1952 and 2005.

Furthermore, after the neoclassical theory (Solow, 1956), which points to human capital as the major source of the economic growth, numerous studies have investigated the issue of labour productivity in manufacturing sector (Su and Heshmati, 2011). The Center for the Study of Living Standard (CSLS) (2003) documented China's productivity performance since 1978 and determined its impact on poverty. The report finds that strong economic growth has been fuelled by rapid productivity growth. Labour productivity is found to have had a strong negative effect on poverty in China, with productivity increases in the industrial sector more important for poverty reduction than those in the agricultural sector. Similarly, Su and Heshmati's (2011) find the positive relationship between the share of industry output and the labour productivity in China during the period of 2000-2009.

Another group of researchers reveal productivity drivers, such as human capital, and investment in research and development (R&D). Empirical studies point out that R&D generates substantial returns, both in terms of innovation and through adoption of existing technologies (Hall, Lotti, and Mairesse, 2009), while human capital can play a productive role in term of the absorption capacity to assimilate new technologies (Canton, Minne, Nieuwenguis, Smid, and Van der Steeg, 2005). The connection between R&D and productivity is well established in the literature.[33] Study for Italian SMEs found that R&D intensity, along with investment in equipment, enhance the likelihood of having both process and product innovation. Both these kinds of innovation have a positive impact on SMEs' productivity (Hall, Lotti, and Mairesse, 2009). However,

[33] For example, Blinder (2000) simply assets that technology is the primary driver of productivity gains. Other studies that show the link between R&D and productivity are: Coe and Helpman (1995), Kao, Chiang and Chen (1999), and Crisculo and Haskel (2002).

analysis on cross-sectional data of 186 exporting SMEs in China demonstrates that R&D intensity and firm size are positively. In Korea, it is recognized that the best way to enhance SMEs' productivity is to bolster their R&D capabilities. In this context, the government of Korea decided to raise the share of SMEs in its R&D spending from the current 26 per cent to 40 per cent by 2015 (Internet source: www. Koilaf.org).

The efficiency and productivity growth in a broad sense, whether arising from input accumulation such as capital and labour or in response to investment in R&D, innovations and improved human capital is an important source of economic growth. However, the relavent question here is that whether there is a relationship between the size of economic activity and productivity?

The debate on relation between productivity and size of the economic activity dates back to the writing of Adam Smith. As Cleveland has pointed out Adam Smith remarked that concentrated land ownership by "great proprietor" hampered productivity and growth (Cleveland, 2003). Accordingly concentration of land ownership or "the engrossment of land" allows for a life of indolence and luxury by the owner of the estate. Cleveland noted that "Attributes the prosperity of the British Colonies in North America to the practice of distributing land in small holdings, and blames the backwardness of the Spanish colonies on the engrossment of land." (Cleveland, 2003, p. 671).

In a similar vein Acemoglu and Robinson (2012) in comparing historical economic development of Mexico, under the Aztec, and the USA as a European offshoot, maintains that the latter country was characterized by inclusive economic and political institutions that enforced property rights for a broad cross section of society and encouraged investment in new technologies and skills. In contrast economic growth in the former was hampered by the "extractive economic institutions" that were "structured to extract resources from the many by the few" and failed "to protect property rights or provide incentives for economic activity" (Acemoglu and Robinson 2012, p. 430).

Though the negative relationship between concentrated ownership and productivity has been acknowledged in the literature the economic theory does not have an answer regarding the relative productivity of SMEs and large firms. On the one hand, large firms may take advantage of economies of scale and scope and more easily undertake some fixed costs. On the other hand, small firms may have higher flexibility to face changes in their environment, they may use cooperation to achieve economies of scale and scope similar to those of larger firms; or they may simply focus on small and highly specialized markets. As was mentioned earlier on certain empirical studies address the higher efficiency of SMEs, though this might differ across countries and sectors.

1.6 MARKET FAILURES AND INSTITUTIONAL FAILURES

In this section it is argued that the ramification of market failures, arising from asymmetric information, transaction costs, institutional failure, incomplete property rights or other forms of market failure provides an important role for government intervention. For the development of SMEs, the justification for government intervention is concern about the positive potential contributions of SMES in terms of labour intensity and hence employment creation, income equality and productivity.

The evolution of economics paradigm into the world of imperfect competition - challenging the Neoclassical assumptions of perfect competition, frictionless transactions, perfect information, and well-defined property rights - highlighted the importance of market failure (Sweezy, 1970). Small and Medium Enterprises (SMEs), though their impact, role, technological sophistication and contribution to employment, productivity, and income distribution vary across regions and over time, are said to be subject to market failures arising from transaction costs and institutional failures (Beck, 2007).

1.6.1 Market failure

Ronald Coase's seminal contribution to the theory of the firm highlighted the significance of transaction costs.[34] Another seminal contribution in this field is that of Williamson. In Coase's (1937, 1961) original formulation, transaction costs refer to the cost of using the price mechanism or the cost of carrying out a transaction by means of an exchange on the open market. Coase (1961) explains that in order to carry out a market transaction it is necessary to discover who it is that one wishes to deal with, to conduct negotiations leading up to a bargain, to draw up the contract, to undertake the inspection needed to make sure that the terms of the contract are being observed. Williamson (1985) and Ronald Coase identified three kinds of transaction costs: search and information costs, bargaining and decision costs, and policing and enforcement costs.

First, search or information costs associated with finding information about products, prices, inputs, new partners, buyers and sellers. Shokane (2003) argues that information is a crucial resource in gaining a sustainable, competitive advantage for modern enterprises. The priority ranking of the SMEs' needs clearly puts information provision at the top of the list of services to be provided.[35] However, in most developing countries, according to UNIDO (2005), the SME sector suffers from inadequacies in the receiving of business information.[36] Many studies, especially Hallberg (1999) and Hytti (2000), find that costs of obtaining information impede small firms in their access to private and public sources of data and advice on training, financial resources, technology, or export market (Hughes, 2000).

Regarding to financial resources, it is argued that the fixed costs of obtaining information about small firms lead to credit rationing in the loan market (Hallberg, 1999; and Hytti, 2000). Hallberg finds that in credit markets, it is difficult or costly for banks to obtain information on the creditworthiness of potential SMEs clients. Thus, if lenders perceive the risk of lending to that clients to be greater than it actually is, they will charge higher interest rates or refrain from

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[34] Coase (1937, 1988)

[35] As Ladzani (2001) explains, the SMEs' development is hampered when market signals on business opportunities, customer trends, methods of organization are not communicated effectively to the SMEs.

[36] For example, in Uganda, SMEs operate in information-poor environment where there is no meaningful information system in place to facilitate efficient and effective access to business (UNIDO, 2005).

lending to that clients altogether (Hallberg, 1990).

Second, bargaining and decision costs are the costs required to come to an acceptable agreement with the other party to the transaction, drawing up an appropriate contract. Nooteboom (1992) identifies costs at the stage of contract as "incurred in the preparation of an agreement to transact in which one tries to anticipate possible problems during execution. These costs include costs of search of information on reliability of the transaction, possible contingencies in the future and degree to which investments will be sunk. They further include costs of negotiation, legal advice, set-up of arbitration, design of safeguards and guarantees against misuse." (p.285). These costs include the costs of negotiation, legal advice, set up of any third-party procedures, and designing safe-guards (Carmel and Nicholson, 2005).

Third, policing and enforcement costs are the costs of making sure the other party sticks to the terms of the contract, and taking appropriate action (often through the legal system) if this turns out not to be the case. This kind of transaction cost is called monitoring cost.

Transaction costs can therefore be broadly defined as costs involved in the exchange of credit for a promise to pay later. These costs involve the cost of information-gathering on debtors/projects, loan administration, and contract monitoring and enforcement (Nooteboom, 1992). Transaction costs drive a wedge between funding costs of capital of financial institutions and the lending rate they charge borrowers (Beck, 2007). Beck's study on SMEs' financing argues that the higher the transactions cost the greater is the extent to which they inhibit access to credit by the SMEs and the poor.[37]

The lack of adequate financial resources places many significant constraints on SME development (Abor and Quartey, 2010). Many studies emphasize two important difficulties resulting from the capital constraint: (1) lack of ability to expand and adopt new technology; and (2) difficulty in obtaining raw material.

[37] Mukwashi's (2000) study on access to capital and improving business in Sub-Saharan Africa agreed in general that one of the major difficulties SMEs come across is the issue of access to finance. Information asymmetry, poorly prepared project proposals, inadequate collateral, and lack of historical records of the company's transaction are among the constraints faced, especially, by SMEs in developing countries (Mukwashi, 2000).

The credit constraint pertaining to working capital is one of the major factors influencing firms from expanding and adopting new technology (Sheng, 2010).[38] The inability to tap into capital markets or the high price of capital that SMEs face leads them to operate with much less capital per worker than larger firms (van Biesebroeck, 2005).[39] Kayanula and Quartey (2000) argued that SMEs' difficulties in gaining access to appropriate technologies and information on available techniques limit innovation and SME competitiveness in terms of both the price and the quality of products. Berry, Rodriguez and Sandee (2011) study shows that Total Factor Productivity (TFP) rises primarily as a result of technological change in Philippine's industry. For instance, 18 per cent of the small firms in Malawi and Ghana in Aryeetey, Baah-Nuakoh, Duggleby, Hetting, and Steel (1994) mentioned old equipment as the most significant constraint which restricted productivity growth of SMEs. Mephokee's (2006) study on Thai SMEs finds that the high cost of credit forces labour intensive industries to use old fashioned technology. This causes the decline of their competitiveness that eventually leads to a reduction in employment.

Second, finance is a major constraint not only on working capital, but also on raw materials (Kayanula and Quartey, 2000 and Parker, Riopelle and Steel, 1995). Evidence shows that the difficulty of obtaining raw materials is ranked as one of the top problems constraining productivity growth in van Biesebroeck's study in 2005. In addition, a 1998 World Bank survey of firms showed that most firms said the slowdown in their production was caused by the increase in input costs (see Berry and Rodriguez, 2001). A study on small enterprises in five African countries (Ghana, Malawi, Mali, Senegal, and Tanzania) showed that poor cash flow was the main reason of the high cost of obtaining local raw materials (Parker et al, 1995). Small enterprises in Ghana and Malawi emphasized the higher costs of obtaining local materials.

Many studies attempted to check whether the financial constraint is different for SMEs versus large firms. Many studies, however, found that access to financial resources by smaller enterprises is limited compared to larger firms. World Bank research suggests the existence of financial constraint because formal banks do not lend to the smallest firms in most countries

[38] van Biesebroeck's study ranks credit constraint as the top rank affecting productivity growth of SMEs in developing countries, especially African countries.
[39] Parker et al (1995) study reported that credit constraints had an impact on working capital (24 per cent) of small enterprises in Malawi and Ghana.

(Levy, 1993). For instance, almost a fifth of SMEs in Malaysia found it a major constraint compared to only 8 per cent of large Malaysian firms (Sheng, 2010). The constraint is slightly worse for other countries (eg. Thailand, India, Bangladesh, and Vietnam) where SMEs are significantly at a disadvantage when it comes to accessing bank financing (Sheng, 2010). In Ghana and Malawi, it is reported that access to finance remained a dominant constraint to SMEs, especially small enterprises (Kayanula and Quartey, 2000). Similar constraints were found by Parker et al (1995) and Aryeetey et al (1994) in the case of Ghana and Malawi.

The issues that arise in financing differ considerably between firms. However, there are key differences in financing smaller and larger enterprises.

Firstly, larger firms usually comply with higher disclosure requirements to a greater extent than SMEs (Beck, 2007 and Hallberg, 1999). Compared to SMEs, they continually access a broad range of external funds including bonds, equity and loans. As a result, in order to compensate for the higher costs of information collection, financial institutions charge higher interest rates to SMEs than to large enterprises (Hallgerg, 1999, p.12).

Secondly, SMEs usually have better information about the expected profits of activities than external financial institutions (Beck, 2007). The lack of information leads lenders to charge higher market rates to compensate for risk which may crowd out low-risk, low-return borrowers, leaving a relatively higher number of high risk/return borrowers in the market (see also Beck, 2007, Stiglitz and Weiss, 1981). We will discuss further more in section 1.2.2 in this Chapter.

Thirdly, small firms, especially in the case of new enterprises, cannot point to credit histories which provide important signal and help facilitate access to debt financing (Beck, 2007). Their diverse characteristics could increase assessment and monitoring costs. Specifically, as noted by Bechri, Najah, and Nugent (1999) SMEs do not possess appropriate accounting procedures for use in their loan applications, so the costs incurred by banks to verify information provided them by firms are high. These problems cause the transaction costs of the loan to become high relative to the small size of the loan.

Lastly, lending to SMEs is more likely to be based on collateral than is the case for loans to larger enterprises (Kayanula and Quartey, 2000 and Sanni, 2009). This may lead to situations in which lending is not based on expected return but rather upon access to collateral. Many SMEs lacking access to good collateral suffer from higher interest rates, as well as credit rationing (Sanni, 2009).

Many governments and financial institutions (commercial banks) have tried to address the problems of high transaction costs and risks by creating subsidized credit programmes and/or providing loan guarantees. The OECD reports that lending programs currently take the largest part of all government programs for SME financing in most countries (Park, Lim, and Koo, 2008). However, such projects have often fostered a culture of non-repayment or failed to reach the target group. Examples of such failed interventions are targeted credit schemes set up in Sub-Saharan Africa in the early 1980s by the Development Finance Institutions (DFIs) (UNCTAD, 2001). As a result, UNCTAD argues that it would be better for financial institutions to partner with Business Development Services (BDS) providers. BDS providers can play an important role in this process because they are close to their clients and they have direct knowledge of the enterprises' financial status and past performance.

1.6.2 Imperfect and asymmetric information

In economics and contract theory, information asymmetry, Arrow (1969) and Akerlof (1970), deals with the study of decisions in transactions where one party has more or better information than the other. Greenwald and Stiglitz (1986) demonstrated that when relevant information is dispersed asymmetrically across players in the economy, markets could fail to produce efficient outcomes (Young, 2004). Information asymmetries are studied in the context of market failure.

The well-known Stiglitz-Weiss model shows that moral hazard and adverse selection originated by information asymmetry are the causes of credit rationing (Stiglitz and Weiss, 1981). Compared with large-scale enterprises, SMEs are more prone to the problem of information asymmetry. SMEs have information on their own operating results, financial position, and earnings, which is usually impossible for the financing institutions to obtain in time. Many

studies have shown the negative effect that credit information sharing has on the credit availability to SMEs. He and Yuan (2008) show that the crucial factor to resolve the financial difficulty of SMEs in west China is to remove the information asymmetry between the lender and the SMEs. A study by ADB (2006) shows that, in China, banks are used to channel funds almost exclusively to state-owned enterprises. This behavior is understandable since lending to new and small private firms is costly and risky in the absence of adequate information about these firms.

When lenders perceive the risk of lending to SMEs, they will charge a higher interest rate. The higher interest rate attracts riskier borrowers to the pool and will entice borrowers to undertake riskier projects with a higher probability of default (Beck, 2007). For example, once the borrower receives the loan, it may change the use of the money under the loan agreement, and put the sum in a more risky project with higher return. The misappropriation of the loan will weaken the repayment ability and consequently affect the expected return of the lender. Therefore, according to Ganbold (2008), moral hazard is one of the most important reasons why the lender cuts the loan amount down. Thus, once there is information asymmetry in the market, the financing institutions have to withdraw from the market due to adverse selection and moral hazard. Information asymmetry is the main reason of financing difficulties of SMEs.

According to Beck (2007) the impossibility to use interest rates as screening technology attracts lenders to use non-interest screening devices, including collateral, warrants or assessment based on audited information. However, the effectiveness of this is often problematic in developing countries, especially for new firms, micro-entrepreneurs, and SMEs, because they often lack significant fixed assets that they could use as collateral. In addition, the costs for banks related to the seizure and liquidation of collateral can be significant, and the legal process can take a long time (see Ganbold, 2008, and Beck, 2007).

To establish mutual respect, SMEs should strengthen their credit awareness and establish a good credit relationship with banks, like paying back loans on time (Wang, 2004). For example, the promotion through seed corn funding of SME co-operative or mutual guarantee schemes were established in order to reduce information asymmetry in U.K. credit markets (Hughes, 1997). Moreover, Fontes (2005) suggested to gradually develop specialized financial institutions

oriented towards SME credit. In order to increase the amount of funds available to SMEs, He and Yuan's (2008) recommendation is that China's credit system should try to adapt for the financing of SMEs. It is suggested that the fundamental solution for SMEs financing in west China is to create government sponsored financial institutions that are specialized in SME financing (Lin and Li, 2001).

1.6.3 Institutional failures

It is claimed that SMEs are not only impeded by market failures, as discussed above, but also other institutional failures (Beck, Demirguc-Kunt and Levine, 2005). Some regulations, for instance property right guarantee rules and enforcement, competition laws, and safety regulations, are important for ensuring a smooth functioning of the market economy. These regulations reduce transaction costs, minimize risks and contribute to increasing productivity (Altenburg and Eckhardt, 2006).

However, other regulations influence the costs and risks of doing business. In many countries, the amount of registrations and paperwork has reached unreasonable levels. Many studies, especially World Bank (2004)[40] and Kayanula and Quartey (2000), show that high start-up costs relating to licensing and registration requirement impose excessive burdens on SMEs in poor countries. For example, in 2004, starting a business in sub-Saharan Africa took 63 days on average, cost 225 per cent and required a minimum capital equivalent to 254 per cent of annual per capita income. By comparison, the average of OECD countries was 25 days, 8 per cent and 44 per cent, respectively (World Bank, 2004a). There are 16 procedures (in Ghana) and 18 procedures (in South Africa) involved in licensing a business, and it takes 127 days (in Ghana) and 176 days (in South Africa) to deal with licensing issues (World Bank, 2006).

The cost and risks of regulation affect small firms much more than large enterprises, because the former are less equipped to deal with problems arising from regulations as they have less capacity than larger firms to navigate through the complexities of regulatory and bureaucratic networks

[40] The World Bank report *Doing business in 2004* provides empirical cross country evidence that cumbersome regulation is associated with lower labour productivity (World Bank, 2004).

(Altenburg and Eckhardt, 2006 and OECD, 1996). A study in 11 OECD countries provided empirical evidence that registration or administration costs paid by SMEs were five times higher than for large firms (OECD, 1995).

Furthermore, labour law and regulation also constrains the path of employment generation in labour intensive sectors. Das and Kalita's (2009) study provided evidence that a crucial issue pertaining to the employment generation potential of labour intensive industries has to do with existing labour rules and regulations. In India, for example, the introduction of job security regulation in the late 1970s forced industries to adopt capital-intensive production techniques (Fallon and Lucas, 1993 cited in Das and Kalita, 2009). This is one of the reasons for the slow down of jobs generation in India during 1979-80 and 1990-91 (Thomas, 2002 cited in Das and Kalita, 2009).

Regarding labour laws and regulations, there are indications that wages matter more to SMEs than to larger firms, and that the application of too high a minimum wage makes SMEs either exit, or become less labour intensive (Berry, Blottnitz, Cassim, Kesper, Rajaratnam and Seventer, 2002). Berry et al explained that when labour costs are too high, SMEs growth will be stunted, which results in fewer jobs. In contrast, when costs are lower, SMEs are able to hire more employments if necessary. Two studies undertaken by Ghose (1994) and the World Bank (1989) concluded that the sharp decrease in employment growth in the Indian labour intensive sector in the 1980s could be explained by the increase in real cost of labour (cited in Das and Kalita, 2009). In Thailand, the high wage of labour caused its labour intensive industries to lose their competitiveness, resulting an increase in unemployment (Mephokee, 2006). Mephokee explained that in terms of production costs, especially labour costs, Thai SMEs could not compete with competitors that have lower labour costs such as China, Indonesia, and Vietnam.

Legal institutions that protect contracts and property rights influence not only the size of firms but also the kinds of firms best able to develop (Kumar, Rajan and Zingales, 1999).[41] Institutional failure occurs when property rights are not established when it is technically possible to do so.

[41] Kumar et al (1999) find that the average size of firms in human capital-intensive and R&D intensive industries is larger in countries with better property rights and patent protection.

Thus to enforce contracts and property rights, firms need to be able to rely on a system with a stronger rule of law (Kumar et al, 1999).

In an environment characterized by weak contract enforceability, firms would be cautious entering into contracts with suppliers, partners or managers. While such transactions would still be present, their costs would likely rise dramatically for the firm (Beck, Demirguc-Kunt, and Maksimovic, 2003). Empirical evidence supports the negative impact of weak contracting environment especially on the growth of SMEs and new firms. For example, according to Levine (2005), inefficient legal systems make it more costly and risky to use formal contracts to finance projects. This may lead financial systems to fund well-established, well-connected firms rather than relying on the formal contracting system to fund new firms with potentially high-return projects.

Country-level studies consistently show that poorly defined property rights reduce firms' ability to access finance, which could lead to the overall failure of markets to generate dynamic growth. In order to increase financial institutions' willingness to provide finance to SMEs, government of a country has to ensure that both lenders and borrowers have clearly defined property rights (Malhotra, Chen, Criscuolo, Fan, Hamel, and Savchenko, 2006). For instance, Malhotra et al (2006) notes "Stronger creditor rights, stemming from laws guaranteeing secured creditors' priority in the case of default, allow lenders to reduce the risk of future losses." (p. 13).[42]

Moreover, Johnson, McMillan and Woodruff's (2002) study shows that securing borrowers' property rights to assets they can pledge as collateral can help borrowers both in accessing finance and in obtaining cheaper and longer-term loans.[43] In other words, if property cannot be bought and sold with the confidence that the authorities will uphold the transaction, financial institutions will be reluctant to take on the risk of lending against physical collateral.[44] However, Malhotra et al (2006) argue that having legal provisions that ensure debtors' and creditors' rights

[42] World Bank' s (2004c) study in the U.S shows that small firms are 25 per cent more likely to be denied credit if they are in states that provide creditors with less protection when the borrower is bankupt.

[43] Furthermore, according to Altenburg and Eckhardt (2006), property documents are vital for mobilizing credit to stimulate all kinds of inter-firm transactions which, in turn, stimulate additional investments and increase productivity growth.

[44] de Soto (1989) provided evidence that developing countries generally fail to guarantee property rights to poor people, with the consequence that their properties are "dead capital" that cannot be used as collateral to obtain loans.

are no sufficient. Their effectiveness depends on strong enforcement of the law.[45]

1.7 CONCLUSION

From an economic point of view, the main justification for government intervention is the existence of market and institutional failure that might stunt growth of SMEs, which in turn can lead to lower aggregate growth. In this context, public interventions targeted at industries are justified in terms of addressing market and institutional failures that affect SMEs.

The importance of transaction costs in economic exchange is an ongoing debate between Neoclassical and New Institutional Economics. While the former argues that most transactions are made in perfectly competitive scenarios, the latter dismisses this simplification of reality and proposes the inclusion of less measurable aspects influencing markets, such as high transaction costs, asymmetric information, poor-defined property rights, ineffective contract enforcement and legal framework, and poor access to finance of firms. High transaction cost, for instance, for registration and licensing constrains small-scale enterprise operation. Also, the higher the transaction cost the greater is the extent to which they inhibit access to credit by SMEs. Moral hazard and adverse selection originated by information asymmetry are also the causes of credit rationing. Poorly defined property rights and weak contract enforcement reduce firm's ability to access finance.

However, many studies find that SMEs are not better than large firms at creating jobs, or improving income equality and efficiency. Labour intensity varies more across industries than across firm-size groups within industries. SMEs in several instances are not better than large firms at innovating and boosting productivity.

Above all, many researchers argue that SMEs are not the same across countries. In many countries, SMEs play a large structural role and contribute highly to the share of economic activity. For instance, in Vietnam, SMEs are not only creating jobs, but help to narrow

[45] For example, World Bank (2004c), the lack of an effectiven legal system to enforce laws in the Rusisan Federation has an impact on the development of a deeper credit market.

development gaps. SMEs are export-oriented industries in China, Korea and Taiwan. In advanced countries (such as US, Japan, and South Korea), SMEs are innovative, technology based and operate in new or high technologies, while SMEs in developing countries, especially Thailand, generally operate in traditional sectors, and look for easier access to technology elsewhere.

The following chapter provides a briefing on the importance of SMEs in Cambodia in the field of economic development and brings three hypotheses to be tested in this thesis.

CHAPTER II

CAMBODIA'S SMALL AND MEDIUM SIZED ENTERPRISES DEVELOPMENT: CHARACTERISTICS, STRATEGIES, AND CONSTRAINTS

2.1 INTRODUCTION

This chapter makes an attempt to analyse key characteristics of, and challenges to Cambodia's private sector, in general, and SMEs development, in specific. This chapter is structured as four sections. The first section provides analysis of Cambodia's private sector in the macroeconomic environment. The second section discusses on SME sector in economic development. It discusses key role of SMEs in Cambodia's economy, highlights the country's SMEs development characteristics, and discusses key factors of Cambodia's SMEs promotion policies and strategies. The third section identifies the constraints and challenges of the country's SMEs. The last section is conclusion.

The Cambodia government initiated a strong effort to achieve various reforms in its economy, starting from the 1980s, which reached a dramatic turning point in 1989, when the state economy transformed to a free market economy. Private property rights were restored and price control was abolished. State-owned enterprises were privatized and increased incentives were provided to local and foreign private investment. After a free election in 1993, a large number of Foreign Direct Investments (FDI), mainly from Asian countries followed by Europe and the USA, flourished in the country. The accession to the World Trade Organization (WTO) in 2004 marked a new milestone in the country's economic reform and development.

It is worth noting that the socioeconomic successes have been significantly attributed from the country's small and medium sized enterprises (SMEs). The manufacturing SMEs occupy an overwhelming proportion in total number of country's enterprises accounting for 99 per cent and a substantial part of employment (about two thirds of the country's employment) in 2006.[46]

The regional and international economic integration such as ASEAN and WTO were expected to bring about new opportunities for SMEs development. However, after the ASEAN and WTO accession, Cambodian SMEs anticipate tremendous difficulties in both domestic and global markets because they lack a competitive edge over foreign rivals. Many SMEs experience high

[46] Ministry of Industry Mines and Energy, in Cambodian department of Statistics Yearbook, 2006

production costs, poor quality of products, and low degree of innovativeness. Moreover, capital shortage, lack of advance technology, management skills and expertise, and insufficient market information, and so on hindered these young SMEs to compete globally. In solving both the economic and social problems for the country, the government has been taking various actions to ensure the smooth growth of the sector. The government has introduced a range of policies focused on SMEs development. Key to organizing SMEs development strategies has been the forming of the SME Sub-committee in 2004.

However, many enterprises still face major barriers, particularly the high costs of regulatory compliance, high level of informality, and limited access to key inputs and markets. The current shortcomings of the legal and regulatory environment not only increase the cost of doing business, but also limit SMEs' access to key inputs for growth, such as finance. Although banking in Cambodia is still in the developing stages, it has excess liquidity, meaning that SMEs' limited access to finance is partially the result of the currently risky lending environment.

2.2 THE PRIVATE SECTOR IN THE MACROECONOMIC ENVIRONMENT

This section reviews the evolution of Cambodian private sector in the macroeconomic environment. The first part discusses the general economic performance. After transforming from planned economic system to free market-oriented economic system, Cambodia has embarked a series of reform in an attempt to improve FDI, especially in industry sector. The second part discusses the main feature of enterprise sector which mainly consists of small and medium size enterprises (SMEs). The last part discusses government's policies and regulations to promote private sector.

2.2.1 General economic performance

After the collapse of the *Khmer Rouge* regime in 1979, Cambodia pursued a centrally planned economic system. In 1989, Cambodia began its transformation towards a free market-oriented economic system; however, the country was still distracted by civil war during the subsequent period, limiting the scope for economic development. The signing of the Paris Peace Accord in

1991 ended the years of violence and civil war and allowed Cambodia to unify all conflict parties and the first free and fair national election in 1993 under the auspices of the United Nations Peace Keeping Process, known as United Nations Transitional Authority in Cambodia (UNTAC).

With assistance from the international community, Cambodia has embarked on a series of reforms. In 1994, in an attempt to restore the macroeconomic stability, a medium-term adjustment and reform program was launched and a process of institutional strengthening was undertaken. As a result of the reform, foreign direct investment (FDI) in Cambodia increased significantly, rising from 3.5 percent of GDP in 1994 to 8.3 percent in 1996. Investment covered almost all sectors of the economy. Since 1994, economic performance has been quite impressive, annual GDP growth has averaged a healthy 5.6 per cent (Naron, 2006).

Cambodia's labour force has grown significantly in the last decade. Data from the Cambodia Socio-Economic Survey (CSES) (2007) estimated that the total labour force had increased from 5.2 million in 1999 to 7.8 million in 2007, around 54 per cent of the country's population (see Table 2.1). More than 70 percent of the workforce involved in the informal economy. The World Bank's (20024c) survey shows that 29-50 per cent was sourced from agriculture, 14-22 per cent from fisheries and forestry-based resources, and 36-57 per cent from business and wage labour. Workers in rural areas receive USD 0.86-0.98 per day for agriculture work and USD 0.92-1.02 for non-farm work. Incomes in urban areas tend to be higher than the bare minimum wages offered in rural areas.

Cambodia's economy is cash-based and highly dollarized. The exchange rates of the domestic currency against the USD have changed dramatically during the last ten years, from 2,450.8 (2000) to 4,056.0 (2006) riel per USD (see Table 2.1). Adjustments to the official exchange rate are made daily by the National Bank of Cambodia (NBC) to limit the spread between the official and parallel market rates to less than 1 per cent. The official exchange rate applies mainly to external transactions conducted by the government and state-owned enterprises and is used by banks for recording all transactions in foreign currency. Table 2.1 shows that inflation accelerated rapidly, up to almost 5 per cent in 2006 and almost 6 per cent in 2007 from just 3.3 per cent in 2002. Higher inflation was caused by upwards pressure on transportation costs from elevated

world oil prices, drought-related food price increases, and rapid credit expansion in the private sector (ADB, 2008).

Agriculture sector remains the backbone of the economy, accounting for over 70 per cent of the total workforce. The sector contributes about 36 per cent of GDP in 2006, increasing from 30 per cent in 2003 (see Table 2.1). This is due to good weather conditions. Rice production contributes largely to the growth of this sector.

The industrial sector has been the most dynamic. The percentage of the industrial sector in the Cambodian economy increased from 17.9 per cent in 1998 to 27.7 per cent in 2006.[47] However, the contribution of the sector in the economy went down to 26 per cent in 2007 (see Table 2.1). The primary driver of the growth was a continuous growth of the textiles, footwear, and garment industry (10.2 per cent) and an expansion of construction activities (13 per cent). The value of the exportation of garments sector increased from USD 1.98 billion in 2004 to USD 2.17 billion in 2006. This amounted to almost 80 per cent of total Cambodian exports. Rapid development of the garment industry has a favorable impact on poverty, as it creates employment for female workers coming from the rural areas. Currently, approximately 90 per cent of employees in the garment sector are working in foreign-owned companies.

The service sector, on the other hand, has also shown a promising trend, boosted by a flourishing tourism sector and increases in tourism-related services. From 1995, it has been steady in terms of GDP, accounting for around 34-36 per cent. The number of visitors to Cambodia had increased by 18.53 per cent in 2007, compared with 19.59 per cent in 2006 and 34.72 per cent in 2005 (ADB, 2008).

Exports have increased significantly after a bilateral trade agreement with the US government, which reduced the effective tariff rate on garments produced in Cambodia. Table 2.1 shows the total value of exports increased from USD 912.9 million in 1998 to USD 4,088.0 million in 2007. This trade agreement had contributed to the rapid increase in the garment exports, which was almost nothing in 1995 to around USD 2.17 billion in 2006.

[47] Key Economic Indicators produced by ADB in 2008

At the same time, imports have also increased significantly from USD 1,073.2 million in 1998 to USD 5,419.0 million in 2007 (see Table 2.1). Cambodia has imported an increasing value of petroleum products, motorcycles, vehicles, clothing, cement and steel. Cambodia's trade balance thus had been in deficit during this period.

Table 2.1 Basic Economic Indicators

Item	1995	1998	2002	2004	2006	2007
GDP per capita (USD)	-	252.0	327.0	393.0	491.0	600.0
GDP deflator (%)	-	2.1	1.0	4.9	3.9	6.7
GDP (million USD)	3,338.0	3,100.0	4,283.0	5,332.0	8,020.0	8,604.0
Agriculture (%)	50.4	47.1	35.6	36.0	33.0	30.0
Industry (%)	15.0	17.9	28.0	27.7	25.0	25.0
Service (%)	34.6	35.0	36.4	36.2	42.0	45.0
Exchange rate (riel per USD)	2,450.8	3,744.4	3,912.1	4,019.3	4,056.0	4,001
Exports (million USD)	853.9	912.9	1,769.8	2,588.9	3,693.0	4,088.0
Imports (million USD)	1,187.0	1,073.2	2,360.5	3,269.5	4,727.0	5,419.0
Inflation rate (%, year avr)	7.8	(0.8)	3.3	3.9	4.7	5.9
Labour Force (thousand)	-	5,275.2	6,399.7	7,495.6	-	7,839.1

Source: Ministry of Economy and Finance and National Bank of Cambodia

2.2.2 Domestic private sector: structure of the enterprise sector

Cambodia's private sector had long been depressed and even eliminated in economic domains of the country during the Khmer Rouge (KR) regime from 1975 to 1979. The limited industrial base was completely destroyed. After the KR, Cambodia began to rebuild its economy with financial supports from the International Monetary Fund IMF) under the Enhancement Structural Adjustment Facility. By the early 1980s, agro-industry food processing activities, predominantly rice milling had taking place under the cooperative sector. During the same period, a host of private small enterprises had emerged, providing basic manufacturing goods, including fish sauce to meet growing domestic demand (Sarthi, et al, 2003). In the early 1990s, there was the revision

of the constitution recognizing the private sector in the economy along with the commitment to protect private ownership and restructuring of state-owned enterprises (SOEs) (Baily, 2008). Ever since, the importance of the private sector in Cambodia has re-emerged. By the late 1990s, political stability and macroeconomic stability had been largely achieved and basic infrastructure and institutions had been rebuilt (Chandler, 1998). However, during the time, the Cambodian economy has withstood a number of shocks, including political violence and killings, particularly in 1997, the Asian financial crisis, floods, anti-Thai riots, and SARS.

Private sector of today's Cambodia is a pool of enterprises fed from three streams: privatized state enterprises; foreign investments or joint ventures, and indigenous new entrants consisting of small and medium enterprises (SMEs) (for definition see section 3.2.1, page 48) which are by far the largest in terms of number of enterprises and employment. Because the Cambodian private sector was entirely decimated, new SMEs probably are the indigenous private sector.

The main features of enterprises in Cambodia are that they are small scale or household production units, that most of them operate in semi-industrial sectors like processing agricultural commodities, mostly rice, fish, wood, and rubber. As for the non-farm manufacturing industries, they produce consumer goods such as soft drink, cigarettes, and food items and household products such as soap, paper, and utensils to satisfy local demand. Many of Cambodia's enterprises have remained informal due to barrier to registration and little perceived benefit (Baily, 2008). Cambodia still has a few state-owned enterprises (SOEs). The largest remaining SOEs are the electricity supplier (Electricité du Cambodge, EDC) and the Phnom Penh Water Supply Authority. Several agricultural enterprises, such as rubber plantations, have been privatized and ownership transferred to local businessmen (MIME, 2003).

In 2009, there were 376,761 enterprises in Cambodia, 93 per cent of which were small and medium size and the rest are large size. All most 80 per cent of SMEs were engaged in food, beverage and tobacco sectors, whereas large enterprises (more than 100 workers) operate in textile, wearing apparel, leather, food, beverage, and tobacco.[48]

[48] see Vannarith, Oum, and Thearith (2010)

Cambodia believed that WTO represents an opportunity to reap gains from integration with the global economy and broaden its industrial base, particularly in light of its small domestic market. As a result, garment sector is the only manufacturing industry in Cambodia benefiting from the Most Favoured Nation (MFN) and Generalized System of Preferences (GSP) privileges granted by the US and EU.

The garment sector is by far the most dynamic part of the private sector, with its share of GDP from just 1.3 per cent in 1995 to 15.9 per cent in 2006, and generating 90 per cent of the country's export earning and 27 per cent of its industrial employment in 2007[49]. Workers are mainly women from rural villages; their remittances back home sustain an estimated 20 per cent of the country's 13 million people. World Bank (WB) (2004) shows that garment exports have grown dramatically over the past decade, from USD 20 million in 1995 to over USD 1.4 billion in 2003. All garment production is sold export. It is the 14th largest supplier to the US market in volume terms and the 21st largest in value (World Bank, 2004). In 2010, there were 262 garment factories, compared with 243 in 2009, according to Ministry of Commerce. Among them, there were 236 garment export-oriented factories with 93 per cent of them were foreign direct investment, mainly from China, Hong Kong, Taiwan, and Korea (Vannarith et al, 2010).

2.2.3 Major private sector development policies

Since the late 1990's the Royal Government of Cambodia (RGC) has made significant improvements to the legal framework for commerce in general. A number of laws and regulations relating to the development of the private sector have been promulgated, including the Investment Law (1994), the Act on Organisation and Management issued by the Cambodian Development Committee and the Cambodian Investment Committee (1995), and the Tax Law (1997) (World Bank, 2004).

Although Cambodia did not yet have a competition law and policy, it had outlined a rather ambitious program to increase the economy's international competitiveness. Cambodia has adopted more in-depth reforms as committed after WTO accession (2004) contributing to the

[49] see World Development Indicators (online) and World Bank (2004)

establishment of a level playing field, which is considered to be very important for private sector development in the country. To conform to WTO rules and provisions, many law documents were amended and newly promulgated, creating fairer competition in the country. The RGC has passed important laws and regulations, including the Law on Commercial Enterprises (2005), the Law on Negotiable Instruments and Payment Transactions (2005), and the Law on Commercial Arbitration (2006), the Land Law to strengthen land right and encourage the use of property for collateral (2001), the Law on Accounts, Audit, and the Accounting Profession (2002) and the Law on Investment to encourage purchases of productive capital. The RGC adopted also a new financial sector laws to support the development of banking sector as well as for non-bank financial services such as insurance and leasing (ADB, 2006).

Beside laws and regulations, the RGC clearly recognizes that the creation of an enabling environment for private sector development is a precondition for promoting economic growth, creating employment, reducing poverty, and sustaining economic development. In order to achieve its goal in developing long-term economic growth and supporting the private sector, the RGC issued several strategy papers, including Second Socio-Economic Development Plan (SEDP) 2001-2005 and National Poverty Reduction Strategy. These plans emphasize that private sector growth requires improved infrastructure and legal and regulatory reform to encourage investment, these include improving public sector governance and reducing corruption, providing physical infrastructure and helping to develop the capabilities of the private sector through education and training (ADB, 2006).

For instance, policy initiatives by the Government include: developing infrastructure for establishing industrial and export processing zones, improving service quality and encouraging investment. The export processing zones are proposed for the outskirts of Phnom Penh, Sihanoukville, and Banteay Meanchey (ADB, 2008). The Government also intends to further develop the road network and develop additional power and water supplies.

2.3 SMEs IN ECONOMIC DEVELOPMENT

This section discusses the importance roles of SMEs in economic development. The first part of this section provides a brief definition of SMEs which has been used by government of Cambodia. The second part discusses the SME development characteristic and its contributions in economic development. SMEs, which operate almost entirely in the informal sector and make up around 99 per cent of all industries, are a main source of employment generation, especially women, and output growth. The last part discusses SMEs promotion strategies.

2.3.1 SMEs' definition

It is worth noting that after 25 years of Khmer Rouge regime, it was only in 2005 that the official definition of SMEs was developed. The National Institute of Statistics (NIS) viewed that enterprises could be considered as small when the number of workers was fewer than 10 employees. When the number was between 11 and 100, they would be regarded as medium. In contrast, Ministry of Industry, Mines, and Energy (MIME) defined small enterprises as those with fewer than 50 employees.

In order to avoid differing standards in the definition of SMEs, the Cambodia SME sub-committee, in July 2005, defined SMEs as bellows (see Table 2.2). However, it is unclear whether definitions have been used consistently since[50]. For instance, for policy and statistical purposes, the SME sub-committee prefers to use the definition based on employee number. When employee number is not suitable, such as when there is considerable variance over time in the number of employees at an enterprise, the definition based on financial assets should be used.

[50] SME Sub-committee (2005)

Table 2.2 SME definitions in Cambodia

	Number of Employees	Assets excluding land (USD)
Micro	Less than 11	50, 000
Small	Between 11 and 50	50,000 - 250,000
Medium	Between 51 and 100	250,000 - 500,000
Large	Over 100	Over 500,000

Source: Royal Government of Cambodia Sub-committee on Small and Medium Enterprises SME Secretariat Small and Medium Enterprise Development Framework 2005.

2.3.2 SME development characteristics and its contributions

It is worth noting that Cambodia's SMEs operate almost entirely in the informal sector and are typically not registered with the Ministry of Commerce (MOC). Therefore, it is difficult to estimate the actual number of enterprises, especially the very small ones. Micro enterprises operate largely informally without permits or licenses and do not pay profit tax (ADB, 2008). For instance, MIME conducted a survey in 2006 found that 50 per cent of all food processing industries in Cambodia[51] were informal industries. Almost 90 per cent of all small textile and garment enterprises[52] did not have operating permits in 2006. However, only around 10 per cent of chemicals and non-metallic mineral products industries operated without licenses (ADB, 2006).

As mentioned in previous section that industrial sector growth has fueled economic development and accounts for almost 30 per cent of total GDP in Cambodia. This growth is accounted for by the rapid expansion of SME sector, which make up approximately 99 per cent of all enterprises. As in Table 2.3, the number of industrial establishments with fewer than 100 employees was 32,800 in 2008, increasing from 25,406 in 2000. This represents a growth of approximately 23

[51] Rice milling enterprises, which accounted for around 90 per cent of all food processing industries, had increased from 18,639 (2002) to 23,103 (2006) enterprises and employed roughly 47,500 people in 2006. More than 50 per cent of these enterprises had not obtained operating permits and had been operating informally (ADB, 2006).
[52] These were mostly weaving enterprises and producers of textiles for the handicraft industry (ADB, 2006).

per cent in the number of operating establishments since 2000. Of those industries, 99 per cent were small firms (including micro-firms), were 1 per cent were medium-sized firms. Approximately 80 per cent of Cambodian SMEs were engaged in the food, beverages, and tobacco. 9 per cent were manufacturing of fabricated metal (see Table 2.3).

Table 2.3 Number of SMEs in Cambodia

Enterprises Types	2000	2002	2004	2006	2007	2008
Total Manufacturing	25,406	26,920	28,131	31,149	32,619	32,800
31. Food, beverage and tobacco	20,152	21,568	22,712	25,455	26,381	26,208
32. Garment, textiles, footwear apparel	366	1,417	1,672	1,689	1,474	1,478
33. Woods and wood	869	13	16	-	-	-
34. Paper products, printing and publishing	24	15	25	33	39	43
35. Chemicals, plastic products	297	275	120	159	177	192
36. Non-metallic mineral products except products of petroleum and coal	666	257	680	797	813	875
38. Fabricated metal product, machinery	1,716	1,899	2,239	2,380	2,916	3,039
39. Other manufacturing industries	1,208	976	667	636	819	965

Source: Ministry of Industry, Mines, and Energy (2000–2008)

According to a survey conducted by MIME in 2001, the largest provinces for manufacturing SMEs were Kampong Cham, Kampong Thom, and Prey Veng province. Provinces that had small number of SMEs were Odormeanchey, Pailin, Rattanakiri, Mondol Kiri, and Koh Kong (see Table A1 in Appendix A).

Moreover, SME sector has long been a major source of employment generation accounting for about 71 per cent of the total workforce, whereas large enterprises (LEs) employed about 28 per cent in 2001 (Ho, 2006). Those manufacturing SMEs were in the sectors of garments and textile, food processing, chemicals, rubber, and plastic. In 1993, SMEs employed approximately 85 per cent, and LEs accounted about 12 per cent of total workforce. Although SMEs have a low growth rate, SMEs still have larger share in employment than their larger counterparts.

Table 2.4 shows that the number of employee in manufacturing SMEs increased by 22 per cent between 2002 and 2008. In 2008, the food, beverage and tobacco sector accounts for approximately 60 per cent, where the share of manufacturing of non metallic mineral production is 12 per cent. The share of the manufacturing of wood and wood product is smallest.

Manufacturing SMEs, especially small enterprises, are an important source of employment for women. Based on the survey of over 25,000 firms, ADB (2004) reports that about one third of employees are women indicating the importance of women workers in Cambodia.

In terms of output, SMEs performed relatively well.[53] SMEs' output had increased by 324 per cent between 2002 and 2008. Industries in the sector of non-metallic mineral and fabricated metal products, machinery and equipment increased sharply in 2008. However, food, beverage and tobacco sector kept decreasing since 2006. As for garment, textiles, and footwear sector kept falling since 2003 until 2007. However, this sector rose sharply in 2008 (See Table 2.5).

[53] GDP share of SMEs in Cambodia reached at almost 77 per cent in 2001(Tambunan, 2008c)

Table 2.4 Number of employees in SMEs

Enterprises Types	2002	2004	2005	2006	2007	2008
Total Manufacturing	79,691	75,608	86,016	87,072	94,853	96,883
31. Food, beverage and tobacco	55,208	49,383	57,557	58,512	60,262	57,496
32. Garment, textiles, footwear apparel	5,463	8,118	7,073	6,347	10,580	12,104
33. Woods and wood products	29	97	4	-	-	-
34. Paper products, printing and publishing	207	474	338	351	849	884
35. Chemicals, plastic products	1,077	1,018	1,393	1,448	1,542	1,678
36. Non-metallic mineral products except products of petroleum and coal	8,963	6,702	8,505	8,932	9,298	11,615
38. Fabricated metal product, machinery and equipment	5,627	6,727	9,741	8,243	9,409	9,821
39. Other manufacturing industries	3,117	3,089	3,205	3,239	2,897	3,285

Source: Ministry of Industry, Mines, and Energy (2002–2008)

Table 2.5 Outputs of SMEs (million USD)

Enterprises Types	2002	2003	2004	2005	2006	2007	2008
Total Manufacturing	208.1	186.3	529.8	621.3	659.8	653.7	673.6
31. Food, beverage and tobacco	173.7	161.0	500.0	588.2	615.4	573.6	555.0
32. Garment, textiles, footwear apparel	13.2	2.2	2.4	3.6	3.2	3.5	18.9
33. Woods and wood products	0.0	0.0	0.2	0.0			
34. Paper products, printing and publishing	0.5	0.4	0.5	0.6	0.6	0.9	1.0
35. Chemicals, plastic products	4.3	1.6	4.9	5.8	6.1	5.9	14.2
36. Non-metallic mineral products except products of petroleum and coal	8.4	8.0	8.1	8.8	9.5	30.7	24.5
38. Fabricated metal product, machinery and equipment	5.5	7.1	7.6	9.0	9.5	22.8	29.1
39. Other manufacturing industries	2.6	5.8	6.1	5.4	5.4	16.4	31.0

Source: Ministry of Industry, Mines, and Energy (2002–2008)

- **SMEs export market**

SMEs directly engaged in export activities are still limited. Very few Cambodian manufacturing SMEs are involved in exporting. According to Baily (2008), there is a small cluster of SME garment manufacturers around a province near Thai Cambodia border, exporting to Thai markets. Vannarith, Oum, and Thearith (2010) surveyed on 111 SMEs in Phnom Penh capital shows that Only 1 SME in 2007 and 2008 in their survey reported exporting about 20 per cent of its products abroad. All the rest sell their products domestically. However, large enterprises, especially

foreign owned enterprises, especially garment sector, play a considerate role in the Cambodian export.

It is worth noting that despite their lack of involvement in exports Cambodian SMEs are still competing with foreign producers (Baily, 2008). As a member of Association of South East Asian Nations (ASEAN) and the World Trade Organisation (WTO), it has opened the door to international trade. As a result, domestic SMEs have faced an increasing competition from international competitors. Many of the SMEs from Cambodia's neighbours are more competitive (Baily, 2008).

- **Domestic market**

SMEs, especially small firms (including micro-enterprises), have made a great contribution to the Cambodian domestic market. Ho (2006) shows that during the period 1996–2001, small enterprises accounted for about 77 per cent, whereas medium and large firms accounted for 23 per cent in 2001. This share of small enterprises increased gradually from 60 per cent in 1993, while the share of medium and large firms decreased tremendously from 40 per cent in 1993. Furthermore, during the same period, small enterprise had the highest growth rate of production value for the domestic market than large enterprises (Tambunan, 2008c). This indicates that SMEs playing every important role in domestic market in Cambodia. With respect to domestic market of SMEs, it is expanding due to the rise in living standards. For instance, Uchikawa and Keola (2009) noted that increased urbanization has created new business opportunities like making bottled water, resulting in the setting up of more SMEs.

2.3.3 SME promotion strategies

Although increasing attention is being paid to SMEs elsewhere in the world, it is only in recent years that SMEs have become a centre of attention in Cambodia and inspired more serious studies with respect to their true contribution to the economy. Understanding their importance in economic growth and poverty reduction, the Royal Government of Cambodia has emphasized the important role SMEs play through various policy documents including the Five-year Socio-

Economic Development Plan (SEDP) (2001–2005) and (2005–2010) and National Poverty Reduction Strategy (NPRS).

Moreover, Rectangular Strategy[54], which was proposed by the government at the beginning of its third term on July 2004, stated enhancing SMEs as one of the action toward Private Sector Development and Employment Generation. The strategy emphasizes the importance of the SMEs and sets out thirteen SME development policies for strengthening the SME sector (Table 2.6). Through this strategy the government has made it clear that SMEs will be a major emphasis of economic development policies for many years to come. In recognition of the sector's importance, the government established the Department of Small Industry and Handicraft within MIME in 2002, making it the first Cambodian agency dedicated solely to addressing SME-specific problems (ADB, 2010).

Table 2.6 Rectangular Strategy: 13 strategies for developing SMEs

1.Provide SMES with medium and long term finance	• Provide land titles and encourage use of collateral • Develop financial products and share credit information • Simplify SME accounting and taxation system
2. Suppress smuggling	• Strengthen capacity of anti-smuggling task force • Rationalise number of agencies involved at border checkpoints • Extend the single window concept to border checkpoints
3.Reduce registration and start-up procedures for SMEs	• Reduce administration and cost barriers to registering • Develop on-line registration, decentralise company registration • Link MOC, MEF tax and VAT registration, merge into one process
4. Facilitate export-import activities by simplifying processes	• Review licenses, introduce a single customs admin document • Single Window process at ports, and risk management • Enact the law on customs and develop implementing regulation
5. Support newly established industries for a period	• Foster private sector led incubator systems • One-stop window for all business licenses

[54] The rectangular strategy was announced by the Prime Minister during the first Cabinet meeting of the Third Legislature of the National Assembly at the Office of the Council of Ministers (July 2004).

6. Promote linkages between SMEs and large enterprises	• Encourage linkages between local clusters international orgs • Integrate SMEs clusters in global value chains
7. Assist SMEs enhance productivity and reduce production costs	• Develop toolkit packages for training and SME capacity building • Develop action plan to meet technology and training needs
8. Improve quality of domestic produce to international standards	• Encourage quality standards through ISO 9000 certificate • Encourage links between training, research institutions and SMEs
9.Establish national libraries to test quality and criteria of products	• Use existing public research institutes to enhance capacity for applied research and product quality testing • Strengthen the capacity of research institutes • Foster linkages between private sector and research institutes
10. Strengthen mechanism for the protection of industrial property rights	• Implement specific institution arrangement for effective intellectual property rights
11. Promote vocational skills/training domestically and foreign	• Promote learning networks and joint international marketing • Coordinate providers to identify needs and link with SMEs
12. Expand and accelerate the "one village one product" program	• Take a stock-take of clusters to identify number, size, products and locations • Cooperate with donors and associations to develop common service provisions and support for clusters
13. Strengthen the legal framework	• Enact laws on commercial enterprises, insolvency, secured transactions and contracts • Create specialised court to resolve commercial disputes • Extensive capacity building for commercial court system

Source: Workshop on SME Development Program, *SME Development Framework SME sector road map 2005*

In addition, to implement this set of policies, SME sub-committees were established in August 2004 through Decision No. 46 SSR comprised of 9 ministries and Chamber of Commerce. With support from ADB, the main task of the sub-committees is to establish an "SME Development

Framework" which presents the strategy and action plan of the government for supporting SMEs. The framework's vision is to create a business environment, which will lead to a competitive SME sector contributing to the creation of quality employment and to improve the range of goods and services available to the people of Cambodia. This framework emphasizes the importance of improving access by SMEs to medium- and long-term finance by developing a credit information system, assisting enterprises in accounting and taxation systems, streamlining licensing and registration procedures to reduce bureaucratic red tape, developing a legal framework for leasing, improving market access for SMEs through better trade facilitation, and providing support for building linkages between SMEs and LEs. Through its emphasis on legal and regulatory reforms to establish an enabling environment for SMEs, the framework is intended to reduce risks and uncertainties for businesses that result in high transactions costs.[55]

Moreover, the government of Cambodia uses the mechanism of the SME Development Framework as a tool for inter-ministerial communication in order to address any obstacles that impede SME development and to improve coordination with donor agencies involved in this sector (Sub-committee on SMEs, 2005).

Despites its importance and great efforts from the government to support the sector, SMEs are still facing a great deal of challenges and difficulties. Different agencies point out main barriers limited the growth of the sector, for instance ADB (2006), WB (2004), and Cambodian SMEs Subcommittee. This will be discussed in next section of this Chapter.

2.4 BARRIERS OF SMES

In less developed countries (LDCs), SMEs are facing obstacles that are sometimes similar to those experienced by LEs. However, SMEs, especially the small ones, are much more vulnerable in relation to these problems (Tambunan, 2005). The nature or complexity of many of these problems is also related to the size, activity, and location of enterprises. The majority of Cambodia's SME sector is dominated by family businesses with fewer than ten employees, processing primary produce for the domestic market.

[55] Royal Government of Cambodia, Sub-committee on Small and Medium Enterprises, July 29, 2005.

A number of surveys conducted by different organisations have identified a similar set of barriers impeding development of Cambodian SMEs. For instance, a survey by World Bank (WB) in 2004 identified the main issues hampering the development of Cambodian business in general. The ADB and the Cambodian SME Sub-Committee have indentified many of the same issues faced by Cambodian SMEs. Although the problems vary even between individual enterprises in the same size category and within a branch of activity, there are certain problems which are common to all SMEs, which are linked to three groups of issues as identified by the SME Sub-committee (see Table 2.7) as follows.

Table 2.7: Barriers to SMEs doing business

1. Regulatory and Legal Framework	• Company registration • Licensing requirements • Commercial legal framework • Smuggling
2. Access to Finance	• Collateral and land titling • Leasing • Lack of information on borrowers • SME accounting
3. SME Support Activities	• Business development services • Access to markets •Technology and human resource upgrading • Improving linkages

Source: Royal Government of Cambodia Sub-committee on Small and Medium Enterprises SME Secretariat Small and Medium Enterprise Development Framework 2005

2.4.1 Regulatory and legal framework

In Cambodia, the existing regulatory and legal framework for supporting SME activity remains weak, with many necessary laws (such as commercial enterprise, contracts, insolvency, secured transactions, commercial arbitration and commercial court laws) still in the drafting process or awaiting approval by the government. Studies by ADB (2003, 2004) and the World Bank (2004)

reported that the high cost of doing business in Cambodia has been caused by its weak regulatory and legal framework. International comparisons in the World Bank report (2006) illustrate that, while the regulatory and legal environment is weaker, the cost of doing business is significantly higher in Cambodia than it is in most neighboring countries. The current lack of a commercial legal framework still prevents firms from operating on the basis of impersonal transactions and results in a largely relationship-based business environment where buyers and sellers rely heavily on personal knowledge of each other. In addition, ADB (2004) reported that uncertainty and lack of transparency in the current regulatory regime relating to business registration, business operating licenses, and various regulatory licenses, was a major constraint to development of the private sector, especially SMEs.

The cost of registration of a business was about USD 1,000 in 2004, four times per capita GDP, and was the highest in the Mekong region[56]. A recent World Bank study (2008) and PMDF (2005) showed that all enterprises, including SMEs, faced a significant array of barriers to doing business. The studies estimated that up until 2004, it took 94 days to start a business in Cambodia compared with two days in Australia and 56 days in Vietnam, and the cost was as much as USD 1,500, which is nearly five times Cambodia's per capita income. These figures included both official and unofficial costs and time spent to register a company, including bribes paid to cut through bureaucratic "red tape". According to MPDF (2005), the long time frame and high costs of legally registering a business made Cambodia one of the worst places in the region to set up a business (better only than Indonesia).

Moreover, ADB's (2008) report showed that there were around 17 processes and documentation requirements involving various local and central government agencies[57]. Another constraint, which still persists in most of the country, is that entrepreneurs must travel to Phnom Penh to register their enterprises due to lack of decentralization at local levels. Lack of information technology precludes an efficient business registry and the effective dissemination of data.

[56] The average for the Lao People's Democratic Republic, Thailand, and Viet Nam is about USD 120.
[57] Vietnam has only six requirements.

Although most countries have several agencies that issue specific business licenses, Cambodia lacked a systematic approach which would limit the burden on enterprises. Firstly, information and transparency were lacking in licensing procedures, related costs, and requirements for inspection. This could lead to confusion and abuse by local officials. No information window was available to provide central access to such information. Based on ADB's (2004) report, on average, Cambodian firms were subject to more than 16 license inspections per year. Secondly, without any criteria for determining whether existing regulatory license requirements were redundant, no mechanism was available to ensure that new license requirements do not duplicate existing ones. Coordination between central and local authorities was limited. Finally, the process for the issue of operating licenses was unclear, unnecessarily costly, and time consuming. Accordingly, there were no clear criteria for a fair and effective process for license issuance for various sectors.

In addition, the official cost of registering and transferring the rights of property is 4.1 per cent of the property value in Cambodia, compared with only 2.2 per cent in Malaysia, 2.7 per cent in Singapore, and 3.1 per cent in China (MPDF, 2005). The time it takes to legally register property in Cambodia is also slow compared with other countries in the region. For a business to purchase land and buildings, for instance, the law requires the completion of seven different procedures which take an average of 56 days to complete.

PMDF (2005) shows the time and costs required to enforce a contract in Cambodia compare unfavorably with other countries in the region. It takes an average of 401 days to enforce a contract, and court and professional legal fees cost 121.3 per cent of the value of the debt. Thus for every USD 100 of unpaid debt, a Cambodian business must pay USD 121.30 in court and legal fees to recover it. This makes resorting to the court system more expensive in Cambodia than in any other country in the region, except Indonesia. This high cost puts smaller businesses and the poor at a disadvantage because they cannot afford high legal costs.

As for business owners, especially SME owners, the high cost to recover a debt in Cambodia makes them reluctant to do business with anyone they do not know well. As for labour

regulations, Cambodia is among the most rigid when it comes to hiring workers. However, when it comes to firing workers, Cambodia has the most liberal regulations (MPDF, 2005).

2.4.2 Access to finance

Kyambalesa (1994) defined firms' financing as the total amount of money invested in SMEs owners. It is one of the major factors that relate to the growth performance of SMEs. Mannan (1993) indicated that the lack of sufficient firm financing will create a significant problems for SMEs' business activities, particularly their ability to grow. ADB (2008) revealed that, in 2004, only 10 per cent of the nation's population had access to finance and MPDF (2008) reported that bank loans to the private sector represented roughly 18 per cent of GDP in 2007, increasing from 6.80 per cent of GDP in 2002. The ratio of total lending to GDP was still far below that of neighbouring countries and this means that the private sector still faces difficulties in accessing credit.

A study of SMEs by the Mekong Private Sector Development Facility (MPDF) in 2008 found that over 60 per cent of respondents considered lack of working capital to be a major problem, and 70 per cent of the firms needed long-term loans. However, banks are reluctant to extend such long term loans to SMEs. Another study on bank financing for SMEs by Stephen in 2003 found an almost total absence of medium and long-term lending to SMEs, only 1 per cent of total loans to SMEs were for two-year terms, 29 per cent was for one to two year terms, and 70 per cent was for terms of less than one year. In addition to that, analysis of bank lending policies shows that, in most cases, banks will simply not extend loans for periods longer than 24 months. Very rarely are loans extended for longer terms on a case-by-case basis (Stephen, 2003).

Banks prefer to provide working capital (short-term) rather than fixed capital financing (medium- or long-term) and prefer immovable assets (land and buildings) in Phnom Penh or other major cities to movable and intangible assets (equipment and machinery) as collateral. Also, banks will not lend more than 30 to 50 per cent of the total value of collateral (MPDF, 2008). However, Stephen (2003) notes that even though banks can have first mortgages over land and buildings, the high-risk lending environment is exacerbated by a very weak court system that makes acting

on collateral difficult and in practice continues to make this form of lending very risky. This has resulted in Cambodia having one of the lowest levels of bank intermediation in the region. In addition, banks prefer to lend to individual borrowers rather than corporations. This preference is most likely due to the lack of audited, accurate and reliable information on SME applicants and the current practice where immovable assets are usually registered in the individual's name rather than in the corporation's name (Stephen, 2003).

ADB (2004), in its SME development program, identified lack of credit information as a serious deficiency in Cambodia, and one of the chief reasons why both SMEs and individuals find it so difficult to obtain the financing they need. The lack of credit information available to lenders greatly increases risk and uncertainty for lenders, with the result that unless borrowers have land and buildings worth far more than the value of the proposed loan, banks are unwilling to lend. To improve the availability of credit information, the National Bank of Cambodia (NBC), with technical assistance from ADB, began working on a pilot Credit Information System (CIS) in 2004 in partnership with the Association of Banks in Cambodia, and participating banks. The CIS, which became operational in 2006, collects and shares among members only "negative" credit information on defaulting borrowers. However, according to MPDF (2008), the finance industry has made limited use of the CIS. This is because financial institutions need more than just negative information which allows them to be able to screen out individuals and businesses with bad debts.

ADB (2004) reported that underdeveloped accounting and taxation systems prevented SMEs from providing sufficient financial information to commercial banks. Lenders had difficulty obtaining an accurate picture of their financial position because of the lack of financial statements for most small enterprises. Although the accounting law and the Cambodian Accounting Standard were established by the government, without an understanding of accounting procedures, the SMEs were often unable to provide necessary and reliable information as required by the commercial banks. It is a significant barrier that the accounting system is too complicated for use by SMEs, and SMEs faced difficulty in providing collateral for loans. Furthermore, many of the accounting standards issued were not relevant to SMEs and their less complex financial situation.

Moreover, Cambodia has no legal framework for alternative forms of finance and of finance providers, for example, leasing and leasing companies that depend less on creditors' rights for their expansion. Leasing offers an alternative form of finance whereby a leaser relies on its ownership of the leased asset and the lessee's cash flow to service the lease payments. The benefits of leasing include simpler security arrangements and fewer requirements for historical financial information. However, the lack of a legal framework has been a major obstacle to the development of leasing in Cambodia (ADB, 2004). According MPDF (2008), although leasing law and related regulations has been developed (but the government has not yet approved it), the court system is ineffective. It is therefore imperative that an effective enforcement mechanism be put in place before leasing is widely used as a financial product.

2.4.3 SME support activities

In comparison with its main competitors, Cambodian SMEs, both unlicensed and licensed enterprises, generally have significantly lower rates of productivity. For instance, the SMEs secretariat's (2005) report shows that total factor productivity level in Cambodia was lower than in India and China. This was primary due to the state of human and physical capital is considered a major constraint to Cambodian SMEs. Many Cambodian firms use old and inefficient machines. This constrains SMEs' abilities to upgrade the quality of their output. According to Baily (2008), many SME owners are unaware of existing technology, how to use it, or how to access it. Moreover, training in business management, especially training to improve productivity, is not readily available to the micro and small enterprise sector in Cambodia.

An additional problem is the infrastructure issue, including expensive and/or poor infrastructure such as transport, storage facilities, water, electricity, and telecommunication, and poorly developed physical markets. SMEs secretariat's (2005) report, fragmented markets and poor information about opportunities and market conditions are caused by poor infrastructure and telecommunication. Electricity and telecommunication services in Cambodia are more expensive than its neighbour countries. Line rental for SMEs in Cambodia is four times higher than Vietnam and Thailand and seven times higher than in Laos PDR. The supply of electricity is

insufficient and unreliable. Thus, since majority of SMEs is in rural areas, improving in rural infrastructure facilities for the SMEs is necessary to enhance their efficiency and productivity.

Moreover, although there are number of government ministries and business associations, especially Phnom Penh Chamber of Commerce, which offer business development services (BDS) to SMEs, these services reach very few SMEs.[58] In Cambodia about one per cent of SMEs received BDS, compared with, for example, 15 per cent in Sri Lanka, and 11 per cent in Thailand (World Bank, 2004). The lack of finance and capacity has prevented the government from assisting SMEs.[59]

Many organizations and government departments provide information for SMEs on domestic and international markets, including Cambodian Development Review Institute, aid organizations, local media, and government ministries. However, the information contained in publications, especially monthly or quarterly newsletters which are issued by government agencies, is sometimes unreliable and is not easily understood by a lot of SMEs.[60] Baily (2008) notes that many SME owners are simply unaware of the possibilities for expanding their markets.

2.5 CONCLUSION

In many countries, SMEs have considerably potential for driving sustainable and equitable economic growth. Cambodia's SMEs have played a significant role in job creation. The sector has long been a major source of employment generation and income for poor people in Cambodia. Although their involvement in exports remains minimal, SMEs play every important role in domestic market. However, SMEs in Cambodia suffer from structural weaknesses accentuated from a long period of civil war and political instability that hamper their future growth. With the expansion of globalization manufacturing SMEs in Cambodia anticipate tremendous difficulties in both domestic and global market. Their weakness is the lack of a competitive edge over foreign rivals. Thus, these enterprises need to improve quality and

[58] Phnom Penh Small and Medium sized Industry Association website, 2007.
[59] The SME Sub-Committee does not provide any additional information on this survey, such as when it was conducted, or by whom.
[60] Royal Government of Cambodia SME Sub-Committee, 2005.

efficiency of output to international standards to survive. Cambodian SMEs do not only face a range of barriers hindering their competition with imports, they also, up until recently, have received less specific assistance for their development.

The Rectangular Strategy, which as established by the RGC in 2004, emphasizes the importance of the SMEs and sets out policies for strengthening the SMEs sector. Moreover, at the same year, the SME Development Framework was also created under the supervision of the SME Sub-committee. This framework is the first attempt by the government to identify barriers and introduce measures specific to promoting development of the country's SMEs. Three major barriers to SME development have been identified: weaknesses in the regulatory and legal framework; limited SME access to finance; and a lack of SME support activities.

To sum up, Cambodian manufacturing SMEs are said to play a vital role in economic development and income growth in Cambodia, as they have been the primary source of job creation across the country. However, there are still considerable controversies over whether SMEs are more efficient than large enterprises (LEs) in contributing to economic development in Cambodia. Therefore, the next chapter is related with empirical evidence on whether SMEs are more labour intensive, as productive as LEs or more, more equitable in distributing the income their generate.

CHAPTER III

LITERATURE REVIEW AND THEORETICAL ANALYSIS

3.1 INTRODUCTION

This chapter is comprised of four sections. The first section provides empirical evidence of previous works on the definition of SME, which varies significantly from country to country. The second, third, and fourth sections provide empirical results and discuss methodologies and methods of previous studies on the advantages of SMEs in economic development, including the labour intensity and productivity level of SMEs, and the equitable distribution of income of SMEs.

Large-scale production units were basic elements used in the explanations and theories of the growth process. They were part of a more encompassing, coherent model of economic and social development (Celebi, 2003). As the large-scale firms' main ingredients were mass production, market expansion and minimizing production cost, they were the main point of concentration of the economists and the economic growth theories (Acs, 1996). On the other hand small production units were on their long secular downward trend. This decline dates back to the onset of the industrial revolution period (Acs, 1996). Although very little and nearly no discussion upon small firms was included in the major theories and the leading textbooks, economics and researchers were aware of some special characteristic related to small firms (Celebi, 2003). For instance, "labour economists know that smaller firms pay lower wages for apparently comparable workers, and industrial organization economists know that small firms are more likely to fail and have faster and more variable growth than large firms" (Brock and Evans, 1996, p. 98).

Over the last two decades many theoreticians and researchers provided empirical evidence on the widespread importance of small and medium enterprises (SMEs). This increase importance was due to SMEs' impact on the development and health of the national and regional economies of different countries. The relative importance of small producers varies significantly across countries and, within a given country, across stages of development over time (Snodgrass and Biggs, 1996, p. 33). Among past studies, several countries showed SMEs possessed many desirable characteristics, including the high usage of labour, the economic use of capital, high productivity level, and a strong relationship with more equitable distribution of income (Huang, 2003).

3.2 DEFINITIONS OF MANUFACTURING SMEs

The notion of small- and large-scale businesses[61] has been around for many years. The concept of the medium developed over time because of the improvements and changes that were taking place (Barrow, 1993). Main government developments regarding small firms started to take place in US in 1953 when Small Business Administration (SBA)[62] founded by US government. Small firms were defined differently according to each sector and within each main business category (Barrow, 1993). In 1969, a committee was set up in United Kingdom (UK) under the chairmanship of J.E. Bolton (Zaman, 2007). Its aim was to consider the available facilities, make recommendations into the condition of small firms in the national economy of UK. The committee decided that a "Small firm is an independent business, managed by its owner or part-owners and having a small market share." (Zaman, 2007). The committee recognized that it is more appropriate to define size by the number of employees in some sectors but more appropriate to use turnover in others.

To date, the term SME covers a wide range of definitions and measures, varying from country to country and between the various sources reporting SME statistics. Thus, there is no universal determinant or criterion for an SME. Much depends on the character of the relevant host country, and the profile of its own particular business sector, from which a relative measure of an SME is then typically made. Ayyagari, Beck, and Demirguc-Kunt (2005) states that "Some of the commonly used criteria are the number of employees, total net assets, sales and capital investment level." However, some countries just use the number of employees. Castel-Branco (2003) argues that the number of employee is more widely used to define SMEs than other indicators of the scale of operation. According to him, the definition based on the number of employees is slightly less sensitive to the type of activity than different definitions of the scale of operation, and it is a more straightforward statistic. Other countries, on the other hand, use this same criterion, plus an additional criterion based on either the value of the firm's assets or the size of revenues.

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[61] Note: The term small business was applied to so-called one man band like restaurants, neighborhood shops while the term big firms was applied to the giants firms such as general motors (Barrow, 1993).
[62] The aim of the administration was to provide finance for small firms (Barrow, 1993).

However, the definition of the SME sector has some limitations. According to the Labour Research and Research Institute of Namibia (LaRRI) (2002), the measurement of capital investment is problematic because of the difficulty of achieving accurate measurement and also because of the impact of inflation. Moreover, the issue of definitions is further complicated by the need to consider informal enterprise, which typically is a business or self-employed person engaged in legal but unregulated business activities (Edgcomb and Thetford, 2004). Informal enterprises are therefore not captured in census data nor do their owners pay taxes, but they do contribute to a large proportion of the employment in developing countries.

Most countries accept that the number of employee and total assets are common measurements of SMEs definition. In 2003, the International Labour Organization (ILO) conducted a survey of 77 countries which revealed that 74 of them defined SME based on the number of employees or value of plant and machinery (ILO, 2003). The SME department of the World Bank (WB) works with the definition based on the number of employees and total assets (Ayyagari et al, 2005). In 2003, the European Commission revised its definition of SMEs, taking into account economic developments since 1996 and the application of the definition (Zaman, 2007). Table 3.1 shows SME's definition in European Union (EU) is defined as an enterprise that has fewer than 250 employees and total assets/turnover not more than 50 Euro million Euro (Zaman, 2007) per annum.

Table 3.1 Enterprise Categories in European Union (EU)

Criteria	Micro enterprises	Small-sized enterprises	Medium-sized enterprises
Number of employees	0-9	10-49	50-249
Turnover or assets (million Euro)	Less than 2 million euro	10 to 49 million euro	50 million euro and up

Sources: Institutional and Sector Modernization Facility (2007)

The asset value of the business and the number of employees are considered to be the best factors in classifying and identifying the SMEs in some countries in Asia such as Indonesia, Laos,

Philippines and Thailand. Manufacturing SMEs in Indonesia and Laos employ less than 100 workers, while Philippine and Thailand have up to 200 employees. As for total asset value, Thai SMEs have up to USD 2.7 million, whereas only USD 210,000 in Laos (see Table 3.2). Table 3.2 shows that Indonesian SMEs is an enterprise with the number of employment not exceed 50 persons and total assets, excluding land and building, not exceed USD 0.7 million (Hayashi, 2002). In Mongolia, SME are defined as legally registered business entities with employees of 199 or less and with an annual turnover of approximately USD 1.3 million.

Some South Asian countries also defined SME based on total assets and the number of employees, for example Bangladesh, India, and Sri Lanka. Bangladesh manufacturing SMEs are defined to have less than 100 people, and have total assets less than USD 4.29 million (Tambunan, 2007). However, some other Asian countries just use the number of employees to define their SMEs such as Brunei (less than 100), South Korea (less than or equal 300), and China (500). Among Asian countries, Singapore defines its SMEs based on the total value of assets (see Table 3.2). Similarly to these Asian countries, SMEs are defined as having not more than 500 employees in United States.

Beside the above countries, only few countries use total sales and the number of employees to define their SMEs. For instance, in Canada, manufacturing SME is defined as enterprise with less than 500 employees and total sale of up to 14 US million (see Table 3.2) (Hayashi, 2002).

Table 3.2 Definition of Manufacturing SMEs in Asian and Pacific Countries

Country/Organization	Definition of Manufacturing SMEs	
	Criterion	Size
Brunei	Employment	SMEs < 100
Canada[4)]	Employment Sales	SMEs < 500 SMEs ≤ 14 US million
China	Employment	SMEs < 500
Indonesia BPS[1)] MOIT[1)]	Employment Assets	SMEs < 100 SMEs < 0.7 US million
Japan[3)]	Employment Capital investment	SMEs < 300 SMEs < 3 US million
Korea	Employment	SMEs ≤ 300
Myanmar	Employment Capital investment Sale	SMEs < 100 SMEs < USD 741,000 SMEs < USD 1.5 million
Thailand MOI[2)] MOI[2)]	Employment Assets	SMEs < 200 SMEs < USD 2.7 million
Laos	Employment Asset	SMEs < 100 SMEs < USD 210,000
Philippines	Employment Asset	SMEs < 200 SMEs ≤ 1.5 US million
Singapore	Assets	SMEs ≤ 9 US million
Malaysia	Employment Capital investment	SMEs < 150 SMEs ≤ 0.7 US million
Taiwan	Employment Capital investment	SMEs < 200 SMEs < 2 US million
Vietnam	Employment Capital investment	SMEs < 200 SMEs < USD 260,000
USA	Employment	SMEs < 500

Source: Hayashi (2002); Hall (2002, pp. 9-10); Myint (2000, p.3); Reguier (2000, pp.30-31); SMIDEC (2002, p.5); Tambunan (2007, 29-30). 1) BPS = Statistics Indonesia, MOIT = Ministry of Industry and Trade (see Hayashi, 2002); 2) MOI = Ministry Trade (see Hayashi, 2002); 3) See Kawai and Urata (2001); 4) see Hayashi (2002)

3.3 FACTOR INTENSITY OF MANUFACTURING SMEs

This section first discusses the theoretical framework of labour intensity measurement. It explains the importance of labour intensive industries in creating employment opportunities, especially in countries with abundant labour. In addition, it introduces various methods that have been used to analyse factor intensity of firms. The second section provides more empirical work on labour (capital) intensity of different firm sizes. Furthermore, the importance of female labour force participation in different industry sizes will also be discussed.

Manufacturing SMEs employ a large share of the labour force in many countries, but do they present a greater demand for labour than large enterprises (LEs)? Many analysts argue that, within the same industry, manufacturing SMEs are more labour intensive than LEs. It is believed that goods consumed by poor people tend to be more labour intensive than goods consumed by those who are better off. Such goods tend to be provided better by SMEs. This is because SMEs are considered to utilize labour-intensive techniques of production, which in turn results in providing employment opportunities, especially for unskilled and women labour, and in enhancing their income growth and welfare.

Although expansion of SMEs boosts employment more than growth of large firms, there is some evidence to suggest that scale of enterprise is an unreliable guide to labour intensity: many small firms are in fact more capital intensive than large firms in the same industry.

3.3.1 Theoretical framework of labour intensity measurement

Classical economists discussed the growth of the market, focusing upon the change in production rather than demand or consumption. In their framework, labour was a factor of production along with land and capital (Sugihara, 2007). Although capital is singled out as the most important element for the growth of industrial capitalism, Simon Kuznets, when he designed a theory of economic growth, essentially understood the importance of labour in the same way as he understood the importance of capital (Kuznets, 1955).

Thus, in the modern theory of economic growth, the role of labour in industrialization has been mainly discussed in the context of how and in what proportions capital and labour were combined to produce industrial goods[63]. The factor intensity in production theory considered two factors of production, labour and capital. Technology determines the way they combine to form a product. Different products required different proportions of the two factors of production.

Which method is employed in production, whether capital-intensive or labour-intensive, would depend on the capital-labour ratio. The capital-labour ratio is the ratio of the amount of capital to amount of labour, used to produce any given output. If that ratio is high, indicating the use of much capital relative to labour, production is called capital-intensive. If the ratio is low indicating relatively little capital per unit of labour, production is called labour-intensive.

Capital is treated as a homogeneous physical entity which serves as an input in the production functions for consumption goods[64]. In the production function, the capital input is the capital used up (or more likely, the services from capital) during a period (Laing, 1964, p. 476). Similarly, labour which is employed in industry is also an input for the production of consumption goods.

Suppose there are only two inputs, capital and labour, in the production functions for consumption goods, then the production function developed by Robert Solow[65], which represents technical change as a shift in the aggregate production function, can be written:

$$Q = f(L,K;t) \qquad (3.1)$$

Equation (3.1) expresses output (Q) as a function of the stock of capital (K), employment (L). t represents time. The production is assumed to be subject to constant return to scale and to no technological change in Laing's (1964) study. The labour intensity (L^*) of an industry is calculated as:

[63] See Berry, Blottnitz, Cassim, Kesper, Rajaratnam, and Seventer (2002)
[64] It also serves as the output in the production function for capital (Laing, 1964, p. 476).
[65] See Massell (1960, p.182) and Felipe (1997)

$$L^* = \frac{L}{K} \qquad (3.2)$$

A commodity is said to be labour intensive whenever the ratio of labour to capital (*L/K*) is larger when compared with a similar ratio of labour and capital usage for a second commodity. Equation (3.2) is useful for measuring factor intensity of industry. It has been used by many studies.

Labour input (*L*) is measured as the number of production workers plus non-production workers. In van Biesebroeck (2005), labour input includes part-time and seasonal workers. Output (*Q*) is the gross production of each firm. It is the total sales plus the change in the stocks of work in progress and of goods on hand for sale (Fariñas and Martin-Marcos, 2002). An alternative measure to gross output production is the value added.

In 1980, Sam P. S. Ho, a staff member of the World Bank, compared the capital-labour ratio of small-scale enterprise with large enterprises in two countries, Korea and Taiwan. The measure of capital and labour he used is the book value of fixed assets and number of workers respectively. It is generally believed that in most countries book values understate the current real value of capital, but in Ho's study, the problem was less serious because at the time the data was collected (1968 in Korea and 1971 in Taiwan) the prices of capital goods were still relatively stable.

Two other papers of note studied the role of SMEs in economic development in Thailand. Paitoon (2001) and Huang (2003) used the industrial census of 1997 to study Thai SMEs during 1987–1996 and 1997 respectively. The studies tested whether SMEs in Thailand are relatively more labour intensive than LEs. In Paitoon's study, capital input is net book value of fixed assets which includes land, buildings, machinery and equipment, vehicles, and office appliances. Paitoon argued that capital input includes tangible fixed assets but excludes rented assets. As it is likely that there are more small firms with rented fixed assets for production than large firms, the estimated capital input used in the small firms can be underestimated. Furthermore, if smaller firms have older assets than large firms, the low book value of their fixed assets will underestimate capital inputs (Paitoon, 2001, pp. 9-10). In the most recent papers, as in Paitoon's

and Huang's studies, Hayashi (2002) and Sinha (2003) studied the role of SMEs in Indonesia during 1986–1996 and SMEs and LEs in Taiwan during 1989 respectively. However, in Hayashi's study, land is not included in capital stock.[66]

By assuming the constant quality of indexes of capital services, Leung and Yuen (2005) also used the net book value of fixed assets to calculate capital-labour ratio in 21 manufacturing industries in Canada. However, in Leung and Yuen's study, labour inputs are measured as number of quality-adjusted hours worked. Furthermore, in contrast with the abovementioned studies, Leung and Yuen (2005) obtained the capital-labour ratio for the 21 manufacturing industries by aggregating the growth rates of capital and labour separately. Capital growth rates in period *t* are aggregated using each industry's average nominal cost of capital for *t* and *t*-1 as weights. The growth rate of labour input for the 21 manufacturing industries is similarly calculated. The difference in the aggregate capital and labour input growth rates is then used to create indexes. Similarly to Leung and Yuen, in Clark (1978), labour is measured as number of hours. Clark studied the contribution of the capital-labour ratio to productivity growth in the US during 1948–1976. Hall and Scobie (2005), measuring capital intensity in New Zealand, also measured labour input as number of hours.

However, some studies have used labour inputs per unit of output (L/Q) or value added (L/value added) to measure labour intensity, such as Blejer (1978), Morley and Kumar (1987), Nugent and Yhee (2001), Abdullash and Beal (2002), and Kochhar, Kumar and Rajan (2005). Blejer (1978) analysed the empirical relationship between the structure of industrial exports and the level of income per capita across 30 countries. Industries are classified according to value added per employee which means that those in which value added per unit of employment is above the average for all industries are taken to be capital intensive, while those in which it is below the average are taken to be labour intensive. Using the same methodology as in Blejer's study, Abdullash and Beal (2002) used large-scale set of data from 1999 to calculate value added per unit of labour in manufacturing SMEs in Japan. Morley and Kumar (1987) used an input-output model to measure the employment effects of sectoral demand and export expansion. Nugent and Yhee (2001) used the share of labour costs in value added to calculate labour intensity of

[66] The study used its original data which land is excluded capital stock.

production in Korea during 1979–1997. In the most recent study, using the same calculation as in Nugent and Yhee's study, Kochhar et al (2005) compared cross-country data from the UNIDO to characterize manufacturing industry by labour intensity. The proxy for labour intensity is the share of wages in value added for the industry in each country, averaged across a broad group of developing countries.

Although Equation (3.2) is useful for measuring factor intensity of industry, Ho (1980)[67], however, argued that: "The comparison of capital intensity by firm size is meaningful only if all firms belong to the same industry and if the industry is precisely and carefully defined" (Ho, 1980, p. 56). Differences in capital intensity are caused by differences in product or quality rather than differences attributable to firm size, if all firms do not produce the same product of similar quality. However, according to Ho, the problem can be minimized by using disaggregated data.

Moreover, many studies have shown that factor intensity is affected by some other factors, such as demand uncertainty, firm size, real wage, and interest rate.

A model of firm behaviour under demand uncertainty shows that firms' input choices and cost functions are affected by uncertainty (Hartman, 1976; Holthausen, 1976; Ghosal, 1991; Green, Lensink and Murinde, 2001). Ghosal (1991) provides econometric evidence on the relationship between demand uncertainty, firm size and the capital-labour ratio for a sample of 123 US manufacturing industries[68]. He found that there is a significant negative relationship between demand uncertainty and the capital-labour ratio. Green et al (2001) investigated the effect of demand uncertainty on the capital-labour ratio of non-financial firms in Poland. Using an eclectic model to characterize a utility maximizing firm in a transition economy with demand uncertainty and imperfect competition[69], the study found that an increase in demand uncertainty increases the capital-labour ratio, whereas the capital-labour ratio decreases when firms are risk-averse. The

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[67] Sam P. S. Ho, of The World Bank, published a paper on small-scale enterprise in Korea and Taiwan (Working paper No. 384, 1980).

[68] $(K/L) = f\ (UNCER,\ SIZE)$, where (K/L) is the capital-labour ratio, *UNCER* is a measure of demand uncertainty, and SIZE is a measure of firm size (Ghosal, 1991).

[69] $(K/L) = \beta_0 \pm \beta_1 UNC_i + \beta_2 W_i + \varepsilon_i$, where *UNC* denotes demand uncertainty, W is the cost per employee and serves as a control variable in estimation and testing; ε is an error term, and $i = 1,2,3..,n$ firms (Green et al., 2001).

reasons for this are due to Hartman (1976) and Holthausen (1976), who showed that when there exist substitution possibilities between capital and labour, an increase in demand uncertainty leads to lower optimal capital stock and larger labour use. Thus, firms respond to uncertain demand conditions by operating with a lower capital-labour ratio. Holthausen added that demand uncertainty may lead to firms deviating from the least-cost combination of inputs. Firms may use a smaller amount of capital and operate with a lower (inefficient) capital-labour ratio. Furthermore, under the hypothesis of decreasing absolute risk aversion, an increase in firm size also increases the capital-labour ratio (Holthausen, 1976). As far as interest rate and real wage are concerned, Power (1955), Imam and Whalley (1985), and Urata (1983) assumed that either a rise in the rate of interest or a fall in real wages, or both, would always reduce capital intensity, while change in the opposite direction would raise it.

The empirical literature suggests that an increase in the firm size is associated with a decrease in the labour to capital ratio (Page, and Stell, 1984). Access to finance is more difficult for small enterprises as they normally lack collateral and have to face higher interest rates than large companies (Hytti, 2000). Thus, small enterprises usually use technologies that are less modern and less capital-intensive than those used by large enterprises (Billetoft, 1997, p. 16). As small scale industries lack capital, so they utilize the labour power for the production of goods. Small enterprises pay lower wages than large firms (Picot, Garnett, and Richard, 1998). Therefore, they employ workers who are in general less educated and experienced than those employed by large firms. The main advantage of such a process lies in the absorption of the surplus amount of labour in the economy who were not being absorbed by the large and capital intensive industries. This, in turn, helps to scale down the extent of unemployment as well as poverty.

3.3.2 Empirical work on labour-intensive manufacturing

SMEs were found to employ around 72.7 per cent of total manufacturing employment in Japan in 1999. A study by Abdullah and Beal (2002) showed that SMEs tend to be more labour intensive than LEs in the economy. The value added per unit of labour in manufacturing SMEs in Japan was about 50 to 60 per cent of large manufacturing enterprises. This was again largely due to

lower capital intensity by SMEs and it was a reflection of the fact that many SMEs were engaged in more labour-intensive production in Japan.

Huang (2003), studying the development of SMEs in Thailand, found that labour intensity was exceptionally high in nearly all industries under SMEs. The index of labour-to-capital ratio by industry sizes were: 189 (micro), 245 (small), 144 (medium), and 100 (large)[70]. These results affirm the hypothesis that SMEs were relatively more labour intensive than LEs, and imply SMEs' potential in contributing to employment generation in Thai industries. Moreover, Paitoon's (2001) study on Thai SMEs during 1987 to 1996 showed that there was another group of industries where capital-labour ratios did not vary much across size groups: textile products, clothing, footwear, leather products, wood and wood products, rubber products, plastic products, and furniture. Most of these industries were the least capital intensive. Because their capital intensity was not drastically different for firms of different sizes, large firms simply had larger-scale production and employment without significantly altering the production technique.

Suh and Chung's (1998) study on the role of SMEs in Korea during 1990–1995 showed that the concentration of employment in large business declined over time. In particular, the percentage shares of LEs employing 500 or more workers evidently declined across the whole period from 1990 to 1995. In contrast, the percentage of small enterprises employing 10 to 29 workers steadily increase from 7.7 per cent in 1990 to 19.1 per cent in 1995. Consequently, the distribution of employment by establishment size indicates that the role of SMEs in employment is increasingly important, while the role of large business in employment weakens during the period of 1990 to 1995. Nugent and Yhee (2001) found greater labour intensity of production in SMEs than LEs in Korea from 1979 to 1997. The ratios of employment costs to gross value added of SMEs fluctuated on average around 62 whereas only 45 for LEs from 1979 to 1997. These results were similar to Ho's study in 1980, labour intensity of enterprises decreased with the size of establishment.[71]

[70] Note: the study compared the index of the ratios for SMEs relative to that of large enterprises with the base of 100.
[71] In Ho's (1980) study, enterprises were classified into two size categories; small establishments (5–99 workers) and large establishments (100+).

Aw's (2001) study found that SMEs contributed significantly to the Taiwanese economy over the period from 1981-1991. SMEs employed more than 50 per cent of total manufacturing labour force and contributed more than one-third of total sales in manufacturing industry. When compared with LEs, the higher share of employment relative to capital share from SMEs indicates that SMEs are relatively more labour intensive in production. Both the output and employment shares of SMEs were increasing over time from 1981 to 1991. According to Sinha (2003), the rapidly growing SME sector in Taiwan during 1989 was generally focused on labour-intensive activities that employ more lower-skilled workers than do large enterprises. The average capital-labour ratio is 1.305 in large enterprises and 0.187 in SMEs. Similarly, Ho's (1980) study revealed that the capital-labour ratio of Taiwanese enterprises during 1971 increased with firms' size.

Hayashi (2002) examines the development of manufacturing SMEs in Indonesia in 1986, 1996 and 1999 using unpublished data of BPS (Statistics Indonesia). The study found that capital intensity rises with firm size. Large-scale enterprises with 300 to 999 workers had the highest capital-labour ratio in 1986 and 1996. In 1999, on the other hand, capital intensity of medium sized enterprises with 100 to 299 employees increased up to a peak, before leveling off. He concluded that, in broad terms, SMEs can coexist with LEs, by producing a unit of output with less capital but more labour than LEs. Moreover, Hytti (2000) presents the results of a study of employment in SMEs in Finland between 1990 and 1997, concluding that SMEs were more labour intensive than LEs. In order to produce the same value of output, SMEs used more labour as input.

Apart from SMEs' role in job creation, SMEs also raise the participation of women in income generating activities. Lee's (2006) study on SMEs in Korea found that women share a greater portion of total employees among SMEs (31 percent) than in large enterprises (27 percent). In Indonesia, SMEs account for more than 90 percent of all firms providing livelihood for over 90 percent of the country's workforce, especially women and the young (Tambunan, 2008). Moreover, female participation in the workforce of SMEs in Malaysia in 2003 was 36.8 percent of total employment (Aris, 2007). In Brunei, women comprise about 40 percent of the employed population, 90 percent of the girls are literate and numerate and more than half of the SMEs in

the country are owned by women (Onia, 2009). Small and microenterprises are an important source of employment for women in Cambodia. Based on the survey of over 25,000 firms, ADB (2004) reports that about one third of employees are women further indicating the importance of women workers in Cambodia.

Table 3.3 Summary of all studies on labour (capital) intensive of SMEs

Country	Measurement	Authors	Measurement of Capital (K)	Measurement of Labour (L)	Labour-intensive industries
Canada	K/L (*)	Leung and Yuen (2005)	Net book value of fixed assets	Number of hours worked	N/R
New Zealand	K/L	Hall and Scobie (2005)		Number of hours worked	***
Cross-country	L/value added	Kochhar et al (2005)	Value added	Cost of labour (wages)	N/R
Thailand	L/K	Huang (2003)	Net book value of fixed assets	Number of workers	SMEs
Taiwan	K/L	Sinha (2003)	Net book value of fixed assets	Number of workers	SMEs
Indonesia	K/L	Hayashi (2002)	Land is not included in capital stock	Number of workers	SMEs
Japan	L/Value added	Abdullash and Beal (2002)	Value added	Number of labour	SMEs

Thailand	K/L	Paitoon (2001)	Net book value of fixed assets	Number of workers	SMEs
Korea	L/value added	Nugent and Yhee (2001)	Value added	Cost of labour	SMEs
Finland	K/L	Hytti (2000)	Net book value of fixed assets	Number of workers	SMEs
Taiwan and Korea	K/L	Ho (1980)	Net book value of fixed assets	Not mentioned	Small size
30 countries	L/value added (**)	Blejer (1978)	Value added	Number of hours worked	N/R
USA	K/L	Clark (1978)	Net book value of fixed assets	Number of hours worked	N/R

Notes: (*) The indexes are created by the aggregate capital and labour input growth rates.

(**) Enterprises where the value added per unit of worker is below the average of all industries are considered as labour intensive.

(***) The study compared the capital intensity of New Zealand and Australian enterprises.

(N/R) not relevance.

3.4 PRODUCTIVITY MEASUREMENT OF MANUFACTURING SMES

This section discusses on productivity masurement of SMEs. This section tackles some theoretical and methodological issues raised by critics of previous studies. The structure of this section is as follows: It starts out with a discussion on the theoretical framework of productivity measurement. Secondly it discusses various methods used in measuring productivity of firms. Thirdly it discusses characteristics (measurement and calculation) of variables (output, labour, capital, and material), which are useful to study productivity levels of different firms of each country. Fourthly it reviews empirical findings on productivity in different firm-sizes and countries.

Although the broad concept of productivity is easy to understand, measuring productivity in a sector or in the aggregate economy is complex (Houseman, 2006). However, measuring productivity enables firms to better understand where additional resources or process improvements are needed. It can play a key role in business process redesign and optimization, improving throughput, assessing maximum sustainable output, lowering product or service unit costs, and in exploring the feasibility of outsourcing (Roger, 1998).

There are many different measures of productivity. The choice between them depends on the purpose of measurement of productivity and on the availability of data. Generally, productivity measures can be classified as single factor productivity measures, which relate a measure of output to a single measure of input, or multi-factor productivity measures, which relate a measure of output to a bundle of inputs (OECD, 2001). However, it is generally accepted that total factor productivity (TFP) is a better measure of relative productivity of firms and their advances over time than other measures such as labour productivity and capital productivity.

3.4.1 Theoretical framework of productivity measurement

The conceptual framework for the measurement of productivity, including changes in productivity over time and differences in productivity among organizations, is found in the theory of production. Although the origin of the concept of productivity dates back to the early 1940s, with a paper by a Dutch economist Tinbergen (1942), the concept became popularized with the paper of the Robert Solow published in 1957 in which he investigated the productivity of the US economy. Tinbergen and Solow formulated productivity measures in a production function context and linked them to the analysis of economic growth. Today, the measurement of productivity for firms have been the topic of research for a variety of disciplines, including accountancy, economics, engineering and operations research (Roger, 1998, p. 5).

A basic definition of productivity is the ratio of a volume measure of output to a volume measure of input for a specific production situation[72]. The goal of productivity measurement is

[72] See Hsiao and Park (2002). Hayashi (2002) reported both labour and capital productivity levels of Indonesia's non-oil/gas industry by firm size in 1986, 1996 and 1999. However, Nugent and Yhee (1991) and van Biesebroeck

productivity improvement, which involves a combination of increased effectiveness and a better use of available resources.

The standard definition of production is actually what is known as a partial factor measure of productivity, in the sense that it only considers a single input in the ratio. The formula then for partial factor productivity would be the ratio of total output to a single input.[73] For instance, if both output (Q) and input (I) are measured in real units, and then referring to a single firm that uses a single input in order to produce one output, productivity ratio is (Q/I).

Partial productivity measures are useful in showing the savings that have been achieved over time in the use of each input per unit of output. Since the total of multifactor measures provides an aggregate perspective, partial factor productivity measures are easier to relate to specific processes. For instance, labour-based hour (generally, readily available information) is a frequently used input variable in the equation. When this is the case, it would seem that productivity could be increased by substituting machinery for labour. However, that may not necessarily be a wise decision. Labour-based measures do not include mechanization and automation in the input; thus when automation replaces labour, misinterpretation may occur.

In contrast to the classical Ricardian labour theory of value, which emphasizes that labour is the factor input in production, productivity is a neoclassical concept that attempts to measure productivity taking into account all factors of production, thus the underlying assumption that labour is not the only input. A multifactor productivity measure utilizes more than a single factor, for example, both labour and capital. A broader gauge of productivity, total factor productivity (TFP) is measured by combining the effects of all the resources used in the production of goods and services (labour, capital, raw material, etc.) and dividing it into the output.

(2005) measure productivity in Korean and African manufacturing respectively using value added per worker. Similarly, Paitoon (2001) measures productivity level in Thailand using the ratio of value added to both labour and capital.

[73] The ratio of output to the associated labour inputs was the first type of productivity measures to be developed. For instance, the study of output per unit of labour input was prepared in the Bureau of Labour Statistics (BLS) in the U.S in 1880s. In 1940, BLS prepared regular estimates of output per hour in various industries of the U.S. economy.

When a maximum quantity of gross output (Q) can be produced by all inputs, primary ones, labour (L) and capital (K), and intermediate ones (M), and then the commonly used forms of the total factor productivity are:[74]

$$A = \frac{Q}{\alpha L + \beta K + \gamma M} \qquad (3.3)$$

or

$$A = \frac{Q}{L^{\alpha} K^{\beta} M^{\gamma}} \qquad (3.4)$$

where $\alpha+ \beta+ y=1$, $\alpha \geq 0$, $\beta \geq 0$, *and* $y \geq 0$. Equation (3.4) is a geometric index and equation (3.3) is an arithmetic index. A denotes the productivity index; and α, β, *and* y are the weight. A measures an productivity with which all factors of production, in this case labour, capital, and materials, are used. The weights can be taken and interpreted by relating the productivity ratio to an aggregate production function. The aggregate production function can be written as[75]:

$$Q_{i,t} = F(K_{i,t}, L_{i,t}, M_{i,t}, \mathrm{t}) \qquad (3.5)$$

Equation (3.5) expresses output of firm i in year t as a function of stock of capital (K_{it}), labour (L_{it}), material (M_{it}), and time (t)[76]. This production function is assumed to be a constant return to scale, so that a proportional change in all inputs results in a proportional change in value added[77]. If time can be separated from L, K, and M

$$Q_{i,t} = A_{i,t} F(K_{i,t}, L_{i,t}, M_{i,t}) \qquad (3.6)$$

[74] See Lipsey and Carlaw (2002). It is noted that the estimates of output and of factor inputs were used within the framework of the Cobb-Douglas production function and other forms of production functions to yield estimates of factor productivity in the U.S. private economy in 1950s. Early estimates of factor productivity in the US were prepared by Jan Tinbergen in 1942, by George Stigler in 1946 for a manufacturing industries.

[75] See Okamoto and Sjoholm (1999); Baily et al. (1992); and Cororaton and Cuenca (2001). However, Hayashi (2002) follows the Cobb-Douglas production function to calculate productivity level in Indonesia.

[76] The time variable is a proxy of productivity and technical progress.

[77] See Gollop and Jorgenson (1980); and Liang (2001).

and then

$$A_{i,t} = \frac{Q_{i,t}}{F(K_{i,t}, L_{i,t}, M_{i,t})}^{78} \qquad (3.7)$$

$A_{i,t}$ is a parameter referred to as exogenous and is measured by how output changes as time elapses with the input bundle held constant.

In (3.4), α, β, y, sum to one, which ensures the characteristic of constant return to scale (a proportional increase in all inputs will increase the output proportionally). The constant term, A, indicates the degree to which the same input levels lead to greater output. Thus, the change in multi-factor productivity measures (A) reflect the net saving in the real costs of production achieved over time, i.e., increases in productive efficiency generally, if all inputs are included in the denominator. The primary force behind increases in productivity is cost-reducing technological progress. A is known as total factor productivity (TFP), and changes in A are know as TFP change. TFP growth is positive when the rate of changes in gross output is greater than the rate of change in all combined measured inputs.

To sum up, TFP, as in equation 3.7, which measures the changes in output per unit of combined inputs, is the appropriate concept for most productivity assessments, including comparisons across firms or industries, or over time. It is the portion of output not explained by the amount of inputs used in production. As such, its level is determined by how efficiently and intensively the inputs are utilized in production.

TFP measures have been based on comprehensive aggregates of outputs and inputs. And Antle and Capalbo (1988) have indentified two major approaches to TFP measurement: (a) the growth accounting (index number); and (b) the econometric approach (see productivity measurement in 3.4.2).

[78] Factor productivity was being measured using an economic accounts framework, Solow (1957) and other economists took a parametric approach to estimating factor productivity, initially emphasizing the Cobb-Douglas production function.

However, productivity statistics are not necessarily helpful and may be harmful when there are no clear measures of output and inputs and when there is no well-understood production technology, that is, no efficacious procedures for converting inputs into output theoretically. Therefore, in the next section of this chapter, we will provide literature reviews on the characteristics of output and inputs.

3.4.2 Productivity measurement

Two methodologies have been used in most papers to measure productivity. The first is the multilateral index approach which was developed by Good, Nadiri, and Sickles (1997). After Good et al, many researchers used this approach to compare productivity differences among groups of firms in different countries. The second approach was developed by Christensen, Cummings, and Jorgenson (1981). In this approach, relative TFP is calculated by relating the deviation of firm output from the industry mean to the deviations of the factor inputs from the industry means. This method is better for measuring the relative productivity of a given plant in a single year.

- **The Multilateral Index Approach (Good et al, 1997)**

According to Felipe (1997), although expression (3.7) represents output per unit of joint inputs, its interpretation is much less straightforward than that of the partial productivity index, and its meaning – for example, level of technology – is not clear in a direct comparison between different economic units. In 1982, Caves, Christensen and Diewert developed a multilateral index approach which is useful for measuring inputs, outputs, and TFP in firm-level panel data sets. This approach was further studied by Good, Nadiri and Sickles in 1997. It is a separate reference point for each cross-section of observations, which chain-links the reference points together over time. The multilateral index uses a hypothetical firm with input shares that equal the arithmetic mean input shares and input levels that equal the geometric mean of the inputs over all cross-section observations (see equation 3.8).

The measure of TFP is derived from a translog production function where its analytical expression for a firm i in year t as follows:

$$\ln TFP_{i,t} = \left(\ln Q_{i,t} - \ln \overline{Q}_t\right) + \sum_{s=2}^{t}\left(\ln \overline{Q}_s - \ln \overline{Q}_{s-1}\right)$$
$$- \left[\sum_{g=1}^{n} \tfrac{1}{2}(S_{g,i,t} + \overline{S}_{g,t})(\ln X_{g,i,t} - \ln \overline{X}_{g,t}) + \sum_{s=2}^{t}\sum_{g=1}^{n} \tfrac{1}{2}(\overline{S}_{g,s} + \overline{S}_{g,s-1})(\ln \overline{X}_{g,s} - \ln \overline{X}_{g,s-1})\right] \quad (3.8)$$

where each firm i produces a single output $Q_{i,t}$ by using the set of inputs $X_{g,i,t}$, where $g = 1, 2, \ldots n$. The firm's expenditure on input $X_{g,i,t}$, as a share of total revenue, is denoted $S_{g,i,t}$. The overbars denote the average value over all firms in year t. The output, inputs and productivity level of each firm in each year are measure relative to the hypothetical firm at the base year.

The first line of equation (3.8) measures firm output and consists of two parts. The first expresses firm output in year t as a deviation from the mean output in that year. The second part is the cumulative change in the mean output reference point between year t and the initial year. The next two lines in the equation perform the same operation for each input X_g. The inputs are summed using a combination of the input revenue share for the firm S_{git} and the average revenue share $\overline{S}_{gt}$ as weights. The index provides a measure of the proportional difference in *TFP* for firm i in year t relative to the hypothetical firm in the base time period. According to Castany, Lopez-Bazo and Moreno (2007), Hall (1990) suggested that weights are calculated as the share of every input in the total cost of inputs.

Using firm-level TFP index as a single measure of the firms' relative productivity in the theoretical model[79], Aw et al (2001) constructed the index for each firm in each of the three census years 1981, 1986, and 1991 in Taiwan to document the role of firm entry, exit, and growth in Taiwan's productivity growth. The type of data collected in the manufacturing census is similar to what is collected in the United States for productivity measurement, as in Baily, Hulten

[79] Tybout (1996a) discusses alternative productivity measures based on econometric estimation of production functions and summarizes the literature on the sources of productivity differences across producers. Olley and Pakes (1996) develop an econometric methodology for estimating production functions that is consistent with a dynamic, stochastic model of industry development.

and Campbell (1992), or in the industrial countries analyzed in Roberts and Tybout (1996). Using the same firm-level data from the three census years in Taiwan, Aw (2001) examines the relationship between firm size and the growth in total factor productivity. Firms are classified into size classes based on number of employees and total factor productivity levels are calculated for each firm size in each of the three census years.

Chung (1998) also calculates indexes of TFP based on the methodology produced by Good et al (1997). He did so for both the new entrants and the incumbents in each sector for both 1988 and 1993 on the basis of data for gross output, materials inputs, and productive factors. These calculations yield industry-specific TFP distributions for both entrants and incumbent firms. From these distributions, various measures of the characteristics of the distributions can be constructed. For new entrants, Chung calculates the standard error (a commonly used measure of dispersion). For incumbent firms, he calculates the change in the TFP index in period $t + 1$ conditional on that in period t. Finally, he also calculates for each of the 17 sectors the median capital-labour ratio at the beginning of each period.

Moreover, Oh et al (2006) and Castany et al (2007) also used the multilateral index to calculate the total factor productivity (TFP) of the South Korean and Spanish manufacturing industry, respectively, at the firm level, and performed comparative analysis by size classes. Castany et al also investigated the differences in TFP between SMEs and LEs and established the extent to which this gap was caused by differences in endowments of technological and human capital or differences in the returns to these endowments. In order to analyse the causes of differences in TFP by firm size, a methodology which was given by the Oaxaca-Blinder decomposition was used. This decomposition has been widely used to study wage gaps associated with differences in worker characteristics and with discrimination by gender or race.[80]

In conclusion, the multilateral productivity index developed by Good et al (1997) is useful because it provides a consistent way of summarizing the cross-sectional distribution of firm

[80] Following Oaxaca (1973) and Blinder (1973), the difference between the mean wages between two groups, for example, men and women, in period t can be decomposed into an explained or predicted difference due to disparities in observed or measured characteristics between the two groups, and an unexplained or residual difference attributable to both wage discrimination and unmeasured disparities in characteristics.

productivity, using only information specific to that time period, and the distribution over time (Aw et al, 2001). The multilateral TFP index captures factors that can lead to productivity differences across firms, which is well suited to making comparisons in a firm-level panel data set. It measures the proportional differences in TFP for firms in the current year relative to the hypothetical firm in the base time period.

- **The Approach of Christensen et al (1981)**

Christensen, Cummings, and Jorgenson (1981) suggested an approach whereby relative TFP is calculated by relating the deviation of plant output from the industry mean to the deviations of the factor inputs from the industry means. This method is better for giving the relative productivity of a given plant in a single year. The previous sections discussed how productivity measures can be derived from a production function. Many studies have used the neoclassical production function (equation 3.6) with constant return to scale to measure productivity in different countries such as in Indonesia and Japan (Okamoto and Sjoholm, 1999; Urata and Kawai, 2001; and Baily et al 1999). Moreover, Liang (2001) used a translog production function where value added is a function of the logarithms of capital, labour and time to measure productivity of service industries in Taiwan[81]. However, Fariñas and Martin-Marcos (2002) use the linear form of the Cobb-Douglas production function to measure TFP level differences between exporters and non-exporters in Spain. Similarly, Nugent and Yhee (2001) also estimate sector-specific Cobb-Douglas production functions for light industry, heavy industry, and electronics and also for Korean manufacturing as a whole.

Based on the neoclassical production function, where Q_{it} is the real gross output of the i^{th} plant in year t, and K_{it}, L_{it}, and M_{it} are capital, labour, and intermediate inputs respectively, the index of plant-level TFP is measured as:

$$\ln TFP_{it} = (\ln Q_{it} - \overline{\ln Q}) - \alpha_L(\ln L_{it} - \overline{\ln L}) - \alpha_K(\ln K_{it} - \overline{\ln K}) - \alpha_M(\ln M_{it} - \overline{\ln M})^{82} \quad (3.9)$$

[81] Following Gollop and Jorgenson (1980), Liang (2001) uses the approach derived from growth accounting, developed from a translog production function, which is more generalized than the conventional Cobb-Douglas production function.

[82] See Okamoto and Sjoholm (1999); and Baily, Hulten, and Campbell (1992).

where $\overline{Q}$, $\overline{L}$, $\overline{K}$, and $\overline{M}$ are the industry average values of output and factor inputs of industry (i), and α_L, α_K, and α_M are the factor elasticity for each factor input taken as the average of the plant's factor cost shares.

The result of the estimation of productivity level in equation (3.9) is usually interpreted as efficiency gains caused by using the level of inputs. Such an interpretation is appropriate if the firms can achieve maximum amount of output given the level of inputs and technology in each year, for which the estimation is performed. However, according to Urata and Kawai (2001), in the short to medium run, firms may not achieve the most efficient allocation of inputs when there is a constraint of immobility of inputs. Also, firms may not be able to obtain maximum amount of output because of inefficient management or inappropriate incentive system. If such a situation arises, the estimation of TFP is not accurate (Urata and Kawai, 2001).

Based on the general neo-classical production function, and with the assumption of perfect competition in factor and good markets, many studies used the index of plant-level TFP (equation 3.9) to calculate TFP growth for manufacturing industries in different countries such as African countries (van Biesebroeck, 2005), Indonesia (Okamota and Sjoholm, 1999), Japan (Urata and Kawai, 2001), the Philippines (Cororaton and Cuenca, 2001) and Sweden (Josephson and Schon, 2002). In the studies of Cororaton and Cuenca (2001), and Josephson and Schon (2002), two factors of input, labour and capital, and value added were obtained from the national account statistics and the industrial statistics during the periods 1980–1998 (Philippines) and 1950–1994 (Sweden) respectively. The plant-level production data, which covers all plant with more than 20 employees for the years 1990–1995, are from surveys of manufacturing industries in Indonesia in Okamota and Sjoholm's (1999) study. The study is to survey the effects on aggregate manufacturing productivity growth from improvements within establishments, from reallocation of market shares, and from the turnover of plant in the Indonesian manufacturing sector. Productivity growth was mainly explained by reallocation of market shares and from turnover of plant. Johannes van Biesebroeck (2005) collected data from a sample of 200 firms in each country in Africa across firm size and location. Three rounds of interviews were conducted in consecutive years between 1992 and 1996 in African countries. In addition, two other studies used the index of plant-level TFP to study TFP growth of a country's economy. Liang (2002) and

Bassanetti et al (2006) surveyed TFP growth in all sectors of the economy in China (1961–1993) and three European countries (France, Germany, and Italy) (1982–2004) respectively.

Moreover, two studies, Liang (2001) and Townsend and Stern (2000), used the index of plant-level TFP to survey productivity levels in the service sector. Liang used a translog production function to survey productivity growth in service industries (such as finance, insurance, real estate, business services, community, social and personal services, trade and eating/drinking places) in China during the period 1962–1996. Townsend and Stern calculated telecommunication companies' productivity in developing countries. Similarly, Fariñas and Marcos (2002) applied the approach developed by Christensen et al (1981) to investigate TFP differences between exporters and non-exporters on the basis of an unbalanced panel of Spanish manufacturing firms over the period 1990–1999.

- **Labour and capital productivity**

Although TFP is quite widely used in productivity studies, Huang (2003) argued that TFP is subject to the assumption of constant returns to scale where the results of the estimation are usually interpreted as productivity gains through adoption of new technology. Such productivity gains are appropriate only when firms achieve maximum output given the level of inputs and technology in the long run. In the short run, firms are generally constrained by immobility of inputs, inefficient management and inappropriate incentive system causing under-utilization, and the possibility of true production technology being subject to increasing return to scale (Urata et el, 2001). In most developing countries, labour is abundant while capital is scarce, leading to the existence of higher capital productivity. This may imply higher efficiency in the use of scarce resources (Huang, 2003).

The productivity formula, which is often measured as output per person hour, is a useful indicator because it represents the efficiency of labour in generating output (Hayashi, 2002, p. 25). Okamoto and Sjoholm (1999) and van Biesebroeck (2005) used two productivity measures – labour productivity (Q/L) and TFP – to examine productivity growth in the Indonesian and African manufacturing sectors respectively. Okamoto and Sjoholm found the growth pattern to

be rather similar between the two measures; sectors with high labour productivity growth have in general shown high TFP growth. The causes of productivity growth are also similar between TFP and labour productivity. Van Biesebroeck (2005), who discussed the evolution of firms' productivity related to firm size and age, found that both measures of productivity are positively correlated with size. However, while firm age is positively correlated with labour productivity, the relationship with TFP is negative, reflecting the effect of capital accumulation. Bassanetti et al (2006) also used the two measures to study TFP growth of all sectors of the economy in France, Germany and Italy.

Besides using the above two productivity measures, Paitoon (2001) and Huang (2005) used capital productivity (*Q/K*) to compare productivity levels of SMEs with LEs in Thailand. Since Thailand is abundant in labour and scarce in capital, capital productivity is an indicator of efficient resource utilization. Small-scale industries were found to use resources more efficiently than did large plants when the small plants were found to have both higher capital productivity and labour productivity, especially in Ho's (1980) study. Ho used the two productivity measures to compare the productivity level of small enterprises (fewer than 100 workers) with large enterprises in Korea and Taiwan.

However, the use of productivity measures such as *Q/L* or *Q/K* can be misleading since different inputs can substitute for each other (Rogers, 1991). If capital (K) is increased while all other inputs are held constant, this raises output (Q) and also the productivity measure *Q/L*, even though there many have been no increase in the productivity of labour per se. This type of situation has led people to adopt multifactor measures of productivity.

3.4.3 Defining and measuring variables

Output, labour, capital, and material are very useful variables to study the characteristics of different firm levels of each country. The purpose of this section is to detail the characteristics (measurement and calculation) of the four variables.

- **Output**

Studies that use gross production as output to measure TFP of firms are Okamoto and Sjoholm (1999) and Aw (2001). Alternatively, many other studies use value added as output, such as Oh et al (2005), Paitoon (2001), Hayashi (2002), van Biesebroeck (2005) and Cororaton and Cuenca (2001)[83]. Nugent and Yhee (1991) use gross value added as output in their study on labour productivity in Korea. However, according to Jorgenson et al (1987), the use of value added instead of gross production requires the additional assumption that time, capital, labour, and any other inputs are separable from raw material and intermediate inputs, an assumption that was rejected in most sectors for the United States. Cororaton and Cuenca (2001) noted that with gross value added the raw materials are not accounted for in the TFP estimates. Regarding the change in stock, Rogers (1998) noted that the sales or revenue figures normally reported in accounts will not coincide with this if inventory levels have risen or fallen over the period. Therefore, adjustment for the level of inventories should be made. The study on Chinese manufacturing by Aw et al (2001), however, fails to measure the firm's inventories of final output in each census year. Thus, it is unable to distinguish firm sales from firm production in the year.

To calculate the real value of output, the nominal value of output is deflated by the wholesale price index. This has been used in many studies of different countries, such as in Taiwan (China) (Aw et al, 2001), Indonesia (Okamoto and Sjoholm, 1999), China (Liang, 2001), Africa (van Biesebroeck, 2005) and Spain (Fariñas and Martin-Marcos, 2002). Similarly, in Oh et al (2005), output is deflated by the producer price index. In the absence of sectoral price series, the nominal values of value added are converted into real value added using the GDP deflator.

In Hayashi (2002), on the productivity level of Indonesian enterprise, value added is deflated by implicit GDP deflator for manufacturing industry from the Indonesian national accounts. In Polanec (2004), on the productivity level of Slovenian manufacturing sales, value added is deflated using producer price indices. However, if there is a limitation of information on firm-

[83] However, Cororaton and Cuenca (2001) note that gross value added is used as output in sectoral estimation, while gross domestic product is used in the national TFP estimation.

level output prices to use in deflating firm outputs, TFP estimates at the firm level will be biased in a way that is related to firm size (Aw et al, 2001, p. 22).

- **Capital**

The large majority of TFP studies have used the gross capital stock (GCS) as the capital variable. This is the total value of capital assets at what they would have cost to purchase, as new, in the current year (current price GCS) or in a base year (constant price GCS) (Blades and Meyer-zu-Schlochtern, 1997). In Liang (2001), Paitoon (2001)[84], Huang (2002), and Oh (2003) land, buildings, machinery and equipment, vehicles, and office appliances are included in capital assets. However, land is excluded in some other studies, such as Hayashi (2002), Motohashi (2004) and Hsiao and Park (2002).

Blades and Meyer-zu-Schlochtern (1997) noted that with proper maintenance most capital assets go on working at a constant level of efficiency throughout their lives. Aw et al (2001), who defines capital input as the book value of capital stock of the firm, add that the book value of firms changes over time when firms invest in new equipment[85]. Besides Aw et al, many other studies use the book value of capital to construct real capital stocks in different countries. The book value of capital was deflated by a wholesale price index for new capital goods in Korea (Oh et al, 2005), Indonesia (Okamoto and Sjoholm, 1999; Hayashi, 2002[86]), Thailand (Paitoon, 2001) and the Philippines (Cororaton and Cuenca, 2001). According to Polanec (2004), de Loecker and Konings (2004) who study productivity level for Slovenian manufacturing firms, capital is deflated using the consumer price index (CPI).

Aw et al (2001) found that price changes for new capital goods are generally small, averaging less than one per cent per year for most industries in China. The comparisons of book values over time probably do not greatly distort the growth in capital stock (Aw et al, 2001, p. 23). Morrison

[84] In Paitoon (2001), capital input is net book value of fixed assets. It includes tangible fixed assets but excludes rented assets.
[85] However, in Wang and Lawson (2005), on TFP growth in OECD countries, capital stock data is based on real domestic investment from World Bank (2000).
[86] Capital fixed investments (I) are deflated by implicit deflator for gross fixed capital formation from the Indonesian national accounts.

(1993), in a study on capital services, reports that capital stock series are created by adding up the investment in different assets over time, allowing for depreciation, maintenance, inflation in asset prices. However, Rogers (1991) notes that the measure of capital services is not the same as the stock of capital held by a firm or industry.

In Liang (2001), except for land, all types of capital are calculated by adding up corresponding net capital formation, which is the difference between the gross capital formation and the depreciation[87]. Cororaton and Cuenca (2001), Wang and Lawson (2005), and Hall and Scobie (2005) use a perpetual inventory equation to compute the capital stock series in the Philippines, OECD countries, and New Zealand respectively[88]. The three studies calculate capital stock series using a fixed depreciation rate. Similarly, Fariñas and Martin-Marcos (2002) also use an equation to estimate replacement value of the net capital stock in equipment of Spanish industries. The constant price of investment in equipment is cumulated and the value of depreciated equipments is deducted using depreciation rates and price indexes for equipment from the Spanish Ministry of Industry. In Motohashi (2004), on TFP growth and level in five countries (China, Korea, Japan, Taiwan, and the United States), only three types of depreciable assets (ie., structure, equipment, and vehicles) are taken into account for capital inputs, and the data for land and inventory are not available for some countries.

Under the assumption of constant returns to scale, the share of capital cost is obtained by subtracting the labour and material shares from 1 (see Okamoto and Sjoholm, 1999). Moreover, in Hayashi (2002), who uses only two factors of inputs, labour and capital, capital cost share is obtained by subtracting labour share from 1.

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[87] Following Christensen-Jorgenson (1969, 1970), the depreciation rates were calculated by compiling the constant rate depreciation method and the years of depreciation listed in the National Wealth Census (1988) in Taiwan (Liang, 2001, p. 10).

[88] $K_{i,t} = K_{i,t-1}(1-d_i) + I_{i,t}$ where $K_{i,t}$ is capital stock of industry i in year t, $K_{i,t-1}$ is capital stock in previous year, d_i is average depreciation rate, and $I_{i,t}$ is investment in year t (Cororaton and Cuenca, 2001; Wang and Lawson, 2005; and Hall and Scobie, 2005). Cororaton and Cuenca not only calculate capital stock for manufacturing sector in the Philippines, but also others such as agriculture, mining, construction, utilities, transportation, trade, finance, and dwellings, and services.

- **Labour**

Labour is measured by the number of effective hours of work per annum, which is equal to normal hours plus overtime hours minus non-worked hours per annum (Fariñas and Martin-Marcos, 2002)[89]. In Hall and Scobie (2005) and Huang (2003), the data on average hours worked was multiplied by total employment to form total hours worked for measuring labour productivity and the capital-labour ratio in OECD countries and Thailand respectively.

Moreover, the labour input is also measured as the number of production workers plus non-production workers, which includes part-time and seasonal workers (van Biesebroeck, 2005). Aw et al (2001) and Rogers (1998) noted that information on the mix of worker skills in the firm enables us to account for improvements in labour quality over time. Labour should be split into various separate inputs depending on skill, education or other classification (Rogers, 1998, p. 12). In addition, total payments to labour are measured as total salaries to both groups, but data on non-wage benefits paid by the firm are usually unavailable (Aw et al, 2001, p. 22).

Huang (2003) defines labour cost share as the total labour cost of all employees divided by the total output. Wang and Lawson (2005), on TFP of OECD countries, define labour cost shares as the compensation per employee as a percentage of GDP at factor cost per person employed.

- **Material**

Material is a major production costs which arises from materials and parts, fuel, electricity, water, source of manufactured goods and maintenance. Additional production costs cover costs arising from advertising, transportation, communication and insurance (Oh et al, 2005). In Aw (2001), the material input includes the raw materials, fuel, and electricity used by firms. Unlike Aw's study, Paitoon (2001) includes the procurement of intermediate inputs as material inputs.

[89] See also Rogers (1998).

The estimated intermediate inputs are deflated by a general producer price index in China (Aw, 2001)[90], Spain (Fariñas and Martin-Marcos, 2002), Indonesia (Aw et al, 2001), Slovenia (Polanec, 2004) and Korea (Oh et al, 2005). Aw (2001) and Fariñas and Martin-Marcos (2002) deflate fuel and electricity expenditures by an energy price index. These deflators are the same for all industries in the two studies. In Okamoto and Sjoholm (1999), real material inputs are obtained by dividing nominal values by input deflators.

3.4.4 Empirical work on productivity level of firms

This section briefly discusses the findings of empirical work on the productivity level of small, medium and large enterprises. The TFP estimates of these studies are summarized in Table 3.4.

- **Large firms are more productive**

Several studies, such as Little et al (1987), Snodgrass et al (1996), Leidholm (1999), Nugent and Yhee (1991), van Biesebroeck (2005), Aw (2001), and Urata and Kawai (2001), have made serious attempts to analyse the performance of SMEs in developed and developing countries and consider the role of government in assisting enterprises to enhance growth potential. Among these studies, several countries show factor productivity increasing with plant size. Little et al's study shows that, in the US manufacturing sector, industries in which larger firms have a greater market share have greater productivity growth. Nugent and Yhee, who estimate TFP level for each of four size classes of SMEs (5–49, 50–99, 100–199, 200–299 workers) in Korean industries, found that TFP rises with size through the 101–200 size class but then declines with size after that. TFP was found to be lower in electronics than in light industry and heavy industry.

van Biesebroeck (2005) uses a firm-level data set, constructed from surveys in the manufacturing sector of nine African countries. The sample drew around 200 firms from each country. The data collection was coordinated by the World Bank as part of its Regional Programme on Enterprise Development (RPED). The study found significantly higher productivity attained by large firms

[90] In Aw (2001), this covers both manufacturing and non-manufacturing output in China.

which employ 100 or more workers. In addition, labour productivity for firms that had existed for 20 or more years is noticeably higher than for firms in the other age groups. Similarly, a study by Aw (2001) in Taiwan found that the highest levels of productivity are achieved by firms that grow in size over time. Moreover, in Japan, according to Urata and Kawai's (2001) study, small firms on average had lower TFP growth rate and lower TFP levels when compared with larger firms in both 1966 and 1996. However, in several machinery sectors, small firms not only had higher TFP growth rates but also higher TFP levels. According to Urata and Kawai (2001): "One reason for this may be that in the machinery sector there are a number of small but innovative establishments engaged in parts and components production." (p.8)

Large firms are not only significantly more productive than small firms, but they are also more innovative and invest more in human capital than their smaller counterparts (Castany et al, 2007). Acs, Morck, and Young (1999) found that although innovations are brought by small firms to the marketplace, the contribution of innovations to productivity often takes time. Larger firms, however, may have more resources to adopt and implement them. According to Castany et al's (2007) study, innovation and employment of skilled workers are associated with higher TFP level in both small and large firms. TFP increases as the proportion of white-collar workers increases, which indicates a positive relationship between these variables. Also process innovations reduce the unit cost of production and contribute to increases in productivity.

In China, Naughton (1994) points out that large- and medium-scale enterprises performed with outstanding growth during the 1990s. Similarly, Lo (1990), who used aggregate national data, found that the TFP of large- and medium-scale enterprises grew faster than that of the rest of Chinese industry during 1980–1996. This result is consistent with Cheng and Lo (2004), who found that large enterprises registered the fastest productivity growth in China during the period 1994–1997.

As for the measure of capital and labour productivity, Hayashi (2002), who studied the productivity level of Indonesia's Non-Oil/Gas industry by firm size in 1986, 1996 and 1999, found that the output-labour ratio (Q/L) increased with size, except for 1999, when the second largest size group recorded the highest productivity growth. Capital productivity (Q/K) is not

consistent with expected patterns. The productivity level first decreased, then increased as firms became larger.

- **SMEs are more productive**

Snodgrass and Biggs (1996) find that in a few East Asian countries, upon disaggregating data by industry, the connection between productivity and plant size breaks down. Total factor productivity was found to be highest in SMEs, especially among medium-size firms. This finding provides an argument for SMEs not just as a source of improving social welfare, but also as a source of productivity stimulating industrial development. Such productivity growth in SMEs is confirmed in studies such as Miwa (1996) and MOEA (1998) where the source of growth came from SMEs in Japan and Taiwan. In both countries, SMEs are found to actively engage in acquiring and upgrading new technologies and sustaining their competitiveness in the international market.

In South Korea, Oh et al (2006) found that for most of the period 1993–2002, the TFP level of the SMEs was higher than the LEs. The output-weighted TFP level was similar for both LEs and SMEs in 1994, however, the gap widened from 1996 to 1998, narrowing again following the Asian financial crisis in 1998. Overall, the TFP index of small and medium enterprise is higher than large enterprise.

Huang's (2003) study found that in Thailand SMEs are more productive than LEs in some industries. The productivity levels of SMEs are higher than LEs in textiles, paper products, petroleum and fuel, non-metallic mineral, fabricated metal, machines and equipment, electrical machinery, precision equipment and clocks, and furniture industries. The productivity level is even higher for micro-size firms in some industries. Similar results were found by Paitoon (2001). Both small and medium-sized firms performed better than large firms during 1997. Out of 59 industries, in 25 industries small firms had the highest TFP indices, followed by 19 and 15 for medium and large firms, respectively. Huang's and Paitoon's studies were based on the 1997 industrial census data in Thailand. However, in Paitoon's study, the differences in TFP between

SMEs and LEs comes from the face that the capital productivity of SMEs was much greater than that of LEs.

Table 3.4 Summary of all studies on TFP of SMEs

Country	Methodology	Author	Period	More productive Industries
Spain	Good et al (1997)	Castany et al (2007)	1994,1998 and 2002	LEs (all three years)
Korea	Good et al (1997)	Oh et al (2006)	1993–2002	SMEs
Korea	Christensen, et al (1981)	Nugent and Yhee (1991)	1979–1997	LEs (but declining when more than 200 workers)*
Africa	Christensen et al (1981)	van Biesebroeck (2005)	1992–1996	LEs
Thailand	Christensen et al (1981)	Paitoon (2001)	1997	SMEs
Thailand	Christensen et al (1981)	Huang (2003)	1997	SMEs
Taiwan	Good et al (1997)	Aw (2001)	1981, 1986 and 1991	LEs (all three years)
Indonesia	Christensen et al (1981)	Hayashi (2002)	1986–1996	LEs (Note: LEs has higher growth rate than SMEs)
Japan	Christensen et al (1981)	Urata and Kawai (2001)	1966 and 1996	LEs**
East Asia		Snodgrass and Biggs (1996)	N/A	SMEs

Note: (*) TFP indexes are: 0.910 (5–49), 1.078 (50–99), 1.157 (100–199), 0.913 (200–299).

(**) The study compares TFP level of small and large firms in Japan.

3.5 INCOME DISTRIBUTION MEASUREMENT OF SMEs

This section discusses the methodology employed to measure income equality, introduces the various methods that have been used to examine the relationship between SMEs and income equality, and then provides more empirical works on the contribution of SMEs in income equality in different countries.

The role of SMEs in aiding an equitable development process has covered three different topics in the literature (Mazumdar, 2001). First is the role of off-farm employment in agricultural growth in peasant economies. A decentralized labour-intensive growth in agriculture based on the seed-fertilizer revolution creates new demands and linkages, which tend to stimulate the growth of off-farm activities in village industry, trade, and service. These developments provide new income earning opportunities for members of the rural labour force. Second is support for nonagricultural household enterprises, which are largely based on family labour, although sometimes supplemented by one or two hired hands. In rural areas such enterprises, which generally use small amounts of fixed capital, concentrate on traditional crafts using non-mechanized techniques, and they spill over into the urban areas in a variety of activities, especially to lower grade manufacturing activities. Support for household enterprises is an important component of poverty alleviation. Third, there is the varying importance of non-household small enterprises in the modern sector of the economy making use of hired labour. Those enterprises, which are referred to in the literature as small and medium enterprises (SMEs), are more widely dispersed geographically than larger enterprises, supporting the development and diffusion of entrepreneurial spirit and skills, and thereby helping to reduce economic disparities between urban and rural areas.

3.5.1 Theoretical framework of income distribution measurement

Litchfield (1999) conceptualized inequality as the dispersion of a distribution, whether that be income, consumption or other welfare indicator or attribute of a population. Inequality can be

measured in many different ways[91] such as Lorenz curve, Gini coefficients, log normal distribution, coefficients of variations, inter-quartile range, ratios of income received by highest and lowest income groups, and normative measures that take into consideration valuation of society towards welfare of various sections of population such as Theil's Entropy measure, Atkinson's index, Takayama's index, Sen's index etc. (Cowell, 2000; Kemal, 2003). However, Kemal (2003) notes that Lorenz curve and Gini coefficients are generally used for ascertaining changes in income inequalities.

The Lorenz curve provides complete information on the whole distribution of incomes as a proportion of the mean and gives a comprehensive description of the relative standards of living of various groups of households (Kemal, 2003). The Gini coefficient, which was developed by the Italian statistician Corrado Gini in 1912 as a summary measure of income inequality in society, is usually associated with the plot of wealth concentration introduced a few years earlier, in 1905, by Max Lorenz. The Gini coefficient has been used to apply to topics other the income and wealth, but mostly within economics (Dollar and Kraay, 2002). It is defined as a ratio with values between 0 and 1.

To see whether SMEs contribute to income equality, many studies examine the relationship between the SME sector and the growth rate of the Gini coefficient. Using a comparable time-series data on measures of income inequality, namely the observation on the Gini coefficient for Korea contained in Deininger and Squire (1996), Nugent and Yhee (2001) studied the relationship between the share of SMEs in manufacturing employment and the Gini coefficient. There was a negative relationship between the share of SMEs in the economy and the income inequality in Korea during 1952–1996. Similarly, Beck et al (2005) examined the relationship between the importance of SMEs and changes in income distribution of the poorest quintile using the growth rate in the Gini coefficient measure (see equation 3.10). The study used a new database that assembled consistent data on the share of SME labour in the total manufacturing labour force of the lowest income quintile for 45 developing and developed countries. The Gini coefficient (G) is defined as the ratio of area between the Lorenz curve which plots population

[91] Cowell (1995) contains details of at least 12 summary measures of inequality.

shares against income shares. Higher values indicate more income inequality, so that larger negative growth rates indicate a faster movement towards income equality[92].

$$G_{i,t} - G_{i,t-1} = \alpha G_{i,t-1} + \beta(y_{i,t} - y_{i,t-1}) + \gamma SSME_i + \varepsilon_{i,t} \quad (3.10)$$

Equation (3.10) is used to examine the relationship between SMEs and changes in income distribution, as measured by the growth rate in the Gini coefficient. The growth of Gini is the annualized log difference of the Gini coefficient, and thus a measure of the evolution of income distribution.

where $G_{i,t}$ and $y_{i,t}$ is the log of the Gini coefficient and the real GDP per capita, respectively, in country i at year t. *SSME* is the share of the SME sector in the total labour force in manufacturing. The coefficient β indicates whether the income of the lowest income quintile grows proportionally with overall income growth in the economy, while γ indicates whether SME development has any relationship with the evolution of income distribution in the economy. A positive γ means there is an adverse effect, while a negative γ means a favourable relationship between SME development and the evolution of income distribution.

Following the Gini coefficient approach, moreover, Clay, Kampayana and Kayitsigna (1990) assessed the extent to which off-farm employment helps reduce income inequality in Rwanda. The study presented the distribution of total household income in Rwanda and broke this total into sub-categories such as agriculture and non-agriculture income. The finding shows that in developing countries, especially, off-farm employment has long been seen by farm residents as a way to bridge the income gap that arises from stagnating farm production and growing population pressure.

Berkowitz and Jackson (2005) formulated an equation to analyse the influence of small enterprise development on income distribution in Poland and Russia. The study surveyed a sample of about 1600 households in 1992, 1993, and 1994, and about 2300 households in 1997 and 1999 in

[92] While the Gini coefficient is a broader indicator of income inequality than the income share of the lowest income quintile, empirically, the latter is an almost linear function of the former (Dollar and Kraay, 2002).

Poland. As for Russia, the survey covered 75 and 77 out of the 89 regions in 1995 and 2001, respectively. The measures of income distribution, or inequality, were computed for each region based on the respondents in that region. R-squared value and an F-statistic were used to check the significant level of the relationship between small enterprise creation and income inequality.

If $SI_{i,t}$ and SSE denotes the share of income in a region and the share of the small enterprise (SE) sector in the total labour force in the manufacturing sector in country i at year t, the equation can be expressed as:

$$SI_{i,t} - SI_{i,t-1} = \alpha + \beta SSE_i + \delta X_i + \delta SI_{i,t-1} + \varepsilon_i \qquad (3.11)$$

where X is a vector of regional covariates including log population to capture the extent of the market and education. This is because both of these variables are important determinants of income distribution and enterprise development.

Similarly to Berkowitz and Jackson, Shaffer (2002) analysed the influence of firm size, which is measured as the average number of employees per manufacturing firm, on the real median household income in United State from 1979 to 1989. The dependent variable is the average growth rate of median household income. White heteroskedasticity-consistent standard errors are used to compute t-statistics. The study found that the average size of manufacturing firms was strongly and negatively associated with growth rates in median household income. Keane and Prassad's (2002) study shows a strong negative correlation between GDP growth and inequality for fourteen transition countries during the first eight years of the transition. Moreover, the relationship between the share of SMEs in total output and wage disparity has also been used to examine the contribution of SMEs in income equality, especially in Huang's (2003) study. The linear trend line for the relationship between the two variables was a negative slope showing a negative relationship with statistical significance at 5 per cent confidence level.

3.5.2 Empirical work on equal income distribution of SMEs

Mazumdar (2001, p. 6) and Nugent and Yhee (2001, p. 30) note that "it is widely, but often implicitly, assumed that an economy with a larger share of production in SMEs will have a more equal income distribution". Large firms normally tend to have a small number of employees on high wage incomes and this affects a relatively small number of families. Chee (1986) finds that small firms pay their workers, on average, about 40 per cent less than large establishments. However, Nugent and Yhee (2001) note that wages from SMEs are distributed more equally than profits, rent, and other components of national income. The income distribution characteristics of different firm sizes can be deduced by observing the wages rates, the wags share and, to the extent possible, the distribution of labour and capital income (Abdullash and Beal, 2002, pp. 1420-1). As a result, the development of SMEs would increase income for a relatively large number of people and the income distribution impact of SMEs is more favourable than that of large-scale enterprises. Other than that, according to Abdullash and Beal, SMEs offer a better regional distribution of industry and more variety and diversity in term of products and services, choices and preferences to the local consumers.

Nugent and Yhee (2001) and Kuznets (1955) identified factors that make income differentials decrease, such as surplus labour and the growth of human capital, respectively. At first, growth of the manufacturing sector increases income inequality because it pulls people out of the low income sector into the high income sector. However, as more and more people enter the high income sector, intersectoral income differentials decline. Moreover, when the surplus labour in the non-manufacturing sector disappears, the wage rate in this sector will increase, so that the income inequality further reduces. As far as the role of human capital growth on income inequality is concerned, Kuznets (1995) notes that the rapid expansion of education will at some point tend to decrease income inequality within the high income sector.

Small enterprises, especially, are found to generate more equitable income distribution in many studies, including Raynard and Forstater's (2002) and Luetkenhort's (2004) study. Small enterprises were shown to be more labour intensive, and contribute to more equitable income distribution both in South Africa and internationally. They may assist a large number of people to

survive at times when there is no better option (Jackson, 2004, pp. 58-9). Moreover, Berkowitz and Jackson (2005), who investigated how entry and growth of new small firms is related to changes in the distribution of income, found that a one-standard-deviation increase in the share of the workforce in new or small enterprises increases the share of income earned by 1.40 per cent and 1.25 per cent in Polish and Russian regions respectively. However, Shaffer (2002) found a negative relationship between the average size of manufacturing firms and growth rates in median household income in the United States during 1979–1989. An increase of one standard deviation in average firm size is associated with a change in the average growth rate of median household income of -2.50 per cent for manufacturing firms.

A study on SMEs during the period 1952–1996 by Nugent and Yhee (2001) found not only that the hypothesis is plausible for Korean conditions, but also the empirical evidence supports the hypothesis that the greater the relative importance of SMEs in the economy, the lower income inequality is likely to be. While the SME share in manufacturing employment was rising between 1952 and 1960, the Gini coefficient was rising. Then, between 1960 and 1975 while the SME share was falling, the Gini coefficient measure of income inequality was rising quite sharply. After 1975 when the SME share was rising, the Gini coefficient was falling. However, in low income countries, the smallest enterprises have much lower productivity levels than larger firms, and this is reflected in the lower wages and non-wage benefits paid by SMEs compared with large firms. This divergence in labour productivity and wage rates between small and large firms narrows, however, as industrialization proceeds (Hallberg, 1999, p. 8).

In Thailand SMEs are found to encourage more equality by generating and distributing income more equally than LEs. There is a negative relationship between the share of SMEs in provincial output and wage disparity in Huang (2003). This relationship is confirmed through their correlation coefficient of -0.199 showing statistical significance at 5 per cent confidence level. Moreover, the regression of wage disparities and share of SMEs shows a negative slope. Moreover, in Taiwan, between 1952 and 1972 real income for all population groups rose and was distributed more equally. Many SMEs were outside the main urban areas, they gave rural families an opportunity to supplement their incomes with non-agricultural employment. Mao and Schive (1998) found that the Gini coefficient declined from 0.56 in 1953 to 0.32 in 1964 and 0.29 by

1972. However, Beck et al (2005), who regressed the annual growth in the Gini coefficient on the log of the initial Gini coefficient, GDP per capita growth and SME, found that the importance of SMEs had no direct impact on how an economy's income distribution evolves. Both GDP per capita growth and the log of the initial value of Gini did not enter significantly. A larger SME sector did not make income distribution more equal.

Liu and Yu (2008) argued that one way to mitigate the gap in regional economic growth and income distribution is to narrow the disparity in the development of the SMEs sector. Income disparity has increased significantly in the People's Republic of China, largely as a result of a widening urban-rural income gap. The urban-rural inequality stems from the insufficient development of rural SMEs and the regional divergence in SME development (Liu and Yu, 2008). Using provincial cross-section data from 1985 to 2002 to analyse the factors affecting the divergence in provincial economic growth in China, Lv and Sun (2005) indicated that regional disparities in SME development were a main cause of regional disparities in economic development and income. Similarly, Lv and Cai (2005), who compared the contributions to regional disparities in gross industrial output value by different types of enterprises, found SMEs, especially small enterprises, are a key source of the disparity in industrial growth in China, although varying in degree depending on regions and time periods. Liu and Yu (2008) identified a number of factors for the development of SMEs including human capital, production technologies, management skills, protection of property rights, business environment, and access to credit.

Table 3.5: Summary of all studies on income distribution of SMEs

Country	Objective of the study	Author	Period	Results
45 developing and developed countries	Relationship between the share of SMEs and changes in income distribution, as measured by the growth rate in the Gini coefficient.	Beck et al (2005)	1990–2000	SMEs do not make income distribution more equal.
Korea	Relationship between share of SMEs in manufacturing employment and Gini coefficient	Nugent and Yhee (2001)	1952–1960, 1960–1975, and After 1975	SMEs make income distribution more equal.
Poland and Russia	Relationship between income distribution and the share of small enterprises in total labour force.	Berkowitz and Jackson (2005)	Poland: 1992, 1993, 1994, 1997, and 1999. Russia: 1995, 2000, and 2001.	Small enterprises make income distribution more equal.
USA	Relationship between income distribution of median household and the share of labour force in manufacturing.	Shaffer (2002)	1979 to 1989	Enterprises do not improve household income.
Thailand	Relationship between the share of output and wage disparity	Huang (2003)	1997	SMEs make income distribution more equal.

CHAPTER IV

METHODOLOGY OF THE STUDY

4.1 INTRODUCTION

This chapter identifies and defines models or methodologies that are used in the study. There are four sections in this chapter. The first, second, and third sections discuss the objectives of the study and identify methodologies that are used to study (1) labour intensity of SMEs and employment of female labour; (2) productivity of SMEs; and (3) equal income distribution effects of SMEs. The fourth section describes how each variable is measured and calculated in the study.

4.2 HYPOTHESIS 1: SMES ARE RELATIVELY MORE LABOUR INTENSIVE THAN LES

4.2.1 Overview

The aim is to test whether SMEs have a potential to generate more jobs relative to LEs as long as SMEs utilize more labour-intensive production techniques and have an equal access to capital. The use of index numbers to measure labour or capital intensity is implemented by many researchers in different countries. In 1980, Sam P. S. Ho of the Economics Department of the World Bank in Washington DC used the capital-labour ratio to measure capital intensity in small and large enterprises in Taiwan and Korea. After Ho's study, many other papers used the same model to measure factor intensity of industries in different countries, such as in Finland (Hytti, 2000), Thailand (Paitoon, 2001), Indonesia (Hayashi, 2002), Thailand (Huang, 2003), Taiwan (Sinha, 2003), and in Canada (Leung and Yuen, 2005). However, few studies used labour input per unit of value added to calculate factor intensities. Blejer (1978), Abdullash and Beal (2002), Nugent and Yhee (2001) and Kochhar et al (2005) used individual and cross-country data to characterize manufacturing industry by labour intensity in developed and developing countries.

Female participation in the labour force has risen dramatically over recent decades, especially in the SME sector, in various countries. Women comprised a greater portion of total employees among SMEs than in large enterprises in Korea (Lee, 2006), Malaysia (Aris, 2007), and Indonesia (Tambunan, 2008). However, the number of women in the labour force was lower

compared to men in India and Turkey. The female-male labour ratio has been used by many studies, especially Tambunan (2008), to study the contribution of female labour in SMEs.

This paper follows P. S. Ho's model of the capital-labour ratio to identify implications regarding SMEs' contribution to employment generation relative to LEs in Cambodia. The following section discusses methodology that will be used to study the differences of the capital-labour ratio of SMEs and LEs.

4.2.2 Methodology

The promotion of Cambodian SMEs has at least a potential to generate more jobs relative to LEs as long as SMEs utilize more labour-intensive production techniques and have an equal access to capital. The capital-labour ratio is calculated for each industry to account for the capital usage per labour input among different sized firms. By doing so, it is possible to measure how much capital is utilized by SMEs for one unit of labour relative to LEs. A t-test is used to check the reliability of the result and examine the statistical significance.

The production function below represents industry production not firm production. The industry consists of firms under perfect competition. Assuming that only capital (K) and Labour (L) are the input for the output, using Solow's notation:

$$Q_{size,i} = f(L_{size,i}, K_{size,i}, t) \qquad (4.1)$$

Where

$Q_{size,i}$ = quantity of output of SMEs and LEs

size = SMEs (100 or fewer employees) and LEs (more than 100 employees)

$L_{size,i}$ = number of units of labour applied to production in SMEs and LEs

$K_{size,i}$ = amount of capital applied to production in SMEs and LEs measured in USD

t = time

$f(.)$ = production of function

i = SMEs (i = 1,..., 400); and LEs (i = 1,..., 100)

The production function (4.1) is assumed to be identical across industries, thus both SMEs and LEs share the same production function *f(.)*. This means that the industries share the same technologies. Both labour and capital are homogeneous. Thus there is only one type of labour and one type of capital. The labour and capital equipment in different industries are exactly the same. The study also assumes that labour and capital are freely mobile across industries within the country. The definitions and measurements of the two variables are discussed in section 4.5 in this chapter. By taking the ratios of the factor requirements in each industry we can define the capital-labour ratio as capital intensity, or the amount of capital per worker in each industry (see equation 4.2). These ratios, one for each industry, represent the proportions in which factors are used in the production process.

If $K^{*}_{size,i,t}$ denotes capital-labour ratio of SMEs and LEs (*size* = SMEs and LEs) in industry i (i=1,2,..., 400 for SME; and i = 1,2,..., 100 for LEs) at time t, the capital-labour ratio for SMEs and LEs is:

$$K^{*}_{size,i,t} = \frac{1}{n}\sum_{i=1}^{n}\frac{K_{size,i,t}}{L_{size,i,t}} \qquad (4.2)$$

In this respect, similarly to the studies of Oh et al (2005), Okamoto and Sjoholm's (1999), Paitoon's (2001), and Cororaton and Cuenca's (2001) on Korea, Indonesia, Thailand, and the Philippines respectively, the nominal value of capital variable is deflated using GDP deflators (see equation 4.3). In order to construct a capital stock series, this study follows the method of estimating capital stock established by Cororaton and Cuenca (2001), Hall and Scobie (2005) and Wang and Lawson (2005) (see section 4.5: measuring of variables, in this chapter).

$$K^{real}_{size,i,t} = K_{size,i,t}\frac{GDPD_0}{GDPD_t} \qquad (4.3)$$

where $K^{real}_{size,i,t}$, $GDPD_t$, GDPD0 are real capital input, GDP deflator index at time t, and GDP deflator index at base year (2001) respectively.

As a result, equation (4.2) can be rewritten as:

$$K^{*}_{size,i,t} = \frac{1}{n}\sum_{i=1}^{n}\frac{K^{real}_{size,i,t}}{L_{size,i,t}} \quad (4.4)$$

SMEs are more labour intensive, for a unit of output of standard quality, than LEs if:

$$\frac{K^{real}_{sme,i,t}}{L_{sme,i,t}} < \frac{K^{real}_{le,j,t}}{L_{le,j,t}} \quad (4.5)$$

where $K^{real}_{sme,i,t}$ and $K^{real}_{le,i,t}$ is real capital input for SMEs and LEs respectively. And, $L_{sme,i,t}$ and $L_{le,i,t}$ is labour input for SMEs and LEs respectively. In equation (4.5), SME production requires more labour than is required in LE production. If SME is the labour-intensive industry, then LE must be the capital-intensive industry.

Moreover, $FML^{*}_{size,t}$ denotes the female-male labour ratio of SMEs and LEs (*size* = SMEs and LEs) in industry at time *t*. $FL_{size,t}$ *and* $ML_{size,t}$ denote female labour, and male labour, respectively.

$$FML^{*}_{size,t} = \frac{FL_{size,t}}{ML_{size,t}} \quad (4.6)$$

This study uses a t-test to examine the statistical significance of the relationship between SMEs and LEs. This test is to examine the effects of one independent variable on one or more dependent variables and is restricted to comparisons of two conditions or groups (two levels of the independent variable). The results of this test enable me to determine if two means differ significantly. The independent sample t-test method is important to this study because it is used to compare two means that come from different groups of subjects; the dependent variable is measured at the ratio level; and the capital-labour ratios are obtained using a survey from the population across the industries and regions (see chapter V for the details of research processes).

As mentioned earlier, the observations that make up the capital-labour ratio are independent of one another. I compare two sets of data, capital-labour ratios of SMEs and LEs, for one industry at a time over a five-year period (2002–2006). If the mean of SMEs capital-labour ratio is significantly less than LEs, the significance needs to be less than 5 per cent (0.05) to be significant.

4.3 HYPOTHESIS 2: SMES ARE AS PRODUCTIVE AS LES

4.3.1 Overview

Although past productivity studies of SMEs in developed countries showed relatively positive effects of SMEs' development, such results are relatively less prevalent in developing countries. Therefore, this second hypothesis intends to find out whether Cambodian SMEs are comparable or not to LEs in terms of productivity.

Either a bilateral or multilateral index has been defined to perform comparisons among group of firms in many studies. A multilateral index approach, which is also called a "chained-multilateral index", is used to compute total factor productivity (TFP) of each plant or firm, as developed by Good et al (1997). This approach can be used for time series as well as cross-section comparisons and for combinations of time series and cross-section data. It is attractive for firm and industry data in addition to country data. An alternative approach which was developed by Christensen et al (1981) is important for measuring TFP of a given plant in a single year. This approach which is used for comparisons of productivity allows relaxation of part of the assumption associated with the use of index numbers. However, the widely varying results have to be attributed to differences in one or more of the following points: (1) sources of output data and price deflators; (2) the measure of output (gross of production or value added)[93]; (3) the assumed form of production function (Cobb-Douglas, translog); (4) the extent to which economies of scale are accounted for; (5) adjustment in working hours, capital utilization rates; and (6) the level of aggregation. As it is based on the standard production model, TFP is subject to the assumption of

[93] The use of value added instead of gross production requires the additional assumption that time, capital, labour, and any other inputs are separable from raw material and intermediate inputs, an assumption which was rejected in most sectors for the United States (Jorgenson, Gollop, and Fraumeni, 1987).

constant return to scale where the results of the estimation are usually interpreted as productivity gains through adoption of new technology. However, Urata and Kawaii (2001) argued that in the short run, firms are generally constrained by immobility of inputs, inefficient management and inappropriate incentive systems causing under-utilization, and possibility of true production technology being subject to increasing returns to scale. Since TFP usage is still limited, Hayashi (2001), Hsiao and Park (2002) and Huang (2003) provide two further measures, labour and capital productivity measure, to perform comparisons among group of firms. Labour and capital productivity are useful indicators for representing the efficiency of labour and capital respectively.

This paper follows the TFP approach (Good et al, 1997; Christensen et al, 1981), and the labour and capital productivity measure to compare productivity differences between SMEs and LEs in Cambodia. The following sections define the four methodologies of the study that permit us to measure the differences of productivity of SMEs and LEs and the definition of variables in the study.

4.3.2 Methodology

The purpose of this section is to measure the differences in total factor productivity level between small and medium enterprises (SMEs) and large enterprises (LEs) in Cambodia. To investigate the magnitude of these differences, this paper follows four different methodologies. The first methodology was developed by Christensen et al (1981) and applied by Yoo (1991, 1992), Baily et al (1992), Okamoto and Sjoholm (1999), Nugent and Yhee (2001), Huang (2003) and van Biesebroeck (2005). The second methodology was developed by Good et al (1997) and applied by Chung (1998), Hahn (2000, 2004), Aw (2001), Aw, Chung and Roberts (2001), Oh et al (2006) and Castany et al (2007). The last two methodologies were used by Hayashi (2001), Hsiao and Park (2002) and Huang (2003).

To calculate TFP for firms, Baily et al (1992), Okamoto and Sjoholm (1999), Cororaton and Cuenca (2001) and Hayashi (2002) used the neoclassical production function. The calculation of

TFP in this study is also based on the neoclassical production function which has three factors of input: labour (L), capital (K), and intermediate (M) input (see equation 4.7).

$$Q_{size,i} = f\left(L_{size,i}, K_{size,i}, M_{size,i}, t\right) \qquad (4.7)$$

where output of SMEs or LEs ($size$ = SMEs or LEs) ($Q_{size,i}$) is produced from labour ($L_{size,i}$), capital ($K_{size,i}$), and material ($M_{size,i}$) under the conditions of neutral technological change and constant returns to scale. Following Felipe (1997), assuming that the argument "t" is separable from L, K, and M

$$Q_{size,i,t} = A_{size,i,t} f\left(L_{size,i,t}, K_{size,i,t}, M_{size,i,t}\right) \qquad (4.8)$$

$A_{size,i,t}$ is referred to as exogenous and neutral technical progress, and is measure by how output changes as time elapses with the input bundle held constant[94]. Equation (4.8) is the basic the Cobb-Douglas production function, which can be rewritten in long-form as:[95]

$$\ln Q_{size,i,t} = \alpha_{size,i,t} \ln L_{size,i,t} + \beta_{size,i,t} \ln K_{size,i,t} + \gamma_{size,i,t} \ln M_{size,i,t} + A_{size,i,t} \qquad (4.9)$$

where $\alpha_{size,i,t}$, $\beta_{size,i,t}$, and $\gamma_{size,i,t}$ are the elasticity of the output with respect to labour, capital, and intermediate inputs respectively. Under constant returns to scale, the sum of factor input elasticities is equal to one ($\alpha_{size,i,t} + \beta_{size,i,t} + \gamma_{size,i,t} = 1$).

The same assumptions are made as in the first hypothesis, so that SMEs and LEs share the same production function and the same technologies. The term $A_{size,i,t}$ in equation (4.9) can be interpreted as the level of TFP and can be re-expressed as:[96]

$$\ln TFP_{size,i,t} = \ln Q_{size,i,t} - \alpha_{size,i,t} \ln L_{size,i,t} - \beta_{size,i,t} \ln K_{size,i,t} - \gamma_{size,i,t} \ln M_{size,i,t} \qquad (4.10)$$

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[94] See Felipe (1997, p. 5).
[95] See Hayashi (2002, p. 27).
[96] See Wang and Lawson (2005). However, in Wang and Lawson's study, there are only two factors of inputs, labour and capital.

Relative TFP is calculated by relating deviations of firm output from the industry mean to the deviations of the factor inputs from the industry means. As a result, the expression (4.10) could be interpreted as:

$$\begin{aligned}\ln TFP_{size,i,t} = &\left(\ln Q_{size,i,t} - \ln \overline{Q}_{size,t}\right) - \alpha_{size,i,t}\left(\ln L_{size,i,t} - \ln \overline{L}_{size,t}\right) \\ &-\beta_{size,i,t}\left(\ln K_{size,i,t} - \ln \overline{K}_{size,t}\right) - \gamma_{size,i,t}\left(\ln M_{size,i,t} - \ln \overline{M}_{size,t}\right)\end{aligned} \quad (4.11)$$

where $\overline{Q}_{size,t}$, $\overline{L}_{size,t}$, $\overline{K}_{size,t}$, and $\overline{M}_{size,t}$ are the industry average values of output and factor inputs of different size of industry (SMEs or LEs).

In this study all nominal variables (output, capital, and material) that are used in analysis are deflated (see equations 4.12 and 4.13). This hypothesis uses the same capital input as in the first hypothesis, where its nominal value is deflated using a GDP deflator. As for other variables, this study is similar to Aw et al (2001), Fariñas and Martin-Marcos (2002), Liang (2001), van Biesebroeck (2005), Oh et al (2005), and Okamoto and Sjoholm, (1999), where output is deflated using GDP deflators, while material costs are deflated using producer price index (see equations 4.12 and 4.13).

$$Q^{real}_{size,i,t} = Q_{size,i,t}\frac{GDPD_0}{GDPD_t} \quad (4.12)$$

$$M^{real}_{size,i,t} = M_{size,i,t}\frac{PPI_0}{PPI_t} \quad (4.13)$$

where $Q^{real}_{size,i,t}$, and $M^{real}_{size,i,t}$ are real outputs, and real material inputs of different firm sizes (SMEs or LEs) at time *t* respectively, and *GDPD* and *PPI* denote *GDP* deflator and producer price index, respectively. As a result, equation (4.11) can be reinterpreted as relative to the industry as a whole:

$$\ln TFP_{size,i,t} = \left(\ln Q^{real}_{size,i,t} - \ln \bar{Q}^{real}_{size,t}\right) - \alpha_{size,i,t}\left(\ln L_{size,i,t} - \ln \bar{L}_{size,t}\right) - \beta_{size,i,t}\left(\ln K^{real}_{size,i,t} - \ln \bar{K}^{real}_{size,t}\right) - \gamma_{size,i,t}\left(\ln M^{real}_{size,i,t} - \ln \bar{M}^{real}_{size,t}\right) \quad (4.14)$$

The relative TFP index of each establishment is calculated for each industry, then averages of the TFP index are calculated for each firm size in each industry. In order to avoid effects of pricing and tariffs of different industrial products, the index is calculated for each industry separately.

Besides equation (4.14), this chapter also uses the index developed by Good et al (1997) and applied by Chung (1998), Hahn (2000, 2004), Aw (2001), Aw, Chung and Roberts (2001), Oh et al (2006) and Castany et al (2007). It is derived from a translog production function. The total factor productivity index for firm *i* at time *t* in this study is measured as:

$$\ln TFP_{size,i,t} = \left(\ln Q^{real}_{size,i,t} - \ln \bar{Q}^{real}_{size,t}\right) - \frac{1}{2}\sum_{g=1}^{n}\left(S_{size,i,g,t} + \bar{S}_{size,g,t}\right)\left(\ln X^{real}_{size,i,g,t} - \ln \bar{X}^{real}_{size,g,t}\right) + \sum_{s=2}^{t}\left(\ln \bar{Q}^{real}_{size,s} - \ln \bar{Q}^{real}_{size,s-1}\right) - \frac{1}{2}\sum_{s=2}^{t}\sum_{g=1}^{n}\left(\bar{S}_{size,g,s} + \bar{S}_{size,g,s-1}\right)\left(\ln \bar{X}^{real}_{size,g,s} - \ln \bar{X}^{real}_{size,g,s-1}\right) \quad (4.15)$$

Where $X_{size,i,g,t}$ denotes set of inputs where g= *L*, *K*, and *M*. The firm's expenditure on input $X_{size,i,g,t}$, as a share of total revenue, is denoted $S_{size,i,g,t}$, and symbols with the upper bar refer to their average. The subscripts s and g are indices for reference time and inputs respectively. The productivity index for a given firm and year is expressed in relation to the hypothetical firm in the base period, 2002.

The first line of equation (4.15) is the deviation of the firm output and inputs from those of a hypothetical firm, which is the reference point in year *t*. In the second part, the inputs are summed using a combination of the input revenue share for the firm $S_{size,i,g,t}$ and the average revenue share $\bar{s}_{size,g,t}$ in each year as weights. This can be expressed as:

$$= \left(\ln Q^{real}_{size,i,t} - \ln \overline{Q}^{real}_{size,t}\right) - \begin{bmatrix} \frac{1}{2}\left(\alpha_{size,i,t} + \overline{\alpha}_{size,t}\right)\left(\ln L_{size,i,t} - \ln \overline{L}_{size,t}\right) + \\ \frac{1}{2}\left(\beta_{size,i,t} + \overline{\beta}_{size,t}\right)\left(\ln K_{size,i,t} - \ln \overline{K}_{size,t}\right) + \\ \frac{1}{2}\left(\gamma_{size,i,t} + \overline{\gamma}_{size,t}\right)\left(\ln M_{size,i,t} - \ln \overline{M}_{size,t}\right) \end{bmatrix} \quad (4.16)$$

The second line of equation (4.15) is the cumulative change in the output and input reference point between year *t* and the initial year. As output, inputs and shares may change, it introduces a productivity differential every year, and therefore accounts for possible technological changes. Equation (4.17) is the re-expression of the second line of equation (4.15).

$$= \sum_{s=2}^{t}\left(\ln \overline{Q}^{real}_{size,s} - \ln \overline{Q}^{real}_{size,s-1}\right) - \frac{1}{2}\sum_{s=2}^{t}\begin{bmatrix} \left(\overline{\alpha}_{size,i,s} + \overline{\alpha}_{size,i,s-1}\right)\left(\ln \overline{L}_{size,i,s} - \ln \overline{L}_{size,i,s-1}\right) \\ +\left(\overline{\beta}_{size,i,s} + \overline{\beta}_{size,i,s-1}\right)\left(\ln \overline{K}_{size,i,s} - \ln \overline{K}_{size,i,s-1}\right) \\ +\left(\overline{\gamma}_{size,i,s} + \overline{\gamma}_{size,i,s-1}\right)\left(\ln \overline{M}_{size,i,s} - \ln \overline{M}_{size,i,s-1}\right) \end{bmatrix} \quad (4.17)$$

Averaging is likely to remove some measurement error, especially, of all the input and output variable, the wage bill is most volatile over time and across firms (van Biesebroeck, 2005). The averages of real output and inputs of all firms in each industry are calculated as:

$$\ln \overline{Q}^{real}_{size,t} = \frac{1}{n}\sum_{i=1}^{n} \ln Q^{real}_{size,i,t} \quad (4.18)$$

$$\ln \overline{L}_{size,t} = \frac{1}{n}\sum_{i=1}^{n} \ln L_{size,i,t} \quad (4.19)$$

$$\ln \overline{K}^{real}_{size,t} = \frac{1}{n}\sum_{i=1}^{n} \ln K^{real}_{size,i,t} \quad (4.20)$$

$$\ln \overline{M}^{real}_{size,t} = \frac{1}{n}\sum_{i=1}^{n} \ln M^{real}_{size,i,t} \quad (4.21)$$

According to Oh et al (2005), the factor elasticity (ie. $\alpha_{size,i,t}$, $\beta_{size,i,t}$, $\gamma_{size,i,t}$) for each factor input is measured as the average of the firm's factor cost shares and the industry shares within the same plant size class (see equations 4.25, 4.26, and 4.27). Thus, factor elasticity of plant is permitted to vary across industries and size classes, as well as over time. The study follows Hayashi (2002), Huang (2003) and Okamoto and Sjoholm (1999), where labour cost shares are taken as total

labour compensation divided by total output; material cost shares are taken as total cost of material divided by the total output, capital cost shares are computed as residual of the other shares (see section 4.5 in this chapter: measurement of variables).

The averages of the firm's factor cost shares for *L*, *K*, and *M* are expressed as:

$$\overline{\alpha}_{size,t} = \frac{1}{n}\sum_{i=1}^{n}\alpha_{size,i,t} \quad (4.22)$$

$$\overline{\beta}_{size,t} = \frac{1}{n}\sum_{i=1}^{n}\beta_{size,i,t} \quad (4.23)$$

$$\overline{\gamma}_{size,t} = \frac{1}{n}\sum_{i=1}^{n}\gamma_{size,i,t} \quad (4.24)$$

Therefore, the factor elasticity of each factor input is:

$$\alpha_{size,i,t} = \frac{1}{2}\left(\alpha_{size,i,t} + \overline{\alpha}_{size,t}\right) \quad (4.25)$$

$$\beta_{size,i,t} = \frac{1}{2}\left(\beta_{size,i,t} + \overline{\beta}_{size,t}\right) \quad (4.26)$$

$$\gamma_{size,i,t} = \frac{1}{2}\left(\gamma_{size,i,t} + \overline{\gamma}_{size,t}\right) \quad (4.27)$$

Although TFP is quite widely used in productivity studies, there are a number of limitations to its usage. As it is based on the standard production model, TFP is subject to the assumption of constant returns to scale where the results of the estimation are usually interpreted as productivity gains through adoption of new technology. However, according to Urata and Kawaii (2001), such productivity gains are appropriate only when firms achieve maximum output given the level of inputs and technology in the long run. In the short run, firms are generally constrained by immobility of inputs, inefficient management and inappropriate incentive system causing under-utilization, and the possibility of true production technology being subject to increasing return to scale.

Therefore, two further measures are provided to examine the performance of SMEs, simply labour and capital productivity. The two methods have been used by Hayashi (2001) and Hsiao

and Park (2002) to measure productivity for industries in Indonesia, and Korea and Taiwan, respectively. According to Hayashi, labour productivity is a useful indicator, because it can represent the efficiency of labour (as an abundant resource) in generating output. Labour productivity is increased when output rises through the better utilization and coordination of all factors of production. Output may increase when labour is working smarter, harder, faster or with better skills, but it also increases with the use of more or better machinery, a reduction in the waste of input materials or the introduction of technical innovations. In addition, in most developing countries, labour is abundant while capital is scarce. As a result, the existence of higher capital productivity especially in these economies may imply higher efficiency in the use of scarce resources. Labour productivity ($LP_{size,i,t}$) and capital productivity ($KP_{size,i,t}$) can be written as:

$$LP_{size,i,t} = \frac{1}{n}\sum_{i=1}^{n}\frac{Q^{real}_{size,i,t}}{L_{size,i,t}} \qquad (4.28)$$

$$KP_{size,i,t} = \frac{1}{n}\sum_{i=1}^{n}\frac{Q^{real}_{size,i,t}}{K^{real}_{size,i,t}} \qquad (4.29)$$

In this respect, like Huang (2003) and Castany et al (2007), this study uses a t-test to check the reliability of the result and examine the statistical significance of the relationship between SMEs and LEs. As mentioned in the first hypothesis testing, an independent sample t-test method is useful for the comparison of two means that come from different groups. The study compares two data sets of SMEs and LEs, for one industry at a time, over a five-year period. SMEs are significantly more productive than LEs if the TFP level of SMEs is higher than LEs at 5 per cent (0.05) level.

4.4 HYPOTHESIS 3: SMES ARE MORE EQUITABLE IN DISTRIBUTING INCOME THAN LES

4.4.1 Overview

Inequality is defined as the dispersion of a distribution, whether that be income, consumption or some other welfare indicator or attribute of a population (Litchfield, 1999). Inequality can be measured in many different ways. However, according to Kemal (2003), the Lorenz curve and Gini coefficients are generally used for ascertaining changes in income inequalities.

The three most popular methodologies were used to assess the relationship between income inequality and production in different countries. The first was developed by Beck et al (2005), who examined the importance of SMEs in equalizing income distribution by relating the share of SMEs and changes in income distribution, as measured by the growth rate in the Gini coefficient. Similarly to Beck et al's study, Nugent and Yhee (2001) related SME shares in manufacturing employment and Gini coefficient. Clay et al (1990) used the Gini coefficient approach to study the contribution of off-farm employment to income inequality in Rwanda. Second, Berkowitz and Jackson (2005) and Shaffer (2002) studied the relationship between income distribution and the share of enterprises in total labour force to analyse the influence of enterprise development on income distribution in Poland and Russia, and the United States, respectively. However, Berkowitz and Jackson noted that the above estimation is complicated by the possibility of reverse causality (Berkowitz and Jackson, 2005). Third, a recent study by Huang (2003) studied the relationship between the share of SMEs in regional output and wage disparity.

The methodology used by Beck et al (2005), Berkowitz and Jackson (2005) and Shaffer (2002) is the relationship between enterprise development and income distribution of a given industry in multiple years. Since this study is on a single year, therefore, this paper follows Huang's (2003) methodology, the relationship between the share of SMEs and wage disparity, to test whether SMEs are associated with more equitable income distribution in Cambodia. The following sections define the methodology of the study that permits us to measure the degree to which

SMEs contribute to income equality in Cambodia and, lastly, the definition of variables in the study.

4.4.2 Methodology

To test whether SMEs are associated with more equitable income distribution in Cambodia, this study relates the wage disparity in each province to the share of SMEs in provincial output. The wage disparity is represented by the coefficient of variation of wage paid by each firm in different provinces of Cambodia. If the provinces with higher income equality have a higher share of SMEs, this may imply that promotion or development of SMEs could lead to more equitable income distribution in the future. Equation (4.30) below shows the relationship between independent variable (SSME) and dependent variable (CV):

$$CV_{sme,p,t} = \beta_t SSME_{p,t} + e_t \qquad (4.30)$$

where $SSME_{p,t}$ and $CV_{sme,p,t}$ represent the share of SMEs in provincial output and the coefficient of variation of wage in province p ($p= 1,2,3,\ldots, 13$) at time t ($t=2002,\ldots,2006$) respectively. β_t and e_t are slope and intercept at time t. The coefficient of variation of wage and the share of SMEs in each province are expressed as in (4.31) and (4.32) below:

$$CV_{sme,p,t} = \frac{\sigma_{sme,p,t}}{\overline{w}_{sme,p,t}} \qquad (4.31)$$

where $CV_{sme,p}$ = Coefficient of variation of wage in p province

$\sigma_{sme,p}$ = Standard deviation of wage of SME in p province

$\overline{w}_{sme,p}$ = Mean of wage of SME in p province

t = time (2002, 2003, 2004, 2005, and 2006)

p = 12 provinces and one capital in Cambodia

Also, the share of SME in provincial output equals real output of SMEs ($Q^{real}_{sme,p,t}$) divided by total of provincial output ($TQ^{real}_{p,t}$) in real value (see equation 4.32). As mentioned in the second test for the productivity level of SMEs, such as Aw et al (2001), Fariñas and Martin-Marcos (2002), Liang (2001), Oh et al (2005), and Okamoto and Sjoholm (1991), van Biesebroeck (2005), in this study nominal values such as total output of SMEs ($Q_{sme,p,t}$) and total provincial output ($TQ_{p,t}$) are deflated using GDP deflators (see equations 4.33 and 4.34).

$$SSME_{p,t} = \frac{Q^{real}_{sme,p,t}}{TQ^{real}_{p,t}} \qquad (4.32)$$

$$Q^{real}_{size,p,t} = Q_{sme,p,t}\frac{GDPD_{2001}}{GDPD_t} \qquad (4.33)$$

$$TQ^{real}_{size,p,t} = TQ_{sme,p,t}\frac{GDPD_{2001}}{GDPD_t} \qquad (4.34)$$

where $GDPD_{2001}$, and $GDPD_t$ denote GDP deflator at 2001 (an initial year) and at time *t*.

In order to measure the degree to which SSME and CV variables are linearly related, the correlation coefficient (*r*) is used.[97]

$$r_{ssme,cv} = \frac{Cov(SSME,CV)}{\sigma_{SSME},\sigma_{CV}}, \text{ where } -1 < r_{ssme,cv} < 1 \qquad (4.35)$$

The method for collecting the data to calculate the variance of wages within each province is described in detail in section 4.5 of this chapter.

[97] It is similar to Huang (2003) on Thailand and Clay et al. (1990) on Rwanda.

4.5 MEASURING VARIABLES

The data used in this paper are from a survey of 400 SMEs and 100 LEs over a five-year period (2002, 2003, 2004, 2005 and 2006) across the regions and industries in Cambodia. The survey provides information on the output and input variables that are necessary to measure total factor productivity (TFP), labour and capital productivity at the firm level, and wage disparity. This section provides the definition and measurement of all the variables in the study.

4.5.1 Output (Q)

This study follows Aw (2001), Farinas et al (2002), and Okamoto and Sjoholm (1999), in applying the value of gross output deflated by a GDP deflator index.[98] Output includes all receipts of the establishment, including sales of goods produced, receipts of goods for resale, receipts from contract and commission work, receivable rents, other receipts, and changes in value of stock of work-in-progress, finished goods, and goods for resale. The gross production of each firm is used as a measure of output.

Data on production volumes are obtained through sample surveys of 500 enterprises. The output of a firm is computed independently for each type of firm in different size classes (large and medium and small enterprises). All industries in the survey samples provided values and quantities of sales by detailed product category.

The survey on output enables us to measure the firm's inventories of final output in each year. Thus, it is able to distinguish firm sales from firm production in the year. The latter is preferable in productivity studies. The information on firm-level output prices (or GDP deflator) to use in deflating firm output is from the National Institute of Statistics (NIS), Ministry of Planning of Cambodia. NIS regularly conducts an output price survey and publishes the results yearly. While there is no limitation, it does not create the possibility that TFP estimates at the firm level will be

[98] However, Cororaton and Cuenca (2001), Hayashi (2002), Oh et al. (2005), Paitoon (2001) and van Biesebroeck (2005) use value added as output.

biased in a way that is related to firm size. The use of a common industry price deflator will not underestimate or overestimate the real output of SMEs and LEs.

4.5.2 Capital input (K)

Capital input is the net book value of fixed assets which includes buildings, vehicles, machinery and equipment, and office appliances. This study is the same as Hayashi (2002), Hsiao and Park (2002) and Motohashi (2004), but it is in contrast to Huang (2002), Liang (2002), Paitoon (2001) and Sinha (2003), where land is included in capital input. It is likely that land price has changed dramatically in urban areas where more large industries are allocated. This can lead to overestimation in estimating capital assets for large industries. Moreover, this study follows Paitoon (2001), where tangible fixed assets are included, but rented assets are excluded from capital assets[99]. In the survey, among all sizes of industry, only large enterprises used rented fixed assets, especially building and machinery.

In order to construct capital stocks series for the 500 enterprises across regions from 2002 to 2006, it requires assumptions on common sector-specific depreciation rates across industries and regions.[100] This is set to the same rate whether the firm's size is small or large or it operates for less than 12 months per year. The capital stocks estimates for SMEs and LEs are based on Cambodian depreciation rates, with assets divided into classes as follows:[101]

Class 1: Buildings and structures including their basic components. The rate of depreciation is 5 per cent under the Straight Line method (the book value of previous year minus depreciation expense of the original cost - see equation 4.36).

[99] As it is likely that there are more small firms with rented fixed assets for production than large firms, the estimated capital input used in the small firms can be underestimated. Furthermore, if smaller firms have older assets than large firms, their low book value of fixed assets will underestimate capital inputs (Paitoon, 2001, pp. 9-10).
[100] Cororaton and Cuenca (2001) note that in the estimation of the capital stock series rate of depreciation is needed.
[101] See Article 13 in Section 3 of the Law on Taxation of Cambodia (1997). This law is adopted by the National Assembly of the Kingdom of Cambodia on 8 January 1997 at the 7th session, 1st term of the National Assembly.

Class 2: Computers, electronic information systems, software, and data handling equipment. The rate of depreciation is 50 per cent under the Declining Balance method (the book value of previous year minus depreciation expense of the previous year's book value - see equation 4.37).

Class 3: Motor vehicles, and office furniture and equipment. The rate of depreciation is 25 per cent under the Declining Balance method.

Class 4: All other tangible property. The rate of depreciation is 20 per cent under the Declining Balance method.

This study is based on the perpetual inventory method in Cororaton and Cuenca (2001), Hall and Scobie (2005) and Wang and Lawson (2005). It is the method of estimating capital stock which aims at cumulating the constant price investments and deducting the value of depreciated assets. Letting c denote types of capital, with I denoting a new investment and d the depreciation rate, capital stocks (K) under the straight line method (see equation 4.36) and the declining balance method (see equation 4.37) are:

$$K_{size,i,c,t} = K_{size,c,t-1} - (K^{initial}_{size,i,c} \times d_{size,i,c}) + I_{size,i,c,t} \qquad (4.36)$$

$$K_{size,i,c,t} = K_{size,c,t-1} - (K_{size,c,t-1} \times d_{size,i,c}) + I_{size,i,c,t} \qquad (4.37)$$

Investment (I) is any expenses incurred during the operation such as buying new machinery, equipment and office appliances; building a new non-residential building and other construction; maintenance costs; and so on. $K^{initial}_{size,i,c}$ is the initial capital stock. It is the starting values for capital stocks which are required in order to implement the perpetual inventory formula. The starting values of industries are set differently depending on when the industry was established. Thus, the starting year for applying this formula (equation 4.36) for all types of assets had started from the established year.

4.5.3 Labour input (L)

This study uses both data on hours worked and total employees to measure TFP and capital-labour ratio. Similar to Hall and Scobie (2005), labour input was obtained by number of hours worked in a year multiplied by the sum of operative and other employees. The study also follows Oh et al (2005) for measuring labour input, where the number of workers is used, and this includes paid employees (production and non-production workers), working proprietors and unpaid family workers. It is generally agreed that SMEs comprised very small units, possibly employing just a few persons or merely the members of a family. All family members who are working in the industry, although they may not receive any remuneration as wages or salary, are considered as employees. The labour-capital ratio of SMEs can be underestimated, compared with LEs, if business owners or their family members are not included in labour input.

According to the labour law of Cambodia, a regular employee should work 8 hours per day, or 48 hours per week, and more than 21 days per month for more than two months. Employees must have at least one full day (24 hours) off per week, which should normally be a Sunday. Employees must be allowed to choose to work overtime or not. According to overtime authorization letters issued by the Ministry in charge of labour, overtime is usually limited to 2 hours per day. However, the law is unclear as to what night work is and what pay rates apply for night work. Therefore, adjustment is made for the extent of part-time work or less than 8 hours work, hence the idea of full-time equivalent employees. If any employees work less than 5 hours per day, two workers are assumed to be one. This assumption also includes family members who are working in the industry. In contrast to van Biesebroeck (2005), all workers are included in this study, although they may be part-time or seasonal.

4.5.4 Material cost (M)

Similarly to Huang (2003) and Oh et al (2005), the cost of materials is all expenses incurred in the process of producing goods, covering the total cost of raw materials and components used in production, machinery maintenance, purchase of electricity and other energy and fuels consumed for heat and power, water, outsourced manufactured goods, advertising, transportation,

communication and insurance, administrative expenses, and the change in stock of material and components. Expenditures on these categories are converted to USD and deflated by a general producer price index. This is similar to Aw et al (2001) for Indonesia, Oh et al (2005) for Korea, and Polanec (2004) for Slovenia, all studies were intermediate input was deflated by general producer price index. These deflators are the same for all industries. The producer price index data is produced by NIS of Ministry of Planning.

Since the prices of fuel and electricity vary considerably across regions in Cambodia, these expenditures are not deflated separately from total material expenditures by an energy price index[102]. Some enterprises buy electricity and some have their own electrical generators. For enterprises that buy electricity, the cost differs from one region to another depending on the source of supply. For this reason the common energy price index cannot be used for all enterprises. Moreover, a firm that out-sources some of the production steps to a subcontractor generally transfers material inputs to the subcontractor. The value of these transferred material inputs are included with the hiring firm's expenditure on materials. To construct a subcontracting input, the firm's payment to subcontractors is deflated by the output price of the industry in which the firm operates. However, there is no information on the precise step of the production process in which the subcontractor was involved.

4.5.5 Wage

Similarly to Paitoon (2001), wage includes wages and salaries, benefits, and other payments to employees. It is defined as total labour costs divided by the number of workers multiplied by number of work days in a year[103] (see equation 4.38).

$$W_{sme,i,t} = \frac{S_{sme,i,t}}{(TW_{sme,i,t} \times ND_{sme,i,t})} \qquad (4.38)$$

[102] In both Aw (2001) and Farinas and Martin-Marcos (2002), fuel and electricity expenditures are deflated by an energy price index.
[103] See also Hayashi (2002, p. 21).

where $W_{sme,i,t}$, $S_{sme,i,t}$, $TW_{sme,i,t}$ and $ND_{sme,i,t}$ are wage rate, total salary, total number of workers, and number of work days in a year of SMEs, respectively.

As in the questionnaire (see Table 5.6 in section 5.5 of chapter V), in order to calculate wage rate per day of each employee, employees were classified into three groups. Similarly to Liang (2001), labour is classified into three groups: production workers (skilled and unskilled labour); managers, executives, supervisors, administrators, technical and engineering workers; and non-production workers (sales, clerk, receptionist, cook, driver, housekeeper, cleaner). Each group received salary ranging from high to low. To gain more accurate information, we also surveyed the total amount of compensation for each year. Information on the number of days worked per month and the number of months worked per year were also important for wage rate calculation. The study used exchange rate data published by the National Institute of Statistics, Ministry of Planning of Cambodia.

4.5.6 Labour cost share (α_{ij})

This study follows Hayashi (2002), where total labour remuneration of both operative and other employees is divided by the total output to obtain the share of labour costs.

4.5.7 Capital cost share ($\beta_{size,i,t}$)

Following Hayashi (2002) and Okamoto and Sjoholm (1999), the share of capital costs is obtained by subtracting the labour and material shares from 1, $\beta=1-(\alpha+\gamma)$.

4.5.8 Material cost share (γ_{ij})

To obtain the share of material costs, total material costs are divided by the total output.

CHAPTER V

RESEARCH PROCESSES

5.1 INTRODUCTION

In previous chapter, it was stated that this thesis is an exploratory study that will eventually lead to the development of an instrument that will measure the role of SMEs in economic development in Cambodia. The approach was to start from a zero base and to review traditional theories and constructs (chapter I and III) and to develop the proposed methodologies (chapter IV).

This chapter will detail the overall processes of this research. First, it illustrates how this study emerges (type of firms in this study). Second, it details the scope of the research process. The sampling procedure specifies the classification of respondents, sample size, and sampling unit. Next I provide the questionnaire and discuss the process of gathering primary and secondary information and sampling techniques. Fourth, the data processing and analysis provide and explain the statistical techniques that are used for testing the hypotheses. Research result is concerned with description of data collected from the field. Finally, research constraints is concerned with discussion of problems encountered during collecting data.

5.2 TYPE OF FIRMS IN THIS STUDY

The study provides arguments for and against the support of SMEs, taking Cambodia as a case study, where three hypotheses are investigated to reveal SMEs' advantages relative to LEs. The survey concentrated on companies that: (i) operate in the manufacturing industry; (ii) have less than 100 employees (SME), or more than 100 employees (LE); (iii) are formally registered with the government; (iv) are located in Cambodia, across the various regions of the country; and (v) are owned by private individuals, whether of Cambodian or foreign nationality.

The survey focused only on manufacturing firms because they are the most dynamic sector, especially SMEs, which dominate economic activity in Cambodia and account for a substantial part of employment. Increasingly the key to the development of Cambodia, SMEs make up approximately 99 per cent of all enterprises and almost half of all employment (see chapter II).

While some statistical data has been collected for SMEs, there is generally a lack of accurate information available. The limited statistical data, compounded by the lack of a definition for SMEs, has led to uncertainty and confusion as to what an SME is. A definition of SME is important for collecting statistics, as well as for policy development and implementation purposes. Therefore, an SME has to be defined before starting to collect data on SMEs. In addition to that, the Ministry of Industry, Mines and Energy, MIME (2005) argued that, at a practical level, a definition must be easy to implement in terms of gathering accurate and useful data. Furthermore, the SME definition should also be based on the industry or sector, since the characteristics of enterprises vary significantly based on what they do. In most countries, SMEs are defined differently by sector or industry. For example, the maximum number of employees to be considered an SME in the service sector is usually much lower than for manufacturing (DCI, 2003).

SMEs have been variously defined in terms of either value of fixed assets, size of employment or a combination of the two (see Definitions of SMEs in chapter III, section 3.2). Despite the definition of an SME being given differently by various agencies, it seems to be most appropriate to follow the definition set out by Ministry of Industry, Mines and Energy (MIME) of Cambodia, because MIME has long been developing policies, laws and regulations, and development frameworks for SMEs. More importantly, the Sub-committee on SMEs, which was established by Decision No. 46 SSR, dated 11August 2004, is chaired by the minister of MIME. According to the SME Development Framework, which was published by the SME Secretariat for the SME Sub-committee in 2005, in the manufacturing sector, an SME is defined as a firm with 0 to 99 employees, whereas a firm having over 99 employees is considered an LE (see Table 5.1). The definition of SMEs which is based on number of employees is similar to other countries in Southeast Asia, especially Brunei. An SME is defined as an enterprise which employs less than 100 workers in Brunei, Indonesia, and Myanmar.

Table 5.1: SME definition in this study

Sizes	Employee number
Small enterprise	Between 0 and 50 employees
Medium enterprise	Between 51 and 99 employees
Large enterprise	From 100 employees

Source: SME Secretariat (2005), *Small and Medium Enterprise Development Framework*, Sub-committee on Small and Medium Enterprises, Royal Government of Cambodia.

Since defining SMEs by the number of employees has also been widely used, this study does not define firms as SMEs in terms of the value of their fixed assets. Moreover, the problem with defining a small enterprise on the basis of the size of its fixed assets is that the cut-off point needs to be revised over time in order to allow for inflation. MIME (2005) noted that because not all firms revalue their capital in a uniform manner, inconsistencies can also arise.

Defining SMEs by the size of workers is usually straightforward, but can also face some problems. Part-time workers and family workers, who function both as managers and workers, create some definitional problems. The ADB (2005) argued that, for statistical purposes and policy development and implementation, the definition should be based on equivalent full-time employment. For other purposes, where the number of employees is not suitable, an alternative financial definition should be used, based on total assets, excluding land.

Since it is generally agreed that SMEs, especially small enterprises, may comprise very small units possibly employing a few persons or merely members of a family, in this study, all family members who are working in the enterprise although they do not receive wages or salary are considered as employees. Moreover, in van Biesebroeck (2005), all workers are included although part-time or seasonal. However, in this study, adjustment is made for the extent of part-time work, or less than 8 hours per week, hence the idea of full-time equivalent employees. Where any employees work less than 5 hours per day, two workers are assumed to be one. This assumption also includes family members who are working in the enterprise (see chapter IV, section 4.4: measuring variables).

This study also focuses on traditional cottage industries in rural areas which are important for Cambodia as a developing country. Since most SMEs in traditional industries have low levels of knowledge and capital, it is very difficult for them to restructure their business. For that matter, support has to come from government. Thus, this study tries to find effective ways to promote SMEs. Moreover, the majority of the Cambodian SMEs are still in a very early stage of development. In 2005, over 80 per cent of Cambodian industrial SMEs were engaged in the food, beverage, and tobacco industries. The SME sector is dominated by family businesses with fewer than 10 employees, processing primary produce for the domestic market. Cambodian SMEs typically use very basic technology and have low total factor and labour productivity. As globalization deepens they are struggling to compete with imported goods manufactured by SMEs in neighbouring countries, especially Thailand and Vietnam.

The study focuses on firms with some degree of formalization such as registration with the local authority or particular licensing body, SMEs with more than one full employee, and with company registration or partnership registration. Leila and Don (2000) noted that the legal registration criterion was designed to focus attention on the firms most important to future economic growth and job creation. It is well documented in many developing countries that informal sectors are invaluable sources of income generation, particularly for low-income and marginal groups, but the contribution of the informal sector to overall economic growth is limited. Informal sectors are relatively inefficient producers of goods due to their small size and are rarely sources of significant creation of new, salaried jobs as few ever grow large enough to hire even one paid employee. Additionally, legal registration is a prerequisite for numerous key factors behind firm-level expansion, including formal bank lending.

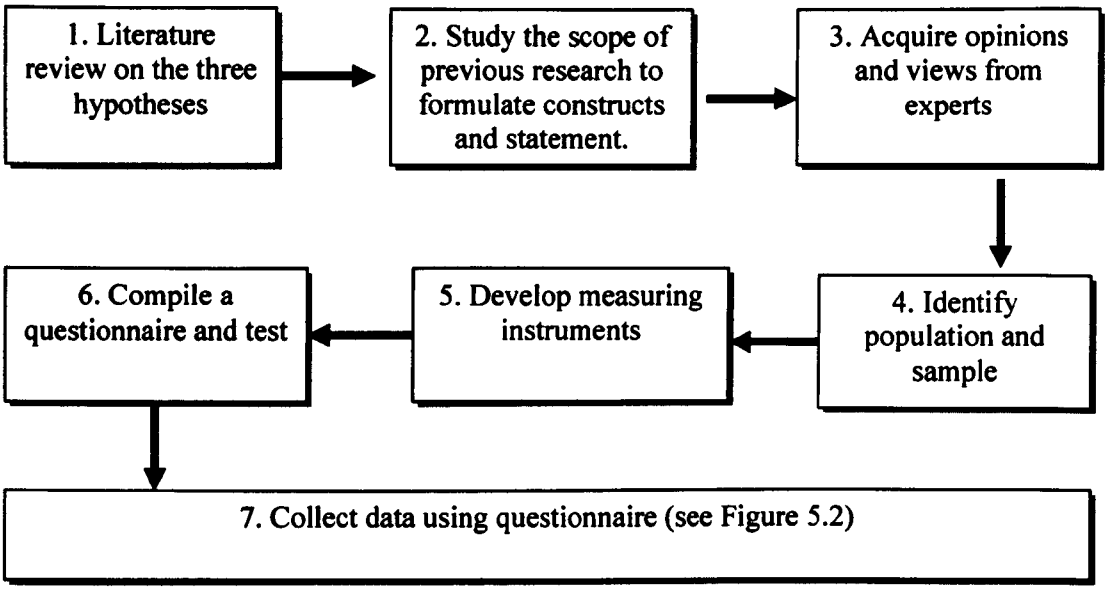
There was no limitation of the geographic scope of the survey, which was across the regions in Cambodia. However, the lack of geographic limitation had some disadvantages: the cost in time and money is higher for surveying enterprises outside the capital.

Finally, the survey was limited to private Cambodian and foreigner ownership. Unlike in neighboring Vietnam, manufacturing is almost entirely privatized in Cambodia and most LEs in Cambodia are owned by foreigners, in contrast with SMEs.

5.3 THE SCOPE OF THE RESEARCH

The research process covers a range of stages and is illustrated in Figure 5.1.

Figure 5.1: The scope of the research process



- 1. A comprehensive overview of the current literature on the importance of SMEs in the context of economic development in general, and SMEs' performance compared with LEs, in particular, in terms of labour, productivity, and income distribution, provided the academic and theoretical base for this study. This literature review was conducted to generate important theoretical constructs (chapter III).

- 2. The scope and extent of previous research approaches and studies were used to formulate constructs and statements to be included in the research instrument, as discussed in chapter IV.

- 3. The opinions of a number of business experts were sought to generate relevant ideas and focus the research approach. The experts who were involved with enterprise activity were: Mr Heng Sophoan, Deputy Director of the Industrial Affairs Department, Ministry of Industry, Mines and Energy (MIME), Mr Bun Naka, deputy chief of bureau of SMEs, Industrial Department in Phnom Penh, Mr Seng Sochinda, Deputy Director of Project

Monitoring Department, Council Development of Cambodia (CDC), Mr Kim Phalla, Deputy Director of Economic and Public Finance Policy Department, Ministry of Economy and Finance (MEF), and Mr Keo Chettra, National Institute of Statistics, Ministry of Planning (MOP). Their contact details are in Table B5 in Appendix B.

- 4. A single comprehensive database of registered small, medium, and large industries was available at the Industrial Affairs Department of MIME and the Trade Department of the Ministry of Commerce (MOC). A list of SMEs from the MIME database was created by combining lists of registered firms from Provincial Industry Departments in all provinces and cities. A list of LEs was created with additional directories from the Project Monitoring Department of the Council for the Development of Cambodia (CDC), the Customs and Excise Tax Department of the Ministry of Economy and Finance, and other official government sources. Data from different sources was merged, filtered for duplication, and then each firm was contacted to verify it was still in operation and that it fit the survey selection criteria. The final database of targeted firms consisted of 510 enterprises (400 SMEs, and 110 LEs) across the regions in Cambodia. Moreover, the survey covers the targeted group industries that were engaged at any time in the reference year in the following economic activities as classified under the United Nations International Standard Industrial Classification of Economic Activities (ISIC) (see Table 5.2). The reference period of the survey was from 2002 to 2006.

- 5. Theoretical constructs, theories, views and inputs were formulated to create statements.

- 6. A structured questionnaire was compiled and tested following the opinions and views from experts who had indicated their willingness during the previous stage. This was done through several meetings. The feedback from experts was used to verify the content and format of questionnaires developed for an actual survey. The style of questionnaire will be discussed in section 5.6.

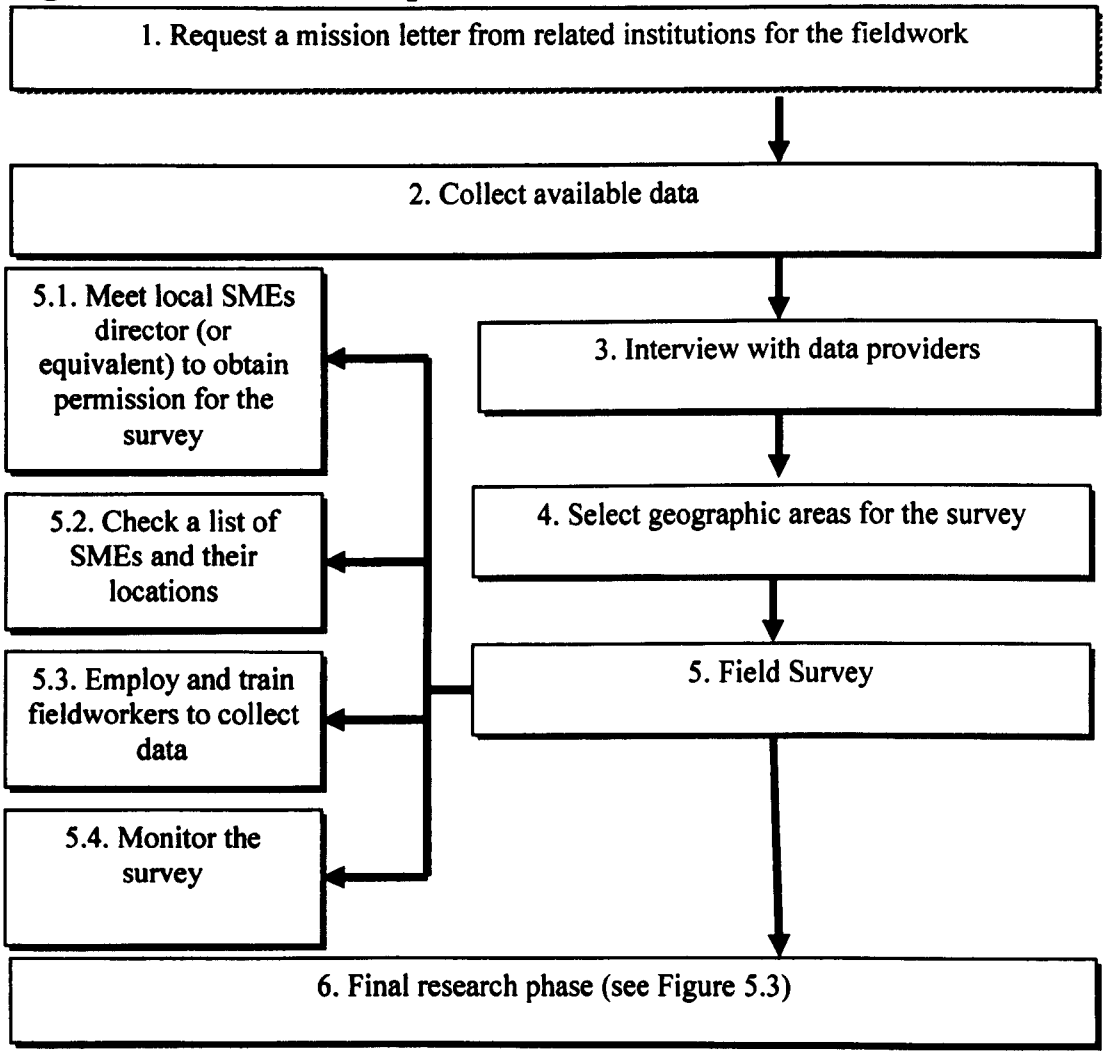
Table 5.2: Groups of industries in the study

ISIC	Group of industries	Activities
31	**Food, beverage and tobacco**	Bread, ice cubes, drinking water, noodles (Khmer, Chinese), fish sauce, soya sauce, chili sauce, bean sauce, ice-cream, fish and beef balls, white wine (local wine), cakes, biscuits, salt, cassava flour, jelly, candy, feed mill, biscuits, sugar, fish meal, tobacco.
32	**Garments, textiles and footwear leather industries**	Motor vehicle upholstery (motorcycle seat cloths), cloths, shoes.
33	**Wood and Wood products**	Wooden furniture (tables, cupboards), joinery (doors, windows, door and window frames).
34	**Paper products, printing and publishing**	Paper bags, paper.
35	**Chemicals, rubber and plastic products**	Spare parts (rubber), plastic and rubber tubing, vehicle tyres, washing powder.
36	**Non-metallic mineral products except products of petroleum and coal**	Brick making, clay pots.
38	**Fabricated metal products, machinery and equipment**	Metal and aluminum door and window frames, cutlery, knives, copper wire, wells.

5.4 SURVEY IMPLEMENTATION

The survey methodology consists first of collecting all available statistics and other relevant data from various sources followed by field surveys in a targeted provinces and city. Available statistics were collected from international organizations, government agencies/institutions, and research institutes. However, some information provided by the above sources was insufficient or unclear, therefore several consultations were held with technical staff. For the data which were also needed in this study but were not available, the survey method was used. All data were recorded for data analysis in a form suitable for using statistical tools. To sum up, there were six steps of collecting data in this study (see Figure 5.2).

Figure 5.2 Data collection process



- 1. In order to gain access to any government agencies and firms in Cambodia, permission letters from the relevant ministries were required. To obtain the permission letters, many documents were needed, including the prepared research proposal for the study, student ID, and a covering letter explaining the research objective. It took on average ten days to obtain each permission letter. This research received three permission letters from three ministries: Ministry of Industry, Mines and Energy (MIME); Ministry of Economy and Finance (MEF); and Ministry of Commerce (MOC). Each letter was signed by the relevant minister and was in the Cambodian language (Khmer) (see Tables B1, B2, B3 in Appendix B).

- 2. Available information was collected from MIME, the Ministry of Agriculture, Forestry and Fisheries (MAFF), the MOC, the Council for the Development of Cambodia (CDC), the Economic and Public Finance Policy Department (EFPD) and the tax department of MEF, the Ministry of Planning (MOP), the National Bank of Cambodia (NBC), the National Institute of Statistic (NIS) and the Cambodia Development Research Institute (CDRI) (see Tables 5.3 and Table B4 in Appendix B). However, direct interviews with responsible persons were still important in this stage.

Table 5.3: Data and Sources

Data	Sources
Numbers of firms (SMEs and LEs) by provinces and city	MIME, CDC, MOC
Number of employees (SMEs and LEs), male and female, by provinces and city	MIME, CDC,MOC
Quantity of production (SMEs and LEs) by provinces and city	MIME, CDC
Capital investment (SMEs and LEs) by provinces and city	MIME, CDC.
GDP per capita or Gross Regional Product (GRP) per capita by provinces and city	EFPD/MEF, and NIS
Total Output (constant value) by provinces and city	EFPD/MEF, and NIS
GDP deflators	EFPD/MEF, NIS
Population by provinces and city	EFPD/MEF, and NIS
Exchange rate (Riel/USD)	EFPD/MEF, and NBC
Wage average rate	EFPD/MEF, MOP, and NISC
Depreciation rate	Tax department of MEF, MIME
Producer price index	MIS

- 3. In developing measuring instruments, especially in the fifth step in Figure 5.1, knowing the characteristic of data (measurement and calculation) was necessary. This step is to ask questions of people who were in charge, especially technical staff (see Table B4 in Appendix B). On average the time taken for interviews was 30 minutes. I faced a lot of problems because appointments had to be made a few days in advance and time was limited. It was helpful for this research because most of data and

information was subject to limited public access. The following ministries and institutions were consulted:

1. Ministry of Commerce (MOC)
    - Foreign Trade Department, Import and Export office
    - Domestic Trade Department
    - Trade Promotion Department
2. Ministry of Economy and Finance (MEF)
    - Department of Customs and Excise Tax
    - Department of Taxation
    - Economic and Public Finance Policy Department (EFPD)
3. Ministry of Industry, Mines and Energy (MIME)
    - Industrial Affairs Department
4. The Council for the Development of Cambodia (CDC)
    - Information and promotion department
5. National Bank of Cambodia (NBC)
6. Ministry of Planning (MOP)
    - National Institute of Statistics (NIS)

- 4. The selection of geographic areas for the survey based on the number of industries, the cooperation of local staff, and the location of firms and provinces. Provinces such as Rattana Kiri, Mondol Kiri, Preah Vihear, Koh Kong, Krong Keb, Paillin, and Otday Mean Chey were not selected because there were few firms, and those firms were too far away from central area. In addition, in provinces such as Siem Reap, Stueng Treng, and Sihanoukville, the local officials seemed not to want to cooperate in this survey, although the permission letter from MIME was shown. As a result, thirteen provinces and one capital out of 24 provinces and cities were chosen to be the location for field research: Kampong Chhnang, Kampong Thom, Phnom Penh, Kampong Cham, Kracheh, Kampot, Kandal, Preyveng, Svayrieng, Takeo, Banteay Meanchey, Kampong Speu, Battambang, and Pursat (see Figure 5.3).

Figure 5.3: Provinces of Cambodia

Source: Cambodian map at www.google.com.kh

- 5. Since data on SMEs and LEs were neither adequate nor comprehensive in Cambodia, field surveys were necessary. Due to different requirements between SMEs and LEs in requesting and conducting an interview, the survey processes of the two were also slightly different.

  Based on the combined list of business directories created by MOC and CDC, and the telephone directory, 110 LEs were contacted to obtain official permission to conduct the survey. Permission letter which was issued by MIME together with a letter explaining the survey's objectives, requesting an interview, and promising a copy of the final report, were sent to all LEs. Letters were then followed up with direct telephone calls to firm managers. The MIME intervention was very important to convince individual managers of the value of establishing a relationship with interviewers through participation in the survey. As a result, 100 firms agreed to participate in this study.

  Because of the large sample for the survey of SMEs (400 firms) and in order to save time and money, the processes of explaining the survey's objective and requesting an interview from the firms were not made. There were three important stages in this

interview from the firms were not made. There were three important stages in this survey. The first stage was to meet with director (or equivalent) of the Provincial Industrial Department to explain the survey's objectives, request cooperation, arrange for assignment of staff for this survey, and promise a copy of the final report. The second stage was to compare the database received from central government (Industrial Affair department in MIME) with the database created by the local industrial department in order to identify the location of the firms, the type of business, and especially responsible staff. To be effective in monitoring, facilitating, and gaining information from the firms, staffs were assigned by their department to work on a daily basis. Each staff member was responsible for one or a few areas/locations. Thus, fieldworkers were selected from those staff members because they were able to access and work in all of the selected areas (village or district). The selection of the fieldworkers was made on a voluntary basis (see Table B5 in Appendix B). The third stage was, first, to conduct a project briefing to ensure that the survey objectives, methodology and quality standard were fully understood by the fieldwork team and then to train fieldworkers to provide sufficient knowledge and techniques for surveying. The training focused on identifying the correct location of an enterprise on the map, gaining cooperation from the business owner and workers, as well as a method of asking each survey item. In some provinces which had more than one enumerator, the fieldwork activity was divided depending on their regional or district responsibility.

After training, the actual field enumeration was held two stages. The first stage was a pilot interview before initiating fieldwork to ensure the staff understood appropriate interview techniques. To do that I joined the field enumeration with the group and the second stage was the individual responsibility. After each step, I held a meeting with them to discuss the issues they faced during the enumeration and seek solutions for them. This was important for the next fieldwork in other provinces. The survey questionnaires were answered by participants on a voluntarily basis. The names of participants from the LEs and SMEs firms were made anonymous in order to avoid intrusiveness. On average the time taken for each interview was 45 minutes. In almost all cases, the respondents were positive in their response, all being generous with the level of information supplied.

- 6. The last step in Figure 5.2 refers to a final research phase that is illustrated in Figure 5.4.

Figure 5.4: The Final Research Phase

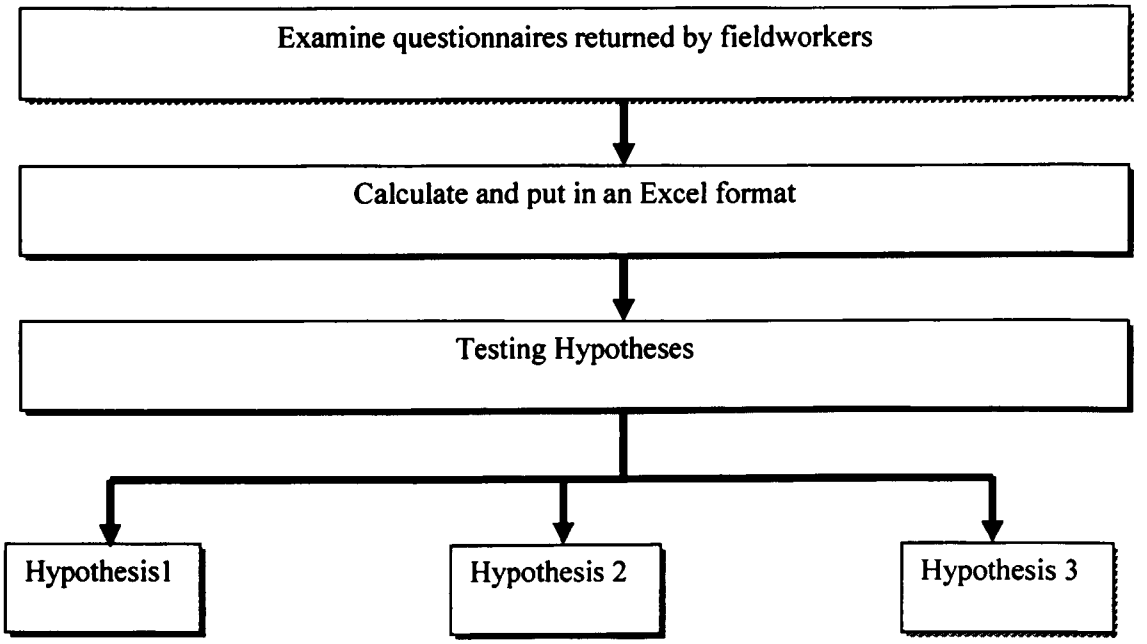


Figure 5.4 is summarized in section 5.5, the questionnaire.

5.5 THE QUESTIONNAIRE

Data for this study were gathered through survey questionnaires (see Table B6 in Appendix B). After refining, categorizing and comparing the information with relevant theoretical and empirical evidence, this was used as a guideline to develop the content of survey questionnaires. An introduction letter was attached with the questionnaire to present the objectives and significant of the study. Further, this letter was attached to the questionnaire to ask for respondents' cooperation. Obtaining accurate data from respondents was influenced strongly not only by the ability to design a questionnaire, but also the recommendation from government officials who were working closely with all the entrepreneurs[104]. All questions

[104] In Cambodia, government institutions monitor the monthly or quarterly activities of LEs that are granted incentives by the government. Some SMEs, but not all, are monitored by grant providers such as the Rural Development Bank of Cambodia (RDBC). RDBC is partly under government control.

were straightforward and required short answers. Therefore, the respondents had the appropriate status to give useful and requisite data.

The survey questionnaire has eight sections. The first section consists of questions on the demographic profile of the respondents. It covers name and address of the firm, contact information, types of business, confirmation of formality of business, year of establishment, name of contact person, and owner of the firm.

Second, there are questions on the total number of persons engaged in business activities: self-employed proprietors, unpaid family members, and paid workers. Worker is defined as being in an industrial employment. Number of workers is the sum of operatives and other employees. "Other employee" refers to all employees other than operatives, including administrative, drivers, sales, services, cooks, clerks, housekeepers, cleaners, technological and clerical personnel such as salaried managers and directors, laboratory and research workers and the like.

The third section is about the amount of annual remuneration to paid workers. Paid workers are classified into three different groups: (1) production workers including labourers, and other non-technical production workers; (2) managers, executives, supervisors, administrators, technical and engineering workers; (3) sales, services and other workers including cooks, drivers, clerks, housekeepers, and cleaners.

Fourth are questions about total value of the firm's fixed assets, access to finance (source of finance), and interest rates. Fixed assets are defined as the net book value of fixed assets including buildings, machinery and equipment, and office appliances. However, land, vehicles, and related fixed assets are excluded.

The fifth section is about the total amount of operating costs other than workers' remuneration: all expenditure on productive process of goods or services in the establishment covering total cost of raw materials and components used in production, cost of industrial services (such as machinery maintenance cost, purchase of electricity energy and fuels consumed for heat and power, and contract and commission work of other companies), purchase of goods for resale, cost of sales expenses, administrative expenses, and the change in stock of material and components.

The sixth section is about the total value of income: all receipts of the establishment including sales of goods produced, receipts of goods for resale, receipts from contract and commission work, receivable rents, other receipts, net value-added, and change in value of stock of work-in-progress, finished goods, and goods for resale.

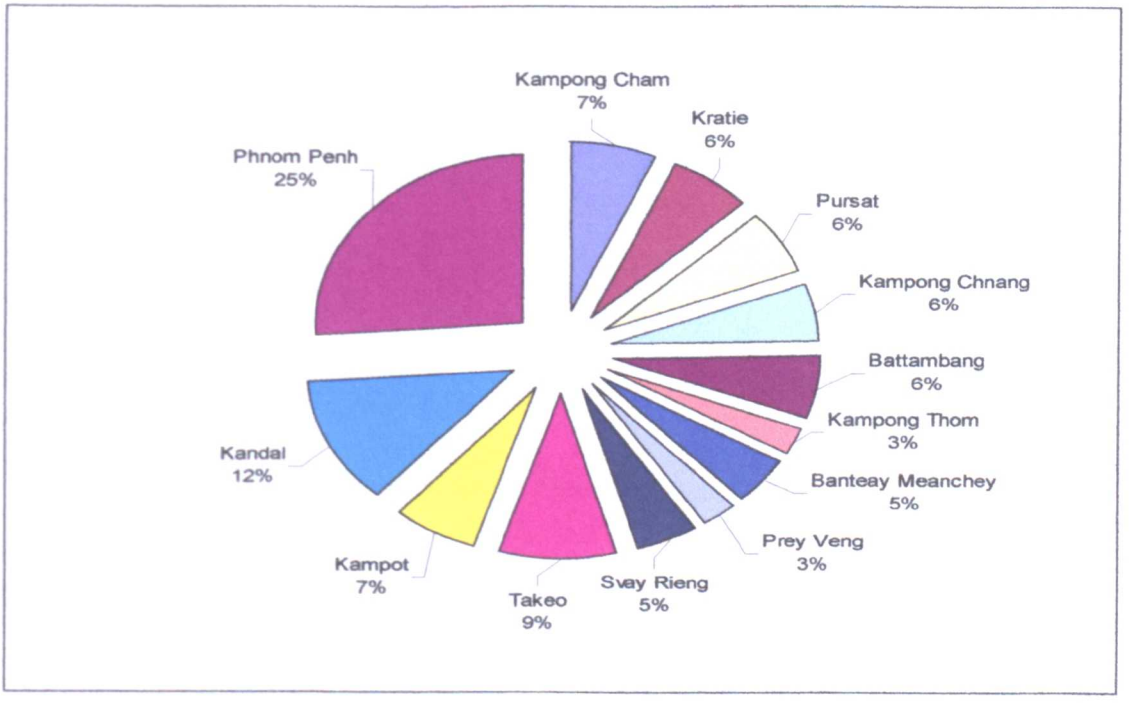
Seventh, there are questions on enterprise's employees such as the total number of hours worked per day, the total number of days worked per month, and number of months worked per year.

Finally, there is information about the fieldworkers, including name, date of interview, and signature.

5.6 GENERAL DESCRIPTION OF THE SAMPLE

The survey of SMEs took place in the thirteen regions mentioned above, and mainly in the key urban and rural areas of these regions. A total of 400 questionnaires were conducted in one city and twelve provinces. One hundred (100) or 25 per cent of the questionnaires were completed in Phnom Penh city, while 50 (12 per cent) and 36 (9 per cent) of the questionnaires were in Kandal and Takeo province, respectively. However, only 3 per cent of questionnaires were completed in Preyveng and Kampong Thom provinces. The rest of the sample was spread at a similar rate, with around 6 to 7 per cent of all questionnaires in other provinces (Figure 6.5). As for LEs, the survey was conducted only in Phnom Penh city, and Kandal and Kampong Speu provinces. Fifty questionnaires (50 per cent) were completed in Phnom Penh, while 25 (25 per cent) were in Kandal province and the rest in Kampon Speu. The reason was that there were no LEs in provinces other than these two and the capital city. The survey employed 25 staff from the SMEs offices of local and central industrial departments. All of the respondents were the owners or the representatives of the firms and they were Cambodian people.

Figure 5.5: Geographic distribution of sample (SMEs)



Source: Survey on 400 SMEs in Cambodia during 2002-2006

5.7 DATA PROCESSING AND ANALYSIS

As in Figure 5.4, after the survey, analysis of the results in questionnaires was also important. Only adequate responses by interviewees were kept, for instance, ten questionnaires from LEs were taken out. However, all questionnaires conducted with SMEs were considered as good, which meant they were accepted. Statistical software was used to calculate means, medians, and ranges for continuous variables. All data were sorted using basic Microsoft Excel processing software (see Table 5.4). A number of variables in the survey, stated in Table 5.4, were then used to compute capita-labour ratio, total factor productivity (TFP), wage disparity, share of SMEs, etc. which could lead to testing the three hypotheses to see whether SMEs perform more desirably vis-à-vis large enterprises (LEs) (see chapter VI). Eviews and Software Package for Social Science (SPSS) were used in this study.

Table 5.4: Data sets of SMEs survey, 2002–06

ISIC	Fixed Capital (US)	Labour		Labour Cost (USD)	Wage	Output (USD)	Material Cost (USD)	Labour Input (Hours)	Capital Source
		Total	Female						
31									
32									
33									
34									
35									
36									
38									

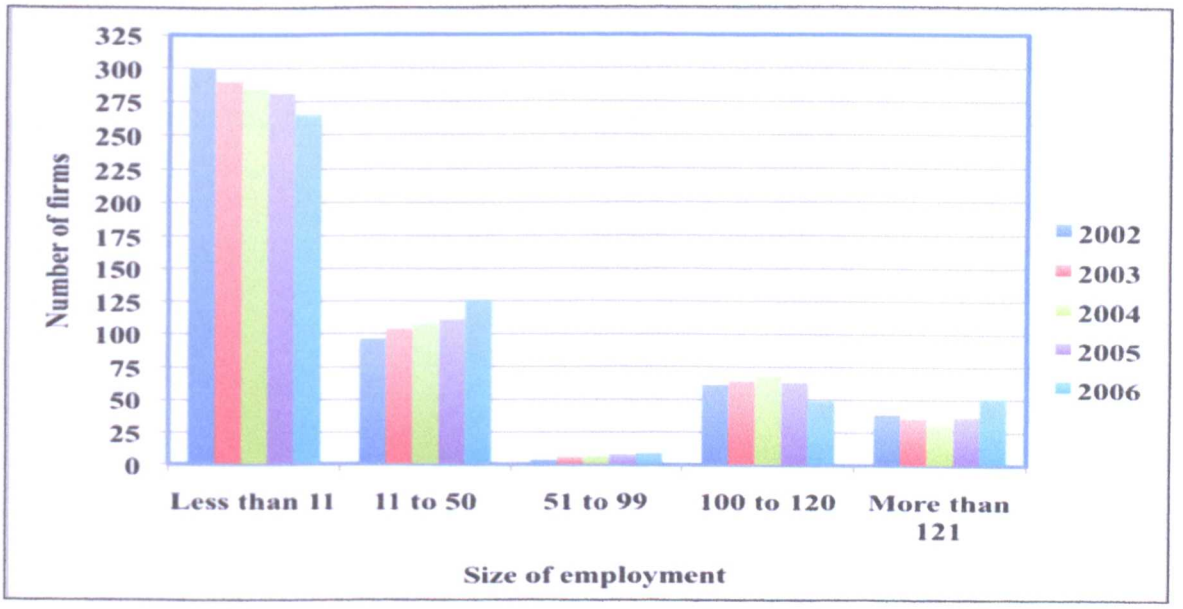
Note: ISIC is International Standard Industrial Classification.

5.8 RESEARCH RESULTS

In the survey, 80 per cent of all enterprises are SMEs with less than 100 employees and 20 per cent is LEs with equal and more than100 employees. In 2002, 60 per cent had fewer than 11 employees, 19 per cent had between 11 and 50 employees, about 1 per cent had between 51 to 99 workers, 12 per cent had between 100 to 120 employees, and 8 per cent had more than 120 workers (see Figure 5.7). From 2002 to 2006, see Figure 5.6 and 5.7, smaller sized enterprises had developed into larger sized enterprises.

For SMEs, the number of enterprises employing less than 11 workers showed a decrease while enterprises with 11 to 50 workers had increased from 19 to 25 per cent; and increased to 2 per cent for firms employing between 51 to 99 workers. During the same period the number of large enterprises employing between 100 to 120 workers had risen from 12 to 14 per cent in 2004, while enterprises with more than 121 workers had fallen from 8 to 6 per cent in 2004. From 2004 until 2006, however, the number of enterprises with 100 to 120 workers had constantly declined, while at the same period enterprises with more than 121 workers showed an opposite sign (see Figure 5.7).

Figure 5.6: Number of firms by size, 2002-06



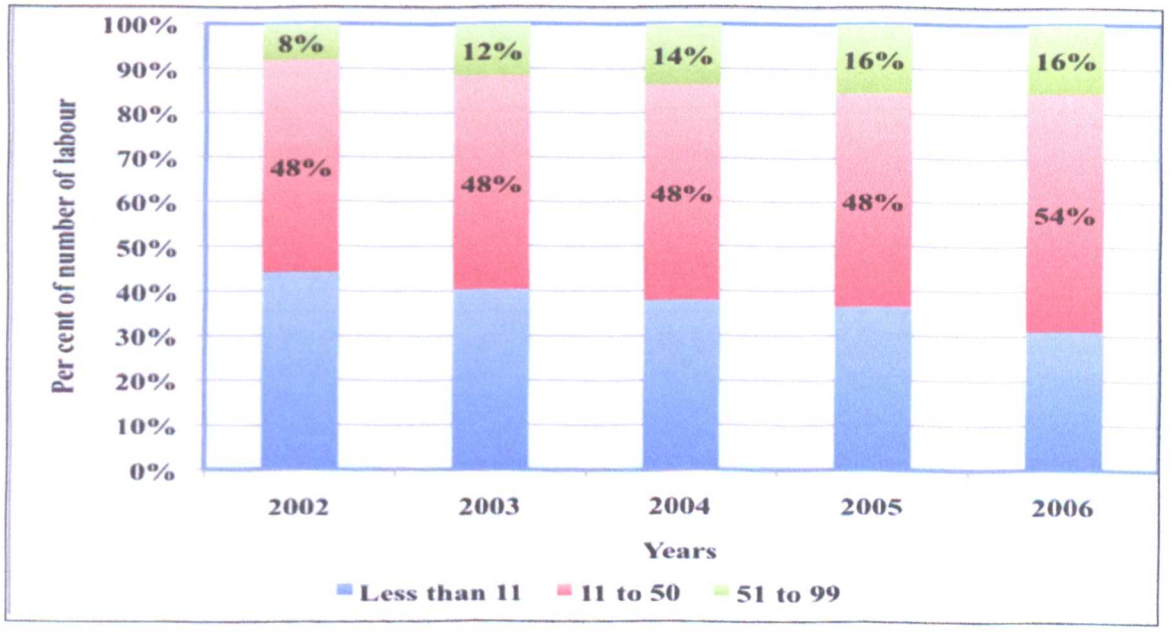
Source: Survey on 400 SMEs and 100 LEs in Cambodia during 2002-2006

As a result of the decrease of number of firms among SMEs, figure 5.8 shows that the share labour force for enterprises with less than 11 workers had decreased from 56 per cent in 2002 to 30 per cent in 2006, while enterprises with 11-50 and 51-99 workers had increased from 48 to 54 per cent, and from 8 to 16 per cent in 2006 respectively. As for large enterprises, although the number of enterprises in the study showed a fluctuation, the share of labour force had changed steadily through out the period 5 years. For example, figure 5.9 shows that the share of employees in enterprises with 100-120 employees had fallen steadily from 19 per cent in 2002 to 12 per cent in 2006, while it had increased from 81 per cent in 2002 to 88 per cent in 2006 for enterprises with more than 121 workers.

Figure 5.7: Share of firms by size, 2002-06 (Per cent)

Source: Survey on 400 SMEs and 100 LEs in Cambodia during 2002-2006

Figure 5.8: Share of employment by firm size, 2002-06 (Per cent)

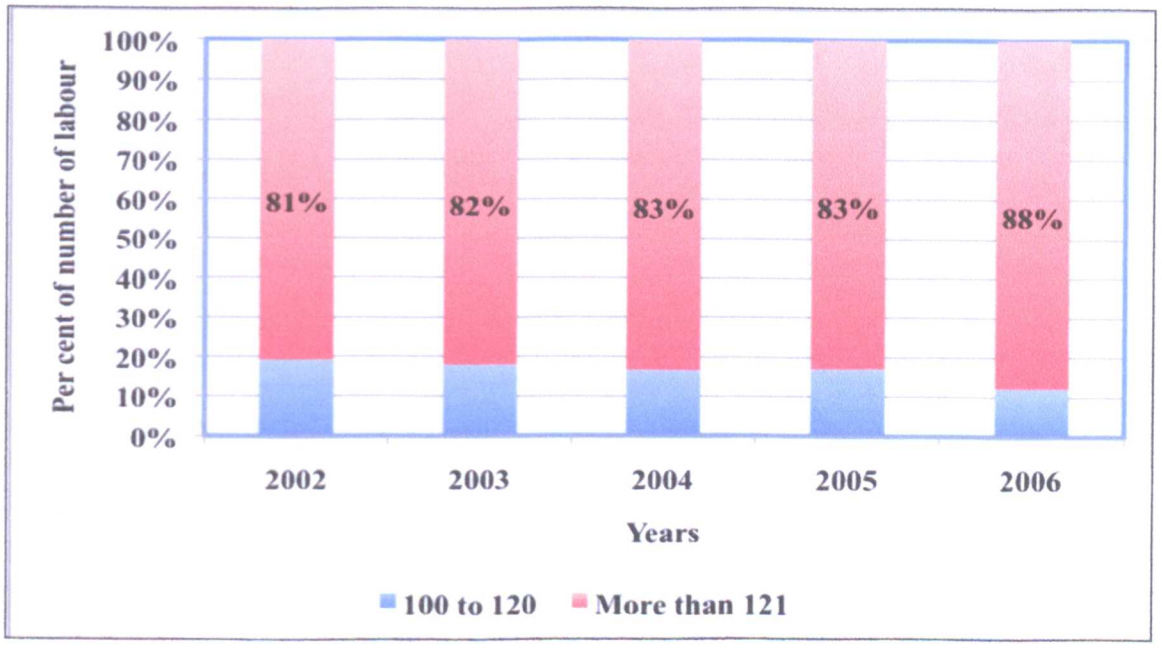


Source: Survey on labour force of 500 enterprises in Cambodia during 2002-2006

Figure 5.10 and 5.11 shows average total capital by industrial groups under SMEs and LEs. During the period 5 years, average total capital of almost all industrial groups under SMEs shows a fluctuation, except garment, textile, footwear, and leather industries, wood and woods industries, and non-metallic industries which shows a steadily decline from 2002 to 2006. In contrast, average total capital of all groups of industry under LEs had decreased

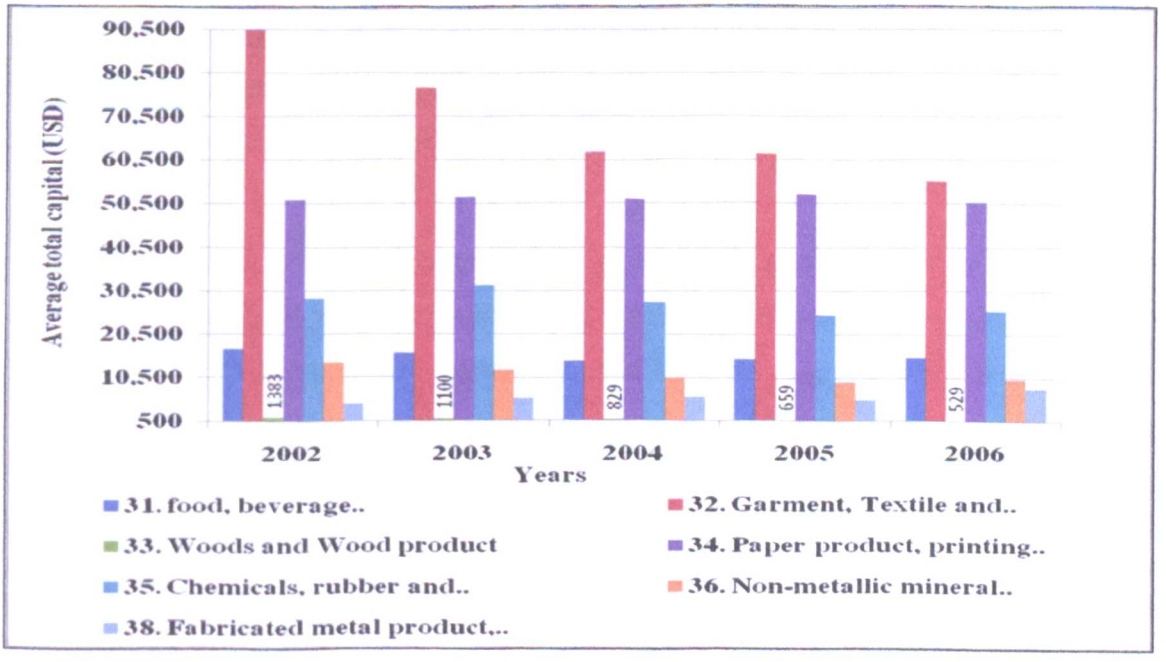
steadily from 2002 to 2006. Wood and wood production under SMEs had the lowest level of capital, whereas it had the highest level under LEs. Garment, textile, footwear, and leather industries had the highest capital stock among all other industries in SME sector. And, non-metallic industries had the lowest capital stock in LE sector (see Figure 5.11).

Figure 5.9: Share of employment by firm size, 2002-06



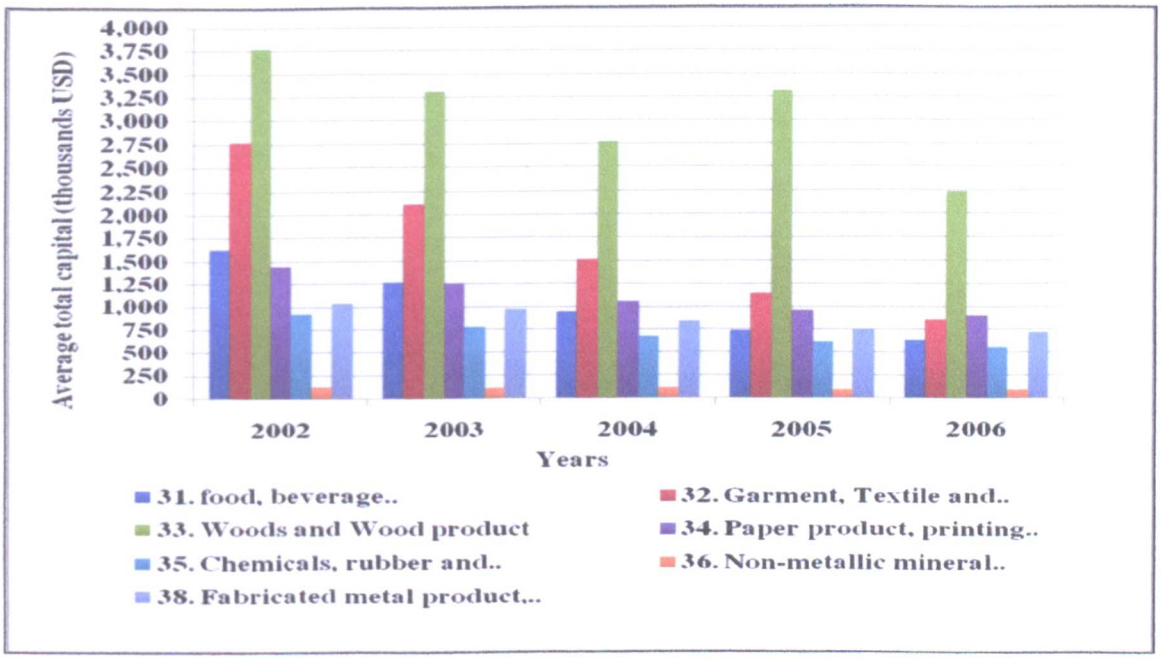
Source: Survey on labour force of 500 enterprises in Cambodia during 2002-2006

Figure 5.10: Average total capital by industry (SMEs), 2002-06



Source: Survey on captial of 400 SMEs in Cambodia during 2002-2006

Figure 5.11: Average total capital by industry (LEs), 2002-06

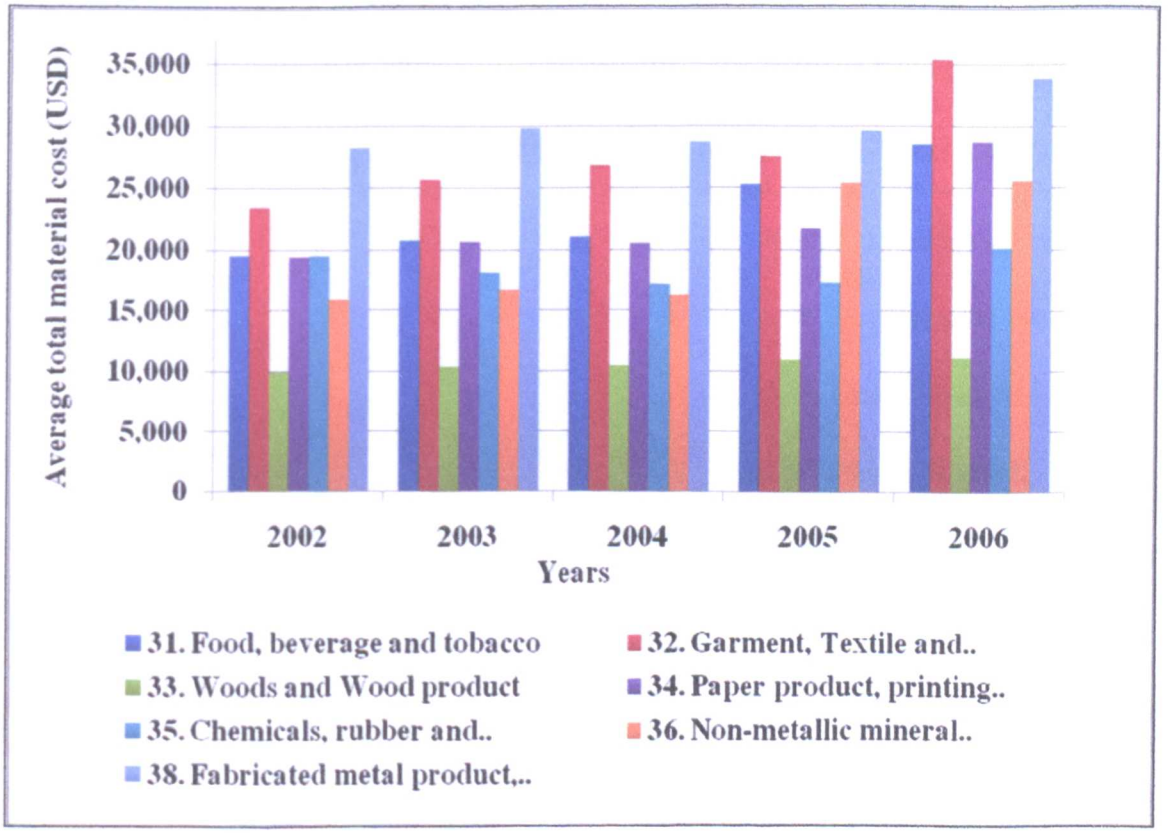


Source: Survey on captial of 100 LEs in Cambodia during 2002-2006

As for material costs, Figure 5.12 and 5.13 shows average total material costs by industrial groups of SMEs and LEs during the period 5 years. Food, beverage and tobacco industries under SMEs had the highest level of material costs, whereas wood and woods industries had the lowest level. Figure 5.12 shows material cost of all industrial groups had gone up, expect for chemicals, rubber and plastic industries, where their material costs had declined in two years (2003 and 2004) before increasing in 2005. Similarly, material costs of LEs had increased in all industrial groups, except wood and woods products. Garment, textile, footwear, and leather industries under LEs had the highest material costs (see Figure 5.13b), and the lowest was non-metallic industries (see Figure 5.13a).

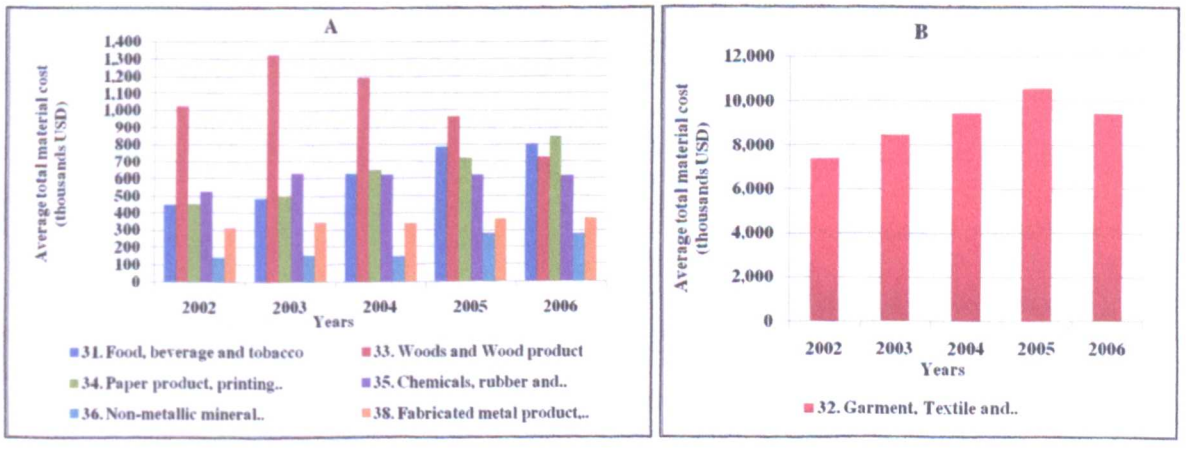
Figure 5.14 and 5.15 shows percentage share of output by industrial groups of SMEs and LEs during the 5 years period. The highest output share were food, beverage, and tobacco (around 70 per cent) in SME sector, and garment, textile, footwear, and leather (in average around 80 per cent) in LEs. However, the output shares of the two groups show contrasting progress. The former group showed a constantly decrease, whereas the latter showed a constantly increase from 2002 to 2006.

Figure 5.12: Average total value of material used by industry (SMEs), 2002-06



Source: Survey on material cost of 400 SMEs in Cambodia during 2002-2006

Figure 5.13: Average total value of material used by industry (LEs), 2002-06

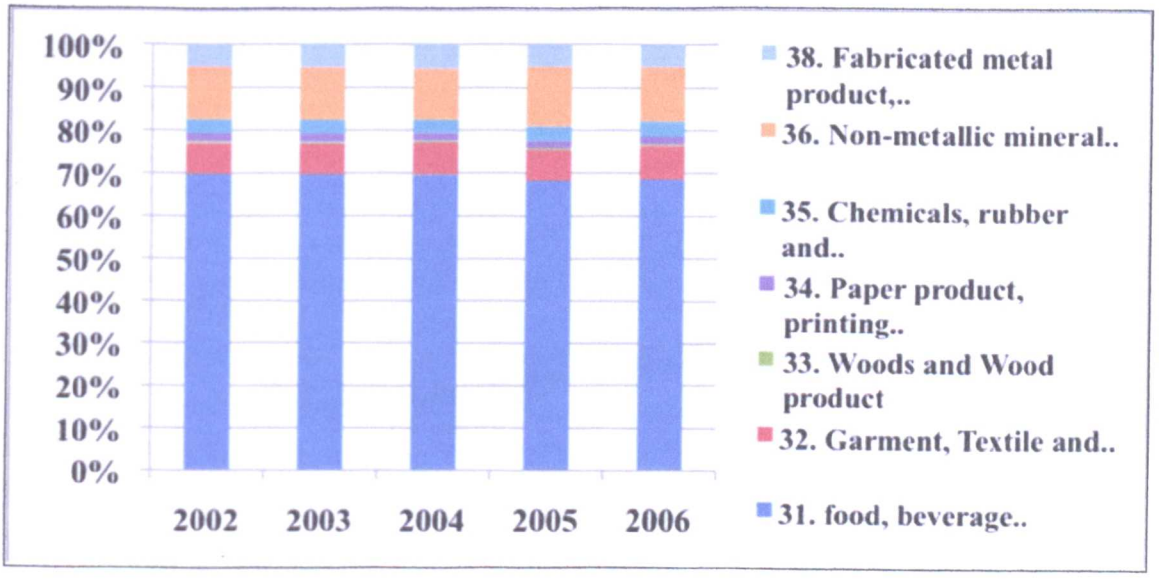


Source: Survey on material cost of 100 LEs in Cambodia during 2002-2006

Beside the above industries, except garment, textile, footwear, and leather industries, which had increased steadily, other industries under SMEs had fluctuated over the period. In 2006, wood and woods production, and paper products had lower output share than in 2002. As for LEs, food, beverage, and tobacco, paper products, non-metallic, and fabricated metal

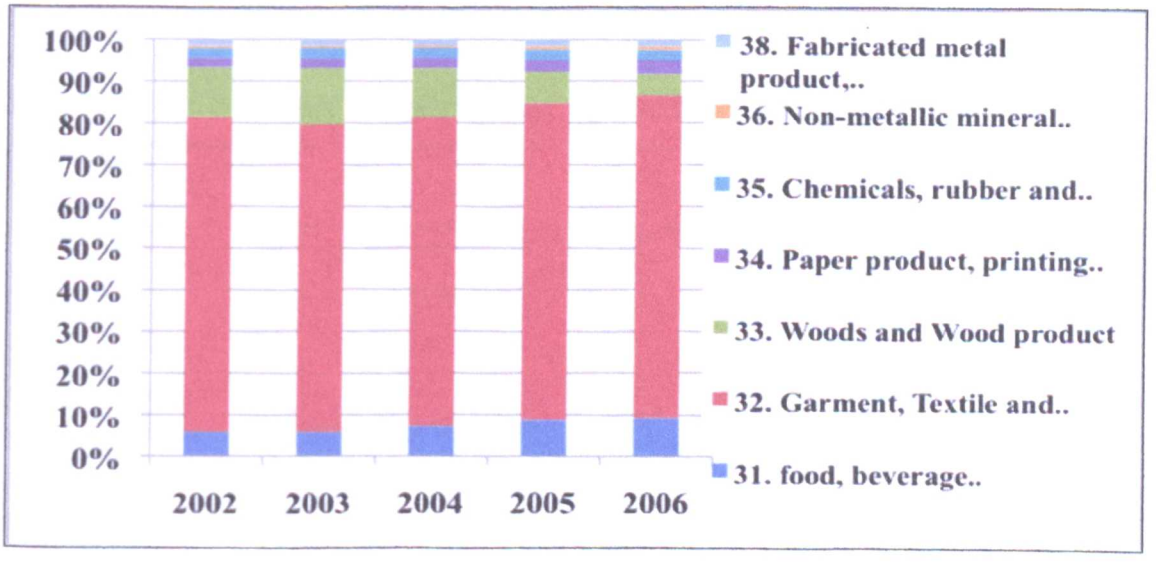
products, machinery, and equipment industries had their output share increased noticeably over the period. However, output of wood and woods production had fallen dramatically in the last two years, 2005 and 2006.

Figure 5.14: Percentage share of output by industry (SMEs), 2002-06



Source: Survey on output of 400 SMEs in Cambodia during 2002-2006

Figure 5.15: Percentage share of output by industry (LEs), 2002-06

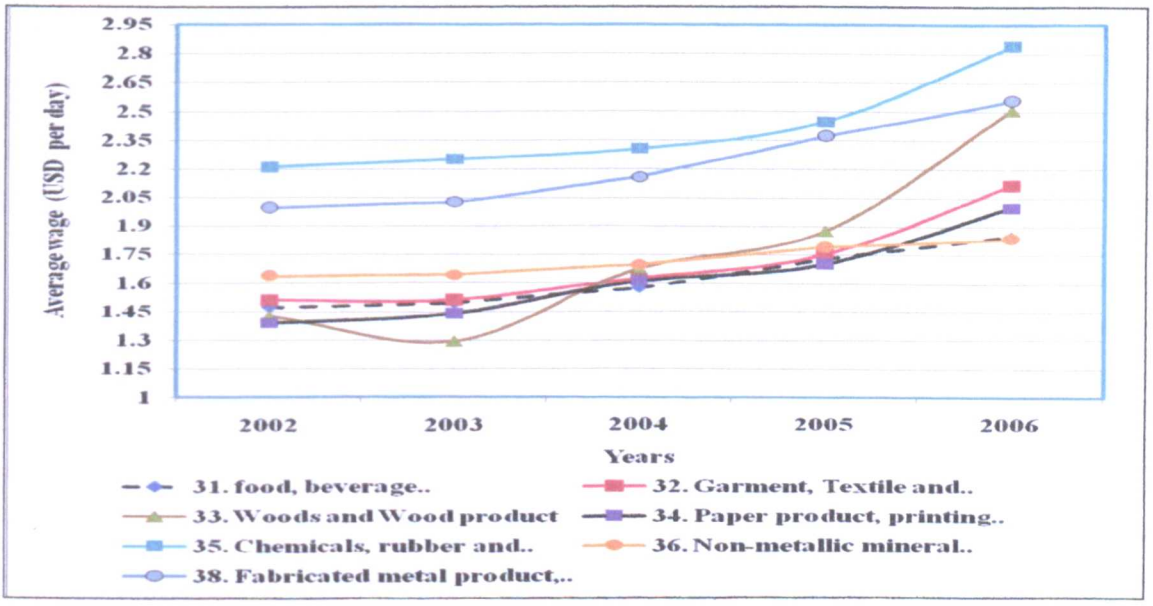


Source: Survey on output of 100 LEs in Cambodia during 2002-2006

This study also collected data on labour forces' salary. Figure 5.16 and 5.17 shows wage average of worker per day by industrial groups of SMEs and LEs over the period of the study. Daily average wage per worker of all industrial groups under SMEs and LEs had increased steadily from 2002 to 2006. Figure 5.16 indicated that chemicals, rubbers, and plastic

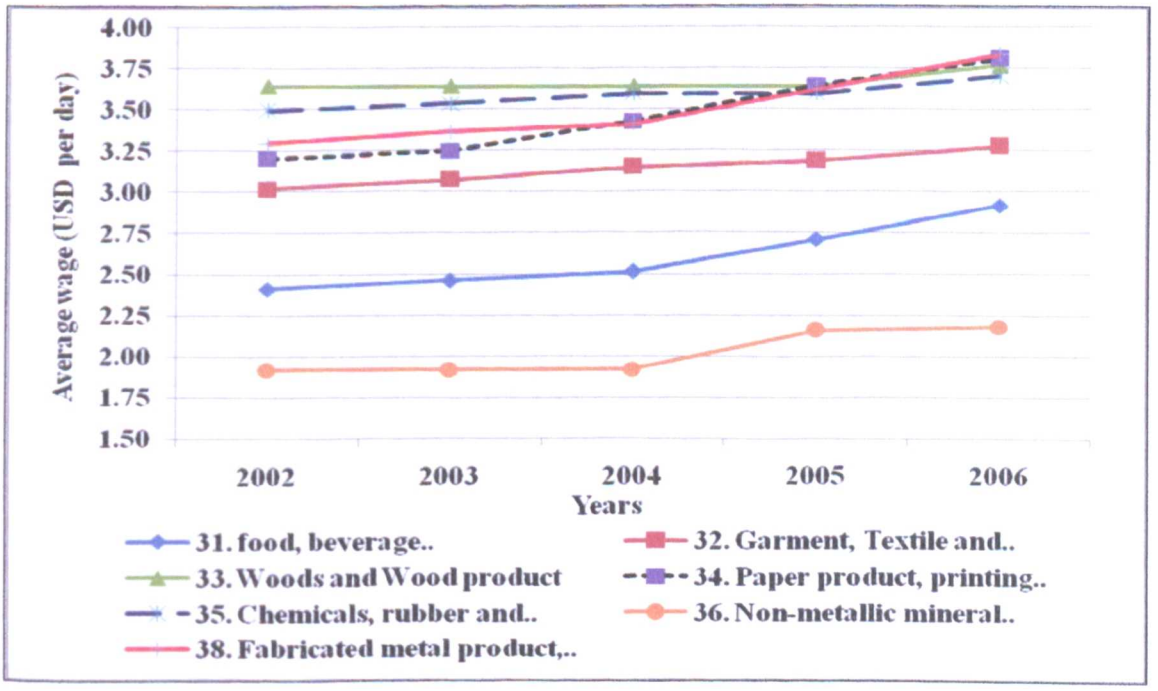
products, and fabricated metal products, machinery and equipment industries under SMEs had the higher wage average compared to other industrial groups in the study. Figure 5.17 shows that except food, beverage, and tobacco industries and non-metallic industries under LEs, which had lower wage average, other industries similar wage average over the period.

Figure 5.16: Average wage per day by industry (SMEs), 2002-06



Source: Survey on wage of 400 SMEs in Cambodia during 2002-2006

Figure 5.17: Average wage per day by industry (LEs), 2002-06



Source: Survey on wage of 100 LEs in Cambodia during 2002-2006

6.9 RESEARCH CONSTRAINTS

The research study encountered some problems such as the availability of data, obtaining permission for the agencies/organizations to carry out the study, and communication problems. Since different institutions produce different data, this caused less accuracy of the available data. NIS is the only one institute which formally produces data, especially macroeconomic data, in Cambodia. However, some of the data were not found at NIS. Information was not well documented and statistical data was also very limited in Cambodia. Data on industry is produced by different government agencies (MIME, CDC, MOP), and they were not using the same criteria. This could be a major problem restraining the research from analysing the topic more deeply. The uncertainty of obtaining permission from government offices and other agencies in Cambodia was also another challenge for this thesis. However, no other research previously has conducted surveys on SMEs in Cambodia on a larger scale than in this study. Therefore, it did take time and money to undertake and complete this survey.

Moreover, because Cambodia's large-scale industry, especially garment factories, comprises mainly foreign-owned factories, financial and operations data are often held by the foreign head office and thus are difficult to obtain. Furthermore, this study employs government officials to do the survey, so the responsiveness of enterprises to such a study may be a function of enterprises' performance level (real or perceived), thereby resulting in selection bias in favour of better-performing enterprises.

CHAPTER VI

TESTING HYPOTHESIS RESULT

6.1 TESTING HYPOTHESIS 1: SMES ARE RELATIVELY MORE LABOUR INTENSIVE THAN LES

Whether or not SMEs should be promoted depends, at least in part, on how efficiently they utilize resources. If SMEs are more labour-intensive than, and use less capital to produce the same goods as, LEs, then, since labour is abundant and capital scarce in the country, a strong economic justification would exist for promoting SMEs. Moreover, Cambodian SMEs have a certain potential to generate more jobs relative to LEs as long as SMEs utilize more labour-intensive production techniques and have equal access to capital. SMEs were found to be relatively more labour-intensive than LEs in Finland (Hytti, 2000), Indonesia (Hayashi, 2002), Japan (Abdullash and Beal, 2002), Korea (Nugent and Yhee, 2001), Taiwan (Sinha, 2003) and Thailand (Huang, 2003; Paitoon, 2001). The purpose of this section is to examine some of the major issues relevant to Cambodia: (1) Are SMEs more labour intensive than LEs? (2) in which industries are SMEs likely to be most labour intensive? And (3) Do SMEs employ more women labour and men?

Moreover, Cambodia had a high female labour force participation rate at 82 percent, compared to 64 percent in Thailand and 52 percent in Indonesia. These rates had been increasing since the early 1990s. The percentage of females in the labour force had increased from 55 percent in 1993 to 71 percent in 2001. Labour force statistics also show that participation rates were higher in rural areas than in urban areas (ILO, 2001 and LFS, 2001). Since SMEs are located across regions, especially in rural areas, and are the primary source of job for unskilled labour, especially from rural areas, it is important to study the contribution of female labour in labour intensive industries. Comparing this by different sizes of industry in different countries, many researchers found that women shared a greater portion of total employees among SMEs than in large enterprises. Similar to other studies, especially Tambunan (2008), this study used the female/male labour ratio to establish the importance of the role of women in SMEs in Cambodia.

This study used the capital-labour ratio to measure the labour intensity of industries. The independent sample t-test method was important in analysing the relationship between SMEs and LEs in term of capital (labour) intensity, and examining the statistical significance. For this we created a sample covering the five-year period 2002–2006 and classified into seven

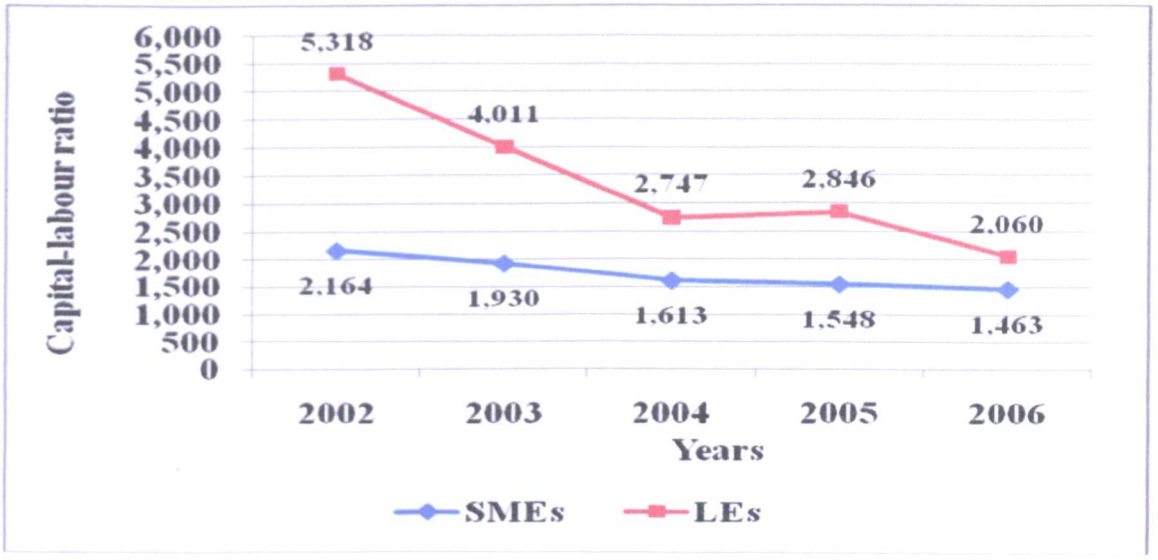
industrial groups. All data used in estimation were averaged over a one-year sample period. Averaging eliminates cyclical influences and enables us to examine the underlying nature of the relationship. We used the designed questionnaires to collect primary data from 400 SMEs and 100 LEs across industries and regions in Cambodia (see the questionnaire format in Table B6 in Appendix B). Data on gross capital stocks (K) were in constant value, therefore, a GDP deflator was used to calculate real capital stock[105]. Capital stocks were constructed using a perpetual inventory method that cumulates constant price investments and deducts the value of depreciate assets (see section 4.4 in chapter IV).

Based on the labour law of Cambodia, industrial employees worked 8 hours per day or 48 hours per week. As most SMEs operated mainly as family businesses, family members who were working in the industry were not treated differently from regular workers. Capital stock, K, is divided by total production workers (L) to obtain the capital-labour ratio (K/L) of each industry (see equation 4.4 in chapter IV). For each group of industries, (K/L) is the mean ratio of each industry. In the sample of 500 industries, there is a wide diversity in the (K/L) ratio.

Tables C1 and C2 in Appendix C show the results of the calculation of capital-labour ratio by industry and by firm size. The average index of all industries ranged from 2,060 to 5,318 (LEs) and 1,463 to 2,164 (SMEs) during the period 2002–2006. Apart from the capital-labour ratio of LEs in 2005, which saw an increase from 2004, the ratio for both SMEs and LEs was declining constantly over the period of the study. Figure 6.1 shows the yearly average capital intensity fall continuously from 5,318 in 2002 to 2,060 in 2006 for LEs, and from 2,164 in 2002 to 1,463 in 2006 for SMEs. The result indicates an increase importance of labour intensive industries in generating employment. Moreover, the level of the decrease in capital-labour ratio for LEs was 61 per cent, higher than SMEs (31 per cent) in 2006. It indicates that labour intensity in the large enterprise sector increased noticeably compared to SMEs in 2006. However, this does not mean that LEs are more labour intensive than SMEs.

[105] GDP deflators from 2001 to 2006 are: 102.70 (2001); 104.10 (2002); 104.33 (2003); 109.91 (2004); 116.22 (2005); and 123.02 (2006) (source: National Institute of Statistics of Cambodia (NISC)).

Figure 6.1: Capital intensive (K/L) of all industries, 2002-06



Source: Survey on capital and labour force of 400 SMEs and 100 LEs in Cambodia during 2002-2006

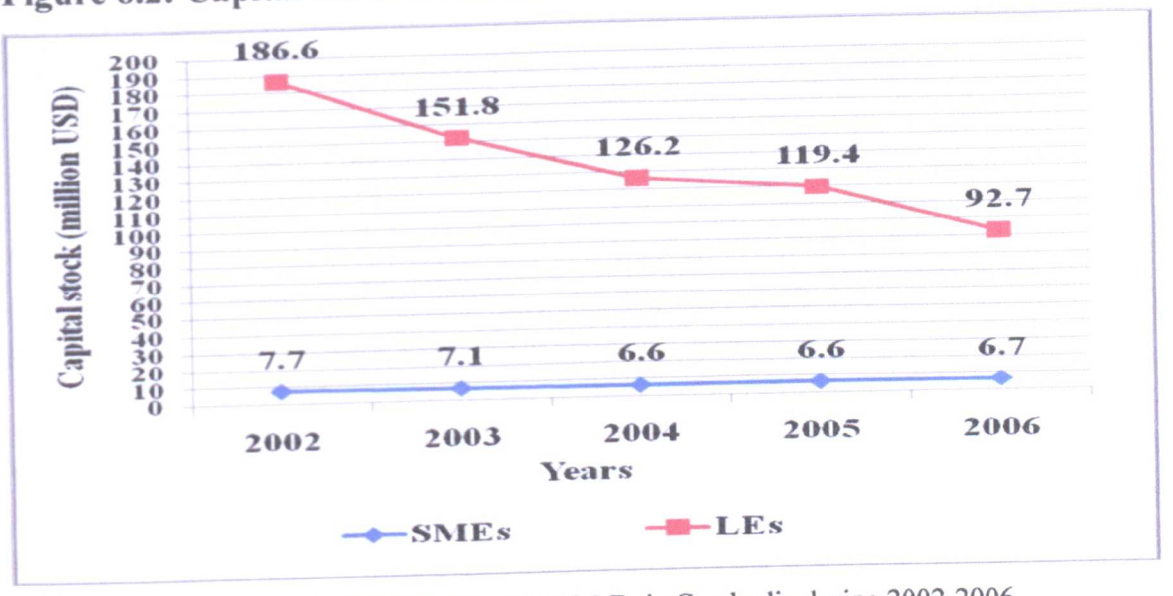
There was a continuous decrease of capital stock, and increase of workforce for SMEs and LEs over the five-year period. Figure 6.2 shows capital stock had dropped from 186.6 millions in 2002 to 92.7 millions in 2006 (around 50 per cent) for LEs, and from 7.7 million in 2002 to 6.7 millions in 2006 (around 13 per cent) for SMEs. Some evidences on the decrease of capital stock of both SMEs and LEs will be discussed later in this section. Labour force in LEs had gone up noticeably from 346,000 in 2002 to 436,000 in 2004 before decreasing to 397,000 in 2005. However, for over the period of 5 years, labour force in LEs had increased from 346,000 in 2002 to 425,000 in 2006 (around 23 per cent), whereas labour force in SMEs had gone up from 35,000 in 2002 to 43,000 in 2006 (around 23 per cent) (see Figure 6.3).

When looking at capital-labour ratio of different groups of enterprise in Table C1 and C2 in Appendix C shows that the ratio of almost all sizes of industrial groups shows a steadily decrease from 2002 to 2006, except for wood and wood product industries under LEs, and for industries under SMEs. The ratio of the two groups of industry went up about 5 per cent and 30 per cent, respectively.

The capital-labour ratio of garment, textile, footwear apparel and leather industries and woods and wood products industries under SMEs shows a decrease at a higher rate (around 70 per cent) than the rest of industry, which show between 25 to 35 per cent decrease in 2006 (see Figure 6.4a and 6.4b). As for groups of industry under LEs, Figure 6.5 shows that food,

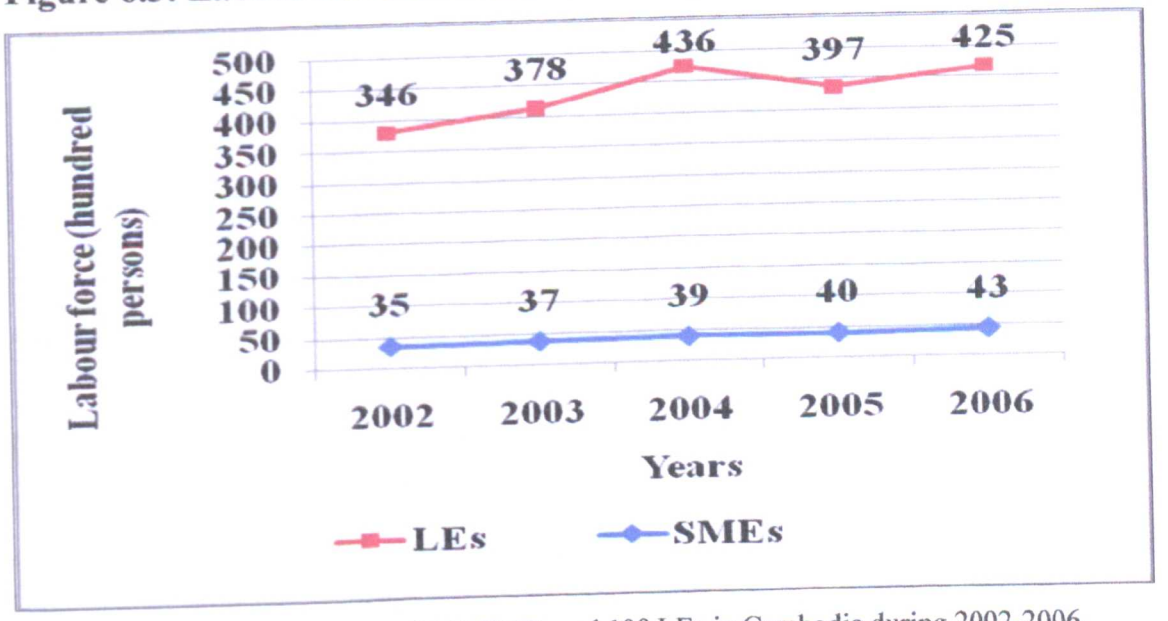
beverage and tobacco industries, and garment, textile and footwear apparel and leather industries went down approximately 70 per cent, whereas the rest of industry decreased approximately 40 per cent in 2006 (see Figure 6.5a and 6.5b).

Figure 6.2: Capital stock of SMEs and LEs, 2002-06



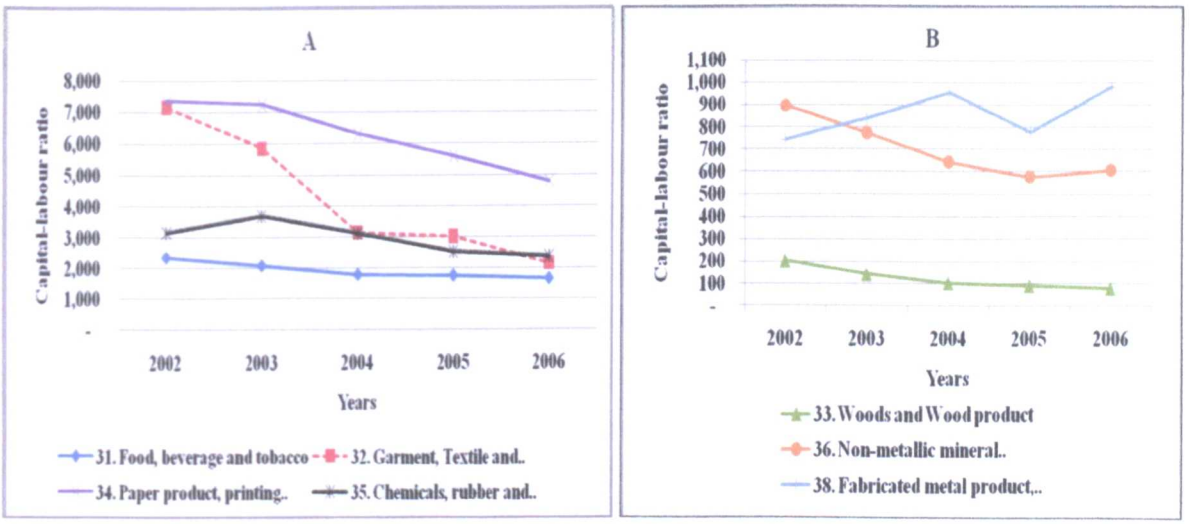
Source: Survey on capital of 400 SMEs and 100 LEs in Cambodia during 2002-2006

Figure 6.3: Labour force of SMEs and LEs, 2002-06



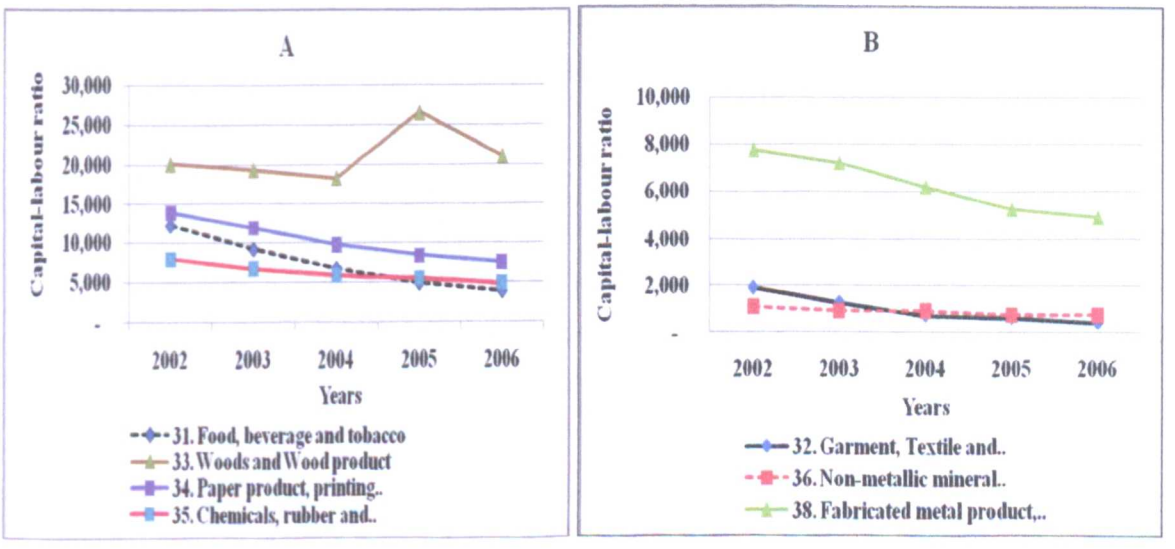
Source: Survey on labour force of 400 SMEs and 100 LEs in Cambodia during 2002-2006

Figure 6.4: Capital-labour ratio of SMEs by industries, 2002-06



Source: Survey on capital and labour force of 400 SMEs in Cambodia during 2002-2006

Figure 6.5: Capital-labour ratio of LEs by industries, 2002-06



Source: Survey on capital and labour force of 100 LEs in Cambodia during 2002-2006

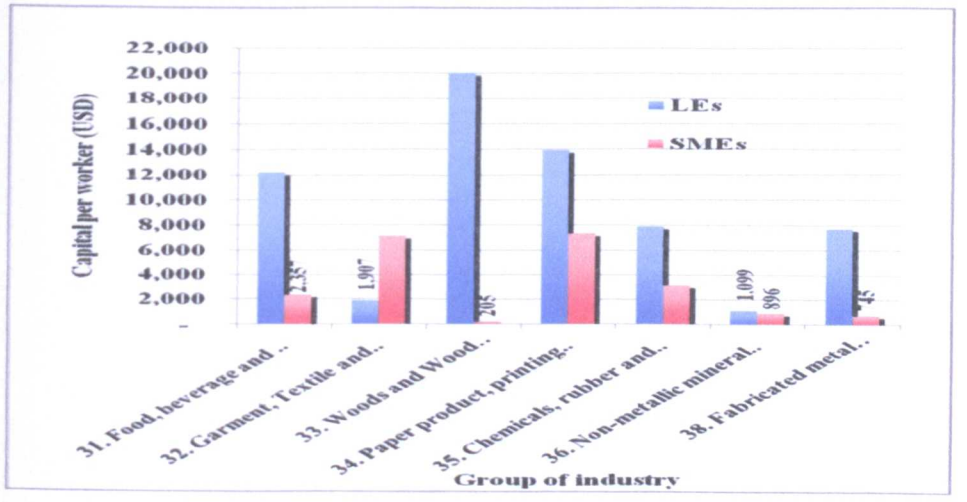
If we compare the two sizes of industry in Figure 6.6, 6.7, 6.8, 6.9 and 6.10, the capital-labour ratio of LEs were exceptionally higher than SMEs in almost all industries, except garment, textile and footwear apparel and leather industries. Thus, this group of industries under SMEs were capital-intensive industries, and all other industries were labour-intensive. Such low capital to labour ratios shows that SMEs generated more labour opportunities per unit of capital than large enterprises. Since they used labour-intensive technology, their growth can be considered to be beneficial to labour-abundant economies like Cambodia.

The government of Cambodia recognizes that LEs in the textile, footwear, and garments sector are the major labour-intensive industries fuelling growth in developing economies, therefore, these industries are promoted (CDC, 2005). The government provides tax and tariff incentives for establishing factories, for the importation of new machinery, and equipment for constructing factories. However, there are no such incentives provided to SMEs. There is a wide availability of labour for these industries and the minimum wage is lower than in neighboring countries such as Malaysia, Thailand, China and the Philippines. Moreover, small enterprises producing goods such as motorcycle seat covers, cloths, shoes, and T-shirts are located in main areas where the capital needed to start a business is high. This could be the reason why the garment, textile and footwear apparel and leather industries under LEs employ more labour per unit of capital than do SMEs.

For LEs, non-metallic mineral products had the lowest capital-labour ratio, whereas woods and wood products were found to have the highest (*K/L*) ratios followed by paper products, printing and publishing; and food, beverage and tobacco. In contrast to LEs, wood and wood products had the lowest ratio under SMEs. SMEs with the highest ratios were paper products, printing, and publishing industries; and the second highest were garments, textile and footwear apparel and leather industries.

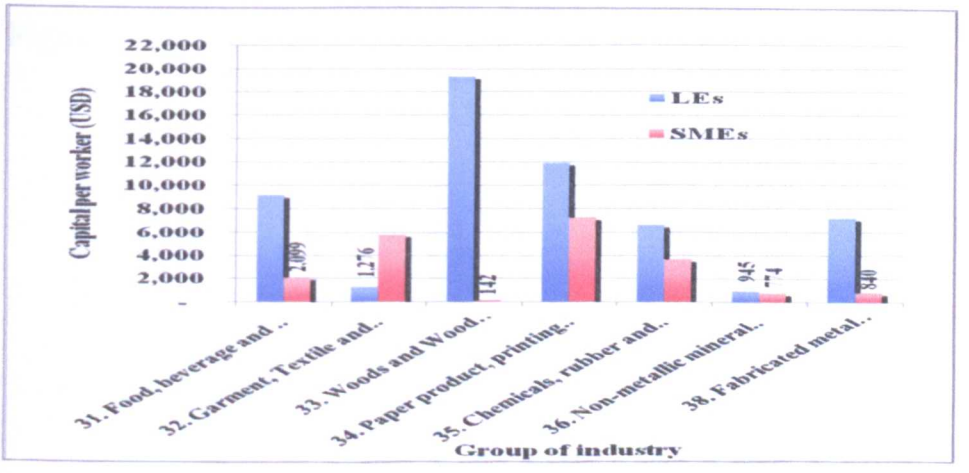
Moreover, it is noted that capital-labour ratio of wood and wood products under SMEs and LEs is very different in all five years studied. LEs in this type of industry use high-tech machinery and equipments to produce high standard products, mostly for export, whereas SMEs use low-tech or home-made machinery and equipments to produce labour-intensive products for domestic consumers.

Figure 6.6: Gross capital per worker in 2002



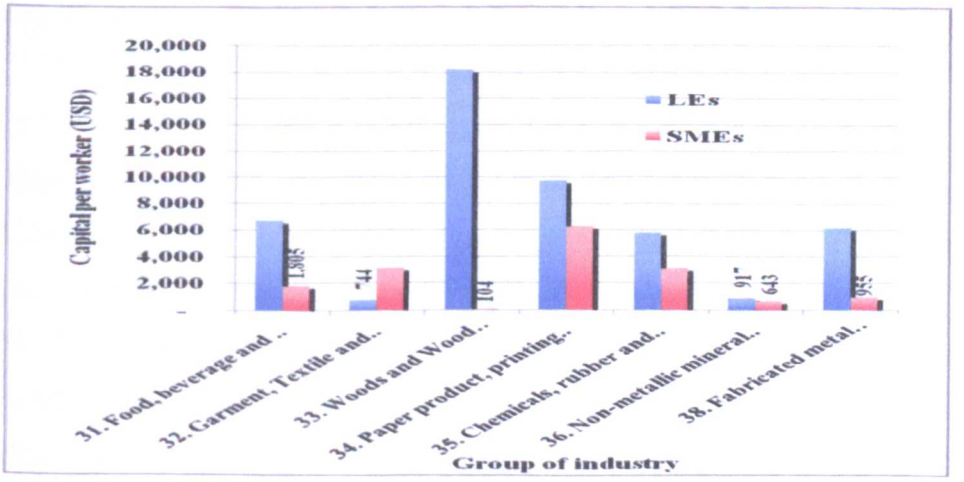
Source: Survey on capital and labour of 400 SMEs and 100 LEs in Cambodia in 2002

Figure 6.7: Gross capital per worker in 2003



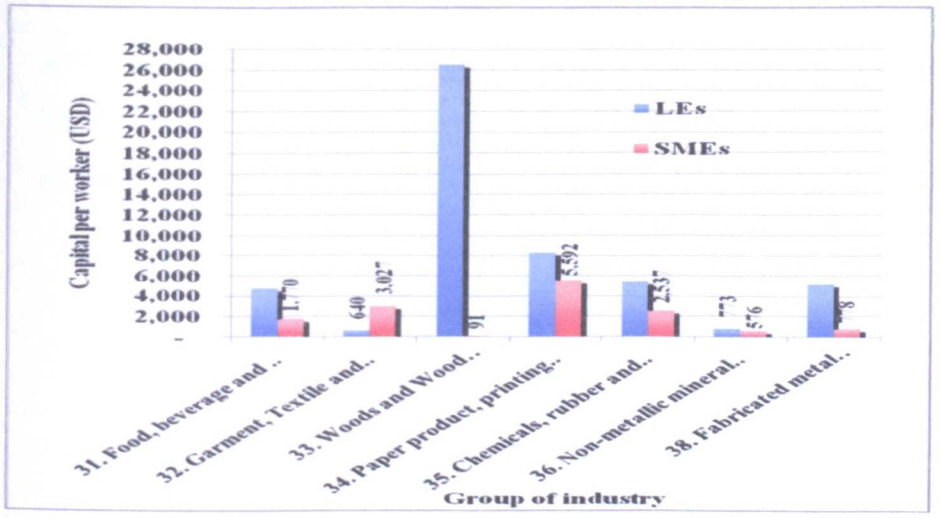
Source: Survey on capital and labour of 400 SMEs and 100 LEs in Cambodia in 2003

Figure 6.8: Gross capital per worker in 2004



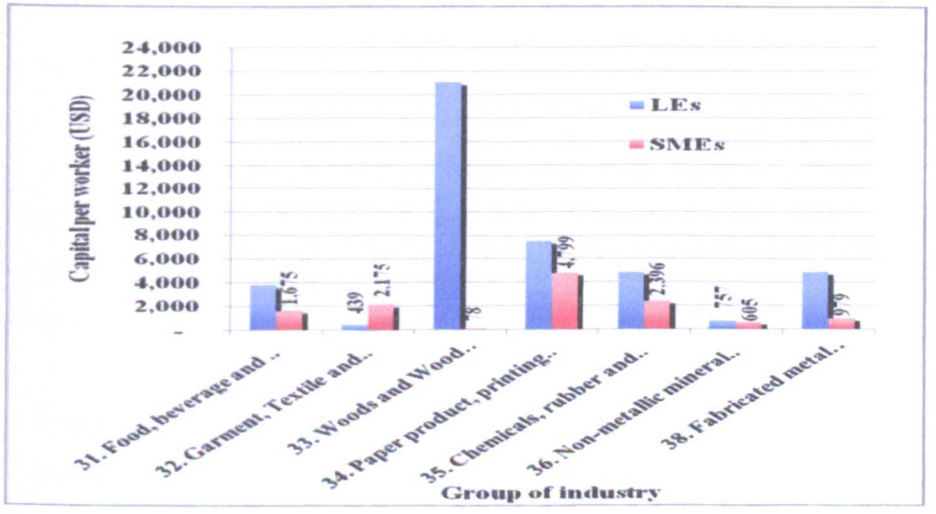
Source: Survey on capital and labour of 400 SMEs and 100 LEs in Cambodia in 2004

Figure 6.9: Gross capital per worker in 2005



Source: Survey on capital and labour of 400 SMEs and 100 LEs in Cambodia in 2005

Figure 6.10: Gross capital per worker in 2006



Source: Survey on capital and labour of 400 SMEs and 100 LEs in Cambodia in 2006

In addition as in Table 6.1, the result from the independent sample t-test shows a highly significant level at 5 per cent ($p<0.05$) in all industries. In the group statistics box (see Table C3a in Appendix C), except for garment, textile and footwear apparel and leather industries, the mean and standard deviation for all other industrial groups under LEs were larger than SMEs. For this reason, the output in Table C3b in Appendix C shows that the t-values of garment, textile and footwear apparel and leather industries were a positive (+) sign, and all other industries had a negative (-) sign. However, for some industrial groups, the significance level for Levene's test for equality of variances was less than 5 per cent ($p<0.05$) which

means that the variances for those two groups were not the same (see Table C3b in Appendix C). Therefore, we need to test whether the difference in the two means is equal to some value given by the null hypothesis that there is no difference between the means. To do that we need to pool the variances before doing the t-test. The pooled variances S_p^2 is calculated by using equation (6.1), where the t-statistic (t) is defined as shown in equation (6.2).

$$S_p^2 = \frac{(n_{sme}-1)S_{sme}^2 + (n_{le}-1)S_{le}^2}{n_{sme}+n_{le}-2} \qquad (6.1)$$

$$t = \frac{\overline{x_{sme}} - \overline{x_{le}}}{\sqrt{S_p^2/n_{sme} + S_p^2/n_{le}}} \qquad (6.2)$$

where n_{sme} and n_{le} is sample size of SMEs and LEs. S_{sme} and S_{le} is standard deviation of SMEs and LEs, respectively. And, the mean number of SMEs and LEs is $\overline{x_{sme}}$ and $\overline{x_{le}}$, respectively.

As in Table C4 in Appendix C shows t-values of all groups of industry are lower than the conventional critical value of p=0.05, which means that at the 95 per cent confidence level we reject the hypothesis that the samples were drawn from population with the same means. This means that there is not a significant difference between the two groups being compared.

There was a decrease of capital-labour ratios of all industries during this five-year period because of the decrease of capital stock, and the increase of the workforce. Figure 6.2 shows that capital stock for LEs had dropped dramatically compared with SMEs in the same period. At the same period, Figure 6.3 shows labour force in all sizes of industries had gone up, except LE industries, where the labour force decreased from 2004 to 2005 and then went up again in 2006.

There were some factors contributing to the decrease of capital stock and the increase of labour force.

Firstly, access to finance is a primary issue as identified by a number of studies, including the ADB and the Cambodian Development Resource Institute (CDRI). Cambodian firms receive over 98 per cent of their capital through informal sources. In 2004, only about one per cent of investment capital and slightly more than one per cent of working capital was provided by commercial banks (World Bank, 2004). Similarly, in this study, we found that majority of capital investments are financed by personal risk capital like savings, loans and assistance from relatives, and selling of an asset. This increases the cost of capital, limits the size of loans, and reduces the period money can be borrowed for, restricting the ability of SMEs to purchase productive capital.

Second, small firms usually use technologies that are less modern and less capital- intensive than those used by large firms (Billetoft 1997, p.16).

Third, most assets such as machinery, buildings, and equipment had been used until their current values were very low. This was because maintenance was a low cost to Cambodian industries. Older machines and equipments are easier to repair with basic knowledge when they break-down. Most SMEs bought used or domestically made machinery and equipment. Thus, their depreciation rate was 25 per cent higher than buildings (5 per cent), resulting in the current values of machinery and equipment dropping significantly. However, the study found that the expenditure on building maintenance was even lower than for machinery and equipment. Most LEs had rented buildings, but rent assets were not included in capital cost in this study.

As far as the increase of labour force is concerned, it had increased more in LEs than in SMEs due to the migration of labour from rural to urban areas, where most of the firms were large in size, and this trend had continued because the expected wages are higher.

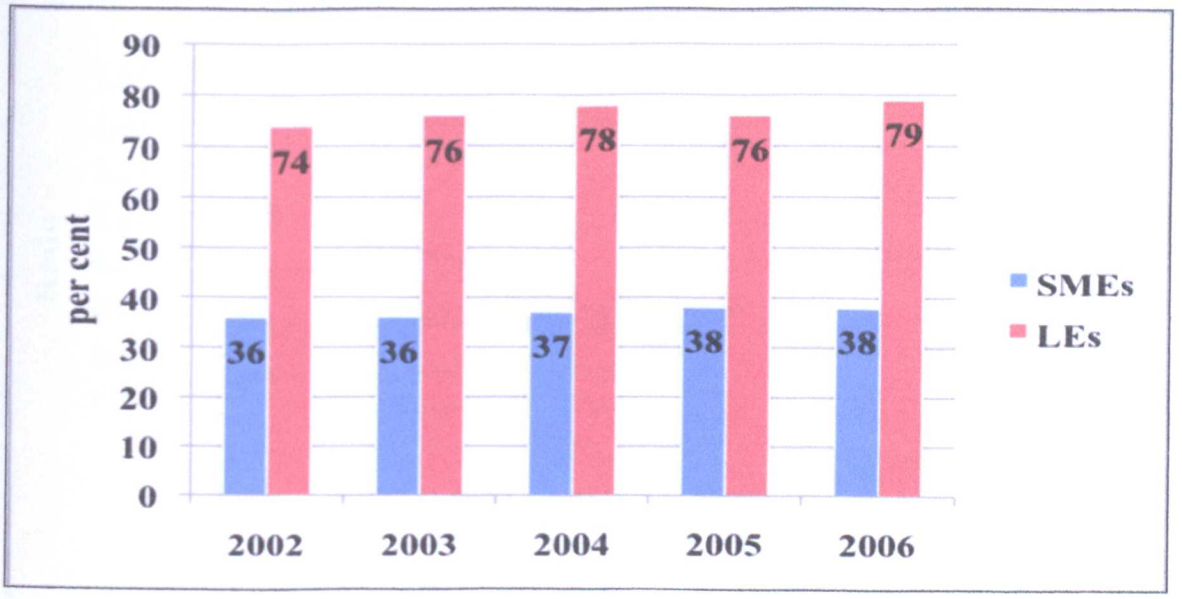
Table 6.1: Testing the difference between SMEs and LEs, 2002–06

Industries	Mean difference	T-value	Significance (2-tailed)
31. Food, beverage and tobacco	SMEs<LEs	-3.518	0.024
32. Garment, textile and footwear apparel and leather industries	SMEs>LEs	3.362	0.023
33. Woods and Wood products	SMEs<LEs	-14.485	0.000
34. Paper products, printing and publishing	SME<LEs	-3.188	0.013
35. Chemicals, plastic products	SME<LEs	-5.427	0.001
36. Non-metallic mineral products except products of petroleum and coal	SME<LEs	-2.303	0.050
38. Fabricated metal products, machinery and equipment	SME<LEs	-9.859	0.001
All Industry	SME<LEs	-2.821	0.043

Source: Survey on 400 SMEs and 100 LEs in Cambodia during 2002-2006

Figure 6.11 shows female labour force share of both SMEs and LEs. It indicates that female labour in LEs was noticeably higher than in SMEs over the 5 year period. However, the percentage share of female labour force in both groups had slightly increased over the period. Similarly, figure 6.12a and 6.12b show the female-labour ratio of both SMEs and LEs had increased steadily during the five year period. Overall, it had risen from 0.568 (2002) to 0.614 (2006) for SMEs; and 2.805 (2002) to 3.656 (2006) for LEs. The female-male ratio of SMEs had gone up in all industries, except paper, printing, non-metallic, fabricated metal, machinery, and equipment.

Figure 6.11: Female percentage share of labour force, 2002-06

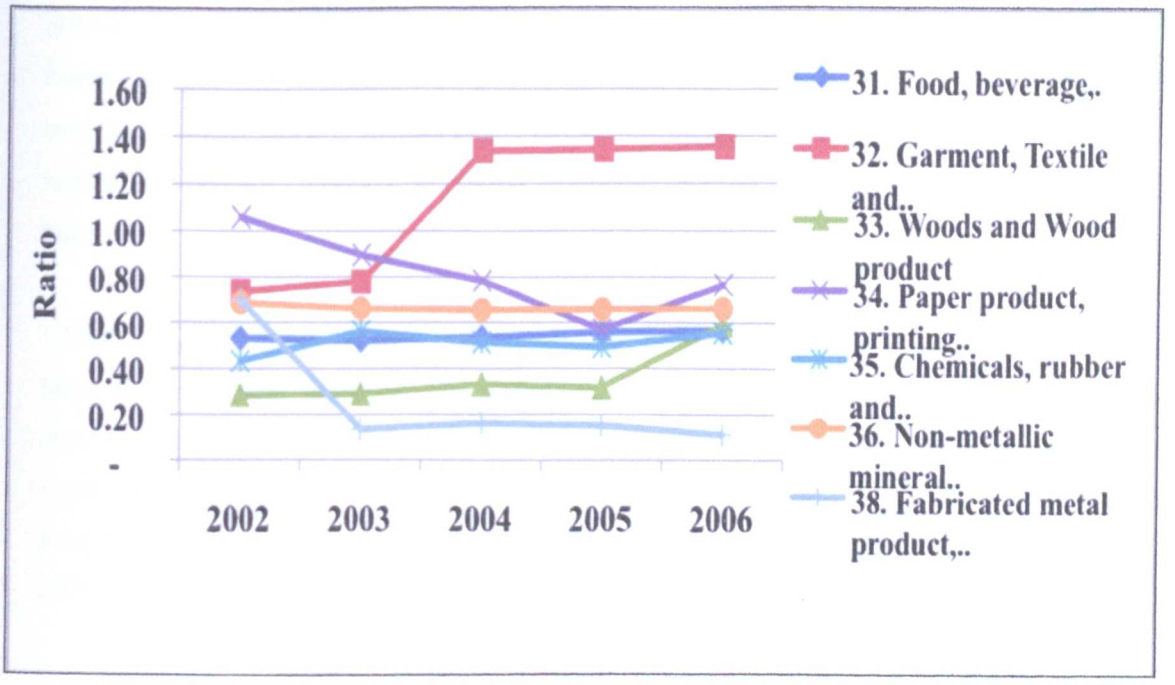


Source: Survey on femal labour of 400 SMEs and 100 LEs in Cambodia during 2002-2006

If we compare the two sizes of industry in table C5 in Appendix C, the female-male ratio of LEs were exceptionally higher than SMEs in almost all industries except wood, paper, printing, fabricated metal, machinery, and equipment industries. Such lower female to male labour ratios shows the less important role of women in SMEs than in LEs.

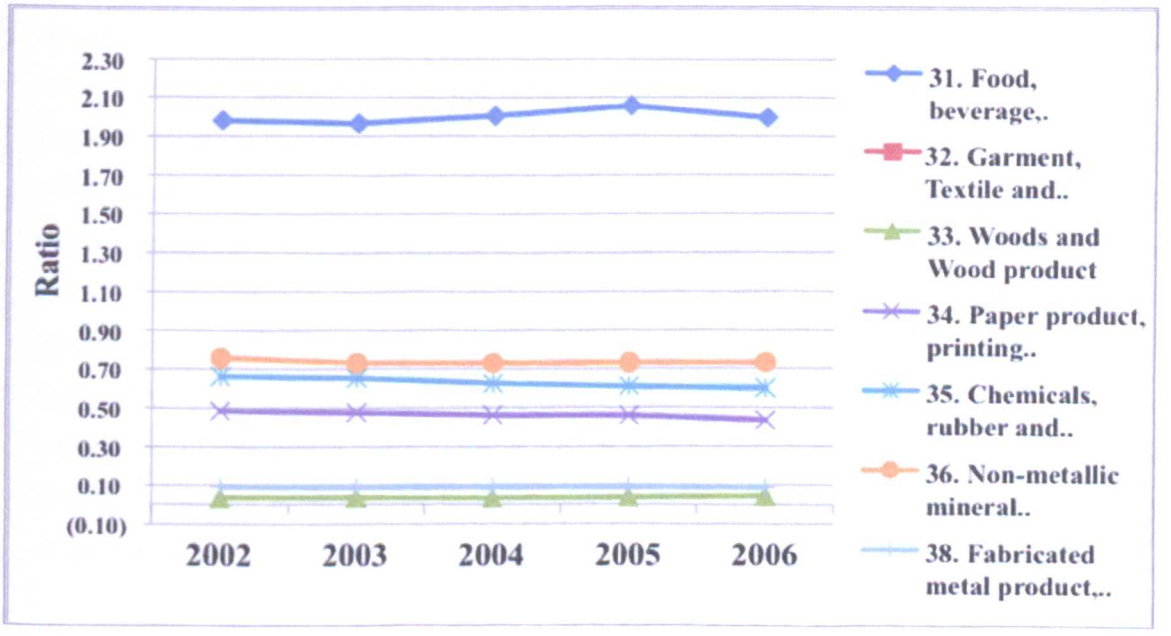
Noticeably, although the female-male ratio of textile and footwear apparel and leather industries under LEs had decreased from 12.396 (2002) to 11.131 (2006), these industries had the highest and much higher ratio than SMEs for the same industry group. However, the participation of women labour in wood industries under LEs was the lowest among other industries. Paper, printing, and publishing under SMEs absorbed the highest female labour, whereas wood industries employed the fewest women workers.

Figure 6.12a: Female-male ratio for SMEs by industries, 2002-06



Source: Survey on labour force of 400 SMEs in Cambodia during 2002-2006

Figure 6.12b: Female-male ratio for LEs by industries, 2002-06



Source: Survey on labour force of 100 LEs in Cambodia during 2002-2006

Furthermore, SMEs were not an important source of employment for women compared to LEs. The breakdown of male and female workers by industry groups in SMEs shows that the percentage of women in the labour force was dramatically low in all industry groups during

2002-2006 (see Table C6 in Appendix C). On average during the five years, there were only around 37 per cent of women workers in SMEs. This could indicate the important of LEs, especially garment industries, in providing jobs and incomes for women. In five years average, women worked in fabricated metal, machinery, and equipment industry was only around 10 percent, whereas in textile, footwear apparel, leather industry was around 50 percent.

USAID's (2005) report shows that one-quarter million Cambodians were employed in the large sized garment industry, and a multiple of that number was employed in supporting sectors. Workers are mainly women (aged 18-25) who migrate from poor rural areas to the capital Phnom Penh where the majority of garment factories are located. It is estimated that around 200,000 employees in garment industry, some 180,000 were young women (ADB, 2005)

In conclusion, Cambodia's industrial development led by a labour-intensive industry is similar to that of neighboring countries in East Asia. All industry SMEs, except the garment, textile and footwear apparel and leather industries, had lower capital-labour ratios than LEs. These SME industries normally employed relatively few workers with high skills and were located in main areas where the fixed assets such as buildings, equipment, and appliances were expensive. Such lower capital-labour ratios in SMEs shows that most tend to use a higher proportion of labour relative to capital inputs. Considering that Cambodia is a country which lacks capital but has abundant labour resources, the high intensity of labour usage relative to capital implies a relatively more efficient usage of scarce resources in the country.

Moreover, the study found that the proportion of women engaged in SMEs were exceptionally lower than LEs, except in the wood, paper, printing, fabricated metal, machinery, and equipment. The percentage of women in the labour force was dramatically low, around 37 per cent in all industry groups under SMEs during 2002-2006. This could indicate the importance of LEs, especially in the garment industry, in providing jobs and incomes for women.

Therefore, the low capital intensity of SMEs implies that Cambodian SMEs tend to utilize more labour for a given amount of capital relative to LEs in the manufacturing sector. Overall, these results affirm the hypothesis that SMEs are relatively more labour intensive than LEs, and imply SMEs' potential in contributing to employment generation in Cambodia

as long as they have an equal access to capital. However, although SMEs typically invest the most of their own capital, there is not equal access to capital compared with large firms. We will discuss this issue in detail in chapter VII.

6.2 Testing Hypothesis 2: SMEs are as productive as LEs or more productive than LEs

Past productivity studies by Snodgrass and Biggs (1996, pp. 27-29) on SMEs in developed countries show relatively positive effects of SMEs on development. However, such results are relatively less prevalent in developing countries. Therefore, the second hypothesis tests whether or not Cambodian SMEs are productive relative to LEs using four measures of productivity: the two total factor productivity (TFP) approaches developed by Good et al (1997) and Christensen et al (1981), labour productivity, and capital productivity.

Using output and input prices collected from the survey of 500 enterprises across the industries and regions in Cambodia, relative TFP and labour and capital productivity levels were calculated using equations 4.14, 4.15, 4.28, and 4.29 (see chapter IV). All productivity indexes are constructed for each enterprise in each of the five census years: 2002, 2003, 2004, 2005, and 2006 (see Tables D2, D3, D4, D5, D6, D7, D8, D9, and D10 in Appendix D). However, using the approach of Good et al, the result shows only the last four years, as 2002 is a base year for the model. The TFP approach developed by Christensen et al (1981) is useful for measuring TFP of a given plant in a single year. The TFP approach developed by Good et al (1997) is also used for time series as well as cross section comparisons and for combinations of time series and cross section data.

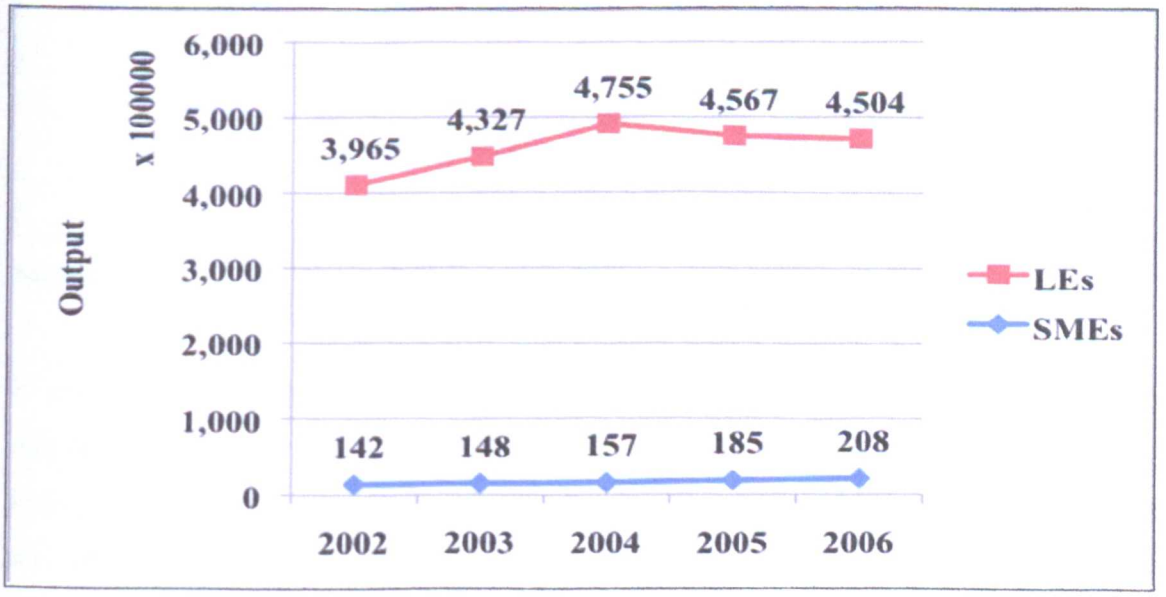
To see whether SMEs and LEs are statistically significantly different in terms of TFP, labour productivity, and capital productivity, a t-test was used (see Tables D11, D12, D13, and D14 in Appendix D). Table D1 in Appendix D compares amount and annual growth rate of output, labour, capital and intermediate inputs over the period 2002–2006. It is the average increase in the value of an individual amount over the period of a year. Tables 6.2, 6.3, 6.4, and 6.5

compare productivity levels between SMEs and LEs engaged in manufacturing during the period 5 years (2002–2006)[106].

Figures 6.13, 6.14, 6.15, and 6.16 show quantity output and inputs of SMEs and LEs over the 5 year period. From the figures we can see that quantity of output, and number of labour and intermediate inputs for SMEs had increased steadily, although capital stock showed a decreased trend over the period. As for LEs, while quantity of output saw an increase, only intermediate inputs showed a steadily increase until 2005. Capital stock had gone down over the period, while labour (number of hours) input showed a noticeable decrease and increase in 2003 and 2004, respectively.

An examination of the growth rates of output for establishments of different sizes reveals that SMEs which employ up to 100 employees recorded the highest growth rate during the four years under study (see Figure 6.13). Table D1 in Appendix D shows the average annual growth rate of SMEs during the four-year period (2003-2006) was around 10 per cent, increasing from 4.16 per cent in 2003 to 12.06 per cent in 2006. In contrast to the relatively favourable output performance of SMEs, LEs had lower annual growth, and the growth rate decreased dramatically in the last two years, 2005 (3.95 per cent) and 2006 (1.37 per cent).

Figure 6.13: Quantity of Output of SMEs and LEs, 2002-06



Source: Survey on output of 400 SMEs and 100 LEs in Cambodia during 2002-2006

[106] The productivity levels of enterprises were also calculated. The results are shown in Tables D1, D2, D3, D4, D5, D6, D7, D8, and D9 in Appendix D.

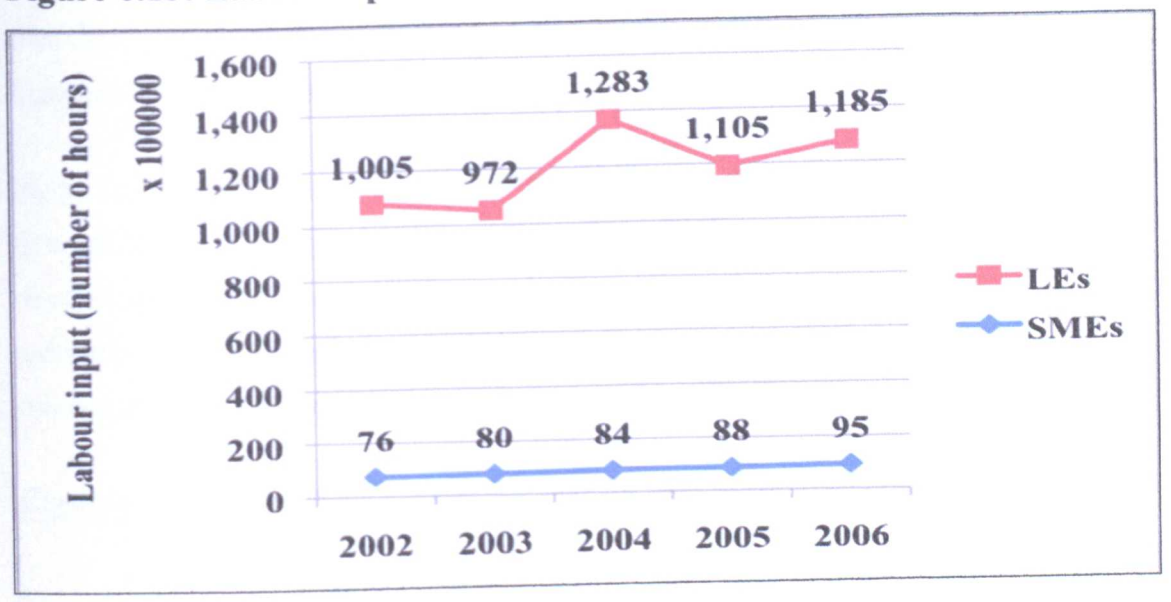
Turning to the changes in inputs, one finds that the annual growth rate of labour inputs under SMEs had increased steadily from 5.07 per cent in 2003 up to 7.96 per cent (2006) (see Table D1 in Appendix D). However, over the same period, the changes in labour inputs of LEs showed sizeable fluctuations. They increased significantly at 32.05 per cent in 2004, but decreased noticeably in 2005 (13.85 per cent). The labour inputs increased slightly again in 2006. Capital inputs of LEs decreased significantly in almost all years, especially in 2003 (18.63 per cent) and in 2006 (22.32 per cent). The decrease also happened for SMEs (except 2006), but at a lower level compared with LEs (see Figure 6.14). The changes in the use of intermediate inputs in SMEs show a very similar pattern to that observed for outputs, indicating that the production relationship between intermediate inputs and outputs was more or less fixed over time. However, the use of intermediate input in LEs does not show a similar pattern with output, especially in the last two years, 2005 and 2006 (see Figure 6.15).

Figure 6.14: Capital stock of SMEs and LEs, 2002-06

Source: Survey on capital of 400 SMEs and 100 LEs in Cambodia during 2002-2006

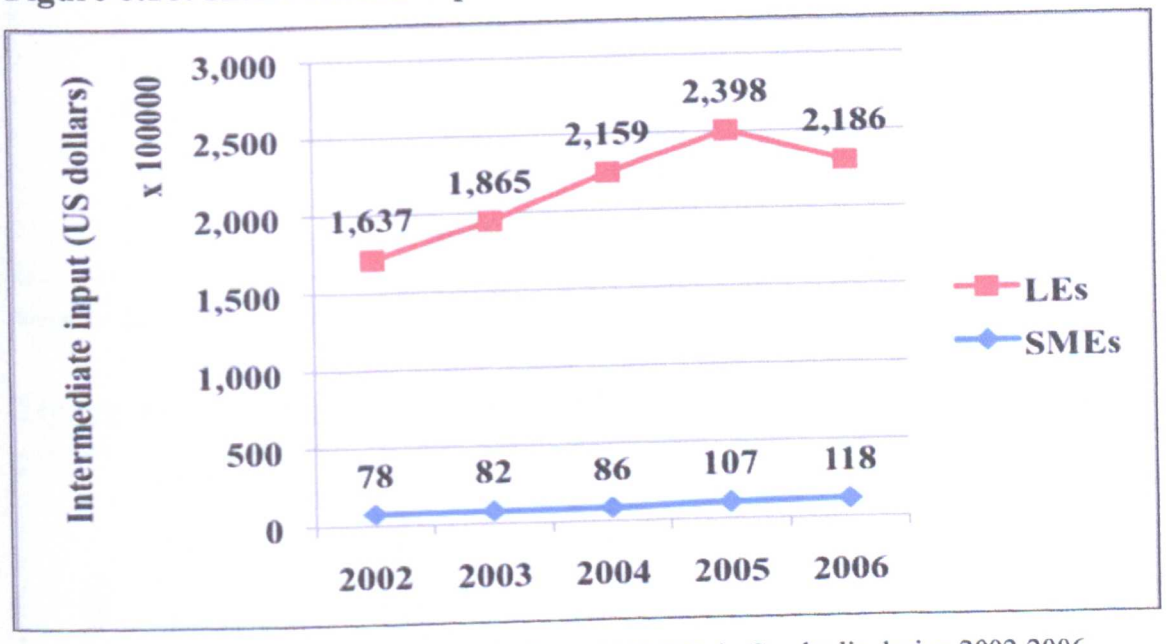
In sum, over the period 2002–2006, output growth increased significantly for SMEs. The output of SMEs grew more than that of LEs, leading to a greater change in the productivity level of SMEs than of LEs. However, we observe, on average, SMEs expanded labour, capital and intermediate inputs to grow faster than LEs. The average annual growth rate of all input factors under SMEs was higher than LEs.

Figure 6.15: Labour input of SMEs and LEs, 2002-06



Source: Survey on labour of 400 SMEs and 100 LEs in Cambodia during 2002-2006

Figure 6.16: Intermediate input of SMEs and LEs, 2002-06



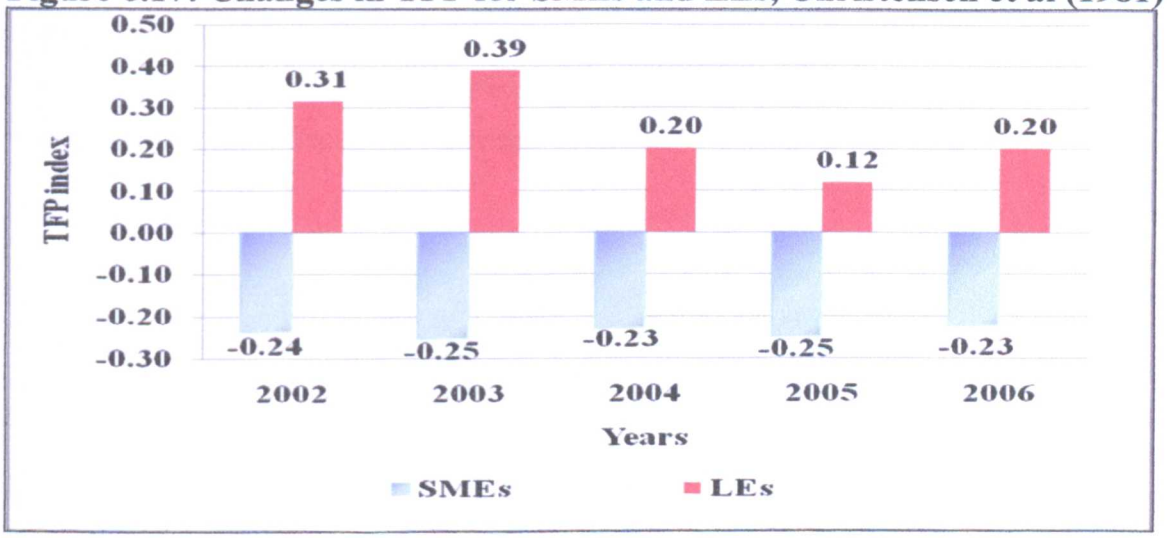
Source: Survey on material cost of 400 SMEs and 100 LEs in Cambodia during 2002-2006

The results of the computation of TFP by using equations (4.14) and (4.15) developed by Christensen et al (1981) and Good et al (1997) respectively are shown in Tables 6.2 and 6.3. The evolution of TFP over the period 2002–2006 is similar to that reported at the firm and aggregate levels in some other studies, such as Okamoto and Sjoholm (1999), Lopez-Salido (2001); Huergo and Moreno (2006); and Castany et al (2007). Using the two different

approaches to focus on TFP differences by firm sizes, it is found that LEs have higher TFP than SMEs and that the difference is statistically significant at the 5 per cent level (see independent samples test in Tables D11 and D12 in Appendix D).

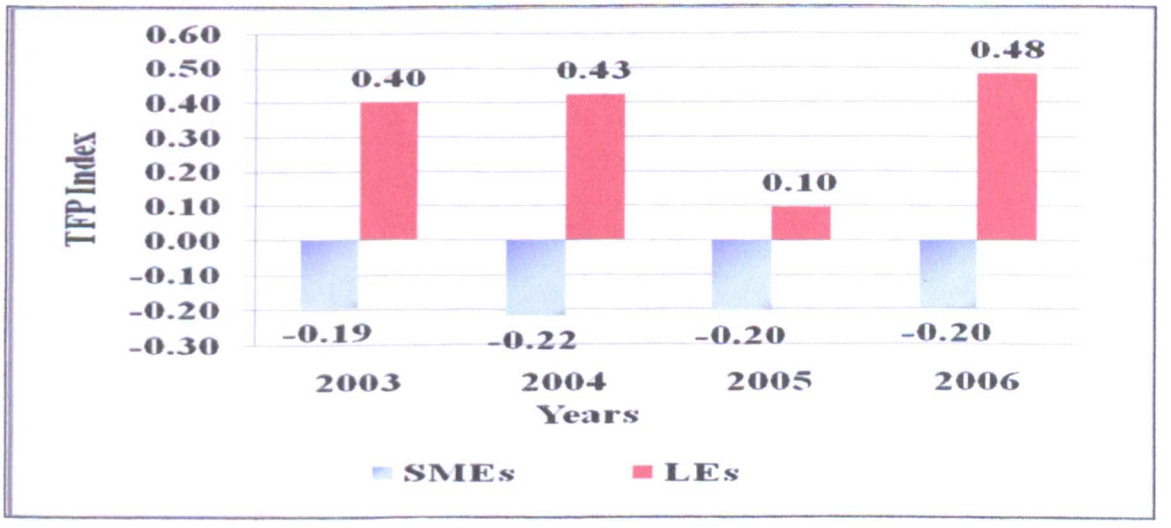
Figure 6.17 and 6.18 show that TFP level of LEs were exceptionally higher than SMEs in all five years. Over the period, while TFP levels of SMEs were not significantly different, the changes in TFP of LEs showed sizeable fluctuations. LEs experienced the highest level of productivity in the first 2 years (2002 and 2003) and the lowest in 2005, whereas SMEs showed the highest level in 2004 and 2006 (see figure 6.17).

Figure 6.17: Changes in TFP for SMEs and LEs, Christensen et al (1981)



Source: Survey on 400 SMEs and 100 LEs in Cambodia during 2002-2006

Figure 6.18: Changes in TFP for SMEs and LEs, Good et al (1997)



Source: Survey on 400 SMEs and 100 LEs in Cambodia during 2002-2006

Although this study did not produce data on the productivity of SMEs by rural and urban areas, since the majority of these enterprises are found in rural areas, while LEs are located in or near big cities like Phnom Penh, it can be assumed that the bulk of SMEs are much less productive. This assumption is simply based on the fact that in rural areas, especially in the provinces outside Phnom Penh, the physical infrastructure is not yet well developed, transport facilities are bad, access to information and capital market is very limited, and good facilities for education and highly skilled workers are not available. Similarly, ADB's (2004) report shows that the competitiveness and productivity of SMEs were often constrained by their weak technical capacities, lack of modern management knowledge, and lack of access to information, capital, and links to foreign markets (ADB, 2004). Moreover, Cambodian SMEs even had significantly lower rates of productivity than other countries such as China, Pakistan, India and Bangladesh (MIME, 2005). The TFP level was 18 per cent lower in Cambodia than in India, and 24 per cent below China. This was primarily due to low labour productivity, which was 65 per cent below India and 62 per cent below China.

Table 6.2: TFP index of SMEs and LEs (Christensen et al (1981) approach)

ISIC	SMEs/ LEs	TFP index (Christensen at al, 1981 approach) 2002	2003	2004	2005	2006	Higher/ Lower	T-test
31. Food, beverage and tobacco	**SMEs**	-0.172	-0.184	-0.131	-0.167	-0.149	SMEs<LEs	**
	LEs	-0.107	0.160	-0.167	-0.144	-0.132		
32. Garment, textile and footwear apparel and leather industries	**SMEs**	-0.472	-0.421	-0.725	-0.397	-0.284	SMEs<LEs	*
	LEs	0.183	0.084	0.031	-0.034	0.031		
33. Wood and Wood products	**SMEs**	-0.207	-0.204	-0.234	-0.156	-0.077	SMEs>LEs	*
	LEs	-0.257	-0.231	-0.258	-0.298	-0.249		
34. Paper products, printing and publishing	**SMEs**	-0.311	-0.296	-0.212	-0.194	-0.231	SMEs<LEs	*
	LEs	-0.100	-0.085	-0.059	-0.064	-0.038		
35. Chemicals, rubbers and plastic products	**SMEs**	-0.418	-0.409	-0.409	-0.310	-0.315	SMEs<LEs	*
	LEs	-0.021	-0.010	-0.006	-0.004	-0.013		
36. Non-metallic mineral products except products of petroleum and coal	**SMEs**	-0.123	-0.136	-0.150	-0.163	-0.179	SMEs<LEs	*
	LEs	-0.075	-0.072	-0.078	-0.024	-0.020		
38. Fabricated metal products, machinery and equipment	**SMEs**	-0.372	-0.418	-0.390	-0.354	-0.388	SMEs<LEs	*
	LEs	-0.137	-0.121	-0.105	-0.087	-0.090		
All Industries	**SMEs**	-0.239	-0.254	-0.228	-0.251	-0.225	SMEs<LEs	*
	LEs	0.314	0.388	0.201	0.118	0.200		

Note: (1) Chapter IV provides the methodology for the calculation of relative TFP index and definition of labour (L), Capital (K), Intermediate Inputs (M), and Output (Q).
(2) * represents statistical significance at 5% confidence level under two-tailed t-tests.
(3) ** represents statistical significance at 10% confidence level under two-tailed t-tests.
T-tests were conducted to see whether there is any statistical difference between SMEs and LEs at the 5% confidence level respectively.

Table 6.3: TFP index of SMEs and LEs using the Good et al (1997) approach

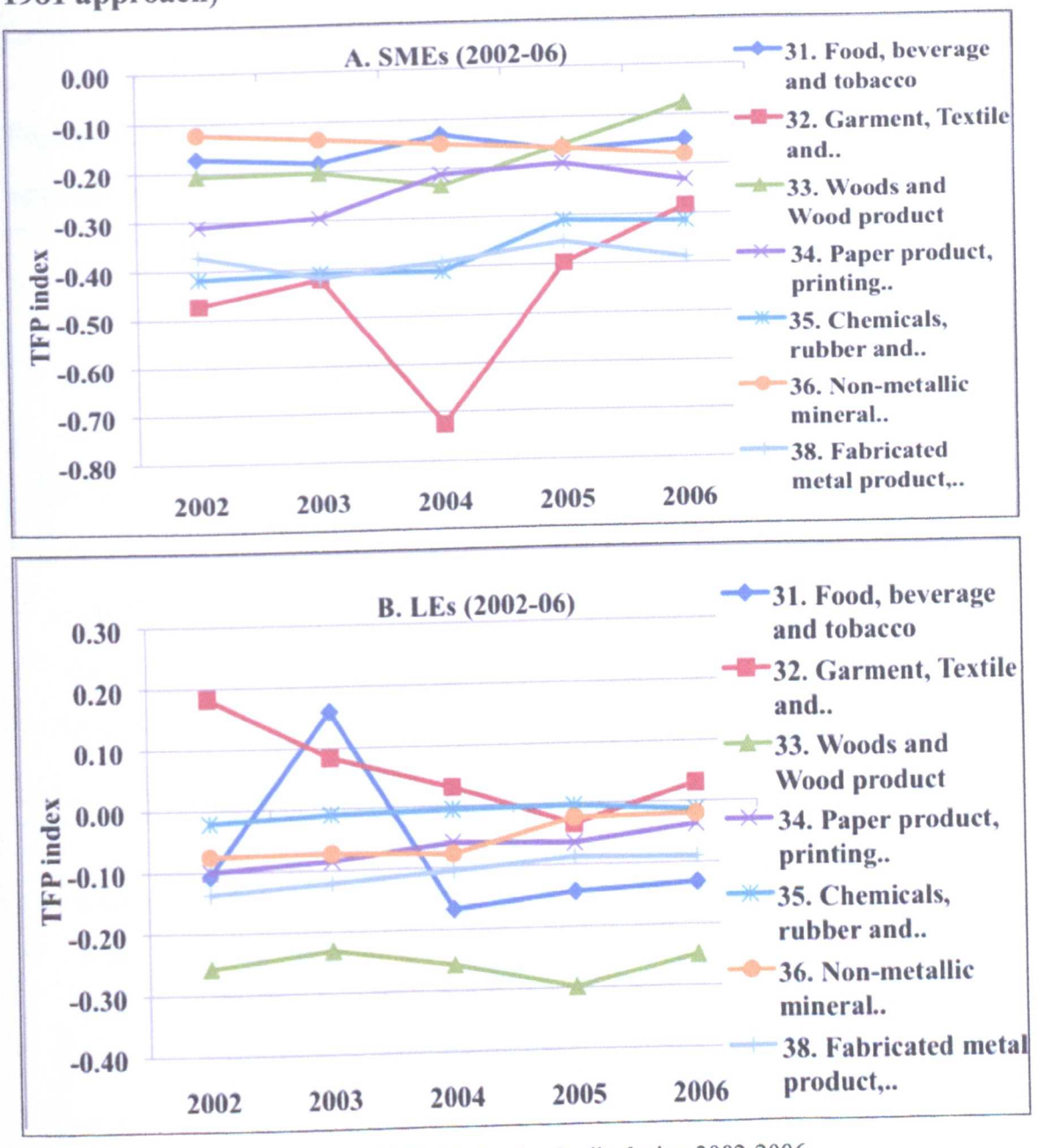
ISIC	SMEs/ LEs	TFP index (Good et al, 1997 approach) 2003	2004	2005	2006	Higher/ Lower	T-test
31. Food, beverage and tobacco	**SMEs**	-0.123	-0.131	-0.083	-0.105	SMEs<LEs	**
	LEs	-0.021	0.439	-0.073	-0.067		
32. Garment, textile and footwear apparel and leather industries	**SMEs**	-0.357	-0.293	-0.622	-0.245	SMEs<LEs	*
	LEs	0.233	0.139	0.069	0.117		
33. Wood and Wood products	**SMEs**	-0.184	-0.096	-0.165	-0.049	SMEs>LEs	**
	LEs	-0.046	-0.177	-0.665	-0.331		
34. Paper products, printing and publishing	**SMEs**	-0.258	-0.336	-0.168	-0.078	SMEs<LEs	*
	LEs	0.013	0.053	-0.022	0.033		
35. Chemicals, rubbers and plastic products	**SMEs**	-0.328	-0.338	-0.110	-0.147	SMEs<LEs	*
	LEs	0.153	0.030	0.027	-0.025		
36. Non-metallic mineral products except products of petroleum and coal	**SMEs**	-0.095	-0.133	-0.093	-0.137	SMEs<LEs	*
	LEs	-0.046	-0.080	-0.036	-0.020		
38. Fabricated metal products, machinery and equipment	**SMEs**	-0.374	-0.312	-0.290	-0.330	SMEs<LEs	*
	LEs	-0.084	-0.078	-0.071	-0.062		
All Industries	**SMEs**	-0.194	-0.217	-0.204	-0.196	SMEs<LEs	*
	LEs	0.404	0.425	0.097	0.484		

Note: (1) Chapter IV provides the methodology for the calculation of relative TFP Index and definition of labour (L), Capital (K), Intermediate Inputs (M), and Output (Q).
(2) * represents statistical significance at 5% confidence level under two-tailed t-tests.
(3) ** represents statistical significance at 10% confidence level under two-tailed t-tests.
T-tests were conducted to see whether there is any statistical difference between SMEs and LEs at the 5% confidence level respectively.

The differences in the total factor productivity (TFP) level among the establishments of different sizes shows that the productivity levels of SMEs were higher than LEs only in wood and wood products industries (see Table 6.2 and 6.3). The two approaches, which were used to calculate TFP of each group of industry, showed similar result. This means that SMEs were not as productive as LEs except in wood and wood products. However, the productivity level of these products under SMEs was found to be statistically insignificantly higher than LEs under Good et al's approach (see Table D12 in Appendix D). The productivity differences between SMEs and LEs were large in the garment, textile, footwear apparel, leather, chemical, rubber, plastic, fabricated metal, machinery, equipment, paper, printing, and publishing industries under the two approaches. All of these industries had statistically significant difference at 5 per cent level between firm sizes (see Table D11 and D12 in Appendix D).

Figures 6.19 and 6.20 show TFP trends of each industry of different sizes during the period of five and four years under the Christensen et al and Good et al approach respectively. All industries under SMEs look like catching up with each other especially in 2005 (see Figure 6.19A). This is due to the fact that the TFP growth rate of firms in the food, beverage, tobacco, non-metallic and mineral industries became slower, and in the chemical, rubber, plastic, fabricated metal, machinery, equipment, garment, textile, footwear apparel, and leather industries it became stronger. In 2006, TFP levels of garment, textile, footwear apparel, leather, papers, printing, publishing, non-metallic, and mineral SMEs were drawing closer together. However, the productivity differences between food, beverage, tobacco, wood, wood products and chemical, rubber, plastic, fabricated metal, machinery, equipment were growing larger in 2006. Similarly, under Good et al's approach, almost all industries were catching up with each other, except garment, textile, footwear apparel, and leather industries, whose TFP decreased noticeably in 2005 (see Figure 6.20A). However, in 2006, although the TFP of these industries increased again to catch up with other industries, fabricated metal, machinery, and equipment industries seem not to be catching up with other industries. It is noted that productivity levels of garment, textile, footwear apparel, and leather industries under SMEs were lower than other industries during the first four years, especially in 2004.

Figure 6.19: Changes in relative TFP position, 2002-06 (Christensen at al, 1981 approach)

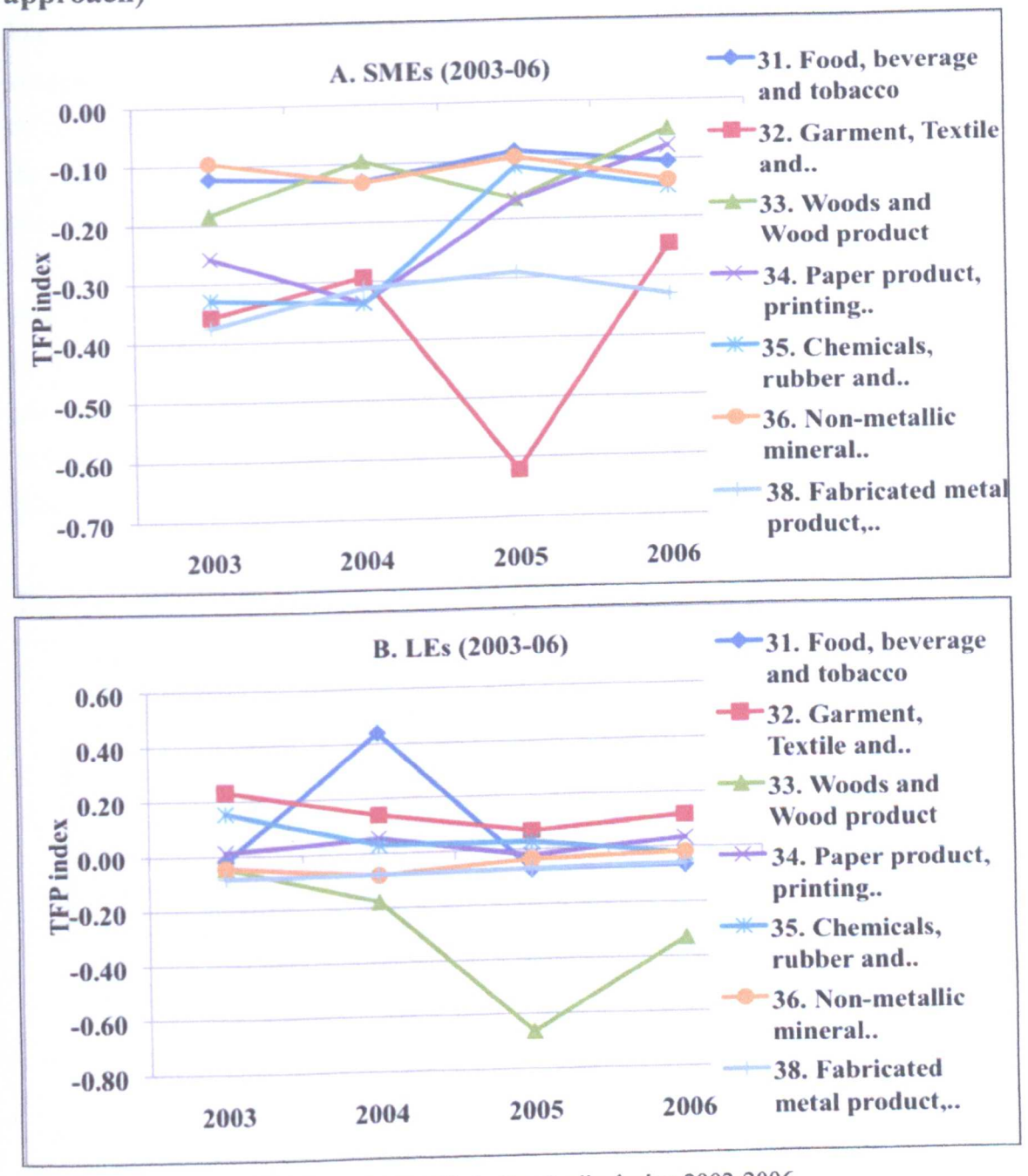


Source: Survey on 400 SMEs and 100 LEs in Cambodia during 2002-2006

As for LEs, under both Christensen et al and Good et al's approach, all industries except wood and wood products seem to move closer together and catch up with each other from 2002 to 2006 (see Figures 6.19B and 6.20B). However, TFP in the garment, textile, footwear apparel and leather industries increased noticeably in 2003 and 2004 under Christensen et al and Good et al's approach respectively. The increase made their TFP levels larger than other industries before decreasing to their lowest level in the year after. The productivity

differences between wood and wood products and other industries are still large under both approaches and it will take a substantial time for them to catch up with other industries' levels.

Figure 6.20: Changes in relative TFP position, 2003-06 (Good et al, 1997 approach)

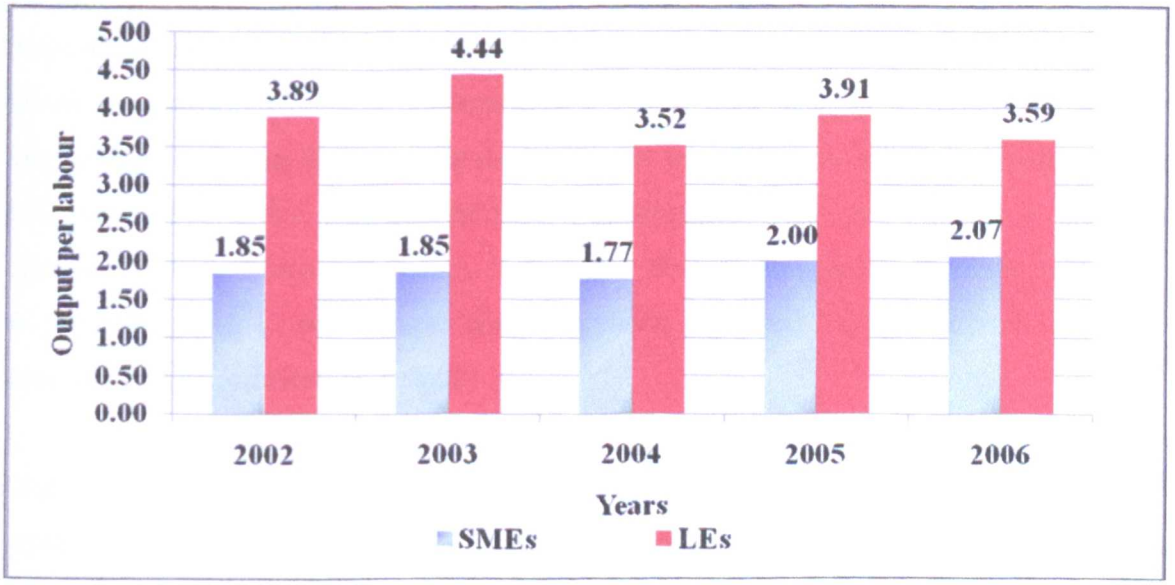


Source: Survey on 400 SMEs and 100 LEs in Cambodia during 2002-2006

Although the data are collected from a five-year survey, possible effects such as scale economies[107], increasing returns to scale, and other effects could also arise, suppressing the real contribution from SMEs. Due to such limitations of the TFP index in interpreting the productivity measures, two other measures of productivity were used: labour and capital productivity.

The results of the computation of labour and capital productivity for different sizes of enterprises over the period 2002–2006 are derived from equations (4.28) and (4.29) in chapter IV (see Tables 6.4 and 6.5). Labour productivity is a useful indicator, because it can represent the efficiency of labour, an abundant resource in Cambodia, in generating output. Figure 6.21 shows average labour productivity of SMEs rose by 12 per cent, although there was a decline of 4.30 per cent in 2004. The productivity levels of SMEs were much lower than LEs, by around 100 per cent (2002 and 2003), 98 per cent (2004), 96 per cent (2005), and 74 per cent (2006) (see Figure 6.21). As for capital productivity, figure 6.22 shows that average capital productivity of SMEs was lower than LEs; 15.3 per cent (2002), 37.3 per cent (2003), 59 per cent (2004), 36.3 per cent (2005), and 57.5 per cent (2006). This is due to the slower productivity growth of SMEs than LEs.

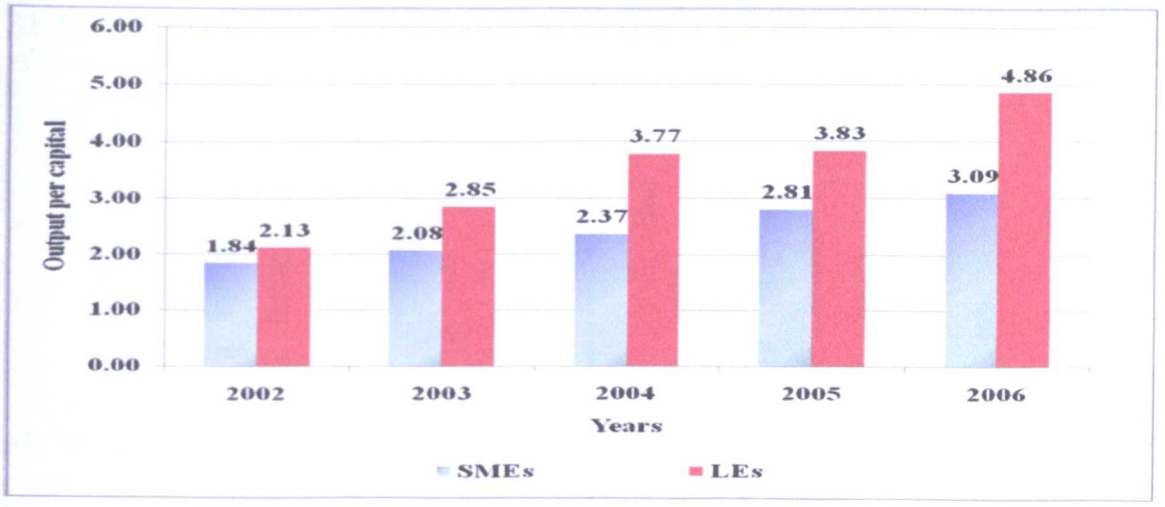
Figure 6.21: Output per labour of SMEs and LEs, 2002-06



Source: Survey on output and labour of 400 SMEs and 100 LEs in Cambodia during 2002-2006

[107] Scale economies add to the reduction in cost, which could create misleading effects if different scale industries are compared (Perkins et al. 2001). Due to the comparatively higher cost incurred in smaller firms than larger firms, this might cause the overall effect on the TFP index to be much less than that of LEs.

Figure 6.22: Output per capital of SMEs and LEs, 2002-06



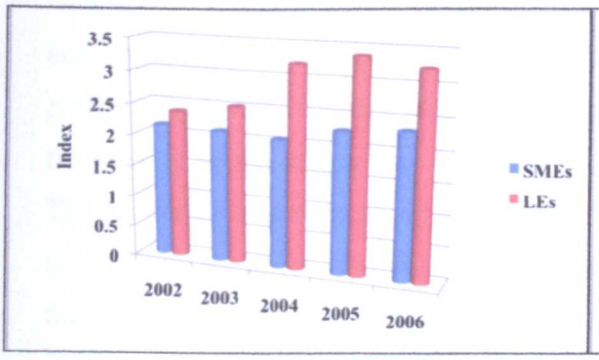
Source: Survey on output and capital of 400 SMEs and 100 LEs in Cambodia during 2002-2006

Comparing groups of industries, SMEs show relatively lower labour productivity than LEs, except for the fabricated metal, machinery, and equipment industries (see Table 6.4). Figure 6.23 shows labour productivity of these industries under SMEs was significantly higher than under LEs over the period 5 years. Labour productivity of SMEs tended to be significantly lower than LEs due to its high dependence on labour usage and lack of capital resources. The result was similar to Tabunam's (2006) study on Indonesia and Laos. The majority of Cambodian SMEs are still in a very early stage of development. The SME sector is dominated by family businesses with fewer than 10 employees, processing primary produce for the domestic market. The sector typically uses very basic technology and has low total factor and labour productivity. A study by Bargawi (2005) showed that there was more efficient use of labour in LEs than in SMEs in Cambodia. It was found that the labour productivity level of LEs, especially in the garment industry, had improved to a point where it had become comparable with China and India – and higher than in Bangladesh. Growth in output per worker was rising 12 per cent per annum between 1999 and 2003, or approximately 58 per cent over the period (Bargawi, 2005).

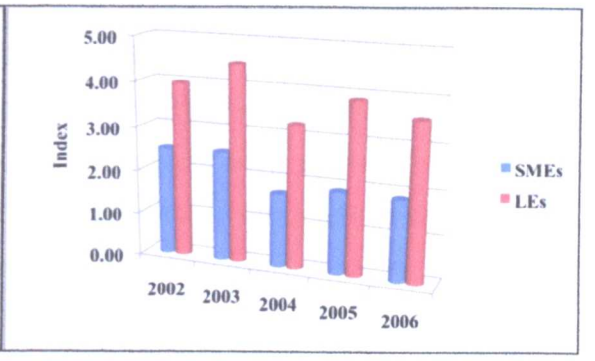
The study shows that wood and wood industries under SMEs had the lowest labour productivity, while paper products, printing and publishing, and fabricated metal products, machinery and equipment had the highest level of labour productivity. In contrast to SMEs, woods and wood industries in LEs had the highest level of labour productivity. Non-metallic mineral products except products of petroleum and coal under LEs had the lowest labour productivity over the period 5 years (see Table 6.4).

Figure 6.23: Output per labour by industry, 2002-06

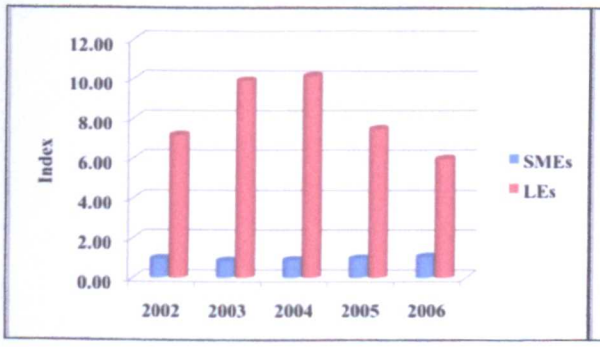
31. Food, beverage and tobacco



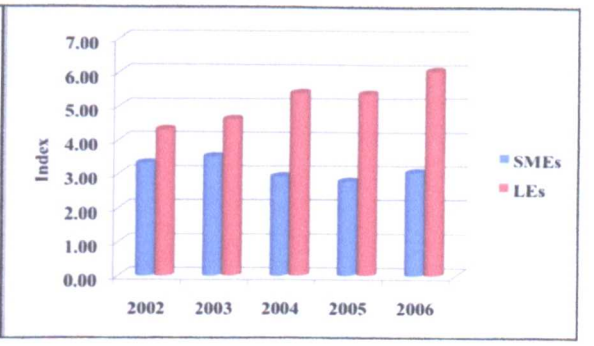
32. Garment, textile, footwear, leather



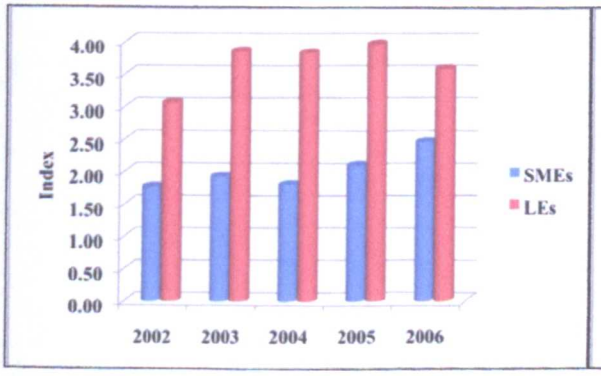
33. Woods and wood product



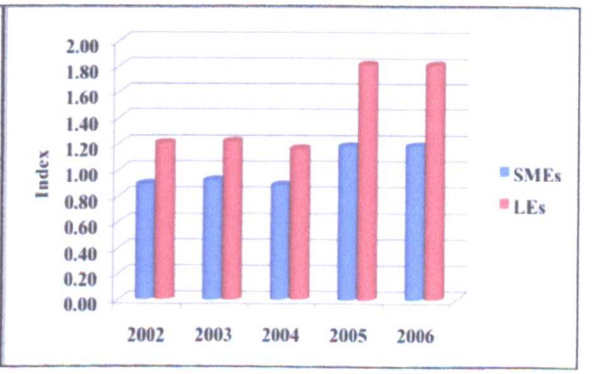
34. Paper products, printing and ..



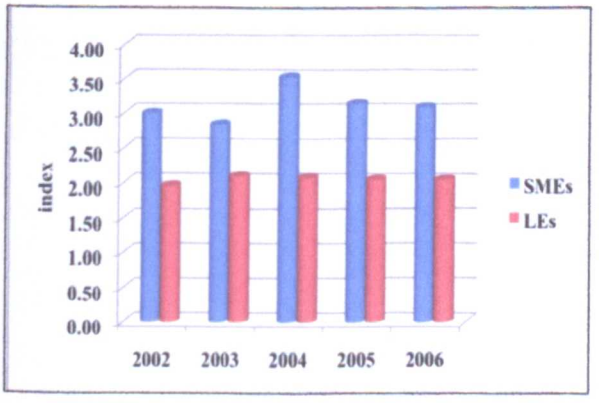
35. Chemicals, plastic products



36. Non-metallic mineral products



38. Fabricated metal products,...

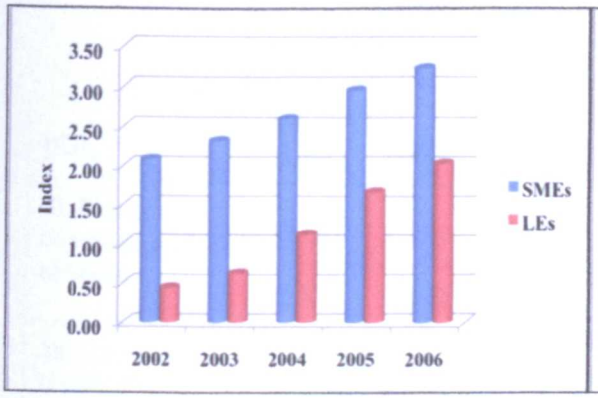


Source: Survey on 400 SMEs and 100 LEs in Cambodia during 2002-2006

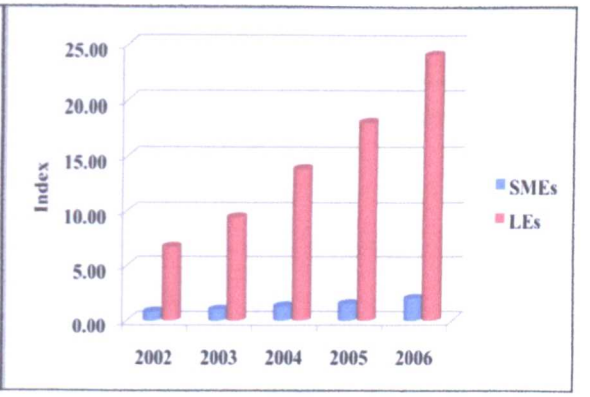
However, SMEs tended to incorporate higher capital productivity in many industries such as the food, beverage and tobacco, wood and wood products, fabricated metal, machinery, and equipment industries (see Figure 6.24). As for paper, printing, publishing, chemicals, plastic, and non-metallic minerals (except products of petroleum and coal industries), the capital productivity levels of SMEs were higher than LEs in some years (see Table 6.5). However, the validity of the results was still quite uncertain as results show statistical insignificance. The results show statistical significance at 5 per cent levels in other industries under labour productivity measures. The capital productivity in woods and wood products, and fabricated metal products were quite high among the SMEs. This was due to the high dependence of SMEs on labour force, especially in the production of wooden and metal tables, doors, windows, and other joinery and furniture.

Figure 6.24: Output per capital by industry, 2002-06

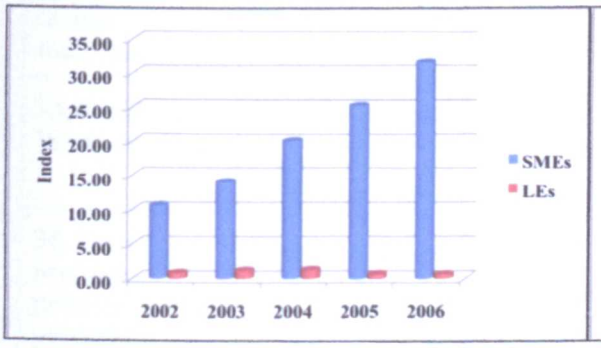
31. Food, beverage and tobacco



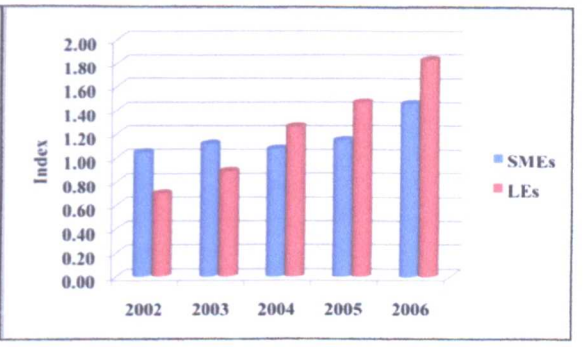
32. Garment, textile, footwear, leather



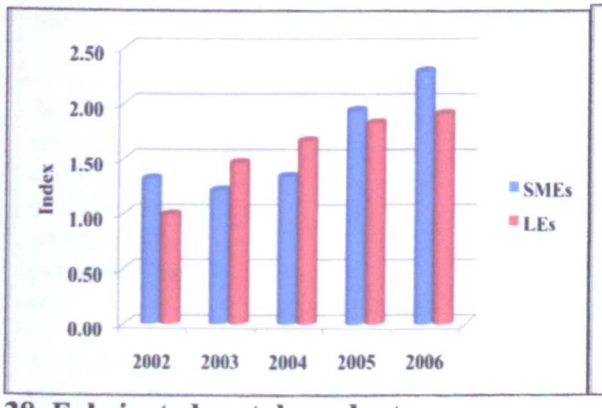
33. Woods and wood product



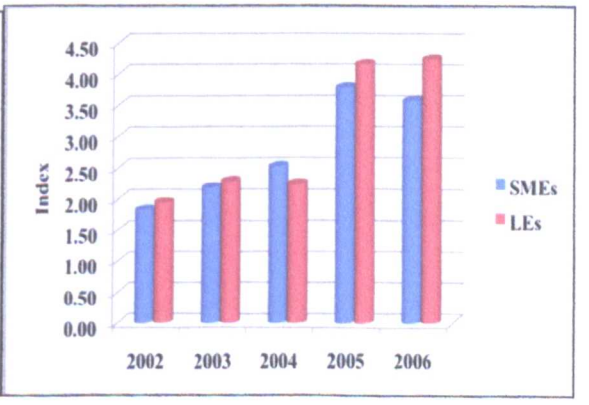
34. Paper products, printing and ..



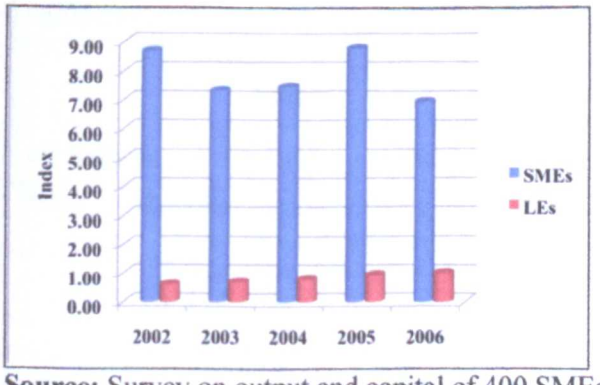
35. Chemicals, plastic products



36. Non-metallic mineral products



38. Fabricated metal products,...



Source: Survey on output and capital of 400 SMEs and 100 LEs in Cambodia during 2002-2006

Table 6.4: Labour productivity (Quantity of Output/Labour) of SMEs and LEs (2002–2006)

ISIC	SMEs/ LEs	Output-labour ratio (Quantity of Output/Labour) 2002	2003	2004	2005	2006	Higher/ lower	T-test
31. Food, beverage and tobacco	**SMEs**	2.135	2.111	2.054	2.262	2.332	SMEs<LEs	*
	LEs	2.379	2.520	3.215	3.380	3.251		
32. Garment, textile and footwear apparel and leather industries	**SMEs**	2.490	2.514	1.700	1.891	1.869	SMEs<LEs	*
	LEs	3.968	4.464	3.250	3.871	3.567		
33. Wood and Wood products	**SMEs**	0.940	0.841	0.876	0.978	1.068	SMEs<LEs	*
	LEs	7.163	9.902	10.141	7.481	5.955		
34. Paper products, printing and publishing	**SMEs**	3.311	3.498	2.928	2.784	3.038	SMEs<LEs	*
	LEs	4.296	4.612	5.386	5.348	6.054		
35. Chemicals, plastic products	**SMEs**	1.762	1.922	1.799	2.101	2.455	SMEs<LEs	*
	LEs	3.060	3.851	3.831	3.964	3.579		
36. Non-metallic mineral products except products of petroleum and coal	**SMEs**	0.888	0.917	0.878	1.179	1.183	SMEs<LEs	*
	LEs	1.206	1.218	1.159	1.816	1.814		
38. Fabricated metal products, machinery and equipment	**SMEs**	2.992	2.835	3.523	3.131	3.083	SMEs>LEs	*
	LEs	1.954	2.092	2.072	2.042	2.045		
All Industries	**SMEs**	1.848	1.853	1.771	1.995	2.069	SMEs<LEs	*
	LEs	3.894	4.443	3.518	3.907	3.590		

Note: (1) Labour productivity = Quantity of Output/Labour

(2) * represents statistical significance at 5% confidence level under two-tailed t-tests. T-tests were conducted to see whether there is any statistical difference between SMEs and LEs.

Table 6.5: Capital productivity (Quantity of Output/Capital) of SMEs and LEs (2002–2006)

	SMEs/ LEs	Output-capital ratio (Quantity of Output/Capital)					Higher/ Lower	T-test
ISIC		**2002**	**2003**	**2004**	**2005**	**2006**		
31. Food, beverage and tobacco	**SMEs**	2.083	2.319	2.598	2.948	3.221	SMEs>LEs	*
	LEs	0.446	0.633	1.124	1.666	2.029		
32. Garment, textile and footwear apparel and leather industries	**SMEs**	0.787	0.972	1.280	1.475	1.984	SMEs<LEs	*
	LEs	6.669	9.441	13.815	18.000	24.035		
33. Wood and Wood products	**SMEs**	10.649	13.997	20.047	25.210	31.581	SMEs>LEs	*
	LEs	0.822	1.172	1.272	0.649	0.651		
34. Paper products, printing and publishing	**SMEs**	1.039	1.114	1.071	1.144	1.453	SMEs<LEs	**
	LEs	0.699	0.884	1.258	1.462	1.822		
35. Chemicals, plastic products	**SMEs**	1.313	1.209	1.334	1.935	2.285	SMEs>LEs	**
	LEs	0.993	1.463	1.659	1.824	1.902		
36. Non-metallic mineral products except products of petroleum and coal	**SMEs**	1.828	2.178	2.517	3.776	3.566	SMEs<LEs	**
	LEs	1.945	2.282	2.238	4.158	4.241		
38. Fabricated metal products, machinery and equipment	**SMEs**	8.662	7.311	7.457	8.764	6.917	SMEs>LEs	*
	LEs	0.606	0.700	0.807	0.937	1.008		
All Industries	**SMEs**	1.843	2.075	2.369	2.808	3.085	SMEs<LEs	**
	LEs	2.125	2.850	3.768	3.826	4.858		

Note: (1) Capital Productivity = Quantity of Output/Capital

(2) * represents statistical significance at 5% confidence level under two-tailed t-tests.

(3) ** represents statistical significance at 10% confidence level under two-tailed t-tests.

T-tests were conducted to see whether there is any statistical difference between SMEs and LEs at the 5% confidence level respectively.

In conclusion, the results could not imply that SMEs are as productive as LEs. This means that the significantly higher productivity is attained by large firms, which employ more than 100 workers. Our analysis of TFP levels by establishment size during the period 2002–2006 reveals that SMEs had lower TFP levels when compared with LEs. The result is consistent with other studies in different countries such as in Africa (van Biesebroeck, 2005), Indonesia (Okamoto and Sjoholm, 1999), Japan (Urata and Kawai, 2001) and South Korea (Castany et al, 2007). SMEs were not only significantly lower than LEs in terms of TFP, but also had lower labour and capital productivity compared with LEs. This indicates the inefficiency of both labour and capital in generating output for SMEs in Cambodia. The finding is similar to Hayashi (2002), who found that labour productivity increased with firm size in Indonesian industries.

However, there are several important exceptions to these patterns. In several industries, such as wood and wood products, SMEs had higher TFP levels. These findings are the same for both the Christensen et al and Good et al approaches. In addition, labour productivity levels were found to be higher in fabricated metal products, machinery and equipment industries in all five years. It shows the efficiency of labour in generating output for those industries under SMEs. Moreover, SMEs also indicate their efficient use of capital in the food, beverage, tobacco, woods and wood products, fabricated metal, and machinery and equipment industries during the five-year period (2002–2006).

6.3 TESTING HYPOTHESIS 3: SMES ARE MORE EQUITABLE IN DISTRIBUTING INCOME

Since it is claimed that SMEs are a source of employment for unskilled labour in rural areas, it follows that SMEs contribute to employment and income generation especially for poor people and help to resolve the problem of poverty and income disparities. SMEs were found to possess the potential of contributing to equal income distribution in many countries especially in Korea during 1952–1975 and after 1997 (Nugent and Yhee, 2001), and Thailand in 1997 (Huang, 2003). Moreover, small enterprises were also found to help to improve income equality in Poland in the 1990s, and Russia in 1995, 2000, and 2001 (Berkowitz and Jackson, 2005). The wide urban-rural income gap has been a long-standing issue for Cambodia. Farmers earn income from both farming and off-farming activities. Due to constraints in human capital, land conditions, and production technologies, the ability to increase income from farming has been limited. An effective way to close the urban-rural income gap is to increase rural incomes by creating more off-farm employment opportunities. It is believed that the development of SMEs in Cambodia is vital both to promote broad-based economic growth and to reduce income inequality. However, some other studies have provided evidence that SMEs could not equalize income distribution in many developing and developed countries during the 1990s (Beck et al, 2005), and in the US in the 1980s (Shaffer, 2002).

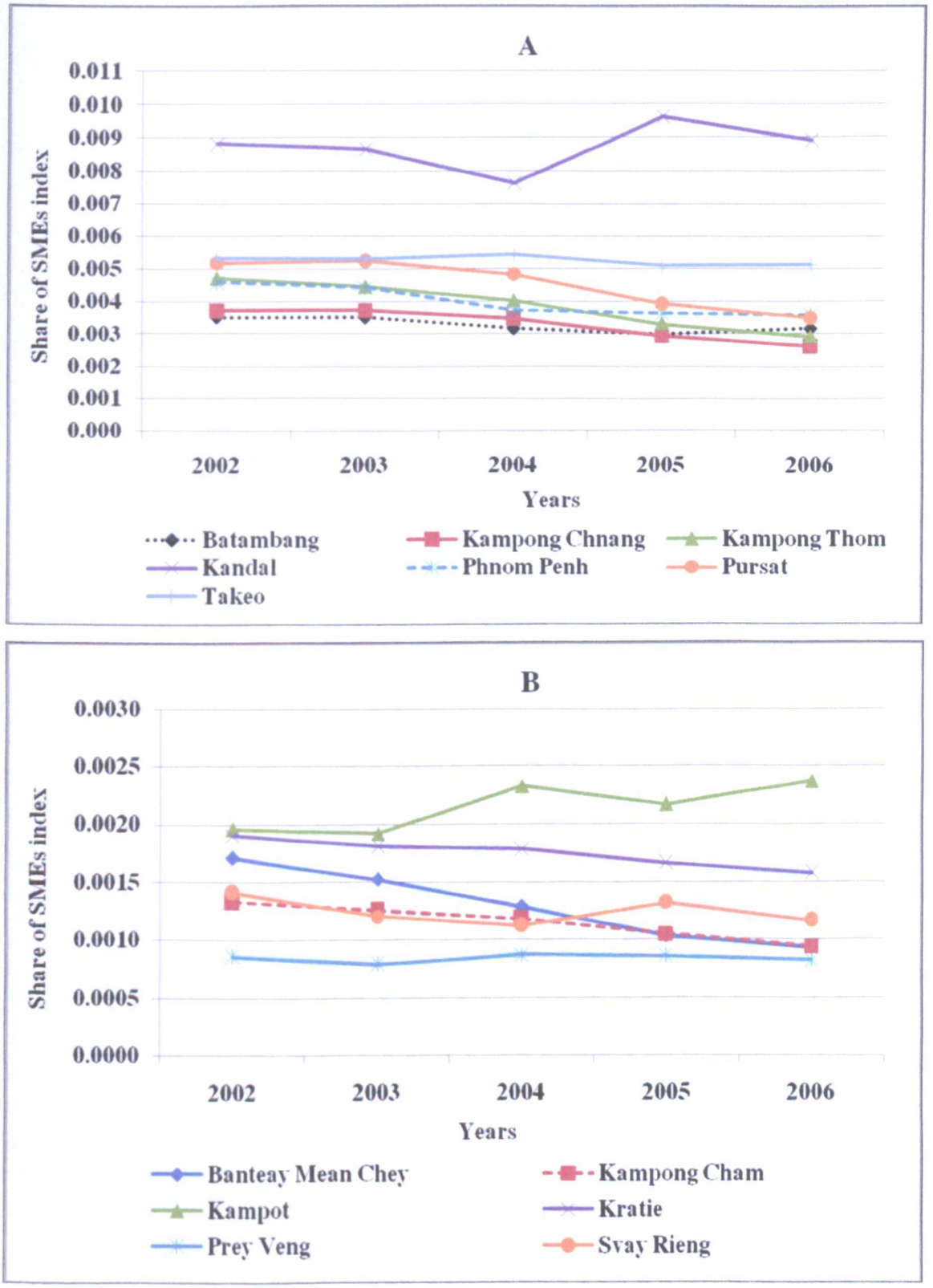
In order to measure the equality of income distribution of SMEs, we grouped the provinces of Cambodia into five different locations: centre, east, south, west, and north. Provinces in the centre are Kampong Chhnang, Kampong Thom, and Phnom Penh; in the East are Kampong Cham, and Kratie; in the South are Kampot, Kandal, Preyveng, Svayrieng, and Takeo; and in the West are Banteay Meanchey, Battambang, and Pursat. However, since provinces in the North part of the country have very few numbers of SMEs, we did not conduct the survey in the North.

The relationship between the wage disparity in each group of provinces and the share of SMEs in provincial output is useful for testing whether SMEs are associated with more equitable income distribution in each region. The share of SMEs in provincial output was calculated as the total output of SMEs divided by total output of province and the value of

coefficient of variation of wage equaled the standard deviation of wage divided by mean of wage of SME in each province (see equation 4.31 and 4.32 in chapter IV). Wage rates are defined as total labour costs divided by the number of workers (see section 6 in chapter IV). Reliable data about the total output of each province and city at current prices are published by the Economic and Public Finance Policy Department, Ministry of Economy and Finance of Cambodia (see Table E1 in Appendix E). Both total output of firms and total provincial output was deflated using a GDP deflator and converted into USD using the official exchange rate from National Bank of Cambodia. Table E2 in Appendix E shows the share of SMEs in provincial outputs and the coefficient of variation of wage in each province and city from 2002 to 2006.

Figures 6.25 and 6.26 show the share of SMEs in provincial outputs (SSME) and the coefficient of variation of wage (CV) from 2002 to 2006. During the five-year period, the share of SMEs in provincial outputs declined steadily in all provinces located in the Centre, the West, the East, and some provinces in the South of Cambodia. This indicates that the role of SMEs was decreasing in importance in those provinces, while it was stronger in some provinces in the South, such as Kampot, and Kandal province (see Figure 6.25a and 6.25b). However, the total output of SMEs in all provinces shows a steady increase during the period 2002–2006. Moreover, the slowdown of the share of SMEs in provincial output cannot prove that SMEs do not contribute to more equal income distribution in Cambodia. Therefore, we need to investigate the correlation of the share of SMEs in provincial output with the coefficient of variation (CV) of wages (see Figures 7.7, 7.8, 7.9, 7.10, and 7.11). In Figure 7.1 and Table 7.2 in Appendix G, four provinces including Banteay Meanchey, Kampong Cham, Kampong Chnang, and Svay Rieng province had the highest CV on average, whereas the lowest CV was Batambang province. However, the CV of almost all provinces appears to be converging from 2004 to 2006, except for Pursat and Banteay Meanchey provinces.

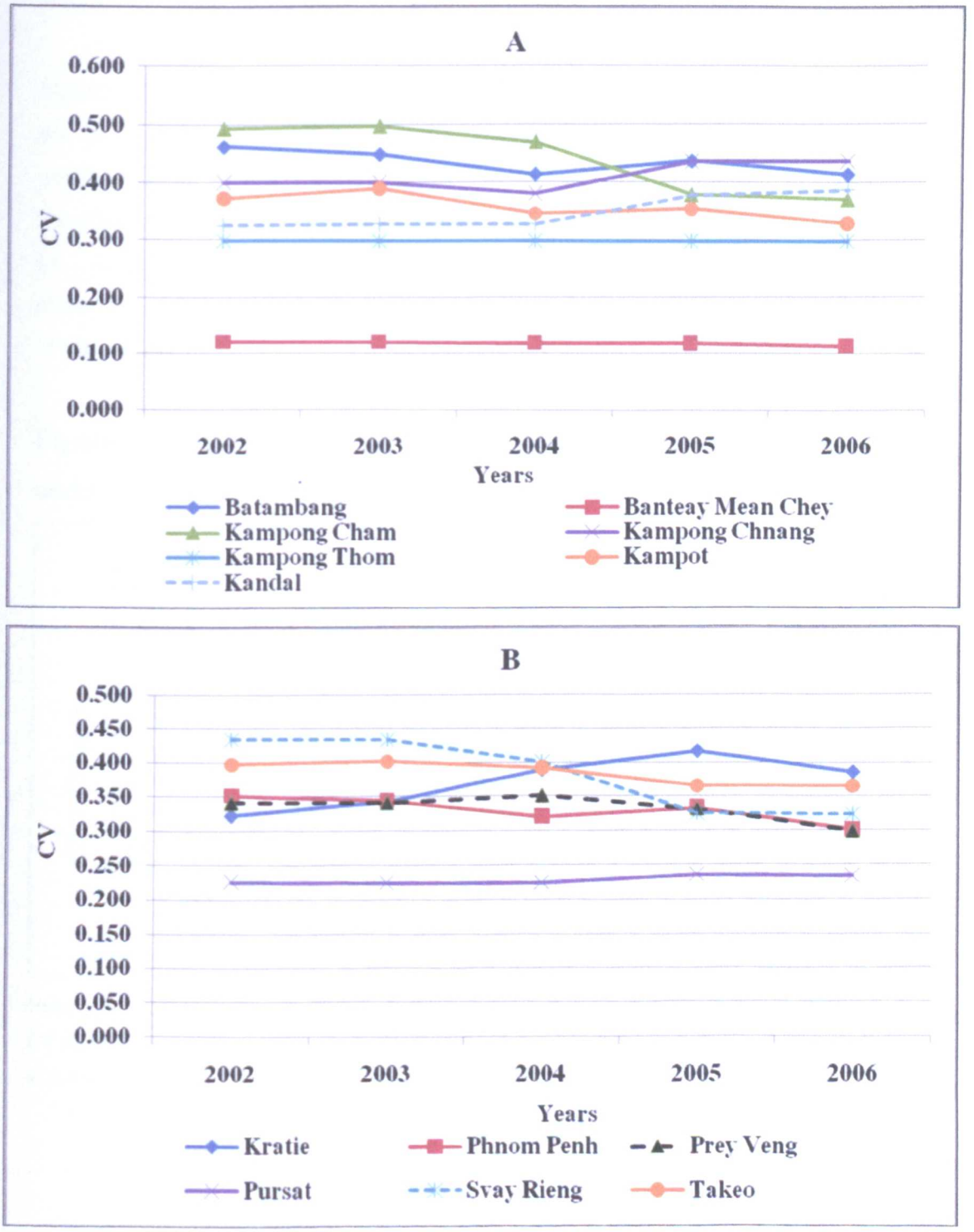
Figure 6.25: Share of SMEs in provincial output (SSME), 2002–06



Source: (1)- Survey on output of 400 SMEs in Cambodia during 2002-2006

(2)- Total provincial output and GDP deflator were published by National Institute of Statistic (2006), *Statistical yearbook 2006*, National Institute of Statistic, Phnom Penh, Cambodia.

Figure 6.26: The coefficient of variation of wage (CV), 2002–06



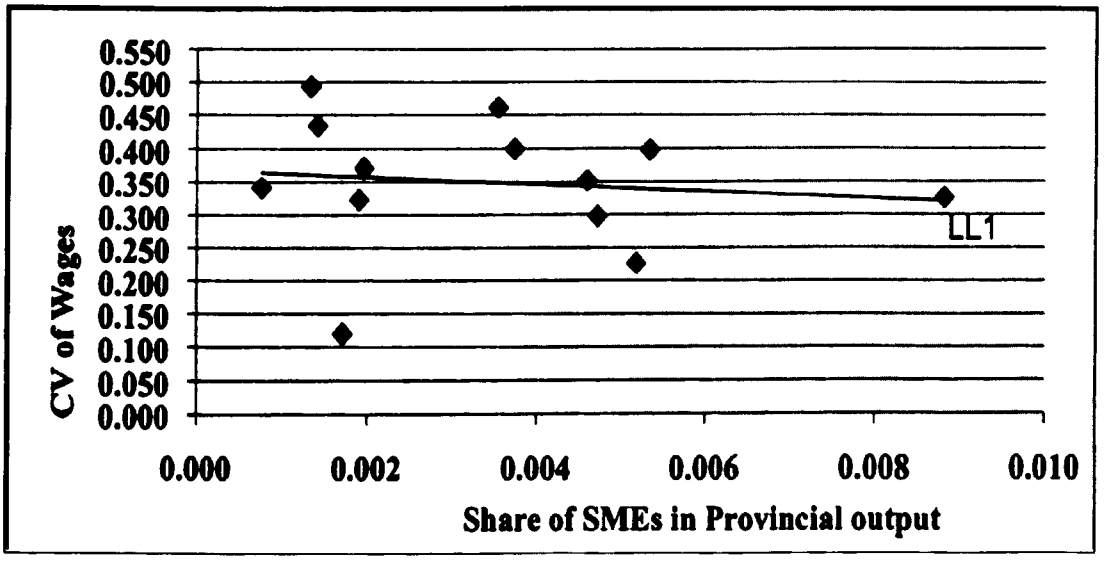
Source: Survey on wage rate of 400 SMEs in Cambodia during 2002-2006

Overall, the relationship between SMEs and the coefficient of variation of wage was not clear. Some provinces with higher (lower) share of SMEs had low (high) CV. In contrast, some provinces with lower share of SMEs had low CV, especially Batambang, while other

provinces with high share of SMEs had high CV also, especially Banteay Meanchey, Kampong Chnang, and Takeo.

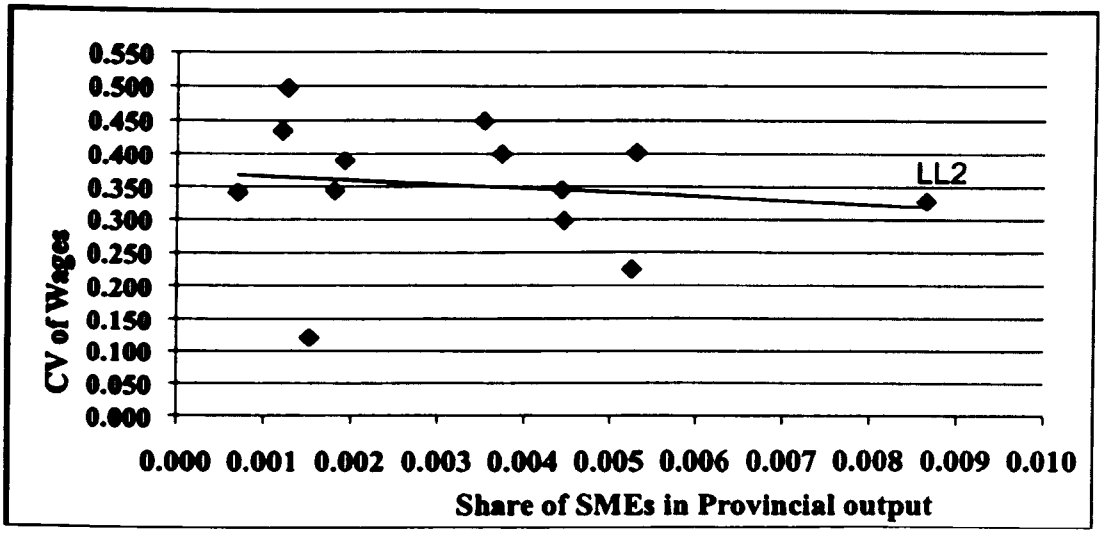
Figures 6.27, 6.28, and 6.29 show a negative relationship between the share of SMEs in provincial output and wage disparity. The relationship is confirmed through their correlation coefficients of -0.125 (2002), -0.139 (2003), and -0.104 (2004), showing statistical significance at 5 per cent confidence level (see Table E3 in Appendix E). Moreover, lines LL1, LL2, LL3 in Figure 6.27, 6.28 and 6.29, respectively, which are the regression of wage disparities and share of SMEs, shows the negative slope of -5.450 (2002), -6.097 (2003), and -4.660 (2004).

Figure 6.27: Correlation between the share of SMEs in provincial output and CV of wage in each province (2002)



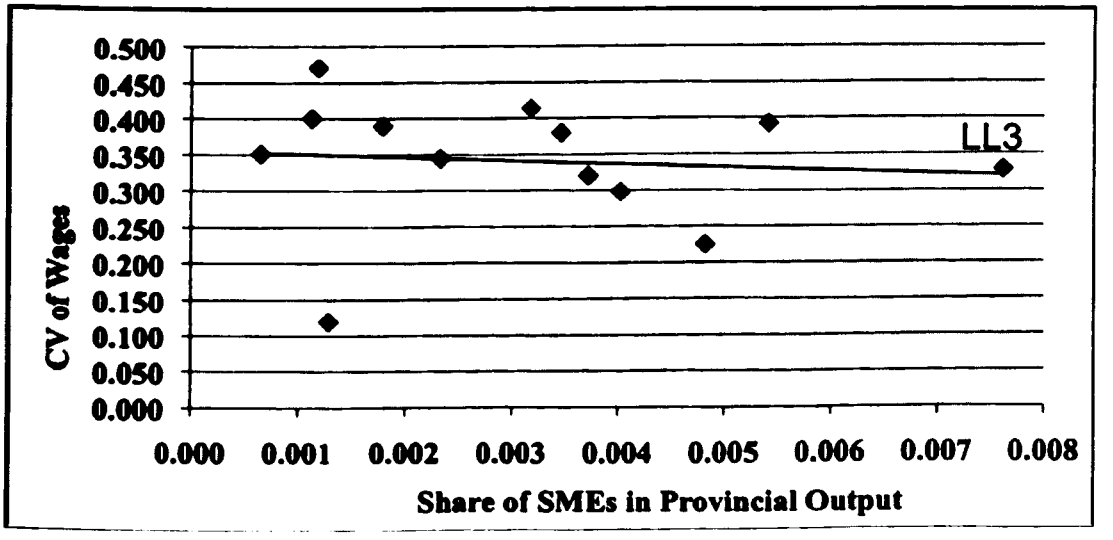
Note: Line (LL1) is the linear trend line for the relationship between Share of SMEs in Provincial output and CV drawn by calculating the least share through points by using the following equation: $y = mx+b$. Where $y = -5.45x + 0.369$; r= -0.125; and t-statistics is at 5% significant level.

Figure 6.28: Correlation between the share of SMEs in provincial output and CV of wage in each province (2003)



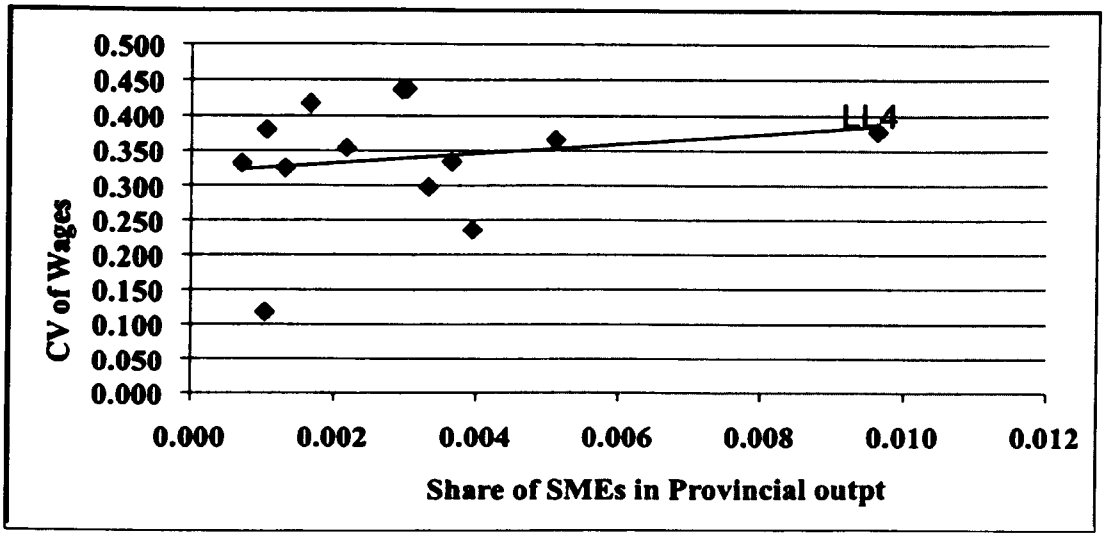
Note: Line (LL2) is the linear trend line for the relationship between Share of SMEs in Provincial output and CV drawn by calculating the least share through points by using the following equation: y = mx+b. Where y = *-6.097x + 0.372;* r= -0.139; and t-statistics is at 5% significant level.

Figure 6.29: Correlation between the share of SMEs in provincial output and CV of wage in each Province (2004)



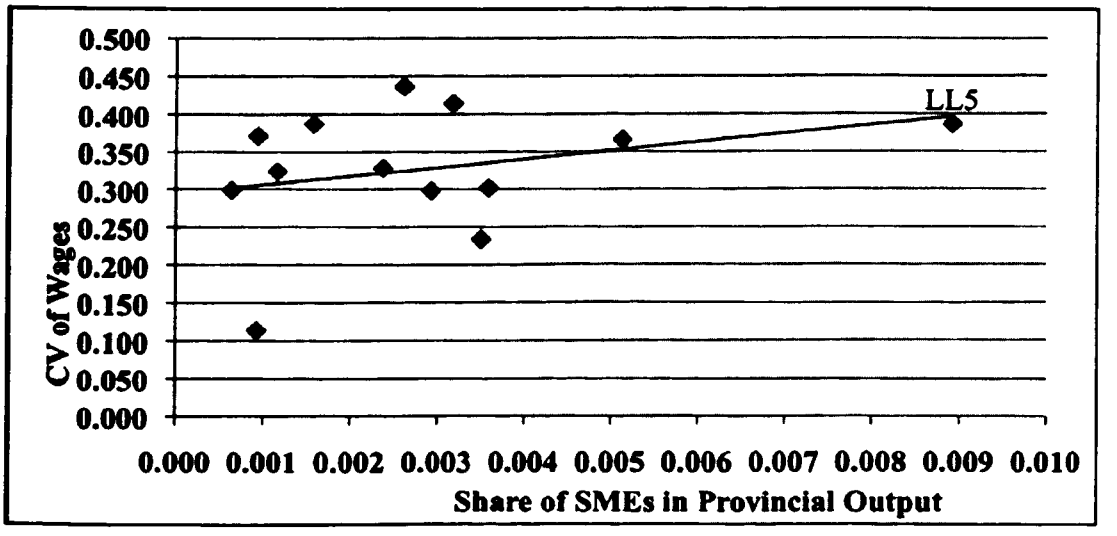
Note: Line (LL3) is the linear trend line for the relationship between Share of SMEs in Provincial output and CV drawn by calculating the least share through points by using the following equation: y = mx+b. Where y = *-4.660x + 0.355;* r= -0.104; and t-statistics is at 5% significant level.

Figure 6.30: Correlation between the share of SMEs in provincial output and CV of wage in each Province (2005)



Note: Line (LL1) is the linear trend line for the relationship between Share of SMEs in Provincial output and CV drawn by calculating the least share through points by using the following equation: y = mx+b. Where y = *6.946x + 0.318;* r= 0.189; and t-statistics is at 5% significant level.

Figure 6.31: Correlation between the share of SMEs in provincial output and CV of wage in each province (2006)



Note: Line (LL1) is the linear trend line for the relationship between Share of SMEs in Provincial output and CV drawn by calculating the least share through points by using the following equation: y = mx+b. Where y = *11.409x + 0.294;* r= 0.299; and t-statistics is at 5% significant level.

In contrast with 2002, 2003, and 2004, moreover, there are positive relationships between the share of SMEs in provincial output and wage disparity (see Figure 6.30 and 6.31). The relationship is confirmed through their correlation coefficient of 0.189 (2005), 0.299 (2006) showing statistical significant at 5 per cent confidence level (see Table E3 in Appendix E). Moreover, lines LL4, and LL5 in Figure 6.30 and 6.31, respectively, which are the regression of wage disparities and share of SMEs, show the positive slope of 6.946 (2005), and 11.409 (2006).

Although these results confirm that the share of SMEs in provincial output responds to the change of wage disparities in all five years, it is difficult to obtain an unequivocal conclusion since the first three years (2002, 2003 and 2004) show a negative slope and the last two years (2005 and 2006) show a positive slop. In order to improve the t-values of the coefficient and estimate the long-run relationship of the variables, we use panel data techniques including fixed effect model (FEM) and random effect model (REM). Panel data provides information about the variation across individual units and over time and have been used in a wide range of empirical research. The difference between the FEM and the REM is that the REM assumes that there is no correlation between the explanatory variables and the group effects whereas the FEM assumes that they are correlated. We include all the twelve provinces and one city in the analysis. For each province and city there are available five observations with yearly frequency.

$$\log CV_{sme,p,t} = \alpha + \beta_t.\log SSME_{p,t} + e_t \quad (6.3)$$

where $p= 1,2,3,\ldots, 13$ identifies the provinces and $t=2002,\ldots,2006$ identifies the year. β_t and e_t are slope and intercept at time t.

The estimations results are presented in Table E4 and E5 in Appendix E. Both fixed and random effects regression show the coefficient is statistically insignificant, which confirms that wage disparities do not respond to the share of SMEs in provincial output in all five years. Although the fixed effects and the random effects model show the expected signs (positive), their p-values are greater than 0.050. Moreover, Hausman test in Table E6 (Appendix E) shows that the p-value is statistically insignificant. Therefore, fixed effects would be not more appropriate in this case.

In conclusion, the share of SMEs in provincial outputs decreased steadily in almost all provinces, except Kampot, and Kandal provinces. The relationship between the share of SMEs in provincial output and the change of wage disparities tends to be negative in the first three years and positive in the last two years. Their relationship was not clear. In some provinces, when the share of SMEs was high (low), there was a low (high) level of CV. However, in some provinces with high (low) share of SMEs, the level of CV was high (low) too. Moreover, their relationship was confirmed to be statistically insignificant under fixed and random effects tests. Thus, SMEs did not possess the potential of contributing to more equal income distribution relative to LEs in Cambodia.

CHAPTER VII

CONCLUSION, POLICY IMPLICATIONS, AND FUTURE STUDIES

7.1 CONCLUSION

This study investigated the importance of SMEs in economic development, taking Cambodia as a case study. Three hypotheses were tested to see whether Cambodian SMEs do bring the advantages and benefits claimed in previous studies. The sections below summarize the result of the study.

The survey on which this study was based was conducted on small, medium, and large manufacturing industries which were formally registered with the government, locally established, and owned by local and foreign people. The survey sample was 500 firms (400 SMEs and 100 LEs) during the five-year period 2002–2006. The survey methodology consisted of collecting all available statistics and data from various sources followed by field surveys in targeted provinces and the capital city. Consultations with technical staff were also important in the survey.

In the data collection process, first, permission letters were necessary to gain access to any government agencies and firms. Second, the study started by collecting available data and information from various government agencies, and research institutes. Appointments with responsible persons were also made at this stage. It was necessary to know how the data was measured and defined. Third, the selection of geographic areas for the survey depended on the number of firms, the cooperation of local staff, and the location of firms and provinces. Some provinces were not selected because (1) there was no cooperation from staff at the local department of industry; (2) they were too far away and did not have much economic activity; and (3) there were not many firms. As a result, 13 out of 22 provinces were selected for the survey.

A total of 400 SMEs and 110 LEs were selected and contacted for the survey. However, only 100 LEs agreed to participate in this study. All targeted industries under LEs were contacted and sent a permission letter which was issued by MIME together with a letter explaining the survey's objectives, requesting an interview, and promising a copy of the final report. In order to save time and money, the procedure for the survey of SMEs (400 firms) was, first, to meet the director (or equivalent) of the provincial industrial department explaining the survey's objectives, requesting cooperation and staff, and promising a copy of the final report. The

second stage was to compare the database from the central government department with a database from the local department in order to identify the locations of firms, the type of business, and, especially, the responsible staff to interview. The last stage was to provide a project briefing to ensure that the survey objectives, methodology and quality standard were fully understood by the fieldwork team, and then to train enumerators on survey knowledge and techniques.

Statistical software was used to calculate means, medians, and ranges for continuous variables. All data were sorted using basic Microsoft Excel processing software. A number of variables in the survey were then used to compute capital-labour ratio, TFP, wage disparity, share of SMEs, etc. However, there were also some constraints for this survey. This is a lesson to be learnt for future study.

Hypothesis 1: SMEs are relatively more labour intensive than LEs

Capital-labour ratio was used to measure the capital intensity of industries. Capital is the net book value of fixed assets excluding land, vehicles, and rented fixed assets, whereas labour is the number of workers in industry. As a result, SMEs were generally seen as being more employment-oriented in items like food and beverage processing, wood and paper products, chemicals and plastic products, non-metallic products, furniture, metal fabrication, and printing. Since they use labour-intensive technology, their growth is considered to be beneficial to labour-abundant economies for employment generation. This also implies more efficient usage of abundant resources for production. However, SMEs were found to be capital-intensive in industries like garments, textiles, footwear, and leather.

Wood products under SMEs used the highest labour per unit of capital, whereas paper, printing and publishing used the lowest. Capital-labour ratios of SMEs were significantly smaller than LEs in all five years. The labour-intensive character of SMEs was consistent with results found by previous studies in different countries such as Finland (Hytti, 2000), Indonesia (Hayashi, 2002), Japan (Abdullash and Beal, 2002), Korea (Nugent and Yhee, 2001), Taiwan (Sinha, 2003) and Thailand (Huang, 2003, and Paitoon, 2001).

The capital-labour ratio decreased dramatically from 2002–2006 in almost all industries except metal products, machinery and equipment. This means that the quantity of labour per unit of capital had increased for SMEs. The current value of assets such as machinery, buildings, and equipment had decreased from year to year. This was because maintenance costs were not expensive in Cambodia. Most SMEs used second-hand or domestic made machinery and equipment. The depreciation rate of machinery and equipment was 25 per cent higher than buildings (5 per cent), so the current values of machinery and equipment had dropped significantly.

Moreover, the breakdowns of female-male labour ratio by industry groups in Cambodia showed that engagement of women in LEs was considerably higher than in SMEs, except for wood, paper, printing, fabricated metal, machinery, and equipment. Wood, paper, printing, fabricated metal, machinery, and equipment under SMEs employed more women than in LEs in all 5 years. However, female participation had decreased from 2002 to 2006 in these industries, except for wood. Furthermore, the percentage of women in the labour force was dramatically low, around 37 percent in all industry groups under SMEs during 2002-2006. This could indicate the importance of LEs, especially garment industries, in providing jobs and incomes for women. Similarly to this study, in Bargawi's (2005) study, more young women (aged 18-25) migrate from poor rural areas to the capital Phnom Penh to enter the paid labour market. The female share of wage employment had increased considerably, which was mostly accounted for by the garment industry. This was because garments workers were relatively well-educated and highly paid compared with most other workers, including those in the civil service (Bargawi, 2005).

As mentioned in the previous chapter, although SMEs were found to be labour-intensive enterprises, in order to fulfill their potential to contribute to employment generation in Cambodia they must have an equal access to capital.

Local commercial banks provided only 1 per cent of working capital and 1.7 per cent of investment capital for SMEs overall. Banks provided lending to SMEs only on the basis of a mortgage over land and buildings. There was no enabling framework to lend on other forms of collateral because of the low capacity of banks to provide loans to SMEs. Kang (2005) found that 70.1 per cent of 648 SMEs surveyed ranked lack of capital as the most significant constraint on business expansion, regardless of the location, size or type of enterprise. He

found that 52 per cent of 137 SMEs that sought a bank loan were refused, and of these, 60 per cent were refused because of a lack of collateral. The CDRI's (2007) report shows that larger firm is better able to afford the higher interest rates charged by commercial banks as well as to meet their strict repayment schedules than would SMEs. Kang's (2005) survey show that more than 81 per cent of the SME respondents said that they were not seeking loans because their expected profit would not be higher than the interest on the loan.

Other than access to capital, moreover, compared with LEs, especially in the garment, textile and footwear apparel and leather industries, SMEs receive unfair treatment from the government. The government provides tax and tariff incentives for establishing factories, especially the import of new machinery, and equipment for constructing factories. However, there are no such incentives provided to SMEs.

Hypothesis 2: SMEs are as productive as LEs or more productive than LEs

Firm productivity measures how much input was needed to produce the firm's output. Output was measured by the volume of goods. There were different measures of productivity depending upon what inputs were measured. Labour productivity measured the output per unit of labour, and capital productivity measured the output per unit of capital. The unit of labour was hours worked. Labour productivity was useful for policy makers because it showed the output per hour worked and rising incomes depend on this measure. However, this was a partial view of productivity. Total factor productivity (TFP) measured all the inputs to the firm. This provided a better, more rounded picture of firm productivity, but it was difficult to estimate.

SMEs were not only significantly lower than LEs in terms of total factor productivity (TFP), but also had lower labour and capital productivity than LEs. This indicates the inefficiency of both labour and capital in generating output for SMEs in Cambodia. SMEs had higher TFP levels than LEs only in wood and wood products. Labour productivity levels of SMEs were higher than LEs in fabricated metal products, machinery and equipment industries. This shows the efficiency of labour in generating output for those industries under SMEs. SMEs also indicate their efficiency use of capital in the food, beverage, tobacco, woods and wood products, fabricated metal, and machinery and equipment industries.

The labour productivity in SMEs was so low that, despite the fact that their total number of establishments and total workers employed were much larger than those in LEs, their share in total output was smaller than those of the LEs. The gap in productivity varies not only over time, but also across industries. During the five-year period under the survey, the differentials between SMEs and LEs tended to become larger in many industries, except food, beverage, tobacco, non-metallic products, and minerals. The output-labour ratio had increased by size of enterprise, suggesting that larger enterprises had more and better assets, including technology and know-how. In Cambodia labour is abundant while capital is scarce. As a result, the lower capital productivity of SMEs may imply lower efficiency in the use of scarce resources. These findings, also confirmed by many other studies, did not come as a surprise, given the fact that especially micro and small enterprises in Cambodia (as in many other developing countries) were traditional enterprises adopting manual modes of production, for example, with a low degree of mechanization. They also lack the necessary inputs to increase productivity, such as skilled workers, capital to buy new machines and modern tools, information on new machines or production tools, and know-how to improve their methods of production. For instance, in the food and beverages industry, micro enterprises were very simple food and beverage processing units mostly for local markets, as compared with LEs (such as Coca-Cola and Nestlé) which their production processes were much better managed and organized, and they generally employed highly skilled workers.

Hypothesis 3: SMEs are more equitable in distributing the income they generate than LEs

The relationship between the wage disparity in each group of provinces and the share of SMEs in provincial output was useful for testing whether SMEs were associated with more equitable income distribution in each region. The share of SMEs in provincial output was calculated as the total output of SMEs divided by total output of province, and the value of the coefficient of variation of wage given by the standard deviation of wage divided by mean of wage of SMEs in each province. Wage rates were defined as total labour costs divided by the number of workers.

The relationship between the share of SMEs in provincial outputs and wage disparity was mainly negative in the first three years and positive in the last two years. The share of SMEs

in provincial outputs declined steadily in all provinces located in the Centre, the West, and the East of Cambodia. It indicated that the role of SMEs was decreasing its importance in those provinces, while it was stronger in all provinces in the South such as Kampot, Svayrieng, Kandal, Prayveng, and Takeo. Their relationship was not clear. In some provinces, when the share of SMEs was high (low), there was a low (high) level of the coefficient variation of wage. However, some provinces with high (low) share of SMEs, the level of the coefficient variation of wage was high (low) too. The share of SMEs in provincial output does not respond to the change of wage disparities under the fixed and random effects model test. Their relationship is statistically insignificant. Thus, SMEs did not contribute to more equal income distribution relative to LEs in Cambodia during the period 2002–2006. The result was consistent with the result found by Beck et al (2005) who studied the relationship between the share of SMEs and changes in income distribution, as measured by the growth rate in the Gini coefficient, in 45 developing and developed countries.

Berry (2001) emphasized the income inequality of most of countries could probably caused by the economic downturn, the economic reforms and the process of technological change. In this study, the high level of income inequality in most of the regions in Cambodia could be associated in part with the dualistic character of the economy. For instance, high share of capital could be invested in the large-scale sector while relatively few jobs were created, leaving the rest of the labour force to work with a much lower capital-labour ratio. Furthermore, the insufficient development of rural SMEs could be important causes of urban-rural income inequality in Cambodia. Thus, in order to reduce the gaps in regional economic growth and income distribution is to narrow the disparity in the development of the SME sector. In this study, we suggest that the development of SME depends on a number of factors, including productivity technologies, skilled labourers, protection of property rights, business environment, and access to credit. This will be discussed in detail in the policy implication section below.

7.2 POLICY IMPLICATIONS

In Cambodia, SMEs are facing obstacles that are sometimes similar to those experienced by LEs. However, SMEs are much more vulnerable in relation to these problems. The nature or complexity of many of these problems is not only related to the size of the enterprises, but

also their activities. The smaller the size of enterprises, the more complex the problems they face. The problems may differ from region to region and from one industry-group to another. Although the problems vary even between individual enterprises in the same size category and within a branch of activity, there are certain problems common to all Cambodian SMEs. Those problems are: (1) poor access to form credit; (2) weak property rights; (3) poor skills/knowledge of workers (especially female labour); (4) high cost of doing business; (5) no or few incentive policies; and (6) no business linkages and networking.

- **Improving access to finance**

Many SME owners continue to rely on private sources to finance business start-ups as well as to maintain or expand businesses. Informal money lenders seemed to play little role in financing SMEs, while only a small number of loans were reported from commercial banks. This survey shows that 79.5 per cent of the 400 SMEs studied drew capital from "own sources", and only 9.75 per cent used "bank sources". Other sources of finance were "own and bank sources" (6 per cent) and "other sources" (4.75 per cent). Similarly, CDRI's (2007) study of a few provinces in Cambodia shows that there was around 80 per cent of own sources financing for SMEs. Entrepreneurs were not seeking loans because they were unsure of or lacked confidence in the viability of their venture. Kang's (2005) study of 648 SMEs found that 70 per cent of the firms faced the lack of capital as the most significant constraint on business expansion. Entrepreneurs who own and manage enterprises, especially smaller size ones, are forced through lack of capital to use poor technology. Similarly to Kang's study, many other studies in different countries also show that finance is a major constraint not only on working capital, but also on raw materials.[108] Evidence shows that the difficulty of obtaining working capital and raw materials are ranked as the top problems constraining productivity growth.[109]

In order to solve these problems, a sound banking system and legal security of contract should be developed. In this sense, better access to formal credit could and should play a larger role in financing capital investments. Cambodia should focus on expanding the financial base

[108] See in Kayanula and Quartey (2000) and Parker, Riopelle and Steel (1995)

[109] The use of inappropriate technologies limits SMEs competitiveness in term of both the price and the quality of products (Kayanula and Quartey (2000). Poor technology restricts productivity growth (Aryeetey et al, 1994) and reduces employment of SMEs (Mephokee, 2006). Poor cash flow was the main reason of the high cost of obtaining raw materials (Parker et al, 1995).

through the micro-credit arrangements in rural areas, where micro-enterprises may develop. In this respect, credit guarantee systems and village funding schemes for SMEs should be available. However, in start-ups and expansion, requirements for collateral are a constraint. This will be discussed in the next section.

- **Providing property ownership**

It is noted in CDRI's report in 2007 that property ownership in the form of legal titles, especially land, is significant in stimulating SME investments in new start-ups and expansions. It promotes a more secure sense of tenure and aids access to more affordable credit. According to Brandao and Feder (1996) and Barzel (1997), people are more likely to invest in economically productive activities when they are confident that they will enjoy the benefits of such investments. Kang (2005) found that in start-ups and expansion, collateral requirements are a constraint; 60 per cent of 137 SMEs in Cambodia were refused a bank loan because of a lack of collateral.

Therefore, government should provide the legal infrastructure for property ownership in the form of legal titles, which the poor can then use as collateral to secure credit for investments in SMEs.

- **Training**

It is consistant with our study the MIME's Sub-committee (2005) study shows that "Cambodian SMEs generally have low productivity which is primarily due to low labour productivity." (p.18). Thus, training is necessary to improve productivity.

When it comes to business training and education in SMEs, traditional methods of skills transfer from family and relatives are the norm in Cambodia (EIC, 2006). Choice of product is based on known skills rather than on what is actually needed by the market. Moreover, training to improve productivity is not readily available to Cambodia's SME sector, especially training in business management. MIME's Sub-committee (2005) reports that business management training is important to improve productivity for SMEs, especially the micro and small ones. Furthermore, EIC's (2005) survey found that majority of factories in Cambodia

require both technical and managerial training. Thus, training should also emphasize on ways to improve efficiency in production and quality control, especially in the garment, textile, footwear, leather, chemicals, rubbers, plastic, fabricated metal, machinery, equipment, paper, printing, and publishing industries, where the productivity levels were found to be very low compared with LEs. Moreover, industry productivity training centres, which would therefore help to develop human resource capacity, should be established in provincial areas.

- **Reducing the cost of doing business and cost related to bureaucratic red tape**

Previous studies show that the cost of establishing a business in Cambodia is higher and takes many times longer than other countries, especially neighboring countries.[110] Administration and registration cost is a barrier to SME development in Cambodia. Moreover, the higher cost of doing business is a constraint for labour-intensive industries in the economy. Policy reforms to reduce the formal and informal fees of all aspects of business, including licensing, inspections, and import and export processing, are needed.

Furthermore, the cost of electricity, telephone, and transportation are also high in Cambodia (World Bank, 2004). For an industry that demands little more than power for low-voltage sewing machines, lights, fans, and small offices, these cost are high. The high cost of electricity affects production costs, while expensive fuel and inadequate road infrastructure increase the cost of transportation. Outside of Phnom Penh city and provincial urban areas, the cost of power is often prohibitively high. Although a high proportion of industries operate using their own power generation systems, the cost is still high (World Bank, 2004). Therefore, the government should improve access to, quality, and cost of electricity and transport.

- **Creating incentive policies for SMEs**

There is no incentive provided to SMEs by the government, in contrast with the government's incentive policies for LEs. Therefore, incentive policies for SMEs should be set up, especially tax incentives for establishing factories to process agricultural products such as cotton, jute,

[110] see World Bank report (2006, 2008) and PMDF (2005).

sugar, palm oil, cashew nuts, rubber, cassava and fruits, developing industries based on processing existing natural resources such as fish, meat, cement production, bricks and tiles. These are the best way to improve the living standard of people in rural areas.

- **Fostering business linkages and networking**

Vannarith, Oum and Thearith's (2010) study ranked "business linkages and networking" in the top priority of assistance needed by the SMEs. Cambodian SMEs are often unable to capture market opportunities which require large production quantities, homogenous standards, and regular supply. They also experience difficulties in achieving economies of scale in the purchase of inputs such as equipment, raw materials, finance, consulting services, and so on. Through business networking and inter-firm collaboration, individual SMEs are in the best position to help each other. They can obtain bulk-purchase inputs, achieve optimal scale in the use of machinery, and pool together their production capacities to satisfy large-scale orders. Ideas are exchanged and developed and knowledge shared in a collective attempt to improve product quality and occupy more profitable market segments.

7.3 FUTURE STUDIES

In many studies, especially in developing countries, SMEs works as a device in encouraging rural development based on the evidences that they provide employment opportunities and generate substantial income for unskilled and semi-skilled labourers especially in rural areas.[111] In Cambodia, as a result of rural dominance of SMEs, they could be a major force of rural development. Therefore, the next study will investigates the concentration of SMEs in rural areas by finding the relationship between the share of SMEs in provincial output and per capita income. Furthermore, it should be noted that this study had some limitations. The most notable one is the fact that the empirical results were derived from a sample of Cambodian SMEs and hence the concern that the findings might be country-specific. Future studies could use samples of firms from other countries, especially neighboring countries, in different patterns or levels of development to test whether these findings can be extended and generalized.

[111] See Huang (2003)

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APPENDICES

APPENDIX A

Table A1: Geographic Distribution of SMEs in Cambodia

Table A2.4: Geographic Distribution of Small and Medium Enterprises

Provinces/City	Number of Firms	Labor		Provinces/City	Number of Firms	Labor	
		Female	Total			Female	Total
1 Banteay Meanchey	508	103	1,379	13 Preah Vihear	311	—	—
2 Battambang	803	204	4,306	14 Prey Veng	2,827	2,752	5,462
3 Kampong Cham	3,039	3,179	10,264	15 Pursat	1,590	1,509	3,495
4 Kampong Chhnang	977	51	1,036	16 Ratanakiri	89	—	—
5 Kampong Speu	1,442	9,339	23,344	17 Siem Reap	1,228	738	2,828
6 Kampong Thom	3,061	2,267	4,879	18 Sihanouk Ville	117	157	805
7 Kampot	1,772	1,956	5,775	19 Stung Treng	127	73	310
8 Kandal	2,117	1,796	6,385	20 Svay Rieng	1,247	1,224	2,630
9 Koh Kong	88	39	272	21 Takeo	1,393	1,415	2,922
10 Kratie	1,410	1,702	4,399	22 Odormeanchey	6	6	29
11 Mondol Kiri	76	3	168	23 Kep	183	267	632
12 Phnom Penh	1,562	4,514	10,664	24 Pailin	12	—	68
Total	26,985	33,316	92,854				

— = no available data

Source: Ministry of Industry, Mines, and Energy. 2001. Survey of Small Industries. Phnom Penh.

Table B6:

QUESTIONNAIRE FOR DATA COLLECTION (2002–06)

Small, Medium, and Large Enterprises

(Manufacturing Sector only)

Province:

I. Identification		
Name of Establishment		
Address		
City/ Province/ Municipality/District /Commune		
Contact	Tel:	Fax: Email:
Type of Business		
Registered with any government agencies	Yes ☐ No ☐	
Year of establishment		
Name of contact person		
Owner of business	Male ☐ Local ☐	Female ☐ Foreigner ☐

II. Number of Persons engaged	
1. Self-employed proprietor and unpaid family workers	Total: 2002: 2003: 2004: 2005: 2006:

	Female: 2002: 2003: 2004: 2005: 2006:
2. Number of paid workers *(Refers to industrial employment. It is the sum of operatives and other employees. "Other employees" refers to all employees other than operatives, including administrative, drivers, sales, services, cooks, clerks, housekeepers, cleaners, technological and clerical personnel such as salaried managers and directors, laboratory and research workers and the like.)*	Total: 2002: 2003: 2004: 2005: 2006: Female: 2002: 2003: 2004: 2005: 2006:

3. Total number of persons engaged	**2002**	**2003**	**2004**
	2005	**2006**	

III. Amount of annual remuneration paid to workers

1. Production workers including labourers, other non-technical production workers.	2002: High	Medium	Low
	2003: High	Medium	Low
	2004: High	Medium	Low
	2005: High	Medium	Low
	2006: High	Medium	Low

2. Managers, executives, supervisors, administrators, technical and engineering workers	2002: High	Medium	Low
	2003: High	Medium	Low
	2004: High	Medium	Low
	2005: High	Medium	Low
	2006: High	Medium	Low
3. Sales, service and other workers, including cooks, clerks, drivers, housekeepers, cleaners	2002: High	Medium	Low
	2003: High	Medium	Low
	2004: High	Medium	Low
	2005: High	Medium	Low
	2006: High	Medium	Low
4. Total amount of compensation	**2002**		
	2003		
	2004		
	2005		
	2006		

V. Value of fixed assets

1. Total Value of Fixed Assets of establishment *(Refers to net book value of fixed assets, which includes buildings, machinery and equipment, and office appliances. However, land, vehicles, and rented fixed assets are excluded.)*	2002: 2003: 2004: 2005: 2006:
2. How does the firm gain access to capital?	Bank □ Own □ Other:..... (please specify)
1. If the firm obtains capital from bank or other, what is the interest rate?	Interest rate:

V. Operating costs (Other than workers' wages/salaries)	
Total amount of operating cost *(All expenditure on productive process of goods or services in the establishment, covering total cost of raw materials and components used in production, cost of industrial services (such as machinery maintenance, purchase of electricity and other fuels consumed for heat and power, and contract and commission work of other companies), purchase of goods for resale, cost of sales, administrative expenses, and the change in stock of material and components.)*	**2002:** **2003:** **2004:** **2005:** **2006:**

VI. Amount of Proceeds/income	
Total value of proceeds/income *(All receipts of the establishment including sales of goods produced, receipts of goods for resale, receipts from contract and commission work, receivable rents, other receipts, net value-added, and change in value of stock of work-in-progress, finished goods, and goods for resale.)*	**2002:** **2003:** **2004:** **2005:** **2006:**

VII. Number of hours worked per day, per month	
1. Number of hours worked per day	**2002:** **2003:** **2004:** **2005:** **2006:**
2. Number of days worked per month	**2002:** **2003:** **2004:** **2005:** **2006:**

3. Number of months worked per year	**2002:** **2003:** **2004:** **2005:** **2006:**

VIII. Enumerator	
Enumerator Name	
Date of interview	
Signature of fieldworker	

APPENDIX C

Table C1: Capital-labour index of SMEs

Industries	Index of Capital-labour ratio $K^{*}_{sme,i,t} = \frac{1}{n}\sum_{i=1}^{n}\frac{K^{real}_{sme,i,t}}{L_{sme,i,t}}$				
	2002	**2003**	**2004**	**2005**	**2006**
31. Food, beverage and tobacco	2,357.16	2,098.83	1,804.71	1,770.15	1,675.49
32. Garment, textile and footwear apparel and leather industries	7,144.30	5,837.86	3,158.27	3,026.90	2,174.94
33. Woods and wood product	204.92	142.00	103.73	91.00	78.50
34. Paper product, printing and publishing	7,340.15	7,225.15	6,278.76	5,591.70	4,799.11
35. Chemicals, plastic products	3,154.34	3,690.98	3,138.17	2,537.30	2,396.26
36. Non-metallic mineral products except products of petroleum and coal	896.11	773.72	643.26	576.24	605.45
38. Fabricated metal products, machinery and equipment	745.29	840.03	955.41	778.18	978.92
All Industries	2,163.79	1,930.12	1,613.30	1,547.58	1,462.77

Note: $K^{*}_{sme,i,t} = \frac{1}{n}\sum_{i=1}^{n}\frac{K^{real}_{sme,i,t}}{L_{sme,i,t}}$, *where* $(K^{*}_{smi,i,t})$ *denotes capital-labour ratio of SMEs in industry i (i= 1,....400) at time t (t=2002,2003,2004,2005,2006).* $(L_{sme,i,t})$ *and* $(K^{real}_{smi,i,t})$ *represent number of workers and real capital stock of industry i at time t respectively.*

Table C2: Capital-labour index of LEs

Industries	Index of capital-labour ratio ($K^{*}_{le,j,t} = \frac{1}{n}\sum_{j=1}^{n}\frac{K^{real}_{le,j,t}}{L_{le,j,t}}$)				
	2002	2003	2004	2005	2006
31. Food, beverage and tobacco	12,246.33	9,167.19	6,720.44	4,793.16	3,792.58
32. Garment, textile and footwear apparel and leather industries	1,907.26	1,276.02	783.99	639.99	439.37
33. Woods and Wood product	20,039.50	19,329.51	18,232.04	26,501.53	21,034.25
34. Paper product, printing and publishing	13,910.55	11,937.73	9,791.33	8,364.27	7,489.21
35. Chemicals, plastic products	7,872.52	6,638.24	5,825.77	5,438.32	4,820.74
36. Non-metallic mineral products except products of petroleum and coal	1,098.97	944.82	916.63	773.26	757.29
38. Fabricated metal products, machinery and equipment	7,751.93	7,197.40	6,190.07	5,251.00	4,907.47
All Industries	5,318.15	4,011.42	2,746.99	2,846.09	2,059.55

Note: $K^{*}_{le,j,t} = \frac{1}{n}\sum_{j=1}^{n}\frac{K^{real}_{le,j,t}}{L_{le,j,t}}$, *where* ($K^{*}_{le,j,t}$) *denotes capital-labour ratio of LEs in industry j (j=1,....100) at time t (t=2002,2003,2004,2005,2006).* ($L_{le,j,t}$) *and* ($K^{real}_{le,j,t}$) *represent number of workers and real capital stock in industry j at time t.*

Table C3: The result of independent simple T-test:

a. Group Statistics

	Capital-labour ratio of Industry	N	Mean	Std. Deviation	Std. Error Mean
31. Food, beverage and tobacco	SMEs	5	1941.26	281.22	125.76
	LEs	5	7343.94	3422.90	1530.76
32. Garment, textile and footwear apparel and leather industries	SMEs	5	4268.45	2114.84	945.78
	LEs	5	1001.32	593.45	265.40
33. Woods and Wood products	SMEs	5	124.03	51.09	22.84
	LEs	5	21027.36	3226.41	1442.89
34. Paper products, printing and publishing	SMEs	5	6246.97	1081.49	483.66
	LEs	5	10298.61	2627.95	1175.25
35. Chemicals, rubber and plastic products	SMEs	5	2983.41	523.82	234.26
	LEs	5	6119.11	1181.01	528.16
36. Non-metallic mineral products except products of petroleum and coal	SMEs	5	698.95	133.57	59.73
	LEs	5	898.19	139.89	62.56
38. Fabricated metal products, machinery and equipment	SMEs	5	859.56	104.27	46.63
	LEs	5	6259.57	1220.33	545.75
All Industries	SMEs	5	1743.51	293.94	131.45
	LEs	5	3400.79	1280.15	572.50

b. Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	T	Sig. (2-tailed)	Mean Difference	Std. Error Difference
31. Food, beverage and tobacco	Equal variances assumed	11.287	.010	-3.518	**.008**	-5402.67	1535.92
	Equal variances not assumed			-3.518	**.024**	-5402.67	1535.92
32. Garment, textile and footwear apparel and leather industries	Equal variances assumed	14.356	.005	3.326	**.010**	3267.12	982.31
	Equal variances not assumed			3.326	**.023**	3267.12	982.31
33. Woods and Wood products	Equal variances assumed	5.264	.051	-14.485	**.000**	-20903.33	1443.07
	Equal variances not assumed			-14.485	**.000**	-20903.33	1443.07
34. Paper products, printing and publishing	Equal variances assumed	4.729	.061	-3.188	**.013**	-4051.64	1270.88
	Equal variances not assumed			-3.188	**.022**	-4051.64	1270.88
35. Chemicals, rubber and plastic products	Equal variances assumed	2.906	.127	-5.427	**.001**	-3135.70	577.78
	Equal variances not assumed			-5.427	**.002**	-3135.70	577.78
36. Non-metallic mineral products except products of petroleum and coal	Equal variances assumed	.003	.954	-2.303	**.050**	-199.23	86.50
	Equal variances not assumed			-2.303	**.050**	-199.23	86.50
38. Fabricated metal product, machinery and equipment	Equal variances assumed	12.674	.007	-9.859	**.000**	-5400.00	547.73
	Equal variances not assumed			-9.859	**.001**	-5400.00	547.73
All Industries	Equal variances assumed	7.907	.023	-2.821	**.022**	-1657.28	587.40
	Equal variances not assumed			-2.821	**.043**	-1657.28	587.40

Table C4: The result of pooled variances and t-values

ISIC		Means (n_{sme} and n_{le})	Std Deviation (S_{sme} and S_{le})	Pooled Variance (S_p)	t-value (t)
31	**SMEs**	1941.268	281.227	2428.5131	-3.517
	LEs	7343.939	3422.903		
32	**SMEs**	4268.454	2114.844	1553.182	3.325
	LEs	1001.324	593.453		
33	**SMEs**	124.030	51.095	2281.705	-14.485
	LEs	21027.37	3226.414		
34	**SMEs**	6246.975	1081.499	2009.449	-3.188
	LEs	10298.62	2627.953		
35	**SMEs**	2983.408	523.826	913.566	-5.427
	LEs	6119.118	1181.022		
36	**SMEs**	698.957	133.571	136.769	-2.303
	LEs	898.192	139.897		
38	**SMEs**	859.567	104.280	866.053	-9.858
	LEs	6259.574	1220.338		
All	**SMEs**	1743.51	293.946	928.766	-2.821
	LEs	3400.792	1280.161		

Table C5: Female labour force participation in SMEs and LEs (2002-2006)

		2002	2003	2004	2005	2006
31. Food, beverage and tobacco	SMEs	0.532	0.522	0.536	0.557	0.565
	LEs	1.982	1.967	2.005	2.056	1.996
32. Textile and footwear apparel and leather industries	SMEs	0.735	0.779	1.339	1.344	1.355
	LEs	12.396	10.967	10.387	9.193	11.131
33. Woods and Wood product	SMEs	0.286	0.292	0.333	0.318	0.588
	LEs	0.034	0.035	0.034	0.038	0.044
34. Paper product, printing and publishing	SMEs	1.059	0.895	0.783	0.567	0.767
	LEs	0.483	0.476	0.462	0.459	0.433
35. Chemicals, rubber and plastic products	SMEs	0.434	0.561	0.514	0.494	0.554
	LEs	0.661	0.653	0.624	0.612	0.601
36. Non-metallic mineral product except product of petroleum and coal	SMEs	0.687	0.662	0.656	0.658	0.662
	LEs	0.756	0.731	0.730	0.731	0.730
38. Fabricated metal product, machinery and equipment	SMEs	0.700	0.138	0.163	0.152	0.112
	LEs	0.092	0.091	0.092	0.091	0.089
All	SMEs	0.568	0.556	0.593	0.601	0.614
	LEs	2.805	3.084	3.520	3.228	3.656

Table C6: Labour force participation in SMEs (2002-2006)

	2002		2003		2004		2005		2006	
	Total	F (%)	Total	F (%)	Total	F (%)	Total	F (%)	Total	F (%)
31. Food, beverage and ..	1995	693 (35)	2121	727 (34)	2200	768 (35)	2292	820 (36)	2493	900 (36)
32. Textile and footwear	177	75 (42)	185	81 (44)	276	158 (57)	286	164 (57)	358	206 (58)
33. Woods and Wood product	27	6 (22)	31	7 (23)	32	8 (25)	29	7 (24)	27	10 (37)
34. Paper product, printing and publishing	35	18 (51)	36	17 (47)	41	18 (44)	47	17 (36)	53	23 (43)
35. Chemicals, rubber and plastic products	109	33 (30)	103	37 (36)	106	36 (34)	118	39 (33)	129	46 (36)
36. Non-metallic mineral product..	1063	433 (41)	1090	434 (40)	1111	440 (40)	1131	449 (40)	1135	452 (40)
38. Fabricated metal product, machinery....	110	16 (15)	124	15 (12)	114	16 (14)	129	17 (13)	149	15 (10)
All	3516	1274 (36)	3690	1318 (36)	3880	1444 (37)	4032	1513 (38)	4344	1652 (38)

APPENDIX D

Table D1: Quantity of output and inputs of SMEs and LEs, 2002–06

	SMEs	Percentage change (%)	LEs	Percentage change (%)
Output (USD)				
2002	14,211,821		396,484,531	
2003	14,803,365	4.162	432,655,372	9.123
2004	15,667,219	5.836	475,501,413	9.903
2005	18,529,499	18.268	456,716,072	-3.951
2006	20,765,326	12.066	450,432,048	-1.376
Labour inputs (Hours)				
2002	7,585,934		100,460,633	
2003	7,970,584	5.071	97,162,582	-3.283
2004	8,382,490	5.168	128,303,643	32.050
2005	8,782,650	4.774	110,538,130	-13.846
2006	9,482,235	7.966	118,538,754	7.238
Capital inputs (USD)				
2002	7,711,590		186,575,831	
2003	7,134,398	-7.485	151,809823	-18.634
2004	6,599,473	-7.498	126,200,362	-16.869
2005	6,598,090	-0.021	119,377,086	-5.407
2006	6,731,449	2.021	92,726,398	-22.325
Intermediate inputs (USD)				
2002	7,794,015		163,680,817	
2003	8,169,024	4.811	186,453,250	13.913
2004	8,617,245	5.487	215,930,296	15.809
2005	10,658,509	23.688	239,752,959	11.033
2006	11,833,738	11.026	218,629,469	-8.811

Table D2: TFP calculation for SMEs and LEs in 2002

ISIC	SMEs/ LEs	$\ln Q^{real}_{size,j,t}$	$\ln K^{real}_{size,j,t}$	$\ln L_{size,j,t}$	$\ln M^{real}_{size,j,t}$	$\ln \overline{Q}^{real}_{size,t}$	$\ln \overline{K}^{real}_{size,t}$	$\ln \overline{L}_{size,t}$	$\ln \overline{M}^{real}_{size,t}$	$\alpha_{size,i,t}$	$\beta_{size,i,t}$	$\gamma_{size,i,t}$	TFP
31. Food, beverage and tobacco	**SMEs**	16.098	15.364	15.339	15.502	9.784	8.451	9.406	9.076	0.151	0.275	0.574	***-0.172***
	LEs	16.929	17.736	16.062	16.446	12.695	13.251	12.551	11.928	0.168	0.258	0.574	**-0.107**
32. Garment, Textile and..	**SMEs**	13.810	14.050	12.898	12.703	11.060	10.574	10.014	9.827	0.093	0.575	0.332	**-0.472**
	LEs	19.506	17.608	18.127	18.592	15.862	13.945	14.544	15.265	0.088	0.331	0.581	**0.183**
33. Woods and Wood product	**SMEs**	10.984	8.618	11.046	10.592	9.170	6.016	9.284	8.625	0.209	0.151	0.640	**-0.207**
	LEs	17.656	17.852	15.687	16.546	14.580	14.278	12.830	13.508	0.081	0.579	0.340	**-0.257**
34. Paper product, printing..	**SMEs**	12.495	12.456	11.297	11.483	10.750	10.331	9.656	9.478	0.058	0.597	0.345	**-0.311**
	LEs	16.021	16.379	14.563	15.225	13.779	13.975	12.359	12.916	0.097	0.458	0.445	**-0.100**
35. Chemicals, rubber and..	**SMEs**	13.020	12.748	12.454	12.368	9.861	8.817	9.538	8.629	0.253	0.243	0.504	**-0.418**
	LEs	16.015	16.021	14.896	15.478	13.698	13.636	12.571	13.160	0.129	0.285	0.586	**-0.021**
36. Non-metallic mineral..	**SMEs**	14.370	13.767	14.489	13.891	9.353	8.320	9.659	8.630	0.313	0.074	0.614	**-0.123**
	LEs	14.677	14.012	14.491	14.174	12.261	11.212	12.153	11.726	0.212	0.188	0.600	**-0.075**
38. Fabricated metal product,..	**SMEs**	13.473	11.314	12.377	13.137	9.653	6.929	9.083	8.823	0.135	0.215	0.650	**-0.372**
	LEs	15.549	16.049	14.879	14.846	13.325	13.379	12.620	12.631	0.197	0.299	0.504	**-0.137**
Total	**SMEs**	16.456	15.845	15.842	15.855	9.757	8.445	9.462	9.002	0.173	0.304	0.523	**-0.239**
	LEs	19.785	19.031	18.425	18.900	13.696	13.427	12.863	12.954	0.139	0.343	0.518	**0.314**

Table D3: TFP calculation for SMEs and LEs in 2003

ISIC	SMEs/ LEs	$\ln Q^{real}_{size,j}$	$\ln K^{real}_{size,j}$	$\ln L_{size,j}$	$\ln M^{real}_{size,j}$	$\ln \bar{Q}^{real}_{size,j}$	$\ln \bar{K}^{real}_{size,j}$	$\ln \bar{L}_{size,j}$	$\ln \bar{M}^{real}_{size,j}$	$\alpha_{size,j,t}$	$\beta_{size,j,t}$	$\gamma_{size,j,t}$	TFP
31. Food, beverage and tobacco	SMEs	16.149	15.308	15.402	15.565	9.826	8.401	9.443	9.100	0.152	0.269	0.579	**-0.184**
	LEs	16.977	17.484	16.103	16.524	12.790	13.167	12.586	12.501	0.155	0.282	0.563	**0.160**
32. Garment, Textile and..	SMEs	13.864	13.892	12.942	12.793	11.127	10.526	10.071	9.904	0.092	0.567	0.341	**-0.421**
	LEs	19.580	17.335	18.084	18.727	16.028	13.701	14.686	15.364	0.089	0.375	0.536	**0.084**
33. Woods and Wood product	SMEs	11.029	8.390	11.202	10.635	9.246	5.782	9.409	8.729	0.206	0.148	0.646	**-0.204**
	LEs	17.881	17.722	15.588	16.803	14.836	14.232	12.724	13.817	0.055	0.588	0.356	**-0.231**
34. Paper product, printing..	SMEs	12.577	12.469	11.325	11.544	10.829	10.345	9.682	9.571	0.058	0.600	0.343	**-0.296**
	LEs	16.113	16.237	14.584	15.320	13.867	13.836	12.383	13.034	0.092	0.457	0.451	**-0.085**
35. Chemicals, rubber and..	SMEs	13.038	12.848	12.385	12.291	9.888	8.951	9.528	8.582	0.243	0.305	0.452	**-0.409**
	LEs	16.242	15.861	14.894	15.652	13.905	13.489	12.574	13.316	0.105	0.339	0.556	**-0.010**
36. Non-metallic mineral..	SMEs	14.424	13.645	14.511	13.946	9.394	8.159	9.671	8.664	0.303	0.086	0.612	**-0.136**
	LEs	14.706	13.881	14.509	14.210	12.293	11.107	12.172	11.762	0.210	0.187	0.603	**-0.072**
38. Fabricated metal product,..	SMEs	13.543	11.554	12.501	13.194	9.724	6.822	9.134	8.927	0.144	0.214	0.643	**-0.418**
	LEs	15.626	15.983	14.888	14.929	13.404	13.360	12.630	12.722	0.189	0.303	0.508	**-0.121**
Total	SMEs	16.508	15.778	15.891	15.914	9.802	8.378	9.495	9.033	0.171	0.313	0.516	**-0.254**

	LEs	19.883	18.836	18.392	19.042	13.829	13.316	12.886	13.232	0.128	0.362	0.511	**0.388**

Table D4 TFP calculation for SMEs and LEs in 2004

ISIC	SMEs/ LEs	$\ln Q^{real}_{size,j}$	$\ln K^{real}_{size,j}$	$\ln L_{size,j}$	$\ln M^{real}_{size,j}$	$\ln \bar{Q}^{real}_{size,j}$	$\ln \bar{K}^{real}_{size,j}$	$\ln \bar{L}_{size,j}$	$\ln \bar{M}^{real}_{size,j}$	$\alpha_{size,j,t}$	$\beta_{size,j,t}$	$\gamma_{size,j,t}$	TFP
31. Food, beverage and tobacco	SMEs	16.151	15.196	15.431	15.578	9.767	8.235	9.438	9.103	0.159	0.198	0.646	**-0.131**
	LEs	17.309	17.192	16.141	16.781	13.419	12.986	12.624	12.662	0.146	0.307	0.547	**-0.167**
32. Garment, Textile and..	SMEs	13.925	13.678	13.394	12.833	11.204	9.823	10.240	9.945	0.117	0.545	0.338	**-0.725**
	LEs	19.627	17.001	18.448	18.834	16.070	13.394	14.895	15.376	0.103	0.385	0.512	**0.031**
33. Woods and Wood product	SMEs	11.106	8.108	11.238	10.640	9.400	5.494	9.436	8.812	0.243	0.151	0.607	**-0.234**
	LEs	17.784	17.544	15.468	16.700	14.796	14.074	12.608	13.768	0.052	0.592	0.356	**-0.258**
34. Paper product, printing..	SMEs	12.527	12.459	11.453	11.541	10.779	10.452	9.825	9.578	0.081	0.560	0.358	**-0.212**
	LEs	16.294	16.064	14.610	15.576	14.050	13.670	12.411	13.334	0.084	0.426	0.491	**-0.059**
35. Chemicals, rubber and..	SMEs	13.003	12.715	12.416	12.241	9.860	8.812	9.546	8.533	0.255	0.301	0.444	**-0.409**
	LEs	16.224	15.718	14.880	15.637	13.884	13.353	12.572	13.297	0.108	0.334	0.558	**-0.006**
36. Non-metallic mineral..	SMEs	14.403	13.480	14.533	13.918	9.381	7.942	9.690	8.649	0.350	0.048	0.609	**-0.150**
	LEs	14.656	13.851	14.509	14.160	12.243	11.017	12.172	11.712	0.220	0.176	0.603	**-0.078**
38. Fabricated metal product,..	SMEs	13.607	11.598	12.348	13.156	9.779	6.858	9.087	8.945	0.138	0.260	0.602	**-0.390**
	LEs	15.619	15.834	14.890	14.923	13.392	13.247	12.631	12.712	0.193	0.299	0.508	**-0.105**
Total	SMEs	16.513	15.650	15.942	15.917	9.764	8.196	9.501	9.034	0.192	0.295	0.515	**-0.228**
	LEs	19.928	18.601	18.670	19.138	14.033	13.140	12.916	13.296	0.129	0.360	0.511	**0.201**

Table D5: TFP calculation for SMEs and LEs in 2005

ISIC	SMEs/ LEs	$\ln Q^{real}_{size,j}$	$\ln K^{real}_{size,j}$	$\ln L_{size,j}$	$\ln M^{real}_{size,j}$	$\ln \overline{Q}^{real}_{size,j}$	$\ln \overline{K}^{real}_{size,j}$	$\ln \overline{L}_{size,j}$	$\ln \overline{M}^{real}_{size,j}$	$\alpha_{size,j,t}$	$\beta_{size,j,t}$	$\gamma_{size,j,t}$	TFP
31. Food, beverage and tobacco	SMEs	16.297	15.216	15.481	15.773	9.882	8.194	9.423	9.221	0.162	0.233	0.605	**-0.167**
	LEs	17.449	16.939	16.231	17.005	13.552	12.835	12.702	12.864	0.148	0.261	0.590	**-0.144**
32. Garment, Textile and..	SMEs	14.060	13.671	13.423	12.860	11.349	10.437	10.304	9.994	0.113	0.581	0.306	**-0.397**
	LEs	19.609	16.719	18.256	18.947	16.118	13.189	14.838	15.405	0.095	0.361	0.543	**-0.034**
33. Woods and Wood product	SMEs	11.105	7.878	11.127	10.691	9.401	5.242	9.346	8.919	0.252	0.101	0.647	**-0.156**
	LEs	17.288	17.720	15.276	16.491	14.394	14.160	12.474	13.618	0.068	0.472	0.460	**-0.298**
34. Paper product, printing..	SMEs	12.614	12.479	11.590	11.597	10.979	10.618	9.941	9.778	0.079	0.569	0.353	**-0.194**
	LEs	16.349	15.969	14.672	15.685	14.098	13.563	12.473	13.420	0.090	0.395	0.514	**-0.064**
35. Chemicals, rubber and..	SMEs	13.270	12.610	12.527	12.244	10.034	8.752	9.618	8.582	0.252	0.378	0.370	**-0.310**
	LEs	16.223	15.622	14.846	15.641	13.874	13.268	12.527	13.282	0.106	0.336	0.558	**-0.004**
36. Non-metallic mineral..	SMEs	14.716	13.387	14.552	14.360	9.547	7.809	9.707	8.846	0.278	0.078	0.643	**-0.163**
	LEs	15.106	13.681	14.509	14.837	12.683	10.941	12.172	12.399	0.161	0.080	0.759	**-0.024**
38. Fabricated metal product,..	SMEs	13.687	11.517	12.546	13.185	9.827	6.634	9.187	9.038	0.154	0.257	0.589	**-0.354**
	LEs	15.661	15.725	14.947	14.998	13.430	13.148	12.693	12.784	0.211	0.264	0.525	**-0.087**
Total	SMEs	16.679	15.646	15.988	16.126	9.888	8.154	9.503	9.160	0.184	0.314	0.502	**-0.251**
	LEs	19.884	18.542	18.521	19.239	14.072	13.038	12.918	13.422	0.126	0.310	0.564	**0.118**

Table D6: TFP calculation for SMEs and LEs in 2006

ISIC	SMEs/ LEs	$\ln Q^{real}_{size,i,t}$	$\ln K^{real}_{size,i,t}$	$\ln L_{size,i,t}$	$\ln M^{real}_{size,i,t}$	$\ln \bar{Q}^{real}_{size,t}$	$\ln \bar{K}^{real}_{size,t}$	$\ln \bar{L}_{size,t}$	$\ln \bar{M}^{real}_{size,t}$	$\alpha_{size,i,t}$	$\beta_{size,i,t}$	$\gamma_{size,i,t}$	TFP
31. Food, beverage and tobacco	SMEs	16.415	15.245	15.568	15.883	10.038	8.228	9.546	9.400	0.167	0.225	0.608	**-0.149**
	LEs	17.494	16.786	16.315	17.029	13.644	12.773	12.770	12.944	0.157	0.262	0.581	**-0.132**
32. Garment, Textile and..	SMEs	14.251	13.565	13.625	13.112	11.508	10.463	10.614	10.206	0.139	0.537	0.323	**-0.284**
	LEs	19.611	16.431	18.339	18.833	16.098	12.907	14.959	15.359	0.118	0.383	0.499	**0.031**
33. Woods and Wood product	SMEs	11.111	7.659	11.046	10.706	9.409	5.005	9.279	8.947	0.325	0.020	0.655	**-0.077**
	LEs	16.897	17.327	15.113	16.201	14.026	13.894	12.381	13.279	0.087	0.423	0.490	**-0.249**
34. Paper product, printing..	SMEs	12.820	12.446	11.709	11.873	11.183	10.576	10.055	9.964	0.085	0.533	0.382	**-0.231**
	LEs	16.510	15.911	14.710	15.848	14.232	13.502	12.509	13.582	0.087	0.392	0.522	**-0.038**
35. Chemicals, rubber and..	SMEs	13.468	12.641	12.570	12.393	10.191	8.764	9.579	8.721	0.241	0.408	0.351	**-0.315**
	LEs	16.169	15.526	14.894	15.630	13.831	13.167	12.573	13.277	0.105	0.314	0.581	**-0.013**
36. Non-metallic mineral..	SMEs	14.719	13.448	14.551	14.368	9.561	7.637	9.706	8.868	0.282	0.070	0.648	**-0.179**
	LEs	15.104	13.660	14.509	14.836	12.682	10.956	12.172	12.398	0.162	0.079	0.759	**-0.020**
38. Fabricated metal product,..	SMEs	13.824	11.890	12.699	13.321	9.919	6.610	9.273	9.158	0.174	0.232	0.593	**-0.388**
	LEs	15.683	15.676	14.968	15.009	13.459	13.114	12.717	12.794	0.222	0.263	0.514	**-0.090**
Total	SMEs	16.792	15.665	16.065	16.230	10.015	8.146	9.604	9.309	0.202	0.289	0.509	**-0.225**
	LEs	19.869	18.288	18.591	19.146	14.053	12.917	12.954	13.403	0.134	0.302	0.564	**0.200**

Table D7: TFP calculation for SMEs and LEs in (2003)

ISIC	SMEs /LEs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	TFP
	SMEs	16.1	15.3	15.4	15.6	0.2	0.3	0.6	9.8	8.4	9.4	9.1	0.2	0.2	0.6	9.8	8.5	9.4	9.1	0.2	0.2	0.6	-0.123
31	LEs	17.0	17.5	16.1	16.5	0.2	0.3	0.6	12.8	13.2	12.6	12.5	0.2	0.3	0.5	12.7	13.3	12.6	11.9	0.2	0.3	0.5	-0.021
	SMEs	13.9	13.9	12.9	12.8	0.1	0.6	0.3	11.1	10.5	10.1	9.9	0.1	0.6	0.3	11.1	10.6	10.0	9.8	0.1	0.6	0.3	-0.357
32	LEs	19.6	17.3	18.1	18.7	0.1	0.4	0.5	16.0	13.7	14.7	15.4	0.1	0.3	0.6	15.9	13.9	14.5	15.3	0.1	0.1	0.8	0.233
	SMEs	11.0	8.4	11.2	10.6	0.2	0.1	0.6	9.2	5.8	9.4	8.7	0.2	0.1	0.6	9.2	6.0	9.3	8.6	0.2	0.2	0.6	-0.184
33	LEs	17.9	17.7	15.6	16.8	0.1	0.6	0.4	14.8	14.2	12.7	13.8	0.1	0.6	0.4	14.6	14.3	12.8	13.5	0.1	0.6	0.4	-0.046
	SMEs	12.6	12.5	11.3	11.5	0.1	0.6	0.3	10.8	10.3	9.7	9.6	0.1	0.6	0.3	10.7	10.3	9.7	9.5	0.1	0.6	0.3	-0.258
34	LEs	16.1	16.2	14.6	15.3	0.1	0.5	0.5	13.9	13.8	12.4	13.0	0.1	0.5	0.5	13.8	14.0	12.4	12.9	0.1	0.5	0.4	-0.013
	SMEs	13.0	12.8	12.4	12.3	0.2	0.3	0.5	9.9	9.0	9.5	8.6	0.4	0.2	0.4	9.9	8.8	9.5	8.6	0.4	0.2	0.5	-0.328
35	LEs	16.2	15.9	14.9	15.7	0.1	0.3	0.6	13.9	13.5	12.6	13.3	0.1	0.3	0.6	13.7	13.6	12.6	13.2	0.1	0.3	0.6	0.153
	SMEs	14.4	13.6	14.5	13.9	0.3	0.1	0.6	9.4	8.2	9.7	8.7	0.4	0.0	0.6	9.4	8.3	9.7	8.6	0.4	0.0	0.6	-0.095
36	LEs	14.7	13.9	14.5	14.2	0.2	0.2	0.6	12.3	11.1	12.2	11.8	0.2	0.2	0.6	12.3	11.2	12.2	11.7	0.2	0.2	0.6	-0.046
	SMEs	13.5	11.6	12.5	13.2	0.1	0.2	0.6	9.7	6.8	9.1	8.9	0.2	0.2	0.6	9.7	6.9	9.1	8.8	0.2	0.2	0.6	-0.374
38	LEs	15.6	16.0	14.9	14.9	0.2	0.3	0.5	13.4	13.4	12.6	12.7	0.2	0.3	0.5	13.3	13.4	12.6	12.6	0.2	0.3	0.5	-0.084
	SMEs	16.5	15.8	15.9	15.9	0.2	0.3	0.5	9.8	8.4	9.5	9.0	0.2	0.2	0.6	9.8	8.4	9.5	9.0	0.2	0.2	0.6	-0.194
All	LEs	19.9	18.8	18.4	19.0	0.1	0.4	0.5	13.8	13.3	12.9	13.2	0.1	0.3	0.5	13.7	13.4	12.9	13.0	0.2	0.3	0.5	0.404

Note: (1)- In order to save space, the table reports the numbers of each variables in one decimal.

(2)- 31, 32, 33, 34, 35, 36, 38 denote each group of industries respectively.

(3)- 1, 2,..., and 21 denote $\ln Q^{real}_{size,j,t}$, $\ln K^{real}_{size,j,t}$, $\ln L_{size,j,t}$, $\ln M^{real}_{size,j,t}$, $\alpha_{size,j,t}$, $\beta_{size,j,t}$, $\gamma_{size,j,t}$, $\ln \overline{Q}^{real}_{s}$, $\ln \overline{K}^{real}_{s}$, $\ln \overline{L}^{real}_{s}$, $\ln \overline{M}^{real}_{s}$, $\overline{\alpha}_{s}$, $\overline{\beta}_{s}$, $\overline{\gamma}_{s}$, $\ln \overline{Q}^{real}_{s-1}$, $\ln \overline{K}^{real}_{s-1}$, $\ln \overline{L}_{s-1}$, $\ln \overline{M}^{real}_{s-1}$, $\overline{\alpha}_{s-1}$, $\overline{\beta}_{s-1}$, and $\overline{\gamma}_{s-1}$ respectively.

Table D8: TFP calculation for SMEs and LEs in (2004)

ISIC	SMEs /LEs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	TFP
	SMEs	16.2	15.2	15.4	15.6	0.2	0.2	0.6	9.8	8.2	9.4	9.1	0.2	0.2	0.6	9.8	8.4	9.4	9.1	0.2	0.2	0.6	**(0.131)**
31	LEs	17.3	17.2	16.1	16.8	0.1	0.3	0.5	13.4	13.0	12.6	12.7	0.2	0.3	0.5	12.8	13.2	12.6	12.5	0.2	0.3	0.5	**0.439**
	SMEs	13.9	13.7	13.4	12.8	0.1	0.5	0.3	11.2	9.8	10.2	9.9	0.1	0.6	0.3	11.1	10.5	10.1	9.9	0.1	0.6	0.3	**(0.293)**
32	LEs	19.6	17.0	18.4	18.8	0.1	0.4	0.5	16.1	13.4	14.9	15.4	0.1	0.3	0.6	16.0	13.7	14.7	15.4	0.1	0.3	0.6	**0.139**
	SMEs	11.1	8.1	11.2	10.6	0.2	0.2	0.6	9.4	5.5	9.4	8.8	0.3	0.2	0.6	9.2	5.8	9.4	8.7	0.2	0.1	0.6	**(0.096)**
33	LEs	17.8	17.5	15.5	16.7	0.1	0.6	0.4	14.8	14.1	12.6	13.8	0.1	0.6	0.4	14.8	14.2	12.7	13.8	0.1	0.6	0.4	**(0.177)**
	SMEs	12.5	12.5	11.5	11.5	0.1	0.6	0.4	10.8	10.5	9.8	9.6	0.1	0.6	0.3	10.8	10.3	9.7	9.6	0.1	0.6	0.3	**(0.336)**
34	LEs	16.3	16.1	14.6	15.6	0.1	0.4	0.5	14.1	13.7	12.4	13.3	0.1	0.4	0.5	13.9	13.8	12.4	13.0	0.1	0.5	0.5	**0.053**
	SMEs	13.0	12.7	12.4	12.2	0.3	0.3	0.4	9.9	8.8	9.5	8.5	0.4	0.2	0.4	9.9	9.0	9.5	8.6	0.4	0.2	0.4	**(0.338)**
35	LEs	16.2	15.7	14.9	15.6	0.1	0.3	0.6	13.9	13.4	12.6	13.3	0.1	0.3	0.6	13.9	13.5	12.6	13.3	0.1	0.3	0.6	**0.030**
	SMEs	14.4	13.5	14.5	13.9	0.4	0.0	0.6	9.4	7.9	9.7	8.6	0.5	-0.0	0.6	9.4	8.2	9.7	8.7	0.4	0.0	0.6	**(0.133)**
36	LEs	14.7	13.9	14.5	14.2	0.2	0.2	0.6	12.2	11.0	12.2	11.7	0.2	0.2	0.6	12.3	11.1	12.2	11.8	0.2	0.2	0.6	**(0.080)**
	SMEs	13.6	11.6	12.3	13.2	0.1	0.3	0.6	9.8	6.9	9.1	8.9	0.2	0.2	0.6	9.7	6.8	9.1	8.9	0.2	0.2	0.6	**(0.312)**
38	LEs	15.6	15.8	14.9	14.9	0.2	0.3	0.5	13.4	13.2	12.6	12.7	0.2	0.3	0.5	13.4	13.4	12.6	12.7	0.2	0.3	0.5	**(0.078)**
	SMEs	16.5	15.7	15.9	15.9	0.2	0.3	0.5	9.8	8.2	9.5	9.0	0.2	0.3	0.5	9.8	8.4	9.5	9.0	0.2	0.2	0.6	**(0.217)**
All	LEs	19.9	18.6	18.7	19.1	0.1	0.4	0.5	14.0	13.1	12.9	13.3	0.1	0.3	0.5	13.8	13.3	12.9	13.2	0.1	0.3	0.5	**0.425**

Note: (1)- In order to save space, the table reports the numbers of each variables in one decimal.

(2)- 31, 32, 33, 34, 35, 36, 38 denote each group of industries respectively.

(3)- 1, 2,..., and 21 denote $\ln Q^{real}_{size,i,t}$, $\ln K^{real}_{size,i,t}$, $\ln L_{size,i,t}$, $\ln M^{real}_{size,i,t}$, $\alpha_{size,i,t}$, $\beta_{size,i,t}$, $\gamma_{size,i,t}$, $\ln \overline{Q}^{real}_{s}$, $\ln \overline{K}^{real}_{s}$, $\ln \overline{L}^{real}_{s}$, $\ln \overline{M}^{real}_{s}$, $\overline{\alpha}_{s}$, $\overline{\beta}_{s}$, $\overline{\gamma}_{s}$, $\ln \overline{Q}^{real}_{s-1}$, $\ln \overline{K}^{real}_{s-1}$, $\ln \overline{L}_{s-1}$, $\ln \overline{M}^{real}_{s-1}$, $\overline{\alpha}_{s-1}$, $\overline{\beta}_{s-1}$, and $\overline{\gamma}_{s-1}$ respectively.

Table D9: TFP calculation for SMEs and LEs in (2005)

ISIC	SMEs /LEs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	TFP
	SMEs	16.3	15.2	15.5	15.8	0.2	0.2	0.6	9.9	8.2	9.4	9.2	0.2	0.2	0.6	9.8	8.2	9.4	9.1	0.2	0.2	0.6	**-0.083**
31	LEs	17.4	16.9	16.2	17.0	0.1	0.3	0.6	13.6	12.8	12.7	12.9	0.2	0.3	0.5	13.4	13.0	12.6	12.7	0.2	0.3	0.5	**-0.073**
	SMEs	14.1	13.7	13.4	12.9	0.1	0.6	0.3	11.3	10.4	10.3	10.0	0.1	0.6	0.3	11.2	9.8	10.2	9.9	0.1	0.6	0.3	**-0.622**
32	LEs	19.6	16.7	18.3	18.9	0.1	0.4	0.5	16.1	13.2	14.8	15.4	0.1	0.3	0.6	16.1	13.4	14.9	15.4	0.1	0.3	0.6	**0.069**
	SMEs	11.1	7.9	11.1	10.7	0.3	0.1	0.6	9.4	5.2	9.3	8.9	0.3	0.1	0.6	9.4	5.5	9.4	8.8	0.3	0.2	0.6	**-0.165**
33	LEs	17.3	17.7	15.3	16.5	0.1	0.5	0.5	14.4	14.2	12.5	13.6	0.1	0.5	0.5	14.8	14.1	12.6	13.8	0.1	0.6	0.4	**-0.665**
	SMEs	12.6	12.5	11.6	11.6	0.1	0.6	0.4	11.0	10.6	9.9	9.8	0.1	0.6	0.3	10.8	10.5	9.8	9.6	0.1	0.6	0.3	**-0.168**
34	LEs	16.3	16.0	14.7	15.7	0.1	0.4	0.5	14.1	13.6	12.5	13.4	0.1	0.4	0.5	14.1	13.7	12.4	13.3	0.1	0.4	0.5	**-0.022**
	SMEs	13.3	12.6	12.5	12.2	0.3	0.4	0.4	10.0	8.8	9.6	8.6	0.4	0.2	0.4	9.9	8.8	9.5	8.5	0.4	0.2	0.4	**-0.110**
35	LEs	16.2	15.6	14.8	15.6	0.1	0.3	0.6	13.9	13.3	12.5	13.3	0.1	0.3	0.6	13.9	13.4	12.6	13.3	0.1	0.3	0.6	**0.027**
	SMEs	14.7	13.4	14.6	14.4	0.3	0.1	0.6	9.5	7.8	9.7	8.8	0.4	0.1	0.6	9.4	7.9	9.7	8.6	0.5	0.0	0.6	**-0.093**
36	LEs	15.1	13.7	14.5	14.8	0.2	0.1	0.8	12.7	10.9	12.2	12.4	0.2	0.1	0.8	12.2	11.0	12.2	11.7	0.2	0.2	0.6	**-0.036**
	SMEs	13.7	11.5	12.5	13.2	0.2	0.3	0.6	9.8	6.6	9.2	9.0	0.2	0.2	0.6	9.8	6.9	9.1	8.9	0.2	0.2	0.6	**-0.290**
38	LEs	15.7	15.7	14.9	15.0	0.2	0.3	0.5	13.4	13.1	12.7	12.8	0.2	0.3	0.5	13.4	13.2	12.6	12.7	0.2	0.3	0.5	**-0.071**
	SMEs	16.7	15.6	16.0	16.1	0.2	0.3	0.5	9.9	8.2	9.5	9.2	0.2	0.3	0.5	9.8	8.2	9.5	9.0	0.2	0.3	0.5	**-0.204**
All	LEs	19.9	18.5	18.5	19.2	0.1	0.3	0.6	14.1	13.0	12.9	13.4	0.1	0.3	0.6	14.0	13.1	12.9	13.3	0.1	0.3	0.5	**0.097**

Note: (1)- In order to save space, the table reports the numbers of each variables in one decimal.

(2)- 31, 32, 33, 34, 35, 36, 38 denote each group of industries respectively.

(3)- 1, 2,..., and 21 denote $\ln Q^{real}_{size,j,t}$, $\ln K^{real}_{size,j,t}$, $\ln L_{size,j,t}$, $\ln M^{real}_{size,j,t}$, $\alpha_{size,j,t}$, $\beta_{size,j,t}$, $\gamma_{size,j,t}$, $\ln \overline{Q}^{real}_{s}$, $\ln \overline{K}^{real}_{s}$, $\ln \overline{L}^{real}_{s}$, $\ln \overline{M}^{real}_{s}$, $\overline{\alpha}_{s}$, $\overline{\beta}_{s}$, $\overline{\gamma}_{s}$, $\ln \overline{Q}^{real}_{s-1}$, $\ln \overline{K}^{real}_{s-1}$, $\ln \overline{L}_{s-1}$, $\ln \overline{M}^{real}_{s-1}$, $\overline{\alpha}_{s-1}$, $\overline{\beta}_{s-1}$, and $\overline{\gamma}_{s-1}$ respectively.

Table D10: TFP calculation for SMEs and LEs in (2006)

ISIC	SMEs /LEs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	TFP
	SMEs	16.4	15.2	15.6	15.9	0.2	0.2	0.6	10.0	8.2	9.5	9.4	0.2	0.1	0.6	9.9	8.2	9.4	9.2	0.2	0.2	0.6	**(0.105)**
31	LEs	17.5	16.8	16.3	17.0	0.2	0.3	0.6	13.6	12.8	12.8	12.9	0.2	0.3	0.5	13.6	12.8	12.7	12.9	0.2	0.3	0.5	**(0.067)**
	SMEs	14.3	13.6	13.6	13.1	0.1	0.5	0.3	11.5	10.5	10.6	10.2	0.1	0.5	0.3	11.3	10.4	10.3	10.0	0.1	0.6	0.3	**(0.245)**
32	LEs	19.6	16.4	18.3	18.8	0.1	0.4	0.5	16.1	12.9	15.0	15.4	0.1	0.3	0.5	16.1	13.2	14.8	15.4	0.1	0.3	0.6	**0.117**
	SMEs	11.1	7.7	11.0	10.7	0.3	0.0	0.7	9.4	5.0	9.3	8.9	0.3	0.0	0.6	9.4	5.2	9.3	8.9	0.3	0.1	0.6	**(0.049)**
33	LEs	16.9	17.3	15.1	16.2	0.1	0.4	0.5	14.0	13.9	12.4	13.3	0.1	0.4	0.5	14.4	14.2	12.5	13.6	0.1	0.5	0.5	**(0.331)**
	SMEs	12.8	12.4	11.7	11.9	0.1	0.5	0.4	11.2	10.6	10.1	10.0	0.1	0.5	0.4	11.0	10.6	9.9	9.8	0.1	0.6	0.3	**(0.078)**
34	LEs	16.5	15.9	14.7	15.8	0.1	0.4	0.5	14.2	13.5	12.5	13.6	0.1	0.4	0.5	14.1	13.6	12.5	13.4	0.1	0.4	0.5	**0.033**
	SMEs	13.5	12.6	12.6	12.4	0.2	0.4	0.4	10.2	8.8	9.6	8.7	0.4	0.3	0.4	10.0	8.8	9.6	8.6	0.4	0.2	0.4	**(0.147)**
35	LEs	16.2	15.5	14.9	15.6	0.1	0.3	0.6	13.8	13.2	12.6	13.3	0.1	0.3	0.6	13.9	13.3	12.5	13.3	0.1	0.3	0.6	**(0.025)**
	SMEs	14.7	13.4	14.6	14.4	0.3	0.1	0.6	9.6	7.6	9.7	8.9	0.4	0.0	0.6	9.5	7.8	9.7	8.8	0.4	0.1	0.6	**(0.137)**
36	LEs	15.1	13.7	14.5	14.8	0.2	0.1	0.8	12.7	11.0	12.2	12.4	0.2	0.1	0.8	12.7	10.9	12.2	12.4	0.2	0.1	0.8	**(0.020)**
	SMEs	13.8	11.9	12.7	13.3	0.2	0.2	0.6	9.9	6.6	9.3	9.2	0.2	0.2	0.6	9.8	6.6	9.2	9.0	0.2	0.2	0.6	**(0.330)**
38	LEs	15.7	15.7	15.0	15.0	0.2	0.3	0.5	13.5	13.1	12.7	12.8	0.2	0.3	0.5	13.4	13.1	12.7	12.8	0.2	0.3	0.5	**(0.062)**
	SMEs	16.8	15.7	16.1	16.2	0.2	0.3	0.5	10.0	8.1	9.6	9.3	0.2	0.3	0.5	9.9	8.2	9.5	9.2	0.2	0.3	0.5	**(0.196)**
All	LEs	19.9	18.3	18.6	19.1	0.1	0.3	0.6	14.1	12.9	13.0	13.4	0.2	0.2	0.6	14.1	13.0	12.9	13.4	0.1	0.3	0.6	**0.484**

Note: (1)- In order to save space, the table reports the numbers of each variables in one decimal.

(2)- 31, 32, 33, 34, 35, 36, 38 denote each group of industries respectively.

(3)- 1, 2,..., and 21 denote $\ln Q^{real}_{size,j,t}$, $\ln K^{real}_{size,j,t}$, $\ln L_{size,j,t}$, $\ln M^{real}_{size,j,t}$, $\alpha_{size,j,t}$, $\beta_{size,j,t}$, $\gamma_{size,j,t}$, $\ln \overline{Q}^{real}_{s}$, $\ln \overline{K}^{real}_{s}$, $\ln \overline{L}^{real}_{s}$, $\ln \overline{M}^{real}_{s}$, $\overline{\alpha}_{s}$, $\overline{\beta}_{s}$, $\overline{\gamma}_{s}$, $\ln \overline{Q}^{real}_{s-1}$, $\ln \overline{K}^{real}_{s-1}$, $\ln \overline{L}_{s-1}$, $\ln \overline{M}^{real}_{s-1}$, $\overline{\alpha}_{s-1}$, $\overline{\beta}_{s-1}$, and $\overline{\gamma}_{s-1}$ respectively.

Table D11: Compare means TFP of SMEs and LEs (2002-2006)

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
31. Food, beverage and tobacco	Equal variances assumed	4.469	.067	-1.354	8	.213	-8.26000E-	6.0995E-02	-.22325	5.8054
	Equal variances not assumed			-1.354	4.190	.244	-8.26000E-	6.0995E-02	-.24896	8.3759
32. Garment, Textile and..	Equal variances assumed	.982	.351	-6.361	8	.000	-.5188	8.156E-02	-.7069	-.3307
	Equal variances not assumed			-6.361	5.852	.001	-.5188	8.156E-02	-.7196	-.3180
33. Woods and Wood product	Equal variances assumed	3.749	.089	2.789	8	.024	8.300E-02	2.976E-02	1.436E	.1516
	Equal variances not assumed			2.789	5.229	.037	8.300E-02	2.976E-02	7.483	.1585
34. Paper product, printing..	Equal variances assumed	7.164	.028	-7.025	8	.000	-.1796	2.557E-02	-.2386	-.1206
	Equal variances not assumed			-7.025	5.636	.001	-.1796	2.557E-02	-.2432	-.1160
35. Chemicals, rubber and..	Equal variances assumed	61.316	.000	-14.677	8	.000	-.3614	2.462E-02	-.4182	-.3046
	Equal variances not assumed			-14.677	4.120	.000	-.3614	2.462E-02	-.4290	-.2938
36. Non-metallic mineral..	Equal variances assumed	2.178	.178	-5.904	8	.000	-9.6400	1.633E-02	-.1341	-5.8749
	Equal variances not assumed			-5.904	7.441	.000	-9.6400	1.633E-02	-.1345	-5.8251
38. Fabricated metal product,..	Equal variances assumed	.002	.967	-19.459	8	.000	-.2764	1.420E-02	-.3092	-.2436
	Equal variances not assumed			-19.459	7.894	.000	-.2764	1.420E-02	-.3092	-.2436
All industries	Equal variances assumed	12.580	.008	-10.086	8	.000	-.4836	4.795E-02	-.5942	-.3730
	Equal variances not assumed			-10.086	4.121	.000	-.4836	4.795E-02	-.6152	-.3520

Table D12: Compare means TFP of SMEs and LEs (2003-2006)

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
31. Food, beverage and tobacco	Equal variances assumed	7.166	.037	-1.450	6	**.197**	-.18000	.12417	-.48384	.12384
	Equal variances not assumed			-1.450	3.045	**.242**	-.18000	.12417	-.57192	.21192
32. Garment, Textile and..	Equal variances assumed	2.126	.195	-5.708		**.001**	-.5188	9.088E-02	-.7411	-.2964
	Equal variances not assumed			-5.708	3.978	**.005**	-.5188	9.088E-02	-.7716	-.2659
33. Woods and Wood product	Equal variances assumed	3.699	.103	1.322	6	**.234**	.1813	.1371	-.1541	.5166
	Equal variances not assumed			1.322	3.327	**.270**	.1813	.1371	-.2317	.5942
34. Paper product, printing..	Equal variances assumed	6.073	.049	-3.949	6	**.008**	-.2293	5.805E-02	-.3713	-8.7208
	Equal variances not assumed			-3.949	3.489	**.022**	-.2293	5.805E-02	-.4002	-5.8339
35. Chemicals, rubber and..	Equal variances assumed	4.447	.080	-3.928	6	**.008**	-.2770	7.051E-02	-.4495	-.1045
	Equal variances not assumed			-3.928	5.076	**.011**	-.2770	7.051E-02	-.4574	-9.6563
36. Non-metallic mineral..	Equal variances assumed	.151	.711	-3.972	6	**.007**	-6.9000E-	1.737E-02	-.1115	-2.6489
	Equal variances not assumed			-3.972	5.974	**.007**	-6.9000E-	1.737E-02	-.1116	-2.6444
38. Fabricated metal product,..	Equal variances assumed	3.151	.126	-13.708	6	**.000**	-.2528	1.844E-02	-.2979	-.2076
	Equal variances not assumed			-13.708	3.421	**.000**	-.2528	1.844E-02	-.3075	-.1980
All industries	Equal variances assumed	6.833	.040	-6.383	6	**.001**	-.5553	8.699E-02	-.7681	-.3424
	Equal variances not assumed			-6.383	3.022	**.008**	-.5553	8.699E-02	-.8310	-.2795

Table D13: Compare means of labour productivity of SMEs and LEs (2002-2006)

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
									Lower
31. Food, beverage and tobacco	Equal variances assumed	28.181	.001	-3.612	8	.007	-.7702	.2132	-1.2619
	Equal variances not assumed			-3.612	4.488	.018	-.7702	.2132	-1.3376
32. Garment, Textile and..	Equal variances assumed	.002	.969	-6.524	8	.000	-1.7312	.2654	-2.3431
	Equal variances not assumed			-6.524	7.760	.000	-1.7312	.2654	-2.3464
33. Woods and Wood product	Equal variances assumed	23.151	.001	-8.813	8	.000	-7.1878	.8156	-9.0685
	Equal variances not assumed			-8.813	4.019	.001	-7.1878	.8156	-9.4479
34. Paper product, printing..	Equal variances assumed	4.030	.080	-6.023	8	.000	-2.0274	.3366	-2.8036
	Equal variances not assumed			-6.023	5.350	.001	-2.0274	.3366	-2.8759
35. Chemicals, rubber and..	Equal variances assumed	.235	.641	-8.025	8	.000	-1.6492	.2055	-2.1231
	Equal variances not assumed			-8.025	7.557	.000	-1.6492	.2055	-2.1280
36. Non-metallic mineral..	Equal variances assumed	20.390	.002	-2.583	8	.032	-.4336	.1679	-.8207
	Equal variances not assumed			-2.583	5.639	.044	-.4336	.1679	-.8509
38. Fabricated metal product,..	Equal variances assumed	3.121	.115	9.184	8	.000	1.0718	.1167	.8027
	Equal variances not assumed			9.184	4.341	.001	1.0718	.1167	.7576
All industries	Equal variances assumed	2.124	.183	-11.416	8	.000	-1.9632	.1720	-2.3598
	Equal variances not assumed			-11.416	4.874	.000	-1.9632	.1720	-2.4087

Table D14: Compare means of capital productivity of SMEs and LEs (2002-2006)

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
31. Food, beverage and tobacco	Equal variances assumed	1.063	.333	3.998	8	**.004**	1.4542	.3637	.6155	2.2929
	Equal variances not assumed			3.998	7.085	**.005**	1.4542	.3637	.5963	2.3121
32. Garment, Textile and..	Equal variances assumed	9.768	.014	-4.233	8	**.003**	-13.0924	3.0933	-20.2255	-5.9593
	Equal variances not assumed			-4.233	4.037	**.013**	-13.0924	3.0933	-21.6501	-4.5347
33. Woods and Wood product	Equal variances assumed	10.432	.012	5.138	8	**.001**	19.3836	3.7726	10.6840	28.0832
	Equal variances not assumed			5.138	4.010	**.007**	19.3836	3.7726	8.9192	29.8480
34. Paper product, printing..	Equal variances assumed	4.292	.072	-.284	8	**.784**	-6.0800E-02	.2142	-.5547	.4331
	Equal variances not assumed			-.284	5.078	**.788**	-6.0800E-02	.2142	-.6088	.4872
35. Chemicals, rubber and..	Equal variances assumed	1.179	.309	.177	8	**.864**	4.700E-02	.2658	-.5660	.6600
	Equal variances not assumed			.177	7.514	**.864**	4.700E-02	.2658	-.5730	.6670
36. Non-metallic mineral..	Equal variances assumed	2.167	.179	-.315	8	**.761**	-.1998	.6338	-1.6613	1.2617
	Equal variances not assumed			-.315	7.470	**.761**	-.1998	.6338	-1.6796	1.2800
38. Fabricated metal product,..	Equal variances assumed	23.254	.001	18.362	8	**.000**	7.0106	.3818	6.1302	7.8910
	Equal variances not assumed			18.362	4.310	**.000**	7.0106	.3818	5.9800	8.0412
All industries	Equal variances assumed	2.236	.173	-2.023	8	**.078**	-1.0494	.5187	-2.2455	.1467
	Equal variances not assumed			-2.023	5.824	**.091**	-1.0494	.5187	-2.3279	.2291

APPENDIX E

Table E1: GDP by provinces at current price (2002–2006)

(Million USD)

Provinces	2002	2003	2004	2005	2006
1. Banteay Meanchey	10.43	15.23	17.64	23.02	28.40
2. Batambang	15.54	19.45	22.89	28.39	34.66
3. Kampong Cham	31.09	35.76	42.68	51.44	62.73
4. Kampong Chnang	3.22	4.03	4.57	5.74	6.87
5. Kampong Thom	12.61	15.59	17.83	22.39	27.03
6. Kampot	19.41	24.31	28.54	35.91	44.15
7. Kandal	129.04	141.34	171.96	201.18	245.22
8. Kratie	11.31	14.03	16.35	20.51	25.07
9. Phnom Penh City	682.33	753.62	942.42	1,095.53	1,354.97
10. Prey Veng	5.89	6.72	7.40	9.04	10.50
11. Pursat	5.16	6.25	6.97	8.70	10.27
12. Svay Rieng	8.46	9.50	11.24	13.42	16.19
13 Takeo	7.04	8.14	9.01	11.05	12.88
Total					

Note: (1) Exchange rate: Riels per USD is 3942 riels (2002); 3984 riels (2003); 4038 riels (2004); 4120 riels (2005); and 4065 riels (2006).

Source: Economic and Public Finance Policy, Ministry of Economy and Finance, Cambodia.

Table E2: Share of SMEs in Provincial Output and the Coefficient of Variation of Wage in each Province (2002–2006)

Provinces	2002		2003		2004		2005		2006	
	SSME	CV	SSME	CV	SSME	CV	SSME	CV	SSME	CV
1. Banteay Meanchey	0.004	0.462	0.004	0.449	0.003	0.414	0.003	0.437	0.003	0.414
2. Batambang	0.002	0.120	0.002	0.120	0.001	0.119	0.001	0.118	0.001	0.114
3. Kampong Cham	0.001	0.493	0.001	0.497	0.001	0.470	0.001	0.380	0.001	0.371
4. Kampong Chnang	0.004	0.400	0.004	0.400	0.003	0.380	0.003	0.436	0.003	0.436
5. Kampong Thom	0.005	0.298	0.004	0.298	0.004	0.298	0.003	0.298	0.003	0.298
6. Kampot	0.002	0.371	0.002	0.389	0.002	0.345	0.002	0.354	0.002	0.328
7. Kandal	0.009	0.326	0.009	0.328	0.008	0.328	0.010	0.377	0.009	0.386
8. Kratie	0.002	0.323	0.002	0.344	0.002	0.390	0.002	0.417	0.002	0.387
9. Phnom Penh City	0.005	0.352	0.004	0.345	0.004	0.321	0.004	0.334	0.004	0.302
10. Prey Veng	0.001	0.341	0.001	0.341	0.001	0.351	0.001	0.331	0.001	0.299
11. Pursat	0.005	0.226	0.005	0.225	0.005	0.225	0.004	0.236	0.004	0.234
12. Svay Rieng	0.001	0.434	0.001	0.434	0.001	0.400	0.001	0.325	0.001	0.324
13 Takeo	0.005	0.398	0.005	0.402	0.005	0.392	0.005	0.366	0.005	0.366

Note: (1) Share of SME (SSME) = (Output of SMEs)/(Total output of each province)

(2) CV_i = Coefficient of variation of wage in i province

σ_i = Standard deviation of wage in i province

X_i = Mean of wage in i province

i=13 province in Capital in Cambodia

$CV_i = \sigma_i / X_i$

$Wage_i$ = Salary/(Sum of Operative and Non-operative workers x Number of work days in a year)

(3) GDP deflator: 102.70 (2001), 104.10 (2002), 104.33 (2003), 109.91 (2004), 116.22 (2005), and 123.02 (2006).

Table E3: Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
									Lower	Upper	
2002	Equal variances assumed	14.570	.001	12.608	24	.000	.3461	2.74527	.289463	.402783	
	Equal variances not assumed			12.608	12.013	.000	.3461	2.745	.286315	.405930	
2003	Equal variances assumed	14.426	.001	12.714	24	.000	.348	2.739	.291786	.404875	
	Equal variances not assumed			12.714	12.013	.000	.348331	2.73969	.288645	.408017	
2004	Equal variances assumed	13.529	.001	13.517	24	.000	.337876	2.49961	.286286	.389465	
	Equal variances not assumed			13.517	12.012	.000	.337876	2.49961	.283420	.392332	
2005	Equal variances assumed	12.483	.002	13.932	24	.000	.336085	2.41227	.286298	.385871	
	Equal variances not assumed			13.932	12.019	.000	.336085	2.41227	.283535	.388634	
2006	Equal variances assumed	14.237	.001	13.801	24	.000	.324617	2.35218	.276070	.373164	
	Equal variances not assumed			13.801	12.017	.000	.324617	2.35218	.273375	.3758	

Table E4: Estimation result for the equation with fixed effects

```
xtreg cv ssmes , fe

Fixed-effects (within) regression               Number of obs      =        65
Group variable: province                        Number of groups   =        13

R-sq:  within  = 0.0100                         Obs per group: min =         5
       between = 0.0006                                        avg =       5.0
       overall = 0.0008                                        max =         5
                                                F(1,51)            =      0.52
       corr(u_i, Xb) = -0.1469                  Prob > F           =    0.4753
------------------------------------------------------------------------------
          cv |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       ssmes |   6.985938   9.712784     0.72   0.475    -12.51329    26.48516
       _cons |   .3196907   .0309714    10.32   0.000     .257513     .3818683
-------------+----------------------------------------------------------------
     sigma_u |  .08904264
     sigma_e |  .03064687
         rho |  .89408552   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(12, 51) =    41.30                 Prob > F = 0.0000
```

Table E5: Estimation result for the equation with Random effects

```
xtreg cv ssmes , re

Random-effects GLS regression                   Number of obs      =        65
Group variable: province                        Number of groups   =        13

R-sq:  within  = 0.0100                         Obs per group: min =         5
       between = 0.0006                                        avg =       5.0
       overall = 0.0008                                        max =         5

                                                Wald chi2(1)       =      0.38
corr(u_i, X)  = 0 (assumed)                     Prob > chi2        =    0.5393
------------------------------------------------------------------------------
          cv |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       ssmes |   4.607205   7.504415     0.61   0.539    -10.10118    19.31559
       _cons |   .3272184   .0347236     9.42   0.000     .2591613    .3952755
-------------+----------------------------------------------------------------
     sigma_u |  .09093161
     sigma_e |  .03064687
         rho |  .89799605   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Table E6: Estimation result of Hausman test

Hausman Test

	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fixed	.	Difference	S.E.
ssmes	6.985938	4.607205	2.378733	6.062338

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(1) = (b-B)'[(V_b-V_B)^(-1)](b-B)

= 0.15

Prob>chi2 = 0.6948