2016 White Paper on Small and Medium Enterprises in Taiwan

Development Strategy for SMEs in Smart Economy

Small and Medium Enterprise Administration

Ministry of Economic Affairs

October 2016

2016 White Paper
on Small and Medium Enterprises in Taiwan

Published by

Small and Medium Enterprise Administration, Ministry of Economic Affairs
3F., No. 95, Section 2, Roosevelt Rd.
Daan Dist.,Taipei City 10646
Taiwan, R.O.C.

Edited by

Chung-Hua Institution for Economic Research
No. 75, Chang Hsing St.
Daan Dist., Taipei City 10672
Taiwan, R.O.C.

Editor in Chief:

Shu-Yen Wu

Managing Editor:

William (Wei-Qi) Lin

English Translator:

William (Wei-Qi) Lin, Shu-Yen Wu, Chih-Ming Hung, Yu-Shan Lo

Proof Reader:

Ying-Xuan Chen

Designed and Printed by:

Hong You Printing Co., Ltd.
6F., No. 10, Ln. 366, Section 2, Jhongshan Rd.
Jhonghe Dist., New Taipei City 23584
Taiwan, R.O.C.

Foreword

Global economic growth in 2015 was 2.6 percent, slightly lower than 2.7 percent in 2014, mainly attributable to lackluster growth in most advanced economies and worse-than-expected economic activity in emerging markets and developing countries. Weighed down by plunging oil price and slower global economic growth, worldwide merchandise export declined significantly, down 12.8 percent in 2015 from 2014, the lowest since global financial crisis in 2009. This led to sluggish economic growth in export-oriented countries, particularly commodities exporting countries. IMF's April World Economic Outlook pointed out that the Asia Pacific region still remains the bright spot supported by good performance of India, Indonesia, Thailand and the Philippines, coupled with mainland China's slower yet still high growth reflecting announced policy stimulus. However, a further weakening in mainland China is expected in the industrial sector, as excess capacity continues to unwind driven by the rebalance of its economy from investment to consumption, export-oriented countries in the region could see substantial decline in export to mainland China. Taiwan as an export-oriented economy was not immune to the difficult macroeconomic and trade environment.

Taiwan's economic growth rate slowed to 0.65 percent in 2015. It is of critical importance for the government to adopt effective policy measures with more forward looking and innovative thinking to cope with the potential severe downside risk in the economy and the cloudier picture of macroeconomic and business fundamentals. The development strategy for SMEs going forward will focus on the trend of smart economy, which creates opportunities for SMEs to innovate and start new businesses through Internet of Things and to upgrade and transform themselves through smart manufacturing by strengthening their typical competitive advantage in flexible production with customization, rapid manufacturing, and creative vitality.

As for the performance of SMEs in 2015, of particular note is the number of SMEs, which reached a record level of 1,383,981 and accounted for 97.69 percent of all enterprises in Taiwan. In addition, the number of employed persons in SMEs rose to 8,759,000 - the highest level in recent years - and represented 78.22 percent of all employed persons in Taiwan. These statistics clearly illustrate that SMEs function as a stabilizing force in labor market and a key driving force of the country's economic development. The annual sales of SMEs in 2015 came to NT$11,803 billion, accounting for 30.36 percent of the total annual sales of all enterprises in Taiwan. As of 2015, 50.43 percent of SMEs had been in existence for 10 years or more, and 54.32 percent of SMEs were sole proprietorships.

In order to witness the development of SMEs in Taiwan, the Small and Medium Enterprise Administration, Ministry of Economic Affairs has published the Chinese and English version White Paper on SMEs in Taiwan on an annual basis since 1992 and 1998 respectively.

In Part One of the 2016 White Paper, an extensive array of statistical figures is provided to describe the development of SMEs from a wide variety of perspectives in 2015, which includes a comparison with their performance in previous years, as well as with the performance of large enterprises.

In Part Two of 2016 White Paper, two special topics are tackled through an in-depth analysis on the significant challenges and opportunities faced by SMEs in recent times. They are "Promoting SMEs' Upgrade and Transformation through Smart Manufacturing" and "Internet of Things: Opportunities for SMEs."

The government has been actively helping SMEs in various ways ensuring an innovation and business friendly environment in which necessary resources are available to them. In Part Three, the major government policies and measures related to SMEs over the period of 2015 and 2016 are emphasized and the resulting effects in 2015 are examined. These policies and measures can be categorized into five areas: (1) Improving Financial and Funding Services and Strengthening Investment in SMEs; (2) Enhancing R&D and Promoting Upgrade and Transformation for SMEs; (3) Strengthening Start-ups, and Incubation and Acceleration Mechanism; (4) Revitalizing Local Industries by Outreach Development and Regional Branding; and (5) Other Government Measures to Support SMEs, such as government procurement, policy loans for special projects and regulatory flexibility. The Appendix to 2016 White Paper also provides important SME statistics covering the years from 2013 to 2015 for reference purposes.

Providing guidance to support the development of SMEs requires a long-term effort and commitment. It is hoped that this White Paper will give readers both in Taiwan and overseas a better understanding of Taiwan's SMEs, while at the same time providing a useful reference work to assist SME managers in their decision-making. Your comments on the content of the White Paper would be most welcome and appreciated.

Yun-Lung Yeh
Director-General
Small and Medium Enterprise Administration
Ministry of Economic Affairs
October 2016

Contents

Part Three Government SME Policies and Prospects

Tables

Figures

Summary

Small and medium-sized enterprises (SMEs) continue to make up the backbone and have been one of the main driving forces of Taiwan's economic development over the past half century: recognized as export vanguard early on, key partners in supply chains and industrial clusters later, and recently focal point of local economy, entrepreneurship, and industrial upgrade and transformation. Global economic growth in 2015 was 2.6 percent, slightly lower than 2.7 percent in 2014, mainly attributable to lackluster growth in most advanced economies and worse-than-expected economic activity in emerging and developing countries amid stubbornly low commodity prices and weak global trade. As an export-oriented economy, Taiwan is highly sensitive to the difficult macroeconomic and trade environment. Both Taiwan's exports and imports with major trading partners fell in 2015. However, Taiwan maintained trade surplus with mainland China, Hong Kong, the United States, and ASEAN 10 member countries, though growth of trade surplus in 2015 was slowed down (except growing surplus with the United States). Due to lack of export momentum, 2016 Taiwan economic growth will need more support from domestic demand. The "Five Innovative Industries Plan" promoted by the new government in 2016 will serve as a major tool for Taiwan's industrial transformation in the global trend of smart manufacturing, promote innovation and new businesses, and improve Taiwan's overall environment by creating a cluster effect that links local and global industries.

Facing unfavorable circumstances in the global value chain (mainland China's rising supply chains, in particular), Taiwanese SMEs, especially those play an important role in the upstream supply chain supporting large enterprises' production and exports, have to consider strengthening their competitiveness by cooperating with large companies or form clusters in overcoming trade barriers. The main development strategy for SMEs going forward will focus on the trend of smart economy, which creates opportunities for SMEs to innovate and start new business ventures through Internet of Things (IoT) and to upgrade and transform themselves through smart manufacturing by strengthening their typical competitive advantage in flexible production with customization, rapid manufacturing, and creative vitality.

2016 White Paper on Small and Medium Enterprises in Taiwan comprises three parts. **Part One** presents an overview and discussion of the most recent operational results, developing trends, and strategic directions of SMEs in Taiwan. **Part Two** provides in-depth discussion on strategies to drive SMEs' upgrade and transformation through smart manufacturing and seize business opportunities for SMEs in the IoT era. **Part Three** reviews various government policy measures related to SMEs and examines their goals, implementation and results.

Part One consists of five chapters, covering macroeconomic environment, SMEs' current state and development, and SMEs' strategy and government policy measures in response to the changing economic and business environment.

Directorate-General of Budget, Accounting and Statistics of Executive Yuan announced in May 2016 that Taiwan's economy grew much slower at a mere 0.65 percent in 2015, and the 2016 economic growth forecast was slashed to 1.06 percent, which could place Taiwan last among the

Four Asian Tigers with GDP below 1.5 percent for two consecutive years. It is of critical importance for the government to adopt effective policy measures with more forward looking and innovative thinking to cope with the potential severe downside risk in the economy and the cloudier picture of macroeconomic and business fundamentals. As for the performance of SMEs in 2015, the number of SMEs reached a record level of 1,383,981, up 2.29 percent from 2014, and accounted for 97.69 percent of all enterprises in Taiwan. In addition, the number of employed persons in SMEs increased to 8,759,000, up 1.03 percent from 2014 - the highest level in recent years - and represented 78.22 percent of all employed persons in Taiwan. The annual sales of SMEs in 2015 came to NT$11,803 billion, down slightly by 0.31 percent from 2014, accounting for 30.36 percent of the total annual sales of all enterprises in Taiwan. In 2015, a total of 98,320 new SMEs were created.

With regard to industrial structure in Taiwan, the number of SMEs is mostly concentrated in the Service sector, with the proportion being 79.7 percent. 48.9 percent of SMEs are in Wholesale and Retail Trade, followed by Accommodation and Food Services industry (10.4 percent), and Manufacturing (10.3 percent). By the forms of organization, 54.3 percent of SMEs are sole proprietorships. By regional distribution, 46.6 percent of all SMEs were concentrated in Northern Taiwan.

In terms of market entry and exit, SMEs often display more flexibility than large enterprises. That explains the left side concentration of the distribution of the years in existence for SMEs: share of SMEs in existence below 10 years is 49.6 percent (vs. 23.3 percent of large enterprises). However, there were nearly 50 percent SMEs had been going concerns 10 years or more by the end of 2015.

Six Special Municipalities combined represent 77.0 percent sales and 73.3 percent employed persons of SMEs, and have 996,191 SMEs, representing 72.0 percent of all SMEs in Taiwan.

The dawning of the era of smart economy has had a huge impact on the business environment for SMEs. The government has made efforts to help SMEs through counseling, subsidies and measures to promote industrial clusters, international marketing and networking, start-ups, and SMEs' upgrade and transformation.

Part Two consists of two chapters, in which two special topics are tackled through an in-depth analysis on the significant challenges and opportunities faced by SMEs in recent years and the corresponding strategies. They are "Promoting SMEs' Upgrade and Transformation through Smart Manufacturing" and "Internet of Things (IoT): Opportunities for SMEs."

Smart manufacturing promotes an ecosystem among material suppliers, equipment manufacturers, distributors and end users. An SME excels in its niche market does not necessarily try to become a consolidator or a leader in smart manufacturing. However, it must be prepared to be linked in the ecosystem and find the right position in the value chains. Smart manufacturing is the next revolution in manufacturing that will rewrite the rules of competition. Can SMEs take advantage of this trend to upgrade and transform their businesses, or are they at risk of being left behind?

Most SMEs do not have enough understanding of smart manufacturing concept, nor realize the existing incentive measures. Though not a deciding factor, the government can play a leading role to help spur SMEs' innovation and enhance their competitiveness linking to smart manufacturing value chains by setting up a platform to offer SMEs information on incentives, mentoring, talent cultivation,

technologies and financing. For capable SMEs willing to invest in smart manufacturing, the Small and Medium Enterprise Administration (SMEA) could (1) invite experts to help find productivity stage of SMEs; (2) understand SMEs' real urgent need through professional diagnosis and consultants' on-site interviews; (3) ask legal entities to help SMEs make proposal to obtain government's assistance; and (4) cultivate backbone SMEs through professional diagnosis and follow-up assistance and selecting successful SMEs as industrial demos to convince SMEs by lowering entry barriers for latecomers through demos and diffusion. Further analyses are presented in Chapter 6.

With the potential to streamline and deliver greater time and cost savings to a broad spectrum of enterprise tasks, in recent years, IoT, driven by the widespread adoption of smart mobile communication and falling prices of sensors and cloud computing, is about to come to fruition. According to BI Intelligence, IoT devices will outnumber smartphones in 2017, and 2018 will see outbreak of opportunities for IoT adoption. Major international companies, including Microsoft, Google, Apple, Intel, Samsung, Taiwan's Acer and Advantech, have been aggressively transforming and positioning in IoT economy, and hope to establish ecosystems through open IoT platforms to stimulate technology innovations and applications in all fields.

The essence of IoT is openness and cooperation. IoT is not mainly driven by large companies as traditional view claims because most large enterprises are too slow in product development process and too return-on-investment (ROI) driven. This approach is not suitable for the development of a large number of IoT products and services using different technologies. SMEs' typical strengths in speed, flexibility and innovation fit well in IoT era to develop their own niche markets by offering diverse, customized products and services in small quantity batches. SMEs can innovate quickly in IoT ecosystem: a variety of open IoT platforms provides easy and simple process to promote a wide spectrum of application development, making it possible for SMEs to scale up swiftly at low cost and grow rapidly as more customers join the network. Case studies in Chapter 7 also indicate that forming partnerships is essential for SMEs to quickly grasp opportunities in IoT market and attract more funding and strategic alliances with third-party services, brands, and hardware.

In response to the coming outbreak of IoT industry that is perceived as the driving force of the next digital revolution, the Taiwanese government has introduced many policy measures designed to spur innovation and enhance its national competitiveness. Further analyses are conducted in Chapter 7.

Part Three consists of five chapters that review various government policy measures related to SMEs and examine their goals, implementation and results.

Many SMEs in Taiwan possess unique technology and innovative products, but lack the scale, capital, technology, and talents of many large businesses with which they regularly compete. Taiwanese government has been working actively to establish effective policy measures to facilitate the development of SMEs and resolve the hurdles facing SMEs. Multiple policy measures were taken by relevant government departments to assist SMEs in funding and credit guarantee, marketing, talent cultivation, technology upgrading and transformation, start-up promotion, incubation and acceleration mechanism, free trade policy, and improved legal and regulatory environment.

The government's development strategy for SMEs in 2015-2016 has focused on (1) Improving Financial and Funding Services and Strengthening Investment in SMEs; (2) Enhancing R&D and Promoting Upgrade and Transformation for SMEs; (3) Strengthening Start-ups and Incubation & Acceleration Mechanism; (4) Revitalizing Local Industries by Outreach Development and Regional Branding; and (5) Other Government Measures to Support SMEs, such as government procurement, policy loans for special projects and regulatory flexibility. A large number of projects and ancillary measures have been implemented in order to help achieve these goals. Each year, the government revises its SME development strategy to reflect changes in the economic environment in Taiwan and the global economy as a whole and carries out planning and implementation of related ancillary measures to boost the competitiveness of Taiwan's SMEs and contribute to their stable, continued development. New guidance and measures recently instituted by the government include "Five Innovative Industries Plan," the new regulation on equity-based crowdfunding, "Industrial Upgrade and Transformation Action Plan," "ide@ Taiwan 2020," "Project for Social Enterprises Action Plan" and the Amendments to the Article 36-2 of the Act for Development of Small and Medium Enterprises to promote innovation, research and development of new start-up companies and SMEs.

Part One
Recent Development of SMEs

Small and medium-sized enterprises (SMEs) continue to make up the backbone and have been one of the main driving forces of Taiwan's economic development over the past half century: recognized as export vanguard early on, key partners in supply chains and industrial clusters later, and recently focal point of local economy, entrepreneurship, and industrial upgrade and transformation. Official data published by central government of R.O.C. are analyzed to facilitate a deep understanding of SMEs. First, four major indicators including the number of enterprises, total annual sales, domestic sales, and export sales are examined for observations in terms of scales, industries, and sectors. Second, SMEs' financial structure and source of finance as well as human resources utilization, working conditions, and talent development are analyzed.

Facing unfavorable circumstances in the global value chain (mainland China's rising supply chains, in particular), Taiwanese SMEs, especially those play an important role in the upstream supply chain supporting large enterprises' production and exports, have to consider strengthening their competitiveness by cooperating with large companies or form clusters in overcoming trade barriers. The main development strategy for SMEs going forward will focus on the trend of smart economy, which creates opportunities for SMEs to innovate and start new business ventures through Internet of Things (IoT) and to upgrade and transform themselves through smart manufacturing by strengthening their typical competitive advantage in flexible production with customization, rapid manufacturing, and creative vitality.


NEWS & EVENTS

CHAPTER 1

Macroeconomic Environment

According to *Global Insight's Comparative World Overview* June 2016 report by IHS Markit Ltd., global economic growth in 2015 was 2.6 percent, slightly lower than 2.7 percent in 2014. The slower global economic growth in 2015 was mainly due to lackluster growth in most advanced economies and worse-than-expected economic activity in emerging markets and developing countries. The pace of global economic growth remains slow and fragile, and the outlook remains challenging.

Weighed down by plunging oil price and slower global economic growth, worldwide merchandise export declined significantly, down 12.8 percent in 2015, the lowest since global financial crisis in 2009. This led to sluggish economic growth in export-oriented countries, particularly commodities exporting countries. Taiwan as an export-oriented economy was not immune to the difficult macroeconomic and trade environment. Both Taiwan's exports and imports came in weaker than expected in 2015. However, the decline of exports was noticeably more severe than that of imports, resulting in negative GDP contribution from trade in 2015. Directorate-General of Budget, Accounting and Statistics of Executive Yuan announced in May 2016 that Taiwan's economy grew much slower at 0.65 percent in 2015, and the 2016 economic growth forecast was slashed to a mere 1.06 percent, which could place Taiwan last among the Four Asian Tigers with GDP below 1.5 percent for two consecutive years. It is of critical importance for Taiwan government to adopt effective policy measures with more forward looking and innovative thinking to cope with the potential severe downside risk in the economy and the cloudier picture of macroeconomic and business fundamentals.

This chapter is divided into three sections to analyze the impact of the changes that have been taking place in macroeconomic environment from 2015 to June 2016. Section I examines the major changes in global economic environment; Section II analyzes the business environment in Taiwan; Section III presents an overview of the development of SMEs in major nations.

I Changes in the Global Economic Environment

1. Overall Economy: Mild Recovery

Although the global financial crisis is now seven years behind us, the world's economy is still struggling to regain momentum in 2016. While the United States, Canada, the United Kingdom and some other developed economies, driven by strong domestic consumer spending, continued to grow, Latin America, Middle East and Africa were hit hard by falling commodity prices. Brazil and the Russian Federation are still mired in recession. Economic activity in emerging market Europe was

more mixed. Central European countries benefited from falling oil price and recovered slowly, but Russian economy contracted further (albeit at a shallower pace) and Turkey was troubled by the high current account deficit, inflation, and political uncertainty. In Asia, first-quarter activity in Japan came in slightly better than expected - even though the underlying momentum in domestic and international demand remains weak and inflation has dropped. The heightened RMB volatility and depreciation, capital flight, and the downturn in mainland China's imports and exports has been an important drag on economic growth of mainland China as well as other Asian countries.

Despite the relatively strong performance, the U.S. economy alone is unlikely to lift the tepid global economic growth as firms become more conservative in capital investment. Protracted commodity market turbulence and rising global risk aversion could have severe macroeconomic repercussions, including through the intensification of bank distress, particularly in vulnerable economies. Continued reliance on credit as a growth driver is heightening the risk of an eventual disruptive adjustment in mainland China. Many commodity exporters still confront the need for painful fiscal adjustments, and emerging market economies more broadly need to be alert to financial stability risks. Risks of noneconomic origin also remain salient. Political divisions within advanced economies may hamper efforts to tackle longstanding structural challenges and the refugee problem; and a shift toward protectionist policies is a distinct threat. Geopolitical tensions, domestic armed strife, and terrorism are also taking a heavy toll on the outlook in several economies, especially in the Middle East, with further cross-border ramifications. It is difficult to be optimistic for the overall improvement of global economy in the short term.

2. Important Factors

(1) Trend of Global Monetary Policy Easing and Its Effect Remain to Be Seen

To stimulate the fragile economy and fight against low inflation or deflation, many major countries worldwide adopted extraordinarily accommodative monetary policy. On January 29, 2016, the Bank of Japan (BOJ) cut a benchmark interest rate below zero (at minus 0.1 percent on marginal excess reserves, effective on February 16, 2016) to battle against deflation, encourage consumer spending, weaken the yen, and stimulate export and economy. The European Central Bank (ECB) announced a package of further easing measures on March 10, 2016, comprising an expansion of its asset purchase program (from €60 billion to €80 billion monthly) including purchases of corporate bonds, new longer-term refinancing operations, and a further reduction in all policy rates.

As of the end of April 2016, 23 countries around the world have adopted negative interest rate policy, including the 19 euro zone countries, Sweden, Switzerland, Denmark and Japan. More than 13 countries announced interest rate cuts in 2016, including Taiwan, Indonesia, India, Australia, and New Zealand. Aggressive rate cuts and large-scale unconventional monetary policy accommodation by major central banks has succeeded to some extent in bolstering demand, through its positive impact on financial markets and lending conditions. However, these tools may over time have diminishing returns and raise financial stability risks. Expansionary fiscal policy could provide support to activity in a number of advanced economies in the event of adverse shocks.

(2) Persistently Low Commodity Prices

From the summer of 2014 through first quarter 2016, commodity prices have plummeted. A combination of feeble global demand and strong supply growth is to blame. China remains key to the demand-side story. Any further softening of growth will likely translate into another round of price declines. Structural excess supply is especially acute in oil markets. Rising U.S. oil production and booming supply driven by advanced shale oil hydraulic fracturing technology, along with an unwillingness and / or inability of OPEC to make large production cuts, is keeping prices low. The quarterly (Q1, 2016) average spot price of Brent and U.S. West Texas Intermediate crude oil fell by over 20 percent from last quarter (Q4, 2015) to $34.5/b and $33.4/b respectively. Metals markets remain oversupplied, with large stocks and prospects for continued increases in capacity resulting from earlier large investments, notably for iron ore (Australia), copper (Peru) and aluminum (China).

(3) Ongoing Threat of Terrorism

The terrorist attacks in Brussels on March 22, 2016, are the latest in a string of horrific assaults that seem to be occurring with greater frequency. A few months earlier, multiple attacks in Paris on November 13, 2015 had claimed 130 lives, making it the worst terrorist act in Europe in a decade. In the Brussels attacks, three bomb blasts at the airport and a subway station killed at least 31 people. The terror group ISIS or Islamic State, which had claimed responsibility for the carnage in Paris, has done so for the Brussels attacks as well. Given that the attacks in Europe have occurred at a time when the continent is already struggling with its worst refugee crisis since World War II, the ongoing threat of terrorism may serve to fan the flames of anti-foreigner sentiment and spur the rise of nationalist political parties, which may have dire consequences for regional and global geopolitics.

3. Economic Performance of Major Countries and Regions

Based on Global Insight's forecast: advance countries, emerging markets, and developing economies are expected to grow at 1.7 percent, 3.9 percent, and 2.6 percent respectively in 2016. Although emerging markets and developing economies are still the main source of global economic growth, there is considerable divergence of performance across emerging market and developing economies. Large emerging market countries such as Brazil and the Russian Federation are still mired in recession; a number of commodity exporters still confront the need for sizable fiscal adjustments, in response to fiscal deficit, excessive debt, etc. The growth of China and India are generally in line with forecasts. Both countries still boast growth at over 6 percent but are expected to see significant slowdown in trade growth (Table 1-1-1).

(1) Advanced Economies

Major advanced economies are at different stages of their post-crisis recovery but are expected to stabilize around a weak growth trajectory. Advanced economies are projected to expand at 1.7 percent in 2016, and continues to be weak in 2017 (Table 1-1-2). With increasing downside risks to growth, and inflation persistently below target, the European Central Bank (ECB) and Bank of Japan are pursuing further policy accommodation, while the U.S. Federal Reserve will normalize policy interest rates more slowly than expected in January.

Table 1-1-1 Trend of Macro Economic Indices of Major Economies Worldwide

Unit: %

Countries / regions	2013	2014	2015	2016	2017	2018
Global economic growth	2.4	2.7	2.6	2.5	3.1	3.2
OECD	1.2	1.8	2.0	1.8	2.2	2.2
Advanced countries	1.1	1.8	1.9	1.7	2.2	2.2
Emerging countries	4.8	4.3	3.8	3.9	4.6	4.9
Developing countries	1.2	1.6	1.9	2.6	3.6	4.0
CPI growth	3.0	2.9	2.4	4.6	3.2	3.0
Commodity export growth	1.9	1.1	-13.4	-1.4	9.4	9.0
Unemployment rate	7.6	7.4	7.3	7.4	7.1	6.9

Source: Global Insight Inc., *Global Insight's Comparative World Overview* (June 2016).

Table 1-1-2 Economic Growth of Advanced Countries

Unit: %

Countries / regions	2015	2016	Quarter			
			I	II	III	IV
Global	2.6	2.5	2.4	2.4	2.5	2.7
Advanced countries	1.9	1.7	1.7	1.6	1.6	1.9
United States	2.4	1.9	2.0	1.7	1.8	2.1
European Union	1.9	1.9	1.8	1.8	1.9	1.9
Germany	1.4	1.9	1.6	1.7	1.9	2.2
France	1.2	1.5	1.4	1.7	1.6	1.5
United Kingdom	2.3	1.9	2.0	1.8	1.9	1.9
Italy	0.6	0.9	1.0	0.9	0.9	1.2
Japan	0.6	0.5	0.0	0.3	0.5	1.2

Note: Quarterly economic growth for United States, Germany, France, United Kingdom and Italy are seasonally adjusted year-on-year growth rates.
Source: Global Insight Inc., *Global Insight's Comparative World Overview* (June 2016).

A. United States: Steady Growth amid Elevated Policy Uncertainty

Growth in the United States was steady at 2.4 percent for 2014 and 2015, but was down significantly in the first quarter of 2016, primarily due to a collapse of capital expenditure in the energy sector and a strong U.S. dollar and weakening demand from emerging markets contributed to stalling exports. Softer-than-expected activity since the start of 2016 has led to downward revisions to growth projections. The U.S. GDP growth is expected to step back to 1.9 percent in 2016, 0.5 percentage points lower than 2015, and to remain around 2 percent for the rest of the forecast period, providing modest support to global growth.

The U.S. Federal Reserve kept interest rates unchanged in June 2016 and said slower economic growth would crimp the pace of monetary policy tightening in future years. Fed Chair Janet Yellen acknowledged the need to see clear signs of economic strength before lifting rates. The trajectory of future policy rates continued to be revised down by the Federal Reserve, reflecting a number of factors including a reassessment of the level of interest rates expected to prevail over the long run. In Europe and Japan, negative interest rates and expanding asset purchase programs have led to a

rising share of government debt traded at negative yields and held by central banks. Despite the extraordinary monetary policy easing, inflation expectations generally remain below central banks inflation objectives. The U.S. Dollar has been strengthening on the back of a so-called "monetary policy divergence" between the Fed and other global central banks, but this "divergence" is disappearing.

A build-up of protectionist rhetoric during the U.S. general election, and concerns about the Republican presidential candidate Donald Trump, could also weigh on sentiment, public spending, business investment, and global trade.

B. European Union (EU): Slow Recovery

Growth in the European Union (28 countries) was at 1.9 percent in 2015 (1.6 percent in the euro area of 19 countries), the best in 4 year. According to Global Insight, however, European Union and the euro area grew only 1.8 percent and 1.4 percent respectively in the first quarter of 2016 due to sluggish consumer spending, business investment, and exports. Problems associated with structural rigidities and persistent imbalances need to be addressed through policy measures in order to revive growth.

In labor market, unemployment rates in European Union and the euro area were 9.7 percent and 11.3 percent respectively in 2015, both down 0.8 percentage points from 2014, and were the lowest in 3 years. Unemployment rate in the euro area was further down to 11.0 percent in March 2016, the lowest in 4.5 years since August 2011. Despite weak economic growth and inflation expectations, the European Commission expects the euro area unemployment rate at 10.7 percent in 2016, down 0.6 percentage points from 2015. However, priorities vary across countries. With still rising unemployment rates in Italy, Portugal and Sweden, and persistently high youth unemployment rates in many countries, skill erosion and its effect on trend employment are palpable concerns.

On March 10, 2016, The ECB unleashed a bigger than expected package of measures to stimulate the eurozone economy, with expanded quantitative easing, incentives to banks to increase lending and further interest rate cuts. The ECB cut its deposit rate by 10 basis points to minus 0.4 percent but eased the impact on banks with cheaper short-term loans and longer-term liquidity at negative interest rates - essentially, paying eurozone lenders to increase credit to households and companies. Christine Lagarde, Managing Director of IMF, commends President Draghi and the ECB for the steps it has taken to improve confidence and financial conditions in the Euro Area, which will further support the recovery. While accommodation should continue in most advanced economies, it is clear that monetary policy can no longer be the alpha and omega to recovery. She proposes the key actions at country level to secure the recovery and lay the foundation for stronger and more equitable medium-term growth - a "Three-Pronged Approach" - (1) Structural Reforms: more specificity on deregulating product and services markets and reforming labor markets; (2) Fiscal Policy: more growth-friendly by shifting the composition of revenue and expenditure; and (3) Monetary Policy.

The Brexit outcome of the U.K. Referendum, which surprised global financial markets, implies the materialization of an important downside risk for the world economy. As a result, Global Insight's global outlook for 2016-17 has worsened by 0.2 percentage points globally and 0.4 ~ 1.0 percentage points for U.K. GDP growth, despite the better-than-expected performance in early 2016. This

deterioration reflects the expected macroeconomic consequences of a sizable increase in uncertainty, including on the political front. This uncertainty is projected to take a toll on confidence and investment, including through its repercussions on financial conditions and market sentiment more generally. The initial financial market reaction was severe but generally orderly. As of mid-July, the pound has weakened by about 10 percent, which will hurt exports to the U.K. Senior European economist and strategist Azad Zangana expects that the overall impact of Brexit will be weaker GDP growth for the UK and higher inflation.

(2) Emerging Economies

According to Global Insight's report in June: emerging markets are expected to grow at 3.9 percent in 2016, slightly higher than 3.8 percent in 2015; Asia Pacific is the bright spot and expected to grow at 5.5 percent in 2016, slightly lower than 5.6 percent in 2015; Latin America / Caribbean (Mexico excluded) is dragged down by Brazil's recession, and expected to grow at minus 1.4 percent in 2016, worse than minus 1.2 percent in 2015; Emerging Europe is dragged down by Russia's recession, and expected to grow 1.4 percent in 2016, much better than a mere 0.3 percent in 2015; Middle East is expected to grow at 2.0 percent in 2016, lower than 2.3 percent in 2015; North Africa is expected to grow at 2.3 percent in 2016, much lower than 3.0 percent in 2015 (Table 1-1-3).

IMF's April *World Economic Outlook* also pointed out that the Asia Pacific region remains the bright spot supported by good performance of India, Indonesia, Thailand and the Philippines, coupled with mainland China's slower yet still high growth reflecting announced policy stimulus. However, a further weakening in mainland China is expected in the industrial sector, as excess capacity continues to unwind, especially in real estate and related upstream industries, as well as in manufacturing. As the economy continues to rebalance from investment to consumption, export-oriented countries in the region could see substantial decline in export to mainland China.

Table 1-1-3 Economic Growth of Emerging Economies

Unit: %

Country / region	2015	2016
Emerging economies	3.8	3.9
Asia Pacific (Japan excluded)	5.6	5.5
Mainland China	6.9	6.5
Singapore	2.0	1.7
South Korea	2.6	2.6
Taiwan	0.6	1.3
Hong Kong	2.5	1.5
Thailand	2.8	2.9
Malaysia	5.0	4.2
Indonesia	4.8	4.9
Philippines	5.9	6.0
India	7.5	7.7
Pakistan	5.5	4.9
Latin America / Caribbean (Mexico excluded)	-1.2	-1.4
Brazil	-3.9	-3.6

Country / region	2015	2016
Argentina	2.0	-0.7
Columbia	3.1	2.5
Peru	3.2	3.6
Chile	2.1	1.6
Mexico	2.5	2.4
Emerging Europe	0.3	1.4
Russia	-3.7	-1.6
Turkey	3.9	3.6
Hungary	2.9	2.0
Czech Republic	4.3	2.6
Poland	3.6	3.5
Middle East	2.3	2.0
Israel	2.5	2.7
Saudi Arabia	3.4	2.0
North Africa	3.0	2.3
Egypt	4.2	3.1
Morocco	4.5	1.7
Republic of South Africa	1.3	0.5

Source: Global Insight Inc., *Global Insight's Comparative World Overview* (June 2016).

A. Mainland China: Economic Growth Slowdown with Downside Risk

In mainland China, growth fell to 6.9 percent in 2015 from 7.4 percent in 2014, the lowest growth since 1990, due to sluggish global economic recovery and ongoing gradual domestic rebalancing with the slowdown in industrial activity. 2016 sees relatively conservative official growth forecast in between 6.5 percent to 7.0 percent with substantial downside risk.

While global industrial activity and trade have been lackluster amid mainland China's rebalancing and generally weak investment in commodity exporters, recent months have seen some pick-up due to stronger infrastructure investment, reflecting policy stimulus. However, it was a bumpy transition away from an era when smokestack industries, huge exports and massive infrastructure spending - underpinned by trillions in state-backed debt - that propelled the economy into the world's second-largest in the past two decades to a "new normal" of modest economic growth through services, consumer spending and private entrepreneurship as new drivers that rely less on debt and more on the stock market for funding.

At the annual National People's Congress in March 2016, Chinese Premier Li Keqiang announced an economic growth target of between 6.5% and 7% for 2016, a goal that acknowledges slowing momentum in the world's second-largest economy. Other goals for 2016 include 3 percent CPI, urban unemployment rate within 4.5 percent, 13 percent M2 growth rate, and fiscal deficit at 3 percent. Global Insight predicts that mainland China will grow at the low end of the range about 6.5 percent in 2016 with further weakening in inventory and credit expansion and in industrial sector as excess capacity continues to unwind. Favorable and unfavorable factors in economic development

are as follows:

Favorable factors include policy stimulus, large-scale investment in green economy (about 2~4 trillion RMB per year), and the third wave of Free-Trade Zones established in 10 more provinces in 2016 (Henan, Shandong, Sichuan, Chongqing, etc.). The Service sector, which now constitutes half of nominal GDP, has overtaken manufacturing as the major driver of growth and accounts for the majority of new urban jobs.

Unfavorable factors include stock market meltdown causing delay of many of necessary reforms, supply-side reform leading to high unemployment and instability, serious housing market bubble, and record high total debt (including financial institutions) at 248.6 percent of gross domestic product by the end of September 2015, estimated by BIS (Bank of International Settlements).

B. ASEAN: Flat Growth due to Weak Export

Among the large developing ASEAN economies, Vietnam and the Philippines have the strongest growth prospects. The moderation of growth in commodity exporters was offset by solid performance in commodity importers, especially Vietnam and the Philippines, and a modest recovery in Thailand on the back of robust domestic consumption. Plunging commodity prices hurt net resource exporters (Indonesia and Malaysia) while benefit net resource importers (Philippines).

Among the ASEAN-5 economies (Indonesia, Malaysia, the Philippines, Thailand, Vietnam), growth will ease in 2016 in Malaysia and Vietnam (to 4.2 percent and 6.2 percent, respectively) but increase moderately in Indonesia, the Philippines, and Thailand (to 4.9 percent, 6.0 percent, and 2.9 percent, respectively). Growth in the ASEAN-5 is envisaged to pick up further in 2017 and thereafter, underpinned by strong domestic demand and a gradual increase in exports (Table 1-1-4). Important factors in economic development in the region are as follows:

Regional economic integration and FTAs are of critical importance for long-term growth: there has been a rising trend towards the formation of multilateral and bilateral free trade agreements (FTAs) and in particular, ASEAN Economic Community (AEC, effective December 31, 2015), Regional Comprehensive Economic Partnership (RCEP), and Trans-Pacific Partnership (TPP).

Promoting economic reform is vital for upgrade and transformation: the main policy challenge is to achieve faster, more inclusive growth, while preserving macro-financial stability. Medium-term fiscal consolidation to stabilize debt and reduce financing requirements would be particularly important for economies where domestic demand growth has been accompanied by high credit growth (Malaysia, Thailand), or where external demand had previously been boosted by the commodities boom (Indonesia), or where fiscal deficits remain elevated (Vietnam). In February 2016, Indonesia launched the 10th economic stimulus package to improve openness; Malaysia's reform focuses on industrial innovation, adopting international standards and strengthening infrastructure; the Philippines eases foreign trade provisions to enhance export growth, and implements manufacturing innovation plan; Singapore continues human resource transformation plan to reduce dependence on foreign labor; Thailand plans to launch a third round of economic stimulus package in 2016 to lift domestic demand; Vietnam's economic reform focuses on improving investment environment and adjusting economic restructures for internationalization and liberalization.

Table 1-1-4 Economic Growth of Advanced and Asia Pacific Economies

Unit: %

Country / region	2014	2015	2016 (forecast)	2017 (forecast)
Global	2.7	2.6	2.5	3.1
Advanced economies	1.8	1.9	1.7	2.2
United States	2.4	2.4	1.9	2.6
European Union	1.4	1.9	1.9	2.0
Germany	1.6	1.4	1.9	2.0
France	0.7	1.2	1.5	1.5
United Kingdom	2.9	2.3	1.9	2.4
Italy	-0.3	0.6	0.9	1.0
Japan	-0.1	0.6	0.5	0.9
Asia Pacific region	4.7	4.7	4.6	4.7
Mainland China	7.3	6.9	6.5	6.4
Taiwan	3.9	0.6	1.3	2.1
South Korea	3.3	2.6	2.6	3.0
Hong Kong	2.5	2.5	1.5	1.8
Singapore	3.3	2.0	1.7	2.2
Thailand	0.8	2.8	2.9	2.9
Malaysia	6.0	5.0	4.2	4.4
Indonesia	5.0	4.8	4.9	4.9
Philippines	6.2	5.9	6.0	5.9
Vietnam	6.0	6.7	6.2	6.5
India	7.2	7.5	7.7	7.6

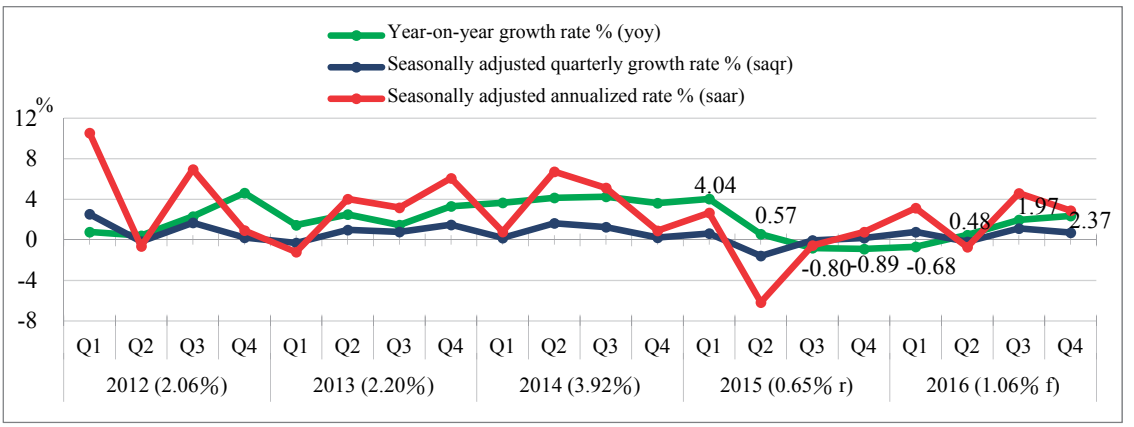
Source: Global Insight Inc., *Global Insight's Comparative World Overview* (June 2016).

II Changes in the Economic Environment in Taiwan

According to statistics and domestic economic outlook published by Directorate General of Budget, Accounting and Statistics (DGBAS) on May 27, 2016, Taiwan's economic growth rate declined significantly to a mere 0.65 percent in 2015, amid weak global recovery and tough comparison. In 2015, quarterly GDP growth showed a downward "recession" trend: 4.04 percent in Q1, 0.57 percent in Q2, minus 0.80 percent in Q3, and minus 0.89 percent in Q4 (Figure 1-2-1).

Based on DGBAS' forecast, Taiwan is expected to grow at 1.06 percent in 2016, a 0.41 percentage points increase from 2015. Due to slow global recovery, low commodity prices, and elevated economic and geopolitical uncertainties, Taiwan export and import are expected to fall in the first half of 2016 and pick up in the second half 2016 (Figure 1-2-1).

Figure 1-2-1 Taiwan Economic Growth Rate, 2012-2016



Source: Directorate General of Budget, Accounting and Statistics (DGBAS), National Statistics Database (May 2016).

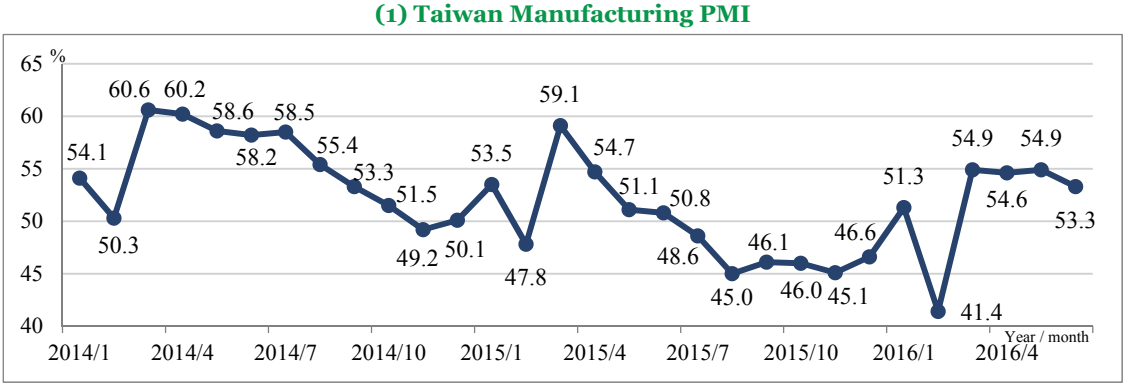
1. Economy Recovered Slightly

In the second half of 2015, Taiwan manufacturing PMI (Purchasing Managers' Index) was below 50; PMI in the early 2016 was volatile due to seasonality such as lunar calendar Spring Festival. PMI in June 2016 was 53.3, showing four consecutive month expansion. Taiwan Non-Manufacturing Index (NMI) in the early 2016 was volatile, swing up and down around 50. NMI was slightly higher than 50 in March 2016 due to relatively low reading in February driven by seasonality of lunar calendar Spring Festival. NMI in April 2016 was 48.8, down 1.7 from March; NMI was further down to 47.9 in May and then was back to 51.7 in June, reflecting uncertainties and mixed views by managers.

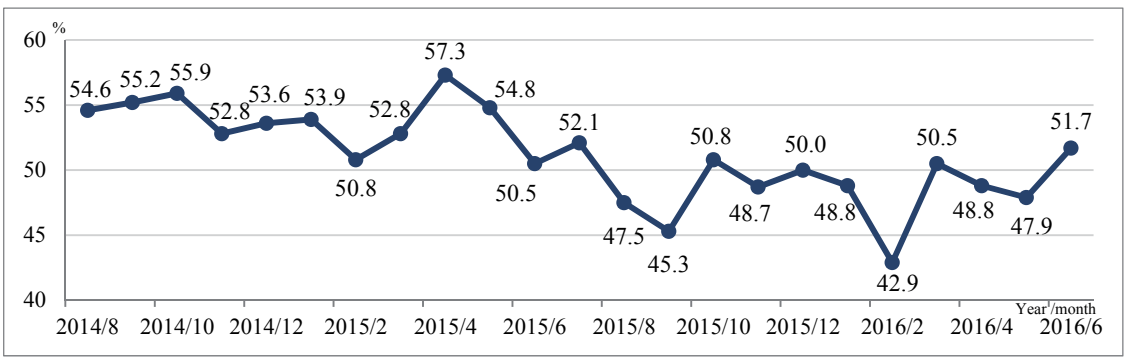
The National Development Council uses "traffic light" symbols to represent the state of health of the economy. Like PMI, the indicators by the National Development Council showed similar trend. Months from June 2015 to March 2016 were given a "blue light," denoting decline, until months of April and May 2016 turning "yellow blue light" showing improvement mainly attributable to growth in semiconductor equipment sales and imports of electrical components. Both industrial production index and index of producer's shipment for manufacturing turned a "yellow blue light" in May 2016, indicating upward trend (Figure 1-2-3).

Figure 1-2-2 Taiwan Manufacturing PMI/ Non-Manufacturing NMI

(1) Taiwan Manufacturing PMI



(2) Taiwan Non-Manufacturing NMI



Note: The PMI (NMI) of more than 50 represents expansion; the PMI (NMI) reading under 50 represents a contraction, and a reading at 50 indicates no change.

Source: National Development Council, Business Indicators Database, accessed June 2016, http://index.ndc.gov.tw/n/zh_tw.

Figure 1-2-3 Taiwan Composite Indicators, 2015-2016

Item \ Year / month		2015 Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	2016 Jan.	Feb.	Mar.	Apr.	May
Monitoring indicators (Total score)	Total score	23	24	22	16	18	16	14	14	14	15	15	14	14	14	16	17	20
	Compared to the same period last year	1	-1	-3	-13	-6	-10	-13	-15	-13	-9	-10	-8	-9	-10	-6	1	2
Monitoring indicators (Light signal)																		
Monetary aggregates, M1B																		
TAIEX average closing price																		
Industrial production index																		
Index of producer's shipment for manufacturing																		
The TIER manufacturing composite indicator																		
Non-agricultural employment																		
Customs-cleared exports																		
Imports of machineries and electrical equipment																		
Sales of trade and food services																		

Note:1. indicates a "red light"; indicates a "yellow-red light"; indicates a "green light"; indicates a "yellow-blue light"; indicates a "blue light." 2.The overall growth performance scores corresponding to each light are as follows: 45 – 38 = red light; 37 – 32 = yellow-red light; 31 – 23 = green light; 22 – 17 = yellow-blue light; 16 – 9 = blue light. 3.With the exception of stock prices, all of the items making up the growth performance index are seasonally adjusted. Please note that the items used in each year's index do not necessarily correspond exactly to those used in previous years; care should therefore be exercised when interpreting the scores.

Source: National Development Council, *Composite Indicators for Taiwan* (June 2015).

2. Core CPI Up Mildly

2015 consumer price index (CPI) declined by 0.31 percent from 2014, mainly driven by the plunging prices of oil (down 24.99 percent), gas (down 22.25 percent), and electricity (down 10.27 percent). However, food price rose 3.13 percent (with rising prices of vegetable, meet, seafood and dining). 2015 core CPI (excluding vegetable, fruits, energy, etc.) rose mildly at 0.79 percent from 2014. Wholesale price index (WPI) dropped significantly, down 8.84 percent in 2015 (Table 1-2-1).

Table 1-2-1 Key Indicators for the Taiwanese Economy, 2008-2015

Unit: %

Indicator / Year	Economic growth rate	Wholesale price index	Consumer price index	Tax revenue	Money supply		Overnight interbank call loan rate	Exchange rate (NT$ to the US$)	Labor force participa-tion rate	Unemploy-ment rate
					M1B	M2				
2008	0.70	5.14	3.52	1.53	-2.94	2.71	2.014	31.52	58.28	4.14
2009	-1.57	-8.73	-0.86	-13.07	16.54	7.45	0.109	33.05	57.90	5.85
2010	10.63	5.46	0.96	6.01	14.93	4.53	0.185	31.64	58.07	5.21
2011	3.80	4.32	1.42	8.78	7.16	5.83	0.341	29.46	58.17	4.39
2012	2.06	-1.16	1.93	1.82	3.45	4.17	0.428	29.61	58.35	4.24
2013	2.20	-2.43	0.79	2.08	7.27	4.78	0.386	29.77	58.43	4.18
2014	3.92	-0.57	1.20	7.74	7.96	5.66	0.387	30.37	58.54	3.96
2015	0.65	-8.84	-0.31	8.03	6.10	6.34	0.353	31.90	58.65	3.78

Note: With the exception of the labor force participation rate, unemployment rate and exchange rate (which are all full-year averages) as well as overnight interbank call loan rate (which is weighted average), all other indicators are expressed as annual growth rates.

Source:

1. DGBAS, National Statistics Database, accessed May 2016, http://ebas1.ebas.gov.tw/pxweb/Dialog/statfile9L.asp.
2. Central Bank of the Republic of China, Statistical Database, accessed May 2016, http://www.pxweb.cbc.gov.tw/dialog/statfile9.asp.

3. Foreign Trade: Down Noticeably

According to External Trade Statistics of 2015, Taiwan's total foreign trade dropped sharply by 13.19 percent to US$522.6 billion from 2014, mainly attributable to weak global demand, plunging commodity prices, and continuous semiconductor inventory destocking. In 2015, exports fell 10.86 percent to US$285.3 billion, and imports dropped 15.83 percent to US$237.2 billion. Trade surplus rose 25.84 percent to US$48.1 billion (Table 1-2-2).

Taiwan's exports to China (mainland China and Hong Kong) and Europe dropped 12.44 percent and 10.85 percent respectively in 2015 from 2014. However, Taiwan's exports to ASEAN 10 member countries reached US$51.6 billion in 2015 from US$27.6 billion in 2015; share of exports to ASEAN rose to 18.01 percent, up 4.21 percentage points from 13.80 percent during the same period. Since 2007, ASEAN has replaced the U.S. to become Taiwan's the second largest export market.

In 2015, Taiwan's exports to China (including Hong Kong) dropped 12.44 percent to US$112.5 billion, the lowest since 2008; Taiwan's imports from China (including Hong Kong) declined by 8.35 percent to US$46.7 billion; Taiwan's Trade surplus with China fell by 15.14 percent from 2014 to US$65.8 billion, the lowest in 6 years (Table 1-2-3).

Table 1-2-2 Taiwan External Trade Performance, 2008-2015

Unit: 100 million US$; %

Indicator / Year	Exports		Imports		Total foreign trade		Trade surplus / deficit	
	Amount	Annual growth rate	Amount	Annual growth rate	Amount	Annual growth rate	Amount	Annual growth rate
2008	2,581	3.72	2,445	9.57	5,025	6.49	136	-47.09
2009	2,057	-20.30	1,776	-27.35	3,833	-23.73	281	106.59
2010	2,780	35.18	2,563	44.30	5,343	39.40	217	-22.56
2011	3,129	12.56	2,881	12.40	6,010	12.48	249	14.39
2012	3,064	-2.08	2,773	-3.73	5,837	-2.87	291	16.99
2013	3,114	1.64	2,780	0.25	5,894	0.98	334	14.90
2014	3,201	2.78	2,818	1.38	6,019	2.12	382	14.44
2015	2,853	-10.86	2,372	-15.83	5,226	-13.19	481	25.84

Source: Ministry of Finance, External Trade Statistical Database, accessed July2016, https://www.mof.gov.tw/Pages/List.aspx?nodeid=100.

Table 1-2-3 Main Trading Partners of Taiwan in 2015

Unit: 100 million US$; %

Indicator / Country / region	Exports			Imports			Trade surplus / deficit	
	Amount	Share of total	Annual growth rate	Amount	Share of total	Annual growth rate	Amount	Annual growth rate
Total	2,853	100.00	-10.86	2,376	100.00	-15.83	481	25.84
China (Hong Kong included)	1,125	39.45	-12.44	467	19.67	-8.35	658	-15.14
Hong Kong	391	13.72	-10.65	15	0.62	-15.40	377	-10.46
Mainland China	734	25.73	-13.37	453	19.05	-8.10	281	-20.69
United States	345	12.11	-1.63	292	12.29	-2.80	53	5.30
Japan	196	6.87	-2.73	389	16.36	-7.43	-193	11.76
South Korea	129	4.51	-0.84	135	5.66	-12.03	-6	-16.56
ASEAN (10 member nations)	516	18.10	-14.18	290	12.22	-16.38	226	-11.18
Europe	260	9.10	-10.85	285	12.00	-11.07	-25	13.28
Others	282	9.88	-4.28	518	21.80	-32.53	-236	-44.81

Note: Mainland China and Hong Kong are sub-items. ASEAN includes Singapore, Malaysia, Indonesia, Vietnam, Thailand, Philippines, Cambodia, Burma, Brunei and Laos.
Source: Ministry of Finance, External Trade Statistical Database, accessed July2016, https://www.mof.gov.tw/Pages/List.aspx?nodeid=100.

4. Domestic Investment: Growth Slowdown

Total domestic investment in 2015 rose a mere 1.23 percent from 2014 to NT$3.5 trillion. However, private investment in 2015 rose 2.75 percent from 2014 to NT$2.9 trillion, contributing 0.54 percentage points to economic growth, mainly driven by investment in airplanes and semiconductor, and offsetting the declining investment from the public sector and government (down 1.34 percent) (Table 1-2-4).

Table 1-2-4 Taiwan Domestic Investment by Sector, 2007-2016

Unit: Million NT$; %

Item / Year	Domestic investment							
	Total		Private		Public		Government	
	Amount	Growth	Amount	Growth	Amount	Growth	Amount	Growth
2007	3,501,589	1.14	2,725,161	1.88	235,531	2.20	542,490	-2.80
2008	3,111,807	-11.13	2,339,443	-14.15	230,871	-1.98	544,862	0.44
2009	2,837,726	-8.81	1,980,938	-15.32	236,341	2.37	621,549	14.07
2010	3,385,791	19.31	2,528,221	27.63	254,043	7.49	603,420	-2.92
2011	3,346,945	-1.15	2,558,491	1.20	219,898	-13.44	568,556	-5.78
2012	3,259,477	-2.61	2,549,613	-0.35	203,575	-7.42	506,289	-10.95
2013	3,432,126	5.30	2,730,416	7.09	209,659	2.99	492,167	-2.79
2014	3,492,658	1.76	2,816,855	3.17	220,787	5.31	455,949	-7.36
2015(r)	3,535,480	1.23	2,894,378	2.75	205,468	-6.94	436,340	-4.30
2016(f)	3,589,127	1.52	2,925,980	1.09	208,981	1.71	454,861	4.24

Note: r: revision; f: forecast.

Source: DGBAS, National Statistics Database, accessed May 2016, http://ebas1.ebas.gov.tw/pxweb/Dialog/statfile9L.asp.

5. Rising Competition from Mainland China's Own Supply Chain

Mainland China in recent years provided significant support to its own industries and actively explored cooperation opportunities with large international companies to form so-called "China's own autonomic supply chain." Share of imported components of mainland China's export dropped sharply from 60 percent in the 1990s, the highest, to about 35% at present. Therefore, many manufacturers in mainland China have begun to place orders to local supply chain. This has posed significant challenge to Taiwan SMEs, especially those play an important OEM role in the upstream value chain supporting large enterprises' production and exports in traditional industries such as textile, clothing, furniture, cement, iron and steel, petrochemical, as well as high-tech areas such as ICT and optical equipment. It is critically important for Taiwan and its SMEs to think seriously on how to remain competitive in response to the rising challenges posted by mainland China.

6. Labor Market Improved Gradually

2015 saw very weak economic growth in Taiwan but nice pick up in employment and regular earnings. Average annual paid employees grew to a total of 8.86 million (79.1 percent of employed persons) in Taiwan, an increase of 123 thousand or 1.4 percent from 2014. The labor force (11,638,000 people) participation rate reached 58.7 percent in 2015, up 0.2 percentage points from 2014. Regular monthly earnings (excluding bonuses) averaged NT$48,490, representing a nice 2.5 percent increase (inflation adjusted real earnings up 2.8 percent) from 2014, far outpaced the GDP growth. Average working hour per month was 175.3 hours in 2015, down 2.6 hours in 2014, reflecting improving labor market condition.

III Development of SMEs in Major Nations

This section examines the state of development of SMEs in selected nations in light of the global economic environment mentioned above.

1. SMEs in Japan

An SME in Japan defined under its "SME Basic Law" Article 2 is an enterprise or an individual with total capital under 300 million Yen and employees under 300 (this definition is applied to an enterprise or an individual in manufacturing, construction, and transportation industries; definition varies by industry). According to the data presented in "*The White Paper on Small and Medium Enterprises in Japan, 2015,*" there were approximately 3,852,934 SMEs in Japan (excluding Primary sectors), accounting for 99.7 percent of the 3,863,530 business enterprises in the country. SMEs' regular paid employees were 24.34 million people, representing 62.7 percent of all regular paid employees in Japan.

In 2015, Japan launched the "Service Industry Challenge Program" and decided to steadily promote the Program, the Nihon Service Award, and other means of spreading best practices to advance higher value added in service industries, including SMEs. The Japanese government sets target to increase Service sector SMEs' productivity by 2 percent each year before 2020. The government will also improve the earning capacity of SMEs and microenterprises, by supporting innovation and the opening of sales channels domestically and overseas, strengthening management consulting and support systems, and reinvigorating shopping districts.

In June 2014, Abe Cabinet announced revised edition of "New Growth Strategy" to accelerate and promote start-ups and create virtuous circle for new ventures. Concrete measures will be taken to encourage business startups in Japan for each of the three goals: creating interests in starting businesses, ensuring a stable living after starting businesses, and reducing costs and procedures for business startups. The Ministry of Economy, Trade and Industry leads the mutual cooperation among the national government, prefectures and municipalities, academia, and industry. It outlines comprehensive action plans and the framework for supporting business startups. Five main areas under the framework are:

(1) Match business opportunities and promote collaboration between new ventures and existing companies.

(2) Encourage existing companies to create new business or new business models: Through the cooperation among the Ministry of Economy, Trade and Industry, "Japan Innovation Network" and "Innovation 100 Committee," help large or medium-sized companies facilitate innovation and create new business or new business models from within; internalize and activate entrepreneurial seeds.

(3) Establish Japan's national award of outstanding new businesses.

(4) Promote talent cultivation and entrepreneurship education: Establish national exchange platform inviting lecturers from industry, consulting firms, and academia.

(5) Establish exchange cannels for policy measures for business start-ups: Actively engage the start-ups opinion leaders forum to examine and review the current policies and offer suggestions on directions of new policy measures (the main theme is: how to create Japan's Apple, Goggle and Facebook!)

SMEs' source of funding comes from either internal funding or external financing. External financing comes from government agencies, financial institutions, and society. As more SMEs enter the Asia and other emerging markets for fast growth, Japan Finance Corporation, Central Bank and other public institutions all have stepped up financing for SMEs' overseas expansion. In April 2012, the new international business department was established to strengthen the support of SMEs' overseas production and sales.

On the other hand, the Japanese government established direct financing market for SMEs through public offering of stocks and bonds, including a secondary market, where SMEs could access capital through listing even though they are still in red. SMEs can also raise capital by issuing corporate bond with credit guarantee extended by Credit Guarantee Association. In 2013 Japanese government also set up a new SME group subsidy program for overseas expansion for a group of over 10 SMEs in order to promote SMEs in formation of industrial clusters for overseas expansion (subsidy ceiling: ¥20 million).

From 2015, the Ministry of Economy, Trade and Industry, through the "Support the Creation of New Business Plan" - a three-year plan, expects to help 67 new ventures get listed in OTC (over the counter), and 280 new ventures access to private venture capital funds.

2. SMEs in South Korea

An SME in South Korea defined by the Small and Medium Business Administration (SMBA) is an enterprise with total capital under 8 billion Won (for wholesale and retail: annual sales under 20 billion Won) or employees under 300. According to the National Statistic Office, as of 2013, there were about 3,416,000 SMEs in South Korea, accounting for 99.9 percent of the about 3,419,000 all enterprises in the country (96 percent are small enterprises). SMEs employed about 13,422,000 people, representing 87.5 percent of all employed people and contributed (amounting to 739.9 trillion South Korea Won) to 47.6 percent of the country's total manufacturing output (1,553.8 trillion Won); SMEs created value added amounting to 223.6 trillion Won, contributing to 46.8 percent of total value added in manufacturing output.

Although the global success of chaebol (a typical business conglomerate structure in South Korea) such as Samsung and Hyundai has boosted South Korea's standing abroad, at home their economic dominance has prompted concerns that they have developed a near-monopoly on the country's most talented workers and capital, while restricting the prospects of the small companies that supply and compete with them. A conservative banking culture makes obtaining financing in South Korea far more difficult for SMEs. The need for more dynamic start-ups and SMEs became one of the dominant themes in recent years.

In 2015, South Korea's SMBA (Small and Medium Business Administration) focuses on establishing Start-up Valley and a 2 trillion Won venture fund to promote venture capital investment

and start-up cluster, as well as to help 5,000 entrepreneurs in high-tech innovation. In February 2014, President Park Geun-hye announced details of a three-year plan (the "474 vision") designed to change the very nature of the Korean economy by reaching 4 percent annual GDP growth, a 70 percent overall employment rate and $40,000 in per capita income. The main idea of the plan is to reform the structure of the economy from public-led to private-led, from manufacturing-focused to service-focused and from export-centered to domestic market-centered. It will boost the number of start-ups and small businesses and foster growth in the service industry, shifting away from an economy dominated by conglomerates and centered on manufacturing. By 2017, the government will inject 3.9 trillion Won into promoting the growth of start-ups. It aims to encourage more than 13,000 entrepreneurs and wants to boost the number of start-ups bouncing back from failure to above 500. The government will increase its R&D budget for small businesses up to 18 percent. By creating a 20 billion Won fund, it will help local start-ups go public on overseas securities markets. The government also plans to boost investment in the Kosdaq, a securities market for IT start-ups, by operating it independently from the Kospi.

The government wants the private sector, especially the service industry, to thrive without excessive government regulations that have squeezed economic growth for the past few years. It also focuses on encouraging more large firms to acquire new start-ups, and merger and acquisition between new business, providing assistance in the application of information technology and R&D in different stages of emerging SMEs; and helping talent cultivation, recruit and retention.

3. SMEs in Singapore

By the end of 2014, there were about 189,000 SMEs in Singapore. SMEs accounted for 99 percent of the business enterprises in the country. The share of SMEs' employees accounted for about 70 percent of all employees, and SEMs contributed about 50 percent of GDP.

Singapore government has been actively promoting various policies and measures to help SMEs. The Capability Development Grant (CDG) is a financial assistance program aimed at helping SMEs defray up to 70 percent of qualifying project costs, relating to consultancy, manpower, training, certification, upgrading productivity and developing business capabilities for process improvement, product development and market access; Enterprise One Business Information Services (EBIS), is a multi-agency initiative led by Singapore Business Federation (SBF) to provide SMEs with most updated information on government information & e-services, business information, and advisory / consulting services, including newsletter, industry research reports, workshops, seminars, and so on; Export Technical Assistance Centre helps SMEs understand and comply with the product standards, technical specifications, food safety and so on.

In 2015, Singapore launched the Collaborative Industry Projects (CIP) initiative to support collaborations between enterprises and industry partners, such as Trade Associations and Chambers and solution providers, to address common industry-specific and business challenges. Enterprises and industry partners across all sectors are encouraged to form consortia to develop and deploy solutions that will help enterprises innovate and improve their productivity. Each consortium must have at least three SMEs committed to implementing the project. Over 400 SMEs have participated in these projects, and approved projects will be eligible for up to 70% funding support for qualifying

development and / or adoption costs. A successful project supported under the CIP initiative will drive transformation and capability upgrading among the enterprises, leading to productivity gain, business growth and innovation.

In 2014, the Infocomm Development Authority of Singapore (ID) launched two "IDA Labs" with investment of SGD10 million to supports individuals and local companies in the tech and media scene to turn novel ideas into working realities. The Labs host discussions and events to meet industry experts and potential users in energised gatherings, focusing on beyond-the-horizon technology trends, pioneering innovations, investment capitalization and marketing strategies. They also offer support to innovative enterprises by providing access to tools and prototyping equipment, mentors, connections, and showcase opportunities, individuals and companies can get started on building hardware prototypes and test new solutions. In an environment that seeks to nurture and encourage cutting-edge approaches to solving problems, the ethos of the IDA Labs provides a fresh perspective to develop revolutionary technology.

The Standards, Productivity and Innovation Board (SPRIN) has established the ACE Startups Grant that provides funding support to entrepreneurial Singaporeans who want to take their first step in starting up differentiated businesses. Applications will be shortlisted on a competitive basis based on the 4 key evaluation criteria of differentiation, business model feasibility, potential market opportunity and management team. SPRING will match S$7 to every S$3 raised by the entrepreneur for up to S$50,000. SPRIN has also founded the Business Angel Scheme (BAS), jointed by five private funds (BAF Spectrum Pte Ltd, Accel-X Pte Ltd, Small World Group Angels, Jungle Ventures, and Individual Angels). Start-ups that obtain investment interest and commitment from any of the business angel investors can apply for matching investment from SPRING SEEDS Capital, SPRING's investment arm. SPRING may match the investment dollar-for-dollar for up to a maximum of S$2 million. Both SPRING SEEDS Capital and the business angel investors will take equity stakes in the company in proportion to their investments.

4. SMEs in Mainland China

The actual number of SMEs in China, by definition, is the sum of the number of actually existing business enterprises and the number of actually existing small private businesses. Currently, the Chinese government does not compile data regarding the number of SMEs in China. It is estimated that 99 percent of enterprises in China are SMEs. Therefore, the "*2014 Blue Book of Small and Medium Enterprises in China*" used the above definition as proxies to gauge the overall trend in the number of SMEs.

As of the end of 2014, there were 18.1928 million actually existing business enterprises, and 49.8406 million actually existing small private businesses, for a total of 68.0334 million. In 2014, the number of actually existing business enterprises increased by 19.08 percent from 2013; the number of actually existing small private businesses rose 12.35 percent from 2013.

Based on the content of *2012-2014 Blue Book of Small and Medium Enterprises in China*, it is noticeable that the main theme of policy measures supporting SMEs has shifted from employment growth, funding source, and tax treatment to more focus on SMEs' transformation and upgrade, as well as micro enterprises' innovation and development.

In 2013, the General Office of the State Council issued opinions on "Strengthening the Dominant Position of Enterprise Technological Innovation to Comprehensively Improve Innovation Capabilities of Enterprises" to facilitate the cultivation of innovation capability, R&D funding, intellectual property protection, and strengthening SMEs' technological innovation and funding channels. Apart from heavy tax burden and elevated production cost, SMEs' lack of access to funding and short term financing has long been the bottleneck to their growth, and in some cases, the cause of failure. Chinese policymakers have announced multiple measures to make it easier to meet the productive private sectors' credit needs. The key to help SMEs' innovation and transformation is to provide funding. Multiple direct and indirect financing channels have been introduced, including security market, subsidy, angel fund, venture capital, P2P, crowd-funding, and national investment fund (RMB 40 billion) for emerging industry start-ups.

In May 2015, mainland China's Ministry of Industry and Information Technology issued the guidance to actively promote nationwide startups and innovation, with focus on the following four major areas:

(1) Accelerating the establishment of start-up and demo bases: Introduce cultivation and demonstration base for small and micro enterprises entrepreneurship and management practices to optimize environment for small and micro enterprises entrepreneurship and innovation; encourage use of idle plants and land, and the establishment of small business entrepreneurial base in existing industrial parks; improve the public service system to provide multi-level, comprehensive network of services.

(2) Strengthening investment and financing services

(3) Implementing "Internet of Things (IoT) + Micro Enterprises" Action Plan

(4) Launched special activities: Actively promoting innovation and start-up companies through activities such as exhibitions, entrepreneurial salons, start-up training, start-up competitions, etc.

Mainland China's economy is still in the stage of transformation and upgrading amid serious industrial overcapacity and difficult operating and financing environment for SMEs. The Government has been promoting the "new normal" of modest economic growth through services, consumer spending and private entrepreneurship as new drivers that focus on service globalization and internalization, emerging industries, as well as transformation and upgrade of traditional manufacturers.

5. SMEs in U.S.

The Small Business Administration (SBA) defines a small business as an enterprise having fewer than 500 employees. Based on the 2013 data from Statistics of U.S. Businesses (SUSB), published by US Census Bureau, there were approximately 5,756,419 small businesses in U.S., accounting for 99.7 percent of the total 5,775,055 business enterprises in the country. SMEs' employees were 56,823,377, representing 48.0 percent of all employees, totaled 118,266,253 in the U.S.

National Small Business Association (NSBA) indicated in "*2015 Year-End Economic Report*" that 26 percent respondents of its survey expected better economic growth in next year (down from

28 percent in 2014); 58 percent respondents expected flat economic growth in next year (up from 53 percent in 2014). However, there were still 75 percent respondents who expressed confidence in growing their businesses.

On Sept. 27, 2010, President Obama signed into law the Small Business Jobs Act, the most significant piece of small business legislation in over a decade. The new law is providing critical resources to help small businesses continue to drive economic recovery and create jobs. The new law extended the successful SBA enhanced loan provisions while offering billions more in lending support, tax cuts, and other opportunities for entrepreneurs and small business owners. The new Law provides US$12 billion in tax relief to help small businesses invest in their firms and create jobs.

Under the framework of the U.S. Reindustrialization, the National Export Initiative (NEI) was launched in 2010 to help meet the U.S. Administration's goal of doubling exports over the next 5 years by working to remove trade barriers abroad, by helping firms - especially small businesses - overcome the hurdles to entering new export markets, by assisting with financing, and in general by pursuing a government-wide approach to export advocacy abroad, among other steps.

Responding to President Obama's call to double exports in the next five years, U.S., Commerce Department and the United States Postal Service (USPS) formed a strategic partnership to launch the "The New Market Exporter Initiative" (NMEI) in July 2010 to help boost U.S. exports. It will identify current USPS customers who are exporting their goods and services abroad, and help expand their reach to additional international markets. The combined strength of customized consulting from the Commerce Department's Commercial Service officers and the value-based logistics expertise and business solutions from the Postal Service provide a simplified roadmap for companies to successfully enter new markets. Through its network of 32,000 post offices and partner posts in 191 countries, the Postal Service will identify SMEs that already export and alert these customers to government sources that can help them find new overseas markets. The Commerce Department, with its network of trade specialists posted in 109 U.S. cities and U.S. embassies and consulates in 77 countries, will serve as a resource to the companies, connecting them with potential international buyers.

Startup America is a White House initiative that was launched in 2011 to celebrate, inspire, and accelerate high-growth entrepreneurship throughout the nation. Since launch, the Obama Administration rolled out a set of entrepreneur-focused policy initiatives in five areas: (1) US$1 Billion Impact Investment Initiative and US$1 Billion Early-Stage Innovation Initiative to unlock access to capital to fuel startup growth; (2) connecting mentors and education to entrepreneurs (3) reducing barriers and making government work for entrepreneurs; (4) accelerating innovation from "lab to market" for breakthrough technologies; and (5) unleashing market opportunities in industries like healthcare, clean energy, and education.

6. SMEs in Germany

According to the German definition, an SME is an enterprise up to 500 employees and up to €50 million annual turnover. Based on the estimates from Institut für Mittelstandsforschung Bonn, by the end of 2014, there were approximately 3.70 million small businesses in Germany, accounting for 99.6 percent of the 3.71 million business enterprises in the country. Based on 2012 data from Federal

Statistical Office and Federal Employment Agency, SMEs employed 15.97 million people, representing 59.4 percent of all employed people, and contributed €2.149 trillion sales (35.3 percent of total sales of all enterprises). 84.2 percent of all employed people have training experience in SMEs.

Germany's recovery from the global recession has been among the fastest of major economies. Its budget deficit is a small fraction of those in the U.S., Britain and Japan. Whereas many European countries faces chronic unemployment for years after global financial crisis, Germany's jobless rate is at a 20-year low. SMEs collectively known as Mittelstand, have powered Germany's export-driven economy for more than a century. Mittelstandspolitik and Mittelstandsbeirat, under Bundesministeriumsfuir Wirtschaft und Technologie, are responsible to help SMEs by analyzing changing environment of science, technology and economy domestically and internationally and offering SME related policy advices.

The Federal Ministry for Economic Affairs and Energy is using a variety of measures to improve the policy environment for SMEs, including (1) strengthen innovation capability, (2) assist in talent recruit, (3) active venture capital, (4) ensure free and open competitive environment; ensure lowering tariffs and non-tariff trade barriers through active WTO negotiations and free trade agreements, (5) ensure access to funding source; relaxation of restrictions on credit guarantee for SMEs (6) promote green technology, (7) accelerate and simplify the administration of export procedures (logistics, overseas exhibitions, etc.); reduce the administrative burden on SMEs, as well as help them develop overseas markets. While past policy measures focus more on helping SMEs expand overseas markets, the most recent policies are more directed toward strengthening innovation capabilities and start-ups.

The Central SME Innovation Programme (ZIM) is a nation-wide funding programme for SMEs and research establishments co-operating with them. It is open to all technologies and sectors. On 15 April 2015, the new ZIM guidelines came into effect. The government had decided to carry on with the Central SME Innovation Programme (ZIM) in its coalition agreement. The new guidelines raised maximum project costs that are eligible for funding to €380,000 per company, and €190,000 per research institute.

CHAPTER 2

Major Trends in the Development of SMEs

Taiwan's economic growth rate declined significantly to a mere 0.65 percent in 2015. The outlook for economic growth of 2016 is not optimistic due to continuous lackluster global economic recovery, sluggish international trade (based on Global Insight's forecast: global trade in goods is expected to fall by 4.7 percent in 2016 from 2015, followed by 11.3 percent drop in 2015 from 2014), lack of significant improvement in domestic business environment, policy uncertainty coming from the new government, and lack of momentum in business investment and consumer confidence. Further, facing the dual challenges of developing and emerging nations carving up the mass-production market (such as red supply chain from mainland China) and industrialized nations occupying the high-end market for custom-made products, Taiwan and its SMEs, especially those play an important role in the upstream value chain as component OEMs, are in urgent need for industrial innovation and transformation to enhance global competitiveness.

This chapter consists five sections to examine main indicators and survey results from government units to understand the development of Taiwan SMEs in 2015. Section I mainly discusses the general business performance of SMEs. There are four major indices (number of enterprises, total annual sales, domestic sales, and export sales) for observations in terms of scales, industries, and sectors, as well as a year-by-year comparison. Section II shows the distribution of the number of enterprises, employees, and total annual sales in different regions in terms of sectors and counties / cities. Section III focuses on the current situation of female enterprises based on the four indices mentioned above. Section IV covers business performance of SMEs in the wholesale and retail trade industry based on the survey results of the *Business Survey of Wholesale, Retail and Food Service Activities* conducted in May 2015 from the Department of Statistics, Ministry of Economic Affairs. Section V offers an overview of SMEs' expenditure on R&D.

Statistics on number of enterprises and total annual sales in this chapter are from Value-Added Business Tax (VAT) data of Fiscal Information Agency, Ministry of Finance, while statistics on employed persons (not in tax data) comes from Directorate-General of Budget, Accounting and Statistics (DGBAS), Manpower Survey data. When it comes to SME scale defined by annual sales or capital one needs to pay attention that in good time, an SME could become a large enterprise with its annual sales across over NT$100 million, while a large enterprise could fall into SME category in bad time with sales down under NT$100 million.

I General Business Performance of SMEs

Three major indices - total annual sales, domestic sales, and export sales - show mild recession in 2015 from 2014; number of enterprises, number of employed persons, and number of paid employees improved slightly during the same period.

As of 2015, there were a total of 1,383,981 SMEs in Taiwan, accounting for 97.69 percent of the total number of enterprises in Taiwan (1,416,738), a record high. SMEs are mostly concentrated in the Service sector, with the proportion being around 80 percent, of which wholesale and retail trade accounts for 48.90 percent. 54.32 percent SMEs are sole proprietorships. One of the major features of SMEs is that they are more flexible in market entry and exit than large enterprises. That explains the left side concentration of the distribution of the years in existence for SMEs: share of SMEs in existence below 10 years is 49.57 percent while majority (76.66 percent) of large enterprises have been in existence for at least 10 years. Newly-established SMEs, defined as those that have been in existence for less than one year, account for 7.10 percent; about 30 percent SMEs have been in existence for less than 5 years although about half SMEs have been in existence for less than 10 years. In 2015, SMEs' sales totaled NT$11,803.1 billion, accounting for 30.36 percent of total sales of all enterprises; domestic share of total SMEs' sales accounted for 87.48.

SMEs are heavily concentrated in Northern Taiwan. In 2015, 46.60 percent (645 thousand) of all SMEs were concentrated in Northern Taiwan; in terms of regions, Taiwan's Six Special Municipalities (Taipei, New Taipei, Taoyuan, Taichung, Tainan and Kaohsiung) are the top six with largest number of SMEs: 996 thousand or 71.98 percent of total SMEs combined. In terms of employment, number of employed persons in SMEs reaches 4,019,000 (45.89 percent) in Northern Taiwan; Taiwan's Six Special Municipalities are the top six employers with total 6,422,000 (73.32 percent) employed persons.

In 2015, female-owned enterprises account for over 30 percent of all enterprises. 61 percent of female-owned enterprises are sole proprietorships mainly in retail and wholesale. About 99 percent female-owned enterprises are SMEs. Domestic share of female-owned SMEs' sales accounted for 90.65 percent showing highly oriented toward domestic markets, higher than 87.81 percent domestic share of male-owned SMEs' sales; similar pattern holds for female-owned large enterprises. In terms of longevity, newly-established female-owned SMEs account for 7.33 percent of all female-owned SMEs (vs. 6.87 percent of newly-established male-owned SMEs). Share of female-owned SMEs in existence below 10 years is 51.31 percent (vs. 48.23 percent male-owned SMEs in existence below 10 years). 48.69 percent female-owned SMEs have been in existence for at least 10 years, slightly lower than 51.77 percent male-owned SMEs in existence for at least 10 years. This could be explained by the factor that female-owned SMEs are more flexible in market entry and exit, or by the factor that male-owned SMEs are more resilient.

Here are further details of the performance and condition of Taiwan SMEs.

1. A Total of 1,384,000 SMEs in 2015, a Record High

Number of SMEs set records several times after contraction during 2007-2009 global financial crisis. As of 2015, there were a total of 1,383,981 SMEs in Taiwan, accounting for 97.69 percent of the total number of enterprises in Taiwan, a record high. This figure represented an increase of 30,932 enterprises or 2.29 percent from 2014. However, the number of large enterprises was 32,757

enterprises, down 0.97 percent from 2014, accounting for 2.31 percent of the total number of enterprises (Table 2-1-1).

Table 2-1-1 Number of Enterprises, Annual Sales, Number of Employed Persons and Number of Paid Employees in Taiwan, 2014-2015

Unit: Enterprises; million NT$; thousand persons; %

Indicator \ Enterprise size	All enterprises		SMEs		Large enterprises	
	2014	2015	2014	2015	2014	2015
No. of enterprises	1,386,128	1,416,738	1,353,049	1,383,981	33,079	32,757
Share of total	100.00	100.00	97.61	97.69	2.39	2.31
Annual growth rate	1.67	2.21	1.64	2.29	2.69	-0.97
Total sales	40,240,506	38,875,340	11,839,868	11,803,115	28,400,638	27,072,225
Share of total	100.00	100.00	29.42	30.36	70.58	69.64
Annual growth rate	4.63	-3.39	4.58	-0.31	4.65	-4.68
Domestic sales	30,019,115	29,158,853	10,345,095	10,325,260	19,674,021	18,833,593
Share of total	100.00	100.00	34.46	35.41	65.54	64.59
Annual growth rate	4.87	-2.87	4.52	-0.19	5.06	-4.27
Export sales	10,221,390	9,716,487	1,494,773	1,477,855	8,726,617	8,238,632
Share of total	100.00	100.00	14.62	15.21	85.38	84.79
Annual growth rate	3.91	-4.94	4.95	-1.13	3.74	-5.59
No. of employed persons	11,079	11,198	8,669	8,759	1,387	1,415
Share of total	100.00	100.00	78.25	78.22	12.52	12.64
Annual growth rate	1.02	1.07	0.94	1.03	2.06	2.04
No. of paid employees	8,737	8,860	6,329	6,424	1,385	1,413
Share of total	100.00	100.00	72.44	72.50	15.85	15.94
Annual growth rate	1.42	1.41	1.48	1.49	2.06	1.99

Note:

1. The annual growth rate is the current year rate of change compared to the previous year.
2. The figures (and percentages) given in the table for the number of employed persons and number of paid employees working in all enterprises include 1,023,000 government employees, accounting for 9.23percent of all employed persons and 11.71 percent of all paid employees.
3. The term "SME" shall mean an enterprise which has completed company registration or business registration in accordance with the requirements of the laws, and which conforms to the following standards: (1) the enterprise is an enterprise in the manufacturing, construction, mining or quarrying industry with paid-in capital of NT$80 million or less; (2) the enterprise is an enterprise in the industry other than any of those mentioned above and had its sales revenue of NT$100 million or less in the previous year, according to the Standards for Identifying Small and Medium Enterprises.
4. Representative office of foreign company (82 representative offices in 2014) in the form of organization is excluded from the data since 2014.

Source:

1. Fiscal Information Agency, Ministry of Finance, Value-Added Business Tax (VAT) data (2014-2015).
2. Directorate-General of Budget, Accounting and Statistics (DGBAS), *Manpower Survey* data (2014-2015).

2. Number of Employed Persons in SMEs Reached 8,750,000 in 2015, a Record High

In 2014, number of employed persons in SMEs reached 8,759,000, of which 6,424,000 were paid employees; both were record high. However, the growth rate was down slightly after 2011; the growth rate of employed persons in SMEs in 2015 was a mere 1.03 percent. SMEs contributed 78.22 percent of total employed persons and 72.50 percent of total paid employees (Table 2-1-1).

3. About 80 Percent of SMEs in Service Sector, Down Slightly

In terms of the sectors, shares of SMEs by sectors have been quite stable and share of SMEs in industry grew slightly while share of SMEs in service decreased slightly after 2010. In 2015, SMEs are mostly concentrated in the service sector, with the proportion being 79.72 percent, and the industrial sector accounts for 19.45 percent. As of 2015, there were a total of 1,103,258 SMEs in service sector, representing an increase of 24,610 SMEs or 2.28 percent from 2014; there were a total of 269,143 SMEs in industrial sector, representing a growth at 2.40 percent, slightly faster than that in service sector. (Table 2-1-2).

Table 2-1-2 Shares of SMEs in Taiwan by Sector, 2009-2015

Unit: Enterprises; million NT$; %

Year / Sector	2009	2010	2011	2012	2013	2014	2015
All SMEs	1,232,025	1,247,998	1,279,784	1,306,729	1,331,182	1,353,049	1,383,981
Agricultural sector	0.90	0.91	0.90	0.90	0.90	0.85	0.84
Industrial sector	18.75	18.67	19.01	19.07	19.19	19.43	19.45
Service sector	80.24	80.42	80.09	80.02	79.91	79.72	79.72
Total sales	9,189,463	10,709,005	11,226,933	11,381,770	11,321,842	11,839,868	11,803,115
Agricultural sector	0.18	0.17	0.16	0.18	0.19	0.20	0.20
Industrial sector	45.85	49.41	50.13	50.13	48.67	49.27	48.23
Service sector	53.96	50.42	49.7	49.69	51.13	50.53	51.56
Domestic sales	7,873,111	9,088,972	9,567,948	9,633,690	9,897,617	10,345,095	10,325,260
Agricultural sector	0.19	0.18	0.17	0.19	0.19	0.20	0.20
Industrial sector	42.35	45.47	46.28	45.65	45.72	46.23	45.13
Service sector	57.46	54.36	53.55	54.16	54.09	53.58	54.68
Export sales	1,316,352	1,620,033	1,649,985	1,748,080	1,424,225	1,494,773	1,477,855
Agricultural sector	0.15	0.14	0.12	0.10	0.19	0.22	0.23
Industrial sector	66.82	71.52	72.5	74.82	69.21	70.36	69.94
Service sector	33.03	28.34	27.38	25.08	30.60	29.42	29.83

Source: Fiscal Information Agency, Ministry of Finance, VAT data (2009-2015).

4. About 50 Percent SMEs Were in Wholesale and Retail Trade

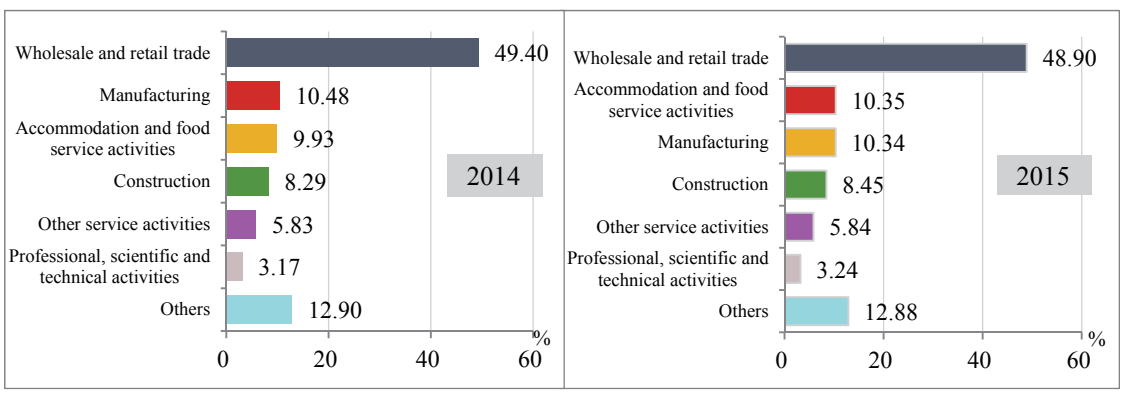
In terms of the industries, 48.90 percent of SMEs are in wholesale and retail trade, a total of 676,791 in 2015 (up 8,363 from 2014), followed by accommodation and food service activities with 10.35 percent of SMEs, a total of 143,177 (up 8,851), and 3rd in manufacturing with 10.34 percent, a total of 143,118, followed by other service activities with 5.84 percent, and professional, scientific and technical activities with 3.24 percent (Figure 2-1-1).

5. Domestic Share of Total Sales of SMEs in 2015 Accounted for 87 Percent

In 2015, SMEs' sales totaled NT$11,803.2 billion, accounting for 30.36 percent of total sales of all enterprises; domestic share of total SMEs' sales accounted for 87.48 percent (NT$10,325.3 billion),

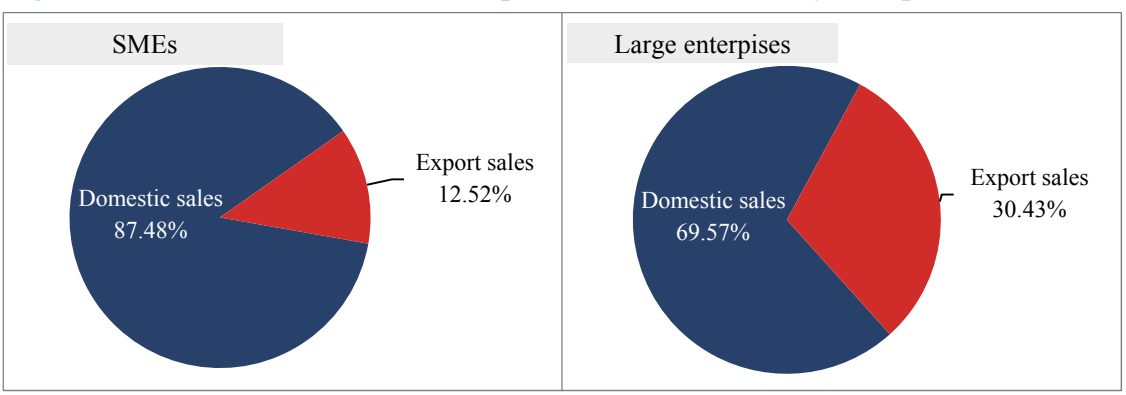
with SMEs' domestic sales down 0.19 percent from 2014. Large enterprises' sales totaled NT$27,072.2 billion, accounting for 69.64 percent of total sales of all enterprises; domestic share of total large enterprises' sales accounted for 69.57 percent (NT$18,833.6 billion), with large enterprises' domestic sales down 4.27 percent from 2014 showing SMEs were more domestically oriented than large enterprises (Figure 2-1-2 and Table 2-1-1).

Figure 2-1-1 Number of SMEs Distribution by Industry, 2014-2015



Source: Fiscal Information Agency, Ministry of Finance, VAT data (2014-2015).

Figure 2-1-2 Shares of Domestic and Export Sales in Total Sales by Enterprise Size, 2015



Source: Fiscal Information Agency, Ministry of Finance, VAT data (2015).

6. Total Export Sales of SMEs Down 1.13 Percent in 2015

Taiwan's economic growth rate in 2015 was a mere 0.65 percent, 3.27 percentage points down from the growth rate of 3.92 percent in 2014. The total sales of SMEs, total domestic sales of SMEs, and total export sales of SMEs fell by 0.31 percent, 0.19 percent, and 1.13 percent respectively (Table 2-1-1).

2015 SMEs' export propensity (SME export sales' share of the SMEs' total sales) was at 12.52 percent, down 0.10 percentage points from 2014, the lowest in six years; 2015 SMEs' export contribution (SME export sales' share of all enterprises' export sales) was at 15.21 percent, up 0.59 percentage points from 2014 but 2.53 percentage points lower than 2012, still lower than SMEs' export contribution level in 2009 (Table 2-1-3).

Table 2-1-3 Number and Sales Performance of SMEs, 2009-2015

Unit: Enterprises; million NT$; %

Indicator \ Year	2009	2010	2011	2012	2013	2014	2015
No. of SMEs	1,232,025	1,247,998	1,279,784	1,306,729	1,331,182	1,353,049	1,383,981
Ratio	97.91	97.68	97.63	97.67	97.64	97.61	97.69
Annual growth rate	-0.22	1.30	2.55	2.11	1.87	1.64	2.29
SME total sales	9,189,463	10,709,005	11,226,933	11,381,770	11,321,842	11,839,868	11,803,115
Ratio	30.65	29.55	29.64	30.23	29.44	29.42	30.36
Annual growth rate	-12.17	16.54	4.84	1.38	-0.53	4.58	-0.31
SME domestic sales	7,873,111	9,088,972	9,567,948	9,633,690	9,897,617	10,345,095	10,325,260
Ratio	35.50	34.67	34.51	34.66	34.58	34.46	35.41
Annual growth rate	-10.72	15.44	5.27	0.69	2.74	4.52	-0.19
SME export sales	1,316,352	1,620,033	1,649,985	1,748,080	1,424,225	1,494,773	1,477,855
Ratio (Export contribution)	16.87	16.16	16.29	17.74	14.48	14.62	15.21
Export propensity	14.32	15.13	14.70	15.36	12.58	12.62	12.52
Annual growth rate	-19.96	23.07	1.85	5.95	-18.53	4.95	-1.13

Note:

1. The ratio indicates SMEs' share in total enterprises.
2. Export contribution = (export sales value of SMEs / export sales value of all enterprises) × 100%.
3. Export propensity = (export sales value of SMEs / total sales value of SMEs) × 100%.

Source: Fiscal Information Agency, Ministry of Finance, VAT data (2009-2015).

The low export contribution rate and the low export propensity of SMEs are generally attributed to the relative strength in New Taiwan Dollar (NTD), the transformation in the structure of Taiwan's industries, and external impacts. Competing countries' aggressive monetary easing policy made Taiwan exporters less competitive through currency appreciation. Besides, in recent years, mainland China and other neighboring countries adopted aggressive export expansion and import substitution strategy that posed significant challenge to Taiwan's export. Some of Taiwan's key roles in the international supply chain were replaced by competitors. Slow progress in business environment and regional economic integration also eroded Taiwan's competitiveness.

The low total exports of SMEs in recent years were mainly driven by the manufacturing sector export. We show the breakdown of SMEs exports by industry in manufacturing sector in Appendix C Table C-9. In terms of export amount within the manufacturing sector, the dominant driver was electronic parts and components in the period of 2012 to 2015. Its exports accounted for 44.43 percent of all manufacturing sector export, amounting to NT$575.58 billion in 2012. It was down about 50 percent to NT$287.53 billion in 2013 mainly due to European debt crisis (29.52 percent of all manufacturing sector export), and then rose only 2.70 percent in 2014, amounting to NT$295.30 billion (28.44 percent of all manufacturing sector export). In 2015, SMEs' electronic parts and components exports fell again by 1.54 percent, amounting to NT$290.75 billion primarily due to weak global recovery and intensified supply chain competition from developing and emerging markets including mainland China and ASEAN member countries.

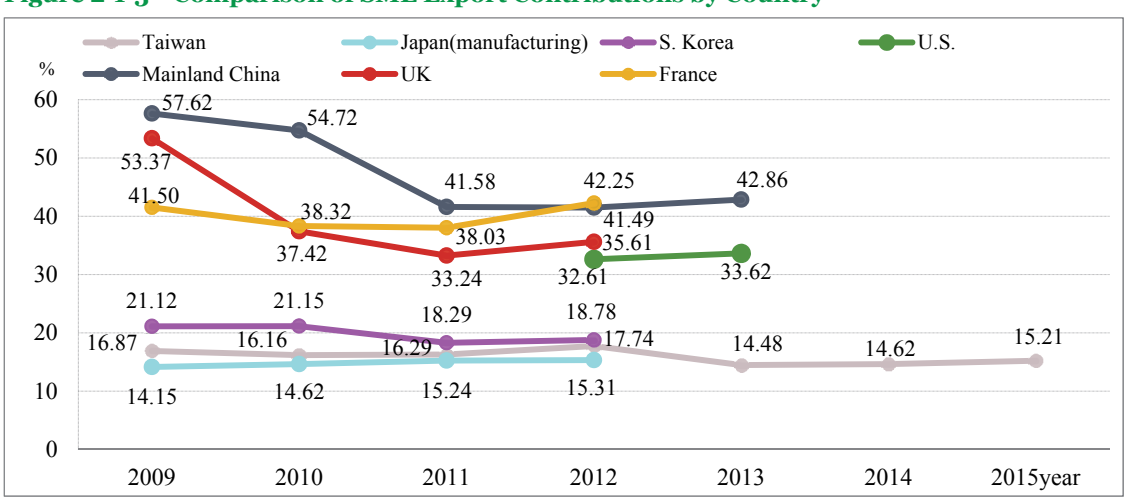
The next four industries contributing the most to SMEs' 2015 exports were machinery and equipment, fabricated metal products, computers, electronic and optical products, and plastic products. Plastic products ranked No. 4 in 2014 but fell to fifth in 2015 due to falling prices driven by plunging prices of oil. However, other transportation equipment was a bright spot with consistent growing exports in manufacturing sector with share of 3.51 percent in 2013, 4.08 percent in 2014, and 4.82 percent in 2015; exports growth rates of 23.9 percent and 16.0% in 2014 and 2015 respectively.

The total sales of large enterprises, total domestic sales of large enterprises, and total export sales of large enterprises fell by 4.68 percent, 4.27 percent, and 5.59 percent respectively, for worse than those of SMEs, showing low resilience to economic stress (Table 2-1-1).

SMEs in different countries play different roles in globalization (measured by export contribution). Take Japan and South Korea, Taiwan's main competitors, for examples:

Japan SMEs used to be more domestic market oriented. Due to globalization and cost concern, Japanese large manufacturers have aggressively outsourced and relocated businesses globally. This plus intensified competition from imported products in domestic market with limited growth, has made more Japan SMEs turn to overseas markets for expansion, as indicated by the modest rise of their export contribution from 14.15 percent in 2009 to 15.31 percent in 2012 (Figure 2-1-3).

Figure 2-1-3 Comparison of SME Export Contributions by Country



Note: Export contribution = (the export value of SMEs / the export value of all enterprises) × 100%.

Source: Taiwan data from *White Paper on SMEs in Taiwan*; Japan data collected by the Japan Small and Medium Enterprise Agency; U.S. data from the U.S. Census Bureau Database; Korean data collected by the Korean Statistical Information Service; the rest from OECD Database.

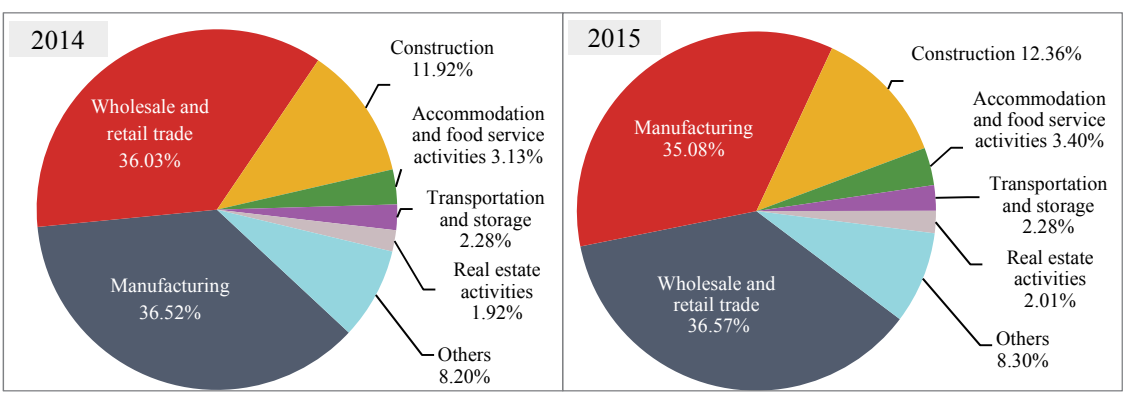
Although the global success of chaebol (a typical business conglomerate structure in South Korea) such as Samsung and Hyundai has boosted South Korea's standing abroad, at home their economic dominance has prompted concerns that they have developed a near-monopoly on the country's most talented workers and capital, while restricting the prospects of SMEs that supply and compete with them. Since 1980s, the government has pared back the dominance of the chaebol and allocated more resources to SMEs. In 1990s, SMEs' export contribution passed that of large enterprises for the first time. However, facing challenge of cost control, technology and business

transformation, and heightened price competition from cheap products of mainland China (South Korea have signed FTAs with many countries including mainland China), South Korea SMEs' export contribution showed similar volatile but generally downward trend (2010-2012) to that of Taiwan SMEs (2010-2014) (Figure 2-1-3).

7. Wholesale and Retail Trade and Manufacturing Remained Top Contributors of Sales

In terms of shares of sales by industry, top three industries in 2015 were wholesale and retail trade with share of 36.57 percent (NT$4,316.5 billion), followed by manufacturing share of 35.08 percent (NT$4,140.3 billion) and construction share of 12.36 percent (NT$1,459.3 billion). Sales of the top three industries combined accounted for 84.01 percent of total sales of SMEs (Figure 2-1-4).

Figure 2-1-4 Distribution of Sales in SMEs by Industry, 2014-2015



Source: Fiscal Information Agency, Ministry of Finance, VAT data (2014-2015).

8. About 98 Thousand New Enterprises in 2015 Were SMEs; Most Sales Came from Domestic Market

Newly-established enterprises are defined as those that have been in existence for less than one year. In 2015, there were 98,320 newly-established SMEs in Taiwan, representing 99.81 percent of the total of 98,507 newly-established enterprises. 92.64 percent of newly-established SMEs' total sales came from domestic market in 2015, slightly higher than 91.75 percent for newly-established large enterprises (Table 2-1-4).

Table 2-1-4 Number and Sales Performance of Newly-Established Enterprises, 2015

Unit: Enterprises; million NT$; %

Enterprise size / Indicator	Total (1)	No. of SMEs (2)	SMEs ratio (3) = (2)/(1)	Share of SMEs total	No. of large enterprises (4)	Large enterprises ratio (5) = (4)/(1)	Share of large enterprises total
No. of enterprises	98,507	98,320	99.81	-	187	19.00	-
Total sales	229,590	182,608	79.54	100.00	46,982	20.46	100.00
Domestic sales	212,681	169,577	79.73	92.64	43,104	20.27	91.75
Export sales	16,909	13,030	77.06	7.95	3,878	22.94	8.25

Note: "-": not applicable. Source: Fiscal Information Agency, Ministry of Finance, VAT data (2015).

9. Service Sector Accounted for the Largest Number of Newly-Established SMEs

In terms of the sectors, the service sector accounted for the largest number of newly-established SMEs (82,464 or 83.87 percent of newly-established SMEs) in 2015, and accounted for about 71.81 percent sales and 42.49 percent exports of newly-established SMEs (Table 2-1-5).

Table 2-1-5 Number and Sales Performance of Newly-Established SMEs by Sector, 2015

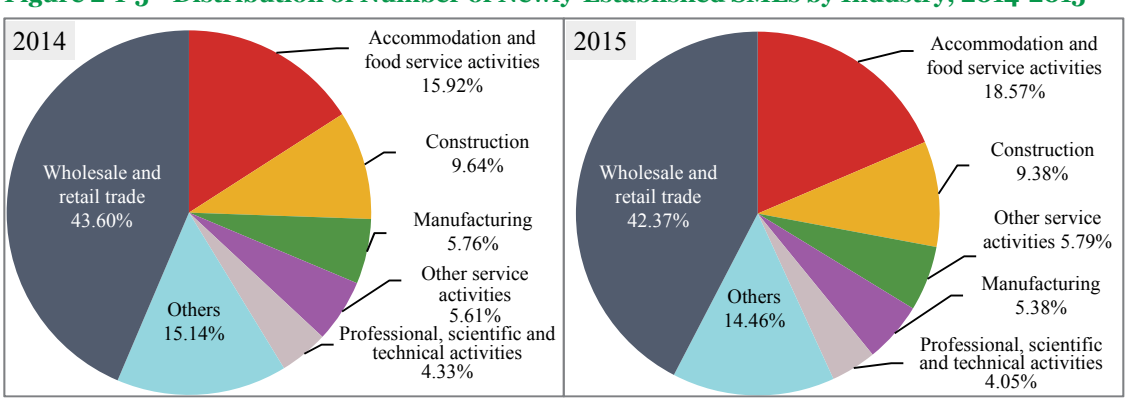
Unit: Enterprises; million NT$; %

Indicator / Sector	No. of enterprises	Share of total	Total sales	Share of total	Domestic sales	Share of total	Export sales	Share of total
All sectors	98,320	100.00	182,608	100.00	169,577	100.00	13,030	100.00
Agricultural sector	780	0.79	665	0.36	651	0.38	14	0.11
Industrial sector	15,076	15.33	50,811	27.83	43,331	25.55	7,480	57.40
Service sector	82,464	83.87	131,132	71.81	125,595	74.06	5,537	42.49

Source: Fiscal Information Agency, Ministry of Finance, VAT data (2015).

In terms of the industries, 42.37 percent of newly-established SMEs were in wholesale and retail trade, followed by accommodation and food service activities at 18.57 percent, and construction at 9.38 percent in 2015 (Figure 2-1-5).

Figure 2-1-5 Distribution of Number of Newly-Established SMEs by Industry, 2014-2015



Source：Fiscal Information Agency, Ministry of Finance, VAT data (2014-2015).

10. Newly-Established SMEs in Accommodation and Food Service Activities Showed Good Growth and Performance

In 2015, number and sales of newly-established SMEs grew by 4.43 percent (or 4,352 SMEs) and 3.55 percent respectively from 2014. However, the number and sales of newly-established SMEs in accommodation and food service activities grew much faster in 2015, at 18.06 percent and 13.19 percent respectively; other industries saw double-digit growth in both number and sales of newly-established SMEs in 2015 were transportation and storage (12.72 percent and 12.47 percent), and arts, entertainment and recreation (16.70 percent and 15.75 percent). However, some industries saw decrease in both number and sales of newly-established SMEs in 2015, such as professional,

scientific and technical activities, real estate activities, financial and insurance activities, water supply and remediation activities, electricity and gas supply, and mining and quarrying.

11. SMEs Are More Flexible in Entry / Exit Than Large Enterprises

As of 2015, 7.10 percent of SMEs had been in existence for less than one year. 31.07 percent of SMEs had been operating within five years, and 49.57 percent within 10 years. The corresponding shares for large enterprises were only 0.57 percent, 9.08 percent and 23.34 percent, respectively. 76.66 percent large enterprises had been in existence for 10 years or more. These figures show that, in terms of market entry and exit, SMEs display more flexibility than large enterprises.

However, share of SMEs in existence for 20 years or more was 24.96 percent, far below 42.70 percent of large enterprises in 2015 (similar comparison seen in previous years). This shows the business succession / transition remains a major challenge to SMEs as going concerns. Further, compared to large enterprises, SMEs in existence for 20 years or more suffered significant sales decline and "the crisis of the elderly age" as their first-generation entrepreneurs got into old age and lost their vitality and creativity. It has become an important issue for sustainable development of SMEs to rediscover and activate the entrepreneurial spirit, combined with sound "second-generation succession" and business transformation strategy. To upgrade SMEs with high potential to Mittelstand, government has launched programs recently to offer guidance and assistance to 50 SMEs with high potential per year, by effectively using talent, technology, intellectual property and brand marketing guidance resources, in combination with alliance companies to build a supply chain ecosystem. (Table 2-1-6).

Table 2-1-6　Shares of SMEs by Particular Ages, 2010-2015

Unit: Enterprises; %

Year / Age	2010	2011	2012	2013	2014	2015	
						SMEs	Large enterprises
Total no. of SMEs	1,247,998	1,279,784	1,306,729	1,331,182	1,353,049	1,383,981	32,757
Less than 1 year	7.50	7.78	7.34	7.42	6.94	7.10	0.57
1 – 2 years	6.95	7.20	7.44	7.12	7.59	6.86	1.68
2 – 3 years	5.75	5.88	6.15	6.37	6.16	6.62	2.17
3 – 4 years	5.38	5.04	5.14	5.39	5.61	5.46	2.20
4 – 5 years	5.75	4.79	4.51	4.59	4.80	5.03	2.46
5 – 10 years	21.95	22.30	21.53	20.43	19.57	18.50	14.26
10 – 20 years	25.33	25.05	24.93	25.17	25.03	25.47	33.96
20 years or more	21.39	21.96	22.95	23.52	24.30	24.96	42.70

Source：Fiscal Information Agency, Ministry of Finance, VAT data (2010-2015).

12. Over 54 Percent SMEs Are Sole Proprietorships

Sole proprietorships constituted the largest group of SMEs, with 751,712 firms or 54.32 percent of the total, followed by limited corporations, with 415,330 firms (30.01 percent of the total), and corporations limited, with 117,321 firms (8.48 percent). These three types accounted for a combined total of 92.80 percent of all SMEs in Taiwan. On the other hand, corporations limited constituted the

largest group of larger enterprises, at 54.99 percent of the total, followed by limited corporations at 23.31 percent and subsidiaries of domestic company at 10.76 percent. These three types accounted for a combined total of 89.06 percent of all larger enterprises in Taiwan (Table 2-1-7).

Table 2-1-7 Number and Share of Enterprises in Taiwan by Form of Organization, 2015

Unit: Enterprises; %

Organization \ Enterprise size	SMEs		Large enterprises	
	Number of enterprises	Share of total	Number of enterprises	Share of total
Total	1,383,981	100.00	32,757	100.00
Corporation limited	117,321	8.48	18,014	54.99
Limited corporation	415,330	30.01	7,637	23.31
Unlimited corporation	95	0.01	-	-
Unlimited corporation with limited liability shareholders	28	0.00	-	-
Partnership	27,635	2.00	86	0.26
Sole proprietorship	751,712	54.32	144	0.44
Subsidiary of domestic company	33,431	2.42	3,526	10.76
Subsidiary of foreign company	4,196	0.30	805	2.46
Others	34,233	2.47	2,545	7.77

Note:

1. Representative office of foreign company (82 representative offices in 2014) in the form of organization is excluded from the data since 2014.
2. Others in the form of organization denote business entities not in the form of any type of companies, partnership or sole proprietorship. Majority of business entities in this form is the offices, branches or retail shops of domestic companies, not counted as subsidiaries of those companies. Besides, the share of total business entitles in others for wholesale and retail trade is 53.74%.
3. "-" represents no data available.

Source: Fiscal Information Agency, Ministry of Finance, VAT data (2015).

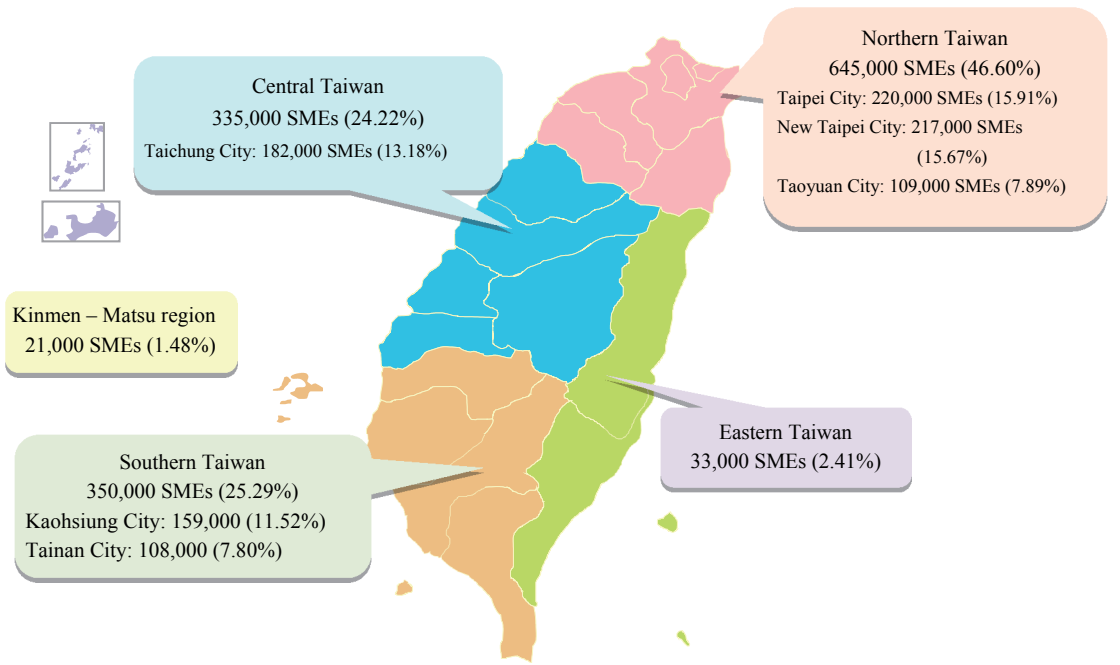
II SMEs and the Regional Development

1. About 47 Percent SMEs Are Concentrated in Northern Taiwan

In regional terms, in 2015, 46.60 percent (645 thousand) of SMEs were concentrated in Northern Taiwan; 24.22 percent (335 thousand) were located in Central Taiwan and 25.29 percent (350 thousand) in Southern Taiwan (Figure 2-2-1).

Taiwan's Six Special Municipalities are the top six with largest number of SMEs: 996 thousand or 71.98 percent of total SMEs combined in 2015. As can be seen from the data presented in Table 2-2-1, of the Six Special Municipalities, Taipei City had the largest number of SMEs: 220 thousand or 15.91 percent of all SMEs, followed by 217 thousand or 15.67 percent in 2nd ranked New Taipei City, 13.18 percent in 3rd ranked Taichung City, 11.52 percent in 4th ranked Kaohsiung City, 7.89 percent in 5th ranked Taoyuan City, and 7.80 percent in 6th ranked Tainan City. Compared to 2014, the Six Special Municipalities reported rising numbers of SMEs. Newly upgraded Taoyuan City showed the largest growth (3.34 percent) in number of SMEs (Table 2-2-1).

Figure 2-2-1 Distribution of SMEs by Region in 2015



Note: Northern Taiwan includes Taipei City, New Taipei City, Keelung City, Ilan County, Taoyuan City, Hsinchu City, and Hsinchu County. Central Taiwan includes Miaoli County, Taichung City, Changhua County, Nantou County and Yunlin County. Southern Taiwan includes Chiayi City, Chiayi County, Tainan City, Kaohsiung City, Pingtung County and Penghu County. Eastern Taiwan includes Hualien County and Taitung County. The Kinmen-Matsu region includes Kinmen County and Lienchiang County.

Source: Fiscal Information Agency, Ministry of Finance, VAT data (2015).

Table 2-2-1 Number and Total Sales of SMEs in Taiwan's Six Special Municipalities by Size of Enterprise, 2015

Unit: Enterprises; million NT$; %

Major cities / Enterprise size	Total	Combined total for the Six Special Municipalities	Taipei City	New Taipei City	Taoyuan City	Taichung City	Tainan City	Kaohsiung City
Number of enterprises								
All enterprises	1,416,738	1,023,578	230,822	221,950	112,039	186,105	109,919	162,743
SMEs	1,383,981	996,191	220,235	216,851	109,249	182,373	108,018	159,465
Share of total	100.00	71.98	15.91	15.67	7.89	13.18	7.80	11.52
Annual growth rate	2.29	2.33	1.95	2.18	3.34	2.86	2.41	1.74
Large enterprise	32,757	27,387	10,587	5,099	2,790	3,732	1,901	3,278
Total sales								
All enterprises	38,875,340	30,564,794	12,556,527	4,461,599	3,397,476	3,818,006	2,268,466	4,062,720
SMEs	11,803,115	9,091,859	1,930,660	1,958,153	1,226,487	1,724,160	930,489	1,321,911
Share of total	100.00	77.03	16.36	16.59	10.39	14.61	7.88	11.20
Annual growth rate	-0.31	-0.23	0.57	-0.79	1.79	-0.23	-0.78	-1.95
Large enterprise	27,072,225	21,472,935	10,625,867	2,503,446	2,170,989	2,093,846	1,337,978	2,740,809

Note: Figures in total include 22 cities in Northern, Central, Southern, Eastern Taiwan and the Kinmen-Matsu region.

Source: Fiscal Information Agency, Ministry of Finance, VAT data (2015).

Examination of the distribution of SMEs by sectors in 2015 shows that, Kaohsiung City had the largest share of agricultural SMEs at 34.69 percent, followed by Ilan County (10.92 percent), and New Taipei City (6.87 percent); New Taipei City had the largest share of industrial SMEs, while Taipei City, the commercial and financial center of Taiwan, had the largest share of service SMEs.

Industry clusters or concentration usually lead to positive economic benefits but at the same time widens the gap between urban and rural areas. However, a more feasible development strategy is not to reverse the rural-urban gap, but to take deep dive into the characteristics of rural counties and help local SMEs develop products of local specialties.

2. SME Sales by City: 77 Percent from Six Special Municipalities

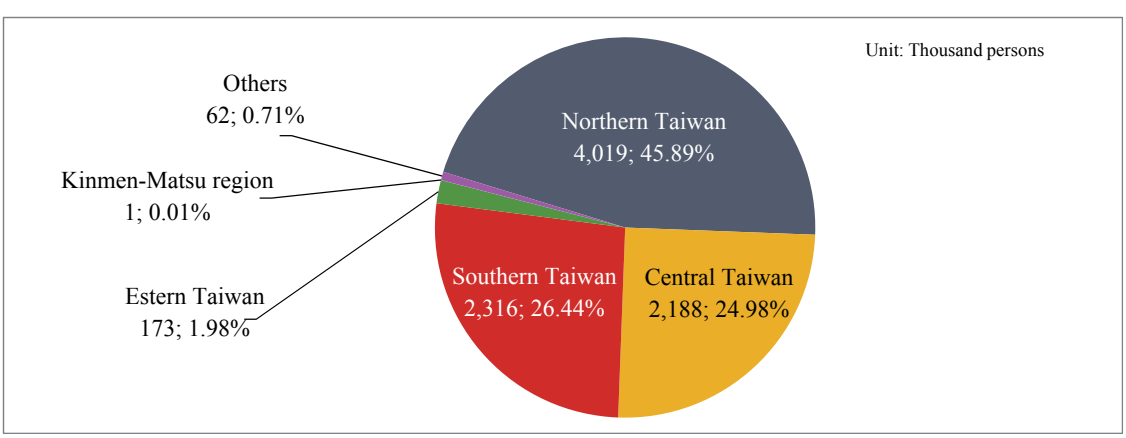
Examination of SME sales in 2015 by city shows that about 77 percent of all SME sales came from the Six Special Municipalities, of which the largest share of overall SME sales was held by those SMEs located in New Taipei City with 16.59 percent of total sales, followed by Taipei City in the second place with 16.36 percent, Taichung City (14.61 percent), Kaohsiung City (11.20 percent), Taoyuan City (10.39 percent), and Tainan City (7.88 percent).

Compared to 2014, two of the Six Special Municipalities saw rising sales in 2015 (Taipei City and Taoyuan City, up 0.57 percent and 1.79 percent respectively), while four of the Six Special Municipalities saw falling sales in 2015 (Taichung City, Kaohsiung City, New Taipei City, and Tainan City, down 0.23 percent, 1.95 percent, 0.79 percent, and 0.78 percent respectively) (Table 2-2-1).

3. Northern Region Had about 46 Percent of Employed Persons by SMEs

As can be seen from the 2015 data presented in Figure 2-2-2, of the four regions, Northern Taiwan had the largest number of employed persons by SMEs (4,019 thousand or 45.89 percent), followed by Southern Taiwan (26.44 percent), and Central Taiwan (24.98 percent).

Figure 2-2-2 Distribution of SME Employment by Region, 2015



Source: Directorate-General of Budget, Accounting and Statistics, *Manpower Survey* data (2015).

4. New Taipei and Taipei City Combined Had over 31 Percent of Employed Persons by SMEs

Of the Six Special Municipalities, New Taipei City had the largest number of employed persons by SMEs (1,370 thousand or 15.65 percent), followed by Taipei City (1,360 thousand or 15.53 percent), and Taichung City (1,188 thousand or 13.56 percent). The Six Special Municipalities had combined employment of 6,422 thousand or 73.32 percent of all people employed by SMEs (Table 2-2-2).

Table 2-2-2 Number of Employed Persons in Taiwan's Six Special Municipalities, 2015

Unit: Thousand persons; %

Major cities / Enterprise size	Total	Combined total for the Six Special Municipalities	Taipei City	New Taipei City	Taoyuan City	Taichung City	Tainan City	Kaohsiung City
All enterprises	11,198	8,217	1,913	1,607	1,035	1,410	937	1,316
SMEs	8,759	6,422	1,360	1,370	732	1,188	749	1,022
Share of total	100.00	73.32	15.53	15.65	8.36	13.56	8.55	11.67
Large enterprises	1,415	1,078	303	127	232	125	119	173
Share of total	100.00	76.15	21.40	8.94	16.37	8.82	8.38	12.23
Government employees	1,024	717	249	110	71	97	69	121

Note: Share of total in the table represents the percentage of employed persons in certain city (or cities) of all employed persons.

Source: Directorate-General of Budget, Accounting and Statistics, *Manpower Survey* data (2015)..

III Female-Owned SMEs

Based on data from Fiscal Information Agency, Ministry of Finance, the gender of a person is determined by the first digit of her (his) identity card number. Therefore, enterprises where the owner is a juridical person or foreigner have to be excluded from the calculations. In addition, it is not possible to eliminate those enterprises where a woman is the nominal owner but is not actually running the business, or where the female "owner" actually controls only a minority of the firm's shares. It follows that the total number of SMEs in Section I may not match the sum of female-owned SMEs and male-owned SMEs.

1. Female-Owned Enterprises Account for about 36 Percent of All Enterprises; about 99 Percent Female-Owned Enterprises Are SMEs

In 2015, there were 1,416,738 enterprises in Taiwan for which the sex of the business owner could be determined. Of these, 508,701 (35.91 percent of the total) were owned by women. Female-owned enterprises increased by 29,440 or 2.14 percent from 2014. 98.78 percent (502,470) of female-owned enterprises were SMEs (Table 2-3-1).

Table 2-3-1 Number and Sales Performance of Enterprises by Sex of Business Owner, 2015

Unit: Enterprises; million NT$; %

Enterprise size / Indicator	All enterprises	SMEs	Large enterprises
No. of enterprises	1,416,738	1,383,981	32,757
Female-owned enterprises	508,701	502,470	6,231
Share of total 1	100.00	98.78	1.22
Share of total 2	35.91	36.31	19.02
Male-owned enterprises	893,745	869,389	24,356
Total sales	38,880,476	11,803,116	27,072,224
Female-owned enterprises	5,409,352	2,889,548	2,519,804
Share of total 1	100.00	53.42	46.58
Share of total 2	13.91	24.48	9.31
Male-owned enterprises	29,085,798	8,482,702	20,603,096
Domestic sales	29,163,989	10,325,260	18,833,593
Female-owned enterprises	4,670,992	2,619,246	2,051,746
Share of total 1	100.00	56.07	43.93
Share of total 2	16.02	25.37	10.89
Male-owned enterprises	21,957,377	7,448,871	14,508,507
Export sales	9,716,486	1,477,855	8,238,630
Female-owned enterprises	738,360	270,302	468,058
Share of total 1	100.00	36.61	63.39
Share of total 2	7.60	18.29	5.68
Male-owned enterprises	7,128,420	1,033,832	6,094,589

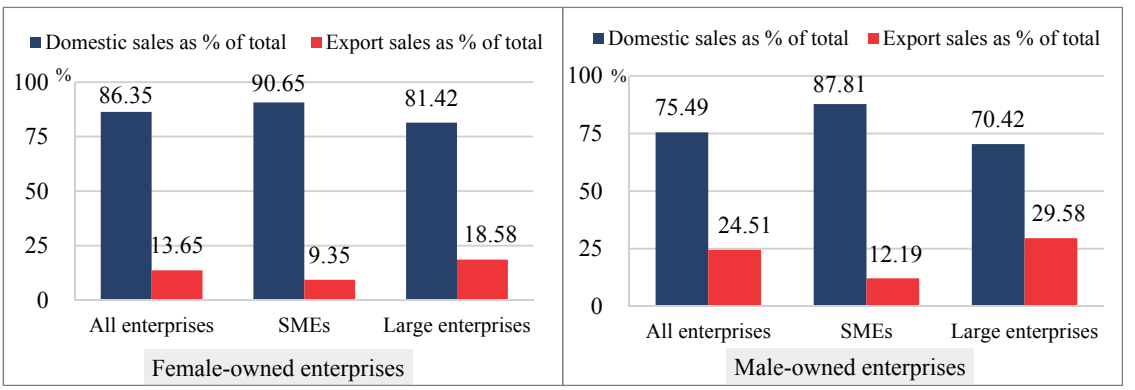
Note:
1. Whether an enterprise should be classified as male-owned or female-owned was determined using the registered identity of the business owner.
2. The totals for all enterprises given in this table do not conform to those given in Table 2-1-1 because some enterprises are registered as being owned by other enterprises or by foreigners; these enterprises were excluded from the data used in this table.
3. Share of total 1 in the table represents the percentages of SMEs (large enterprises) in all female-owned enterprises; share of total 2 represents the percentage of female-owned enterprises in all enterprises.

Source: Fiscal Information Agency, Ministry of Finance, VAT data (2015).

2. Female-Owned Enterprises Are More Oriented toward Domestic Market, Female-Owned SMEs in Particular

In 2015, domestic sales accounted for a dominant 90.65 percent of the total sales of female-owned SMEs, with export sales accounting for only 9.35 percent, (giving a disparity of 81.30 percentage points). For male-owned SMEs, export sales accounted for 12.19 percent and domestic sales accounted for 87.81 percent, giving a disparity of 75.62 percentage points (Figure 2-3-1).

Figure 2-3-1 Shares of Domestic Sales and Export Sales by Sex of Business Owner, 2015

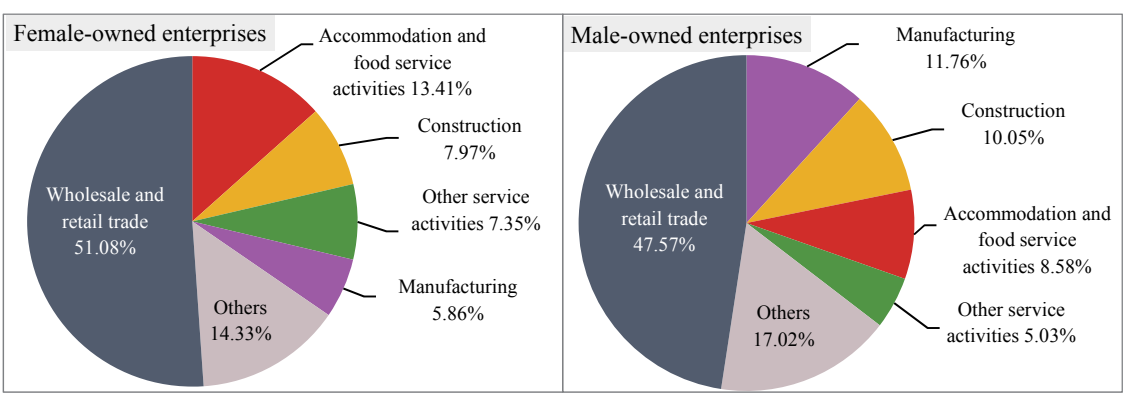


Source: Fiscal Information Agency, Ministry of Finance, VAT data (2015).

3. Female-Owned SMEs Are Heavily Concentrated in the Wholesale and Retail Trade

The service sector accounts for the largest share of the total number of female-owned enterprises at 85 percent, compared to 76 percent share of male-owned enterprises (Appendix C Table C-8).

Figure 2-3-2 Industry Distribution of SMEs by Sex of Business Owner, 2015



Source: Fiscal Information Agency, Ministry of Finance, VAT data (2015).

The wholesale and retail trade industry accounted for the largest share of the total number of female-owned SMEs, and also for the largest share of female-owned SMEs in total sales, and domestic sales, at 51.08 percent, 43.70 percent, and 43.30 percent in 2015. Manufacturing industry accounted for the largest share of female-owned SMEs in export sales, at 49.08 percent in 2015 (Appendix C Table C-8).

The same top five industries accounts for the largest share of the total number of both male and female-owned SMEs with slightly different order. For female-owned SMEs in 2015, the order is wholesale and retail trade at 51.08 percent, followed by accommodation and food service activities at 13.41 percent, construction at 7.97 percent, other service activities at 7.35 percent, and manufacturing at 5.86 percent. For male-owned SMEs, the order is wholesale and retail trade at 47.57

percent, followed by manufacturing at 11.76 percent, construction at 10.05 percent, accommodation and food service activities at 8.58 percent, and other service activities at 5.03 percent (Figure 2-3-2).

4. 61 Percent of Female-Owned Enterprises Are Sole Proprietorships

Sole proprietorships were the most common form of organization for both female-owned enterprises (60.76 percent) and male-owned enterprises (49.46 percent), followed by limited corporations at 27.66 percent and 31.07 percent, and corporation limited at 6.39 percent and 11.07 percent respectively (Table 2-3-2).

Table 2-3-2 Number of Different Form of Enterprises by Sex of Business Owner, 2015

Unit: Enterprises; %

Indicator \ Sex of owner	All enterprises		Female-owned enterprises		Male-owned enterprises	
	No. of enterprises	Share of total	No. of enterprises	Share of total	No. of enterprises	Share of total
Total	1,402,446	100.00	508,701	100.00	893,745	100.00
Corporation limited	131,485	9.38	32,522	6.39	98,963	11.07
Limited corporation	418,332	29.83	140,690	27.66	277,642	31.07
Unlimited corporation	92	0.01	33	0.01	59	0.01
Unlimited corporation with limited liability shareholders	25	0.00	10	0.00	15	0.00
Partnership	27,693	1.97	9,993	1.96	17,700	1.98
Sole proprietorship	751,188	53.56	309,105	60.76	442,083	49.46
Subsidiary of domestic company	35,509	2.53	7,041	1.38	28,468	3.19
Subsidiary of foreign company	2,757	0.20	1,022	0.20	1,735	0.19
Others	35,365	2.52	8,285	1.63	27,080	3.03

Note:

1. Representative office of foreign company in the form of organization is excluded from the data since 2014..
2. Others in the form of organization denote business entities not in the form of any type of companies, partnership or sole proprietorship. Majority of business entities in this form is the offices, branches or retail shops of domestic companies, not counted as subsidiaries of those companies. Besides, the share of total business entitles in others for wholesale and retail trade is 53.74%.

Source: Fiscal Information Agency, Ministry of Finance, VAT data (2015).

5. 51.37 Percent of Female-Owned SMEs Had Been in Existence within 10 Years, Higher Than That of Male-Owned SMEs

In 2015, there were 36,819 newly-established female-owned SMEs, less than 59,744 newly-established male-owned SMEs. In terms of longevity, 51.31 percent of female-owned SMEs had been in existence within 10 years, higher than 48.23 percent of male-owned SMEs in the same category; 51.77 percent of male-owned SMEs had been in existence for 10 years or longer, high than 48.69 percent of female-owned SMEs in the same category (Table 2-3-3).

These figures show that, in terms of market entry and exit, female-owned SMEs display more flexibility than male-owned SMEs, or male-owned SMEs are more resilient.

Table 2-3-3 Shares of SMEs in Particular Ages by Sex of Business Owner, 2015

Unit: Enterprises; %

Sex of owner / Age	All enterprises		Female-owned enterprises		Male-owned enterprises	
	No. of enterprises	Share of total	No. of enterprises	Share of total	No. of enterprises	Share of total
Total no. of SMEs	1,371,859	100.00	502,470	100.00	869,389	100.00
Less than 1 year	96,563	7.04	36,819	7.33	59,744	6.87
1 – 2 years	93,349	6.80	35,056	6.98	58,293	6.71
2 – 3 years	90,312	6.58	34,521	6.87	55,791	6.42
3 – 4 years	74,426	5.43	28,842	5.74	45,584	5.24
4 – 5 years	68,829	5.02	26,844	5.34	41,985	4.83
5 – 10 years	253,576	18.48	95,736	19.05	157,840	18.16
10 – 20 years	350,332	25.54	126,442	25.16	223,890	25.75
20 years or more	344,472	25.11	118,210	23.53	226,262	26.03

Source：Fiscal Information Agency, Ministry of Finance, VAT data (2015).

IV Business Performance for SMEs in Wholesale and Retail Trade

To provide a clear picture of the current state of Taiwanese SMEs in wholesale and retail industry, this section presents business performance of SMEs in the wholesale and retail industry based on the results of *Business Survey of Wholesale, Retail and Food Service Activities* conducted in May 2015 by the Department of Statistics, Ministry of Economic Affairs (an SME is defined as a business entity with less than 100 regular employees; a large enterprise is defined as a business entity with 100 or more regular employees).

1. SMEs in Wholesale: Business Performance

(1) SMEs in Wholesale: Basic Operation Types

Most (94.6 percent) SMEs in wholesale did not operate as part of a franchise. Only 2.8 percent of SMEs in wholesale had foreign subsidiaries. Large enterprises in wholesale business showed similar structure (Table 2-4-1).

(2) SMEs in Wholesale: Clients

Shares of total sales of SMEs in wholesale were 67.2 percent to domestic clients and 32.8 percent to exports in 2014. In terms of domestic clients, trade, wholesale, and retail, and manufacturing factories had the top shares of total sales of SMEs in wholesale at 41.8 percent and 13.4 percent respectively. In terms of exports clients, China (Hong Kong and Macao included) had the largest share of total sales of SMEs in wholesale at 17.6 percent, much higher than other exports clients (Table 2-4-2).

Table 2-4-1 Basic Operation Types in Wholesale, 2014

Unit: Enterprises; %

Basic operation types	Total	SMEs	Large enterprises
Sample size	1,867	1,621	246
Franchise	100.0	100.0	100.0
Not operated as part of a franchise	94.2	94.6	91.1
Authorized stores, dealers or agents	5.0	4.9	5.7
Franchise headquarter	0.9	0.5	3.3
With or without foreign subsidiary	100.0	100.0	100.0
No	96.6	97.2	92.3
Yes	3.4	2.8	7.7

Source: Department of Statistics, Ministry of Economic Affairs, *Business Survey Report of Wholesale, Retail and Food Service Activities* (October 2015).

Table 2-4-2 Share of Sales by Wholesale Clients, 2014

Unit: %

Clients	Total	SMEs	Large enterprises
Domestic clients	65.3	67.2	63.9
Trade, wholesale, retail	40.0	41.8	38.6
Government, general public	11.1	8.1	13.5
Manufacturing factories	9.2	13.4	5.9
Parent or affiliated companies	5.0	3.9	5.9
Export clients	34.7	32.8	36.1
China (Hong Kong and Macao included)	21.0	17.6	23.6
Europe	3.2	3.8	2.7
Southeast Asia	3.2	2.9	3.3
United States	2.7	3.8	1.9
Japan	2.6	2.6	2.7
Others	2.0	2.1	1.9

Source: Department of Statistics, Ministry of Economic Affairs, *Business Survey Report of Wholesale, Retail and Food Service Activities* (October 2015).

(3) SMEs in Wholesale: Suppliers

Shares of total purchase of SMEs in wholesale were 60.8 percent from domestic suppliers and 39.2 percent from overseas suppliers in 2014. In terms of domestic suppliers, trade, wholesale, and retail, and manufacturing factories had the top shares of total purchase of SMEs in wholesale at 25.7 percent and 20.1 percent respectively, followed by parent or affiliated companies at 13.5 percent. In terms of overseas suppliers, China (Hong Kong and Macao included) had the largest share of total purchase of SMEs in wholesale at 8.5 percent, followed by Japan as the close second at 7.6 percent (Table 2-4-3).

Table 2-4-3 Share of Purchase by Wholesale Suppliers, 2014

Unit: %

Suppliers	Total	SMEs	Large enterprises
Domestic suppliers	54.5	60.8	49.7
Trade, wholesale, retail	24.7	25.7	23.9
Manufacturing factories	16.1	20.1	13.0
Parent or affiliated companies	11.5	13.5	10.0
Others	2.2	1.5	2.8
Overseas suppliers	45.5	39.2	50.3
China (Hong Kong and Macao included)	11.5	8.5	13.9
Japan	9.9	7.6	11.6
Southeast Asia	7.8	3.9	10.7
Europe	6.1	5.4	6.7
United States	3.7	3.7	3.7
Others	6.5	10.0	3.7

Source: Department of Statistics, Ministry of Economic Affairs, *Business Survey Report of Wholesale, Retail and Food Service Activities* (October 2015).

2. SMEs in Retail: Business Performance

(1) SMEs in Retail: Basic Operation Types

Most (83.8 percent) SMEs in retail did not operate as part of a franchise, higher than 69.6 percent for large enterprises in retail, followed by authorized stores, dealers or agents at 12.9 percent. Only a mere 0.5 percent of SMEs in retail had foreign subsidiaries (Table 2-4-4).

Table 2-4-4 Basic Operation Types in Retail, 2014

Unit: Enterprises; %

Basic operation types	Total	SMEs	Large enterprises
Sample size	1,015	755	260
Franchise	100.0	100.0	100.0
Not operated as part of a franchise	80.2	83.8	69.6
Authorized stores, dealers or agents	13.2	12.9	14.2
Franchise headquarter	6.6	3.3	16.2
With or without foreign subsidiary	100.0	100.0	100.0
No	98.7	99.5	96.5
Yes	1.3	0.5	3.5

Source: Department of Statistics, Ministry of Economic Affairs, *Business Survey Report of Wholesale, Retail and Food Service Activities* (October 2015).

(2) SMEs in Retail: Revenue Sources

The largest share of total sales of SMEs in retail was 96.7 percent from merchandise sales (including 88.0 percent merchandise not self-produced and 8.7 percent merchandise sales of self-produced products). Other sources had shares below 2 percent. (Table 2-4-5).

Table 2-4-5 Share of Revenue Sources in Retail, 2014

Unit: %

Revenue sources	Total	SMEs	Large enterprises
Total	100.0	100.0	100.0
Merchandise sales	95.1	96.7	94.7
Merchandise not self-produced	88.8	88.0	88.9
Merchandise self-produced	6.3	8.7	5.8
Services	2.0	0.9	2.2
Dinging (in store)	1.9	1.0	2.1
Others	1.1	1.4	1.0

Source: Department of Statistics, Ministry of Economic Affairs, *Business Survey Report of Wholesale, Retail and Food Service Activities* (October 2015).

(3) SMEs in Retail: Merchandise Categories

Largest shares of merchandise categories by sales of SMEs in retail were 33.3 percent from food, beverages, and tobacco, and 17.3 percent from household appliances. Largest shares of merchandise categories by sales of large enterprises in retail were 25.1 percent from food, beverages, and tobacco, 16.4 percent from car and motorcycle components, 11.9 percent from apparel and accessories, and 11.7 percent from ICT products (Table 2-4-6).

Table 2-4-6 Share of Merchandise Sales in Retail, 2014

Unit: %

Merchandise categories	Total	SMEs	Large enterprises
Total	100.0	100.0	100.0
Food, beverages, and tobacco	26.7	33.3	25.1
Car and motorcycle components	14.5	6.1	16.4
ICT products	11.3	9.5	11.7
Apparel and accessories	11.2	8.2	11.9
Household appliances	10.8	17.3	9.3
Pharmaceutical, cosmetic and cleaning products	8.8	5.0	9.7
Culture, education, and entertainment	4.0	5.6	3.6
Housing decoration materials and supplies	0.6	0.8	0.6
Others	12.2	14.2	11.8

Source: Department of Statistics, Ministry of Economic Affairs, *Business Survey Report of Wholesale, Retail and Food Service Activities* (October 2015).

(4) SMEs in Retail: Suppliers

Shares of total purchase of SMEs in retail were 85.7 percent from domestic suppliers and 14.3 percent from overseas suppliers in 2014. In terms of domestic suppliers, trade, wholesale, and retail had the top share of total purchase of SMEs in retail at 61.7 percent, followed by parent or affiliated companies at 13.5 percent. In terms of overseas suppliers, Europe had the largest share of total purchase of SMEs in retail at 4.5 percent. Shares from other countries or regions were below 3.0 percent (Table 2-4-7).

Table 2-4-7 Share of Purchase by Retail Suppliers, 2014

Unit: %

Suppliers	Total	SMEs	Large enterprises
Domestic suppliers	89.3	85.7	90.1
Trade, wholesale, retail	58.3	61.7	57.5
Parent or affiliated companies	21.3	13.5	23.0
Manufacturing factories	8.8	9.1	8.8
Other	0.9	1.4	0.8
Overseas suppliers	10.7	14.3	9.0
China (Hong Kong and Macao included)	2.5	2.6	2.5
Japan	2.3	2.2	2.4
Europe	2.1	4.5	1.5
United States	1.9	2.3	1.8
Southeast Asia	1.4	1.5	1.3
Others	0.5	1.3	0.4

Source: Department of Statistics, Ministry of Economic Affairs, *Business Survey Report of Wholesale, Retail and Food Service Activities* (October 2015).

V Overview of SMEs' Expenditure on R&D

Expenditure on R&D is very important for enterprises' upgrade and transformation to remain competitive and profitable. To measure enterprises' innovation and R&D impact, the most commonly used indicator is firms' R&D expenditure. This section will explore the R&D spending of the nation as a whole and of the corporate sector. At the same time, in order to gain a clear understanding of the R&D strategies of SMEs, we will also analyze the original data from the *Science and Technology Statistics 2015 Edition Highlights* published by Ministry of Science and Technology.

1. National R&D Expenditure Increased 6.29 Percent in 2014

According to the data presented in the Science and Technology Statistics 2015 Edition Highlights by Ministry of Science and Technology, in 2014 total R&D expenditure in Taiwan came to NT$483,492 million, rising 6.29 percent from NT$454,891 million in 2013. 77.15 percent of this spending was in the business sector; 12.56 percent was undertaken by government; 9.95 percent was in the higher education sector, and just 0.33 percent was in the private non-profit sector. Business and private non-profit sectors showed growth in 2014 while government and the higher education sector suffered decline. These data reflect the fact that the business sector has always accounted for the largest share of R&D spending in Taiwan (Table 2-5-1).

2. R&D Expenditure of SMEs Grew Faster Than Large Enterprises

In terms of size, total R&D expenditure by SMEs (defined as enterprises with fewer than 200 employees) had risen consistently for two years in a row in 2013 (up 4.75 percent) and 2014 (up 11.29 percent); total R&D expenditure by large enterprises had also risen in 2013 (up 7.79 percent)

and 2014 (up 8.18 percent). R&D expenditure of SMEs (100-199 employees) grew the fastest at 15.83 percent (Table 2-5-2).

Table 2-5-1 R&D Expenditure by Sector, 2010-2014

Unit: Million NT$; %

Sector	2010	2011	2012	2013	2014	2014	
						Share of total	Growth rate
All sectors	394,960	413,293	431,296	454,891	483,492	100.00	6.29
Business sector	282,546	300,358	319,906	343,456	373,019	77.15	8.61
Government	63,020	62,546	61,172	60,993	60,734	12.56	-0.42
Higher education sector	47,970	48,978	48,898	48,987	48,131	9.95	-1.75
Private non-profit sector	1,424	1,410	1,321	1,455	1,608	0.33	10.52

Source: Ministry of Science and Technology, *Science and Technology Statistics 2015 Edition Highlights* (December 2015).

Table 2-5-2 Business Sector R&D Expenditure by Enterprise Size, 2010-2014

Unit: Million NT$; %

Item	2010	2011	2012	2013	2014	2014	
						Share of total	Growth rate
Total	282,546	300,358	319,906	343,455	373,019	100.00	8.61
SME sub-total	46,759	43,865	45,213	47,361	52,709	14.13	11.29
0 - 99 employees	23,115	23,431	24,725	24,701	26,462	7.09	7.13
100 - 199 employees	23,644	20,434	20,488	22,660	26,247	7.04	15.83
Large enterprises sub-total	235,787	256,493	274,693	296,094	320,310	85.87	8.18
200 - 499 employees	38,530	40,889	45,561	46,593	50,210	13.46	7.76
500 employees or above	197,257	215,604	229,132	249,501	270,100	72.41	8.26

Source: Ministry of Science and Technology, *Science and Technology Statistics 2015 Edition Highlights* (December 2015).

CHAPTER 3

Financial and Funding Analysis of SMEs

Financial analysis has a vital role to play in understanding of the current state of Taiwan's SMEs and the outlook for their future development. The first two sections of this chapter presents an overview of the financial status of Taiwan's SMEs as well as ratio analysis, using Business Income Tax Return data for 2014 provided by the Fiscal Information Agency of the Ministry of Finance; there is thus a one-year time lag as compared with the data presented in the other chapters of this *White Paper*. The third section examines the interaction between SMEs and the banking sector, using survey data from the Central Bank of the Republic of China (Taiwan) or statistics collected by the Financial Supervisory Commission.

I SMEs: Consolidated Financial Analysis

In this section, consolidated balance sheet and income statement data (where the figures for each account are converted into percentages of total assets for balance sheet and percentages of net operating revenue for income statement) are used to examine the fund utilization, asset allocation and operating performance of SMEs, so as to gain an overall understanding of SMEs' financial and business condition.

1. Asset Allocation Analysis

(1) Both Current Assets and Current Liabilities Were Down about 3 Percentage Points

As can be seen from Table 3-1-1, for SMEs in 2014, the share of total assets accounted for by current assets was down 3.04 percentage points, mainly driven by reduced shares of cash (down 1.81 percentage points) and inventories (down 1.01 percentage points), followed by accounts receivable (down 0.30 percentage points) and advance payments (down 0.18 percentage points); only share of other current assets was up 0.27 percentage points. The share of current liabilities was down 2.96 percentage points, similar to the change of current assets. However, the share of liabilities was up mildly by 1.39 percentage points.

In terms of cash ratio, 2014 saw decreased share of cash in over half of the 18 industries, showing declining short-term liquidity in 2014 from 2013. These industries were agriculture, forestry, fishing and animal husbandry, mining and quarrying, electricity and gas supply, water supply and remediation activities, transportation and storage, financial and insurance activities, real estate activities, professional, scientific and technical activities, arts, entertainment and recreation, and other service activities (Table 3-1-2).

In terms of cash ratio, 2014 saw decreased share of cash in over half of the 18 industries, showing declining short-term liquidity in 2014 from 2013. These industries were agriculture, forestry, fishing and animal husbandry, mining and quarrying, electricity and gas supply, water supply and remediation activities, transportation and storage, financial and insurance activities, real estate activities, professional, scientific and technical activities, arts, entertainment and recreation, and other service activities (Table 3-1-2).

Table 3-1-1 Consolidated Balance Sheet for Taiwanese Enterprises, 2013-2014

Unit: %

Item \ Enterprise size / year	SMEs		Large enterprises	
	2013	2014	2013	2014
Current assets	45.88	42.84	57.67	39.68
Cash	16.90	15.09	21.51	16.23
Accounts receivable	11.79	11.49	28.55	14.56
Inventories	14.13	13.12	5.09	6.95
Advance payments	1.39	1.21	0.45	0.74
Other current assets	1.66	1.93	2.07	1.20
Non-current assets	54.12	57.16	42.33	60.32
Long-term investment	29.32	31.34	25.43	35.98
Fund	0.48	-	0.60	-
Fixed asset	21.56	22.46	11.55	15.92
Land and buildings	13.40	12.21	5.37	7.22
Machinery	6.90	5.59	5.50	7.81
Other fixed assets	1.26	4.66	0.68	0.96
Intangible and other assets	2.76	3.36	4.75	8.42
Total assets = Liabilities + Net worth	100.00	100.00	100.00	100.00
Liabilities	52.64	54.03	77.22	66.68
Current liabilities	44.58	41.62	52.35	35.88
Short-term loans	13.04	12.52	37.23	19.80
Accounts payable	13.02	10.95	7.75	11.44
Income received in advance	3.76	3.64	3.41	2.15
Other current liabilities	14.76	14.52	3.96	2.49
Non-current liabilities	8.06	12.40	24.87	30.80
Net worth	47.36	45.97	22.78	33.32

Note: 1. “Fund” as a separated item in 2013 was no longer available in 2014. “Non-current assets” in 2014 is the sum of ”Long-term investment, Fixed asset, and Intangible and other assets “ and the corresponding item in 2013 is calculated accordingly. 2. “Non-current liability”, new item added in 2014, is the sum of “Long-term liability and other liability” and the corresponding item in 2013 is calculated accordingly. 3. “-”: no available data.

Source: Fiscal Information Agency, Ministry of Finance, Business Income Tax Return data (2013-2014).

(2) Long-Term Investment Increased

Funds and long-term investments are investments undertaken by an enterprise for financial or operational reasons, where the investments are held over the long term in forms of stocks, bonds, and so on, that the enterprise does not intend to convert into cash within one year. As can be seen from Table 3-1-1, 2014 saw the long-term investments share of total assets increased for both large

enterprises and SMEs. For SMEs, the long-term investments share increased modestly by 2.02 percentage points (vs. a significant 10.55 percentage points for large enterprises) in 2014, likely indicating conservatism facing challenging business environment with high degree of uncertainty (Table 3-1-1).

(3) SMEs' Fixed Assets Increased Modestly

Fixed assets share of total rose modestly by 0.90 percentage points in 2014 for SMEs, driven by increase in other fixed assets (up 3.40 percentage points) and slight decrease in land and buildings, and machinery (Table 3-1-1).

Table 3-1-2 Consolidated Balance Sheet for Taiwanese SMEs by Industry, 2014

Unit: %

Item \ Industry	Agriculture, forestry, fishing and animal husbandry	Mining and quarrying	Manu-facturing	Electricity and gas supply	Water supply and remediation activities	Construc-tion	Wholesale and retail trade	Transpor-tation and storage	Accommo-dation and food service activities
Current assets	40.09	56.42	59.31	16.73	45.26	84.37	63.86	28.56	24.20
Cash	16.14	18.20	18.39	8.73	20.11	19.31	21.9	17.44	12.53
Accounts receivable	7.74	12.31	20.12	4.54	12.95	19.36	16.25	8.03	4.55
Inventories	6.07	18.97	17.93	0.73	7.98	41.76	21.78	1.52	3.53
Advance payments	8.07	4.04	1.56	0.72	1.57	1.92	1.95	0.86	1.54
Other current assets	2.06	2.90	1.31	2.00	2.64	2.02	1.99	0.72	2.05
Non-current assets	59.92	43.57	40.7	83.28	54.74	15.63	36.14	71.44	75.80
Long-term investment	7.33	0.84	1.60	7.85	10.97	1.14	14.3	4.15	9.75
Fixed asset	49.06	38.30	36.92	73.35	36.13	11.00	18.62	62.11	60.02
Land and buildings	14.69	17.69	22.67	12.49	18.40	4.04	12.56	2.77	42.51
Machinery	29.00	19.00	12.57	57.68	17.05	6.14	4.99	7.56	13.01
Other fixed assets	5.52	1.68	1.69	3.18	0.69	0.83	1.11	0.39	4.50
Intangible and other assets	3.53	4.43	2.18	2.08	7.64	3.49	3.22	5.18	6.03
Total assets =Liabilities + Net worth	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Liabilities	72.18	63.32	66.44	65.48	49.41	67.99	62.42	78.72	70.56
Current liabilities	57.73	56.96	57.86	37.48	40.24	64.60	55.40	33.32	44.11
Short-term loans	21.66	16.79	16.81	11.63	6.91	9.44	13.85	7.53	13.19
Accounts payable	9.87	15.56	20.58	18.33	13.46	13.42	18.07	3.81	7.72
Income received in advance	1.04	0.68	3.28	0.20	4.87	32.27	1.02	0.16	1.45
Other current liabilities	25.15	23.93	17.20	7.33	15.00	9.46	22.46	21.82	21.74
Non-current liabilities	14.45	6.37	8.58	28.00	9.17	3.39	7.02	45.40	26.46
Net worth	27.82	36.68	33.56	34.52	50.59	32.01	37.58	21.28	29.44

Table 3-1-2 Consolidated Balance Sheet for Taiwanese SMEs by Industry, 2014(Continued)

Unit: %

Item \ Industry	Information and communication	Financial and insurance activities	Real estate activities	Professional, scientific and technical activities	Support service activities	Education	Human health and social work activities	Arts, entertainment and recreation	Other service activities
Current assets	52.07	16.99	42.69	57.14	54.95	50.38	42.61	23.26	41.96
Cash	28.67	8.53	9.82	32.20	29.86	30.60	19.12	11.83	22.32
Accounts receivable	11.47	5.73	3.16	13.60	19.07	11.45	21.26	5.44	7.77
Inventories	5.55	0.49	25.12	6.23	1.35	1.52	1.30	2.08	8.82
Advance payments	2.89	0.20	1.58	2.18	1.90	3.01	0.34	1.85	1.04
Other current assets	3.49	2.05	3.01	2.91	2.78	3.79	0.60	2.06	2.01
Non-current assets	47.93	83.00	57.30	42.87	45.05	49.62	57.39	76.73	58.04
Long-term investment	16.13	80.55	15.79	16.80	14.85	11.85	3.32	7.54	34.57
Fixed asset	19.14	1.69	31.52	20.92	23.63	30.02	52.07	59.65	18.56
Land and buildings	11.49	1.50	27.21	14.07	6.60	20.33	37.07	42.57	13.61
Machinery	6.39	0.15	2.29	5.46	13.09	5.37	9.35	12.26	3.94
Other fixed assets	1.35	0.04	2.06	1.42	3.97	4.32	5.65	4.83	1.02
Intangible and other assets	12.66	0.76	9.99	5.15	6.57	7.75	2.00	9.54	4.91
Total assets =Liabilities + Net worth	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Liabilities	55.22	27.23	69.49	51.5	47.22	75.82	51.87	79.72	40.71
Current liabilities	48.54	17.88	50.79	43.33	38.94	65.41	41.47	49.19	32.02
Short-term loans	7.37	9.78	17.10	7.55	9.40	14.87	5.19	13.82	4.21
Accounts payable	14.03	3.21	8.50	11.91	11.91	12.35	14.05	8.68	7.18
Income received in advance	2.52	0.13	3.22	4.04	1.24	11.15	3.39	1.98	3.21
Other current liabilities	24.61	4.76	21.97	19.83	16.39	27.04	18.84	24.71	17.43
Non-current liabilities	6.68	9.35	18.70	8.17	8.28	10.41	10.40	30.52	8.69
Net worth	44.78	72.77	30.51	48.50	52.78	24.18	48.13	20.28	59.29

Source: Fiscal Information Agency, Ministry of Finance, Business Income Tax Return data (2014).

2. Analysis of SME Financial Structure

Looking at the SMEs' debt structure with above examination of the asset allocation of SMEs can give a more comprehensive picture of the SMEs' overall financial status.

(1) Share of Current Liabilities Declined at Almost the Same Pace as Share of Current Assets

As can be seen from Table 3-1-1, share of current liabilities declined at almost the same pace as share of current assets in 2014 for both SMEs (2.96 vs. 3.04 percentage points) and large enterprises (16.47 vs. 15.99 percentage points), showing stable short-term debt servicing capability.

(2) Rising Non-current Liabilities, Large Enterprises in Particular

In 2014, SMEs' non-current liabilities ratio rose by 4.34 percentage points to 12.40 percent, while

large enterprises non-current liabilities ratio rose sharply by 5.93 percentage points to 30.80 percent. Non-current liabilities represent debt that does not have to be repaid within one year, such as bonds payable and long-term bills payable. Most SMEs are family businesses that lack scale, financial transparency, and management skills. Financial institutions are often reluctant to lend to SMEs, hence low long-term liabilities ratio, reflecting inadequate capitalization. A noticeable change was the sharp increase of long-term liabilities ratio in large enterprises that suggested a much optimistic stance to take advantage of low cost funding (Table 3-1-1).

3. Analysis of SMEs' Profit and Loss

(1) Gross Margin Improved as Operating Costs Declined for SMEs

As regards operating costs share of net revenue, operating costs of large enterprises rose slightly while operating costs of SMEs declined slightly from 2013 to 2014. As a result, SMEs' gross margin (referring to "gross operating profit" item in Table 3-1-3) improved modestly by 0.48 percentage points while large enterprises' gross margin declined slight by 0.26 percentage points in 2014 (Table 3-1-3).

Table 3-1-3 Profit and Loss of Taiwanese Enterprises, 2013-2014

Unit: %

Item \ Enterprise size / year	SMEs		Large enterprises	
	2013	2014	2013	2014
Net operating revenue	100.00	100.00	100.00	100.00
Minus: Operating costs	78.79	78.31	88.51	88.77
Gross operating profit	21.21	21.69	11.49	11.23
Minus: Operating expenses	18.69	18.90	7.93	7.56
Net operating profit	2.53	2.79	3.56	3.68
Plus: Non-operating revenue	1.55	1.57	3.15	3.90
Minus: Interest expenses	0.55	0.58	0.36	0.35
Minus: Other non-operating expenses	0.56	0.53	1.79	2.69
Current term profit (before tax)	2.98	3.25	4.55	4.53

Source: Fiscal Information Agency, Ministry of Finance, Business Income Tax Return data (2013-2014).

(2) Operating Expense Rose Slightly

The term "operating expenses" is used to refer to expenditure derived from an enterprise's selling, general & administrative (SG&A) activities, including sales, management, and R&D expenses, and so on. Regardless of size, firms need to constantly think of ways to cut costs and reduce operating expenses.

In 2014, SMEs' operating expenses rose slightly by 0.21 percentage points to 18.90 percent; large enterprises' operating expenses was down by 0.37 percentage points to 7.56 percent. The pronounced disparity between the operating expenses ratio of SMEs and that of large enterprises is mainly due to SMEs' limited scale to reduce average expense and limited bargaining power to lower funding cost. Therefore, SMEs operation results often are highly sensitive to variable costs (Table 3-1-3).

(3) Net Operating Profit Improved for Both SMEs and Large Enterprises

In 2014, SMEs' net operating profit improved 0.26 percentage points to 2.79 percent with lower operating costs more than offsetting slightly higher operating expenses; large enterprises' net operating profit improved 0.12 percentage points to 3.68 percent with lower operating expenses more than offsetting slightly higher operating costs (Table 3-1-3).

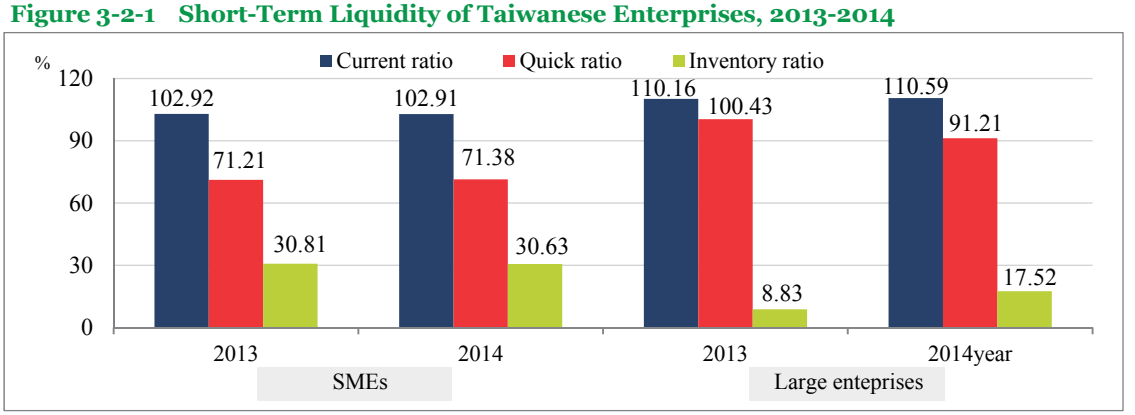
II Analysis of SMEs' Financial Ratios

1. SMEs' Short-Term Debt Servicing Ability Remained Stable

The current ratio is a measure of enterprises' short-term repayment ability; ideally, a company that is in good financial health should have a current ratio of around 200 percent, indicating that the enterprise has NT$2 of current assets available to repay every NT$1 in current liabilities (exception: companies with superior cash generation capability and / or fast turnover ratios could maintain much lower current ratio, hence superior financial efficiency). The reference value for the quick ratio is 100 percent, indicating that the enterprise has NT$1 of current assets that can be quickly converted to cash at close to their book values to repay every NT$1 in current liabilities.

In 2014, there were little change in the current ratio (down 0.01 percentage points), quick ratio (up 0.17 percentage points), and inventory ratio (down 0.18 percentage points) of SMEs; they stood at 102.91 percent, 71.38 percent, and 30.63 percent respectively, showing stable short-term debt servicing capability. On the other hand, while there was slight increase in the current ratio (up 0.43 percentage points) for large enterprises, the quick ratio of large enterprises declined sharply from 100.43 percent to 91.21 percent, a drop of 9.22 percentage points, indicating much lower short-term liquidity and debt servicing ability. 2014 also saw significant rise of large enterprises' inventory ratio (up 8.69 percentage points), showing deteriorated inventory management and / or turnover rate. However, the inventory ratio of large enterprises' was still far below that of SMEs, indicating relative strength of large enterprise in inventory management (Figure 3-2-1).

Figure 3-2-1 Short-Term Liquidity of Taiwanese Enterprises, 2013-2014



Note: 1. Current ratio = current assets ÷ current liabilities × 100% (reference value = 200; ideally, the ratio should be higher than the reference value). 2. Quick ratio = (current assets – inventories) ÷ current liabilities × 100% (reference value = 100; ideally, the ratio should be higher than the reference value). 3. Inventory ratio = inventories ÷ current liabilities × 100% (reference value = 100; ideally, the ratio should be higher than the reference value).
Source: Fiscal Information Agency, Ministry of Finance, Business Income Tax Return data (2013-2014).

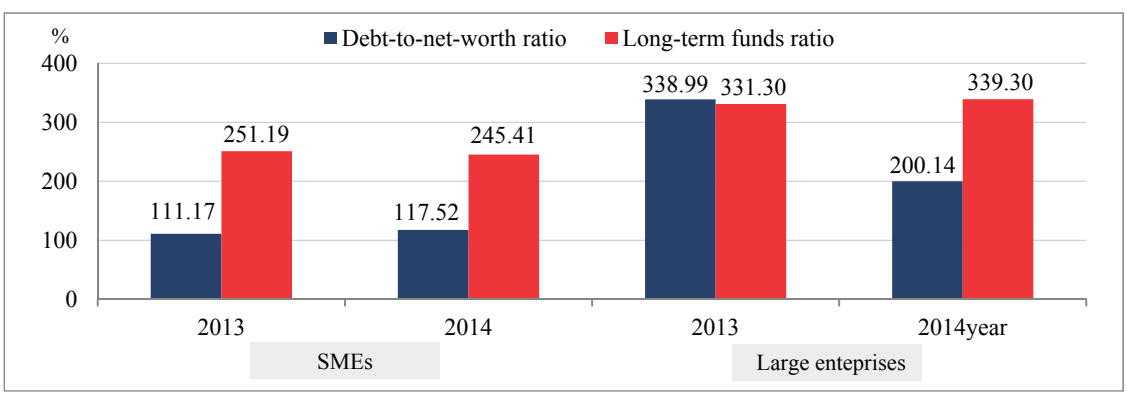
The current ratio remained above 100 but well below 200 for both SMEs and large enterprises. The quick ratio remained below the reference value of 100 percent for both SMEs and large enterprises. However, the quick ratio of large enterprises stood at 91.21 percent in 2014, far above the quick ratio of SMEs at 71.38 percent, indicating relatively poor short-term debt servicing capability of SMEs.

2. SMEs: Rising Debt-to-Net-Worth Ratio and Declining Long-Term Funds Ratio

For the debt-to-net-worth ratio, a reference value of 100 percent is normally used, indicating that the enterprise has NT$1 of capital available for every NT$1 of debt. The higher the debt-to-net-worth ratio, the more heavily leveraged the enterprise is.

In 2013, the average debt-to-net-worth ratio of SMEs was 111.17 percent; in 2014 it rose modestly by 6.35 percentage points to 117.52 percent. For large enterprises, the debt-to-net-worth ratio in 2014 dropped sharply to 200.14 percent (Figure 3-2-2).

Figure 3-2-2 Long-Term Stability of Taiwanese Enterprises, 2013-2014



Note: 1. Debt-to-net-worth ratio = debt ÷ net worth × 100% (reference value = 100; ideally, the ratio should be below the reference value).
2. Long-term funds ratio = (equity + long-term debt) ÷ fixed assets × 100% (reference value = 100; ideally, the ratio should be above the reference value).
Source: Fiscal Information Agency, Ministry of Finance, Business Income Tax Return data (2013-2014).

The fact that the SMEs' debt-to-net-worth ratio was higher than the reference value meant higher credit risk, and potentially declining long-term financial stability. The debt-to-net-worth ratio of large enterprises is far higher than the reference value, indicating that large enterprises are resorting to a high level of financial leverage. In an era of low interest rates, when the economy is starting to pick up again, taking on a reasonable level of leverage through low-interest borrowing can help firms to achieve higher earnings; however, enterprises must be careful not to become over-leveraged, otherwise the firm's financial health may be threatened.

The long-term funds ratio is mainly used to gauge whether a firm's long-term funding operations are appropriate. Ideally, enterprises should rely mainly on long-term funds for their funding of fixed asset purchases. In 2014, the long-term funds ratio of SMEs fell slightly to 245.41 percent, down 5.78 percentage points. During the same period, the long-term funds ratio of large enterprises rose

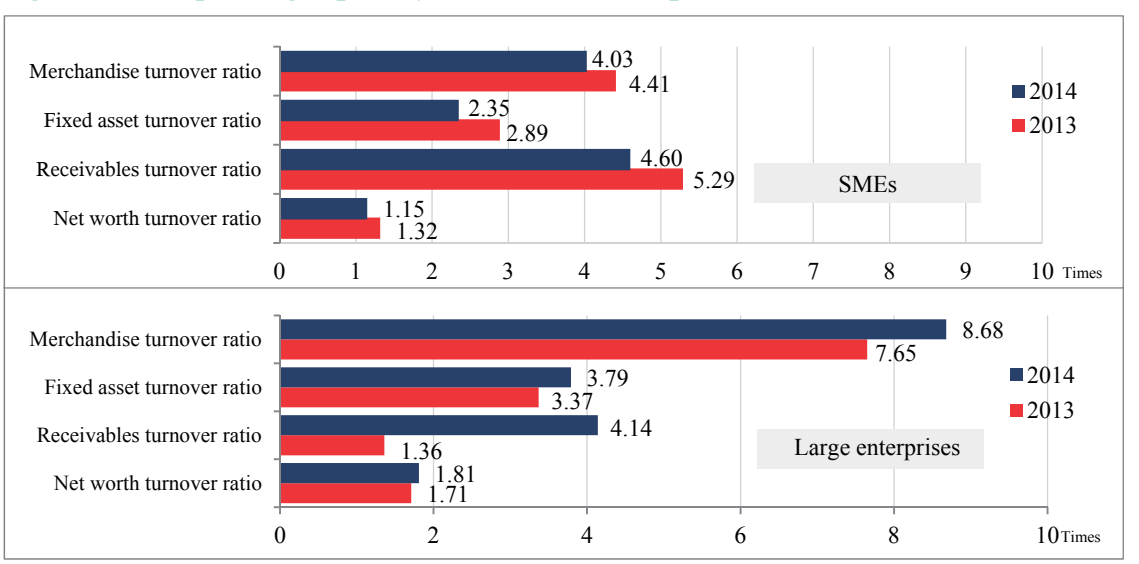
modestly to 339.30 percent, up 8.00 percentage points. Both ratios were much higher than the reference value of 100 percent. This indicated that SMEs assumed more credit risk year on year, however, they were still far conservative than large enterprises which had much higher debt-to-net-worth ratio but at the same time had more resource in investment as shown by much higher long-term funds ratio (Figure 3-2-2).

3. SMEs' Operational Efficiency Down Modestly

An enterprise's operational efficiency can be gauged by examining its efficient utilization of merchandise, fixed asset, and capital, as well as efficiency of collections. Merchandise turnover is an indicator that can be used to determine whether an enterprise is managing to achieve a reasonable balance between inventory and sales; fixed asset turnover is used to measure the efficiency of utilization of a firm's buildings, machinery, land and other fixed assets; receivables turnover measures the efficiency of a company's collection activities. Net worth turnover denotes the ratio of net sales to net worth; if this figure is too high, it could imply that the enterprise has insufficient capital and is too aggressive; if it is too low, it may indicate that the firm has too much capital, or that its sales revenue is too low. Other things being equal, a company with a high net worth turnover rate is earning a greater rate of income on its net worth than a company with a low turnover rate.

Examination of the data in 2014 shows that receivables turnover for SMEs declined modestly to 4.60 from 5.29 in 2013, and merchandise turnover also decreased mildly from 4.41 to 4.03. However, receivables turnover for large enterprises rose sharply to 4.14 from 1.36 in 2013, and merchandise turnover also rose modestly from 7.65 to 8.68, suggesting that the SMEs' operating efficiency was down modestly while that of the large enterprises improved significantly in 2014 (Figure 3-2-3).

Figure 3-2-3 Operating Capability of Taiwanese Enterprises, 2013-2014



Note: 1. Net worth turnover ratio = net sales / net worth. 2. Receivables turnover ratio = net sales / receivables.
3. Fixed asset turnover ratio = net sales / fixed assets. 4. Merchandise turnover ratio = net sales / inventories.

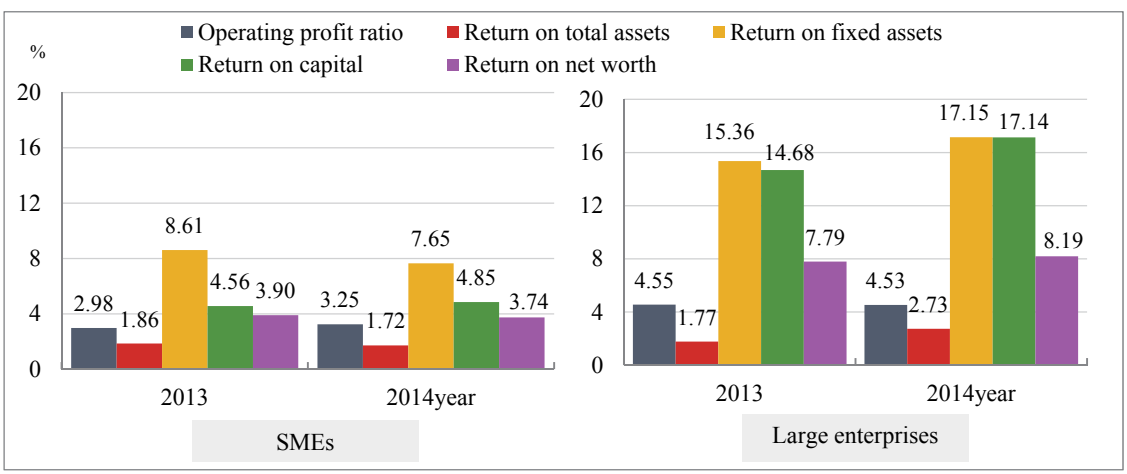
Source: Fiscal Information Agency, Ministry of Finance, Business Income Tax Return data (2013-2014).

Examination of the net worth turnover and fixed asset turnover indicators shows that, for SMEs, fixed asset turnover declined from 2.89 in 2013 to 2.35 in 2014, while net worth turnover also decreased from 1.32 to 1.15. For large enterprises, fixed asset turnover rose from 3.37 in 2013 to 3.79 in 2014, and net worth turnover also rose from 1.71 to 1.81. It is clear that SMEs performed relatively worse in 2014 and also compared unfavorably in fixed asset efficiency as they lacked the scale that large enterprises had (Figure 3-2-3).

4. SMEs Improved Operating Profits and Return on Capital Modestly

2014 saw modestly improved operating profits (to 3.25 percent from 2.98 percent in 2013) and return on capital (to 4.85 percent from 4.56 percent in 2013) for SMEs. However, SMEs was down slightly in terms of return on fixed assets, return on total assets, and return on net worth. Relatively, large enterprises performed far better in terms of return on fixed assets, return on total assets, and return on net worth due to the scale advantage (Figure 3-2-4).

Figure 3-2-4 Profitability of Taiwanese Enterprises, 2013-2014



Note:
1. Operating profit ratio = current profit ÷ net operating income × 100%.
2. Return on total assets = current profit ÷ total assets × 100%.
3. Return on fixed assets = current profit ÷ fixed assets × 100%.
4. Return on capital = current profit ÷ net worth × 100%.
5. Return on net worth = current profit ÷ net worth × 100%.

Source: Fiscal Information Agency, Ministry of Finance, Business Income Tax Return data (2013-2014).

III SME Funding and Financing

Funding is the lifeline of an enterprise, and this is particularly true for SMEs that typically lack adequate funds. Ready access to funds and efficient fund management are among the keys to the successful operation of SMEs.

The sources of SME finance are from internal organic growth and / or external funding such as private lending, commercial loans, bond or equity financing, and government programs; the channels of finance are direct financing through financial markets (stock and bond) and indirect financing

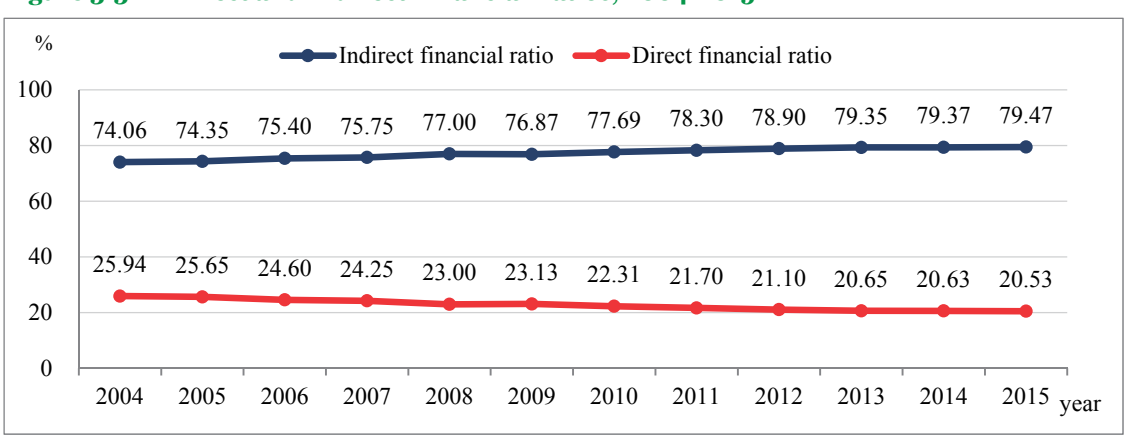
through financial intermediaries, such as banks and finance companies. SMEs are typically heavily reliant on indirect financing as compared to their larger counterparts.

1. Indirect Financing Remains Main Funding Source

The trend towards diversification in financial services has been accompanied by a similar broadening of the funding channels available to business enterprises. However, SMEs and their owners tend to have insufficient knowledge of the range of financing tools that are now available, and in many cases they are unable to provide the comprehensive financial statements needed to secure direct financing. As a result, indirect financing has been growing for SMEs with the help from the government policy measures, while direct financing currently accounts for only a very small percentage of overall SME financing.

According to the report *Direct Financial and Indirect Financial Stock Analysis*, compiled by the Central Bank of the Republic of China (Taiwan), since 2004, the proportion of indirect financing continued to show steady growth while the proportion of direct financing has been declining, but the growing pace of indirect financing slowdown in recent years. In 2015, the proportion of indirect financing accounted for 79.47 percent while the remaining 20.53 percent was direct financing (Figure 3-3-1).

Figure 3-3-1 Direct and Indirect Financial Ratios, 2004-2015

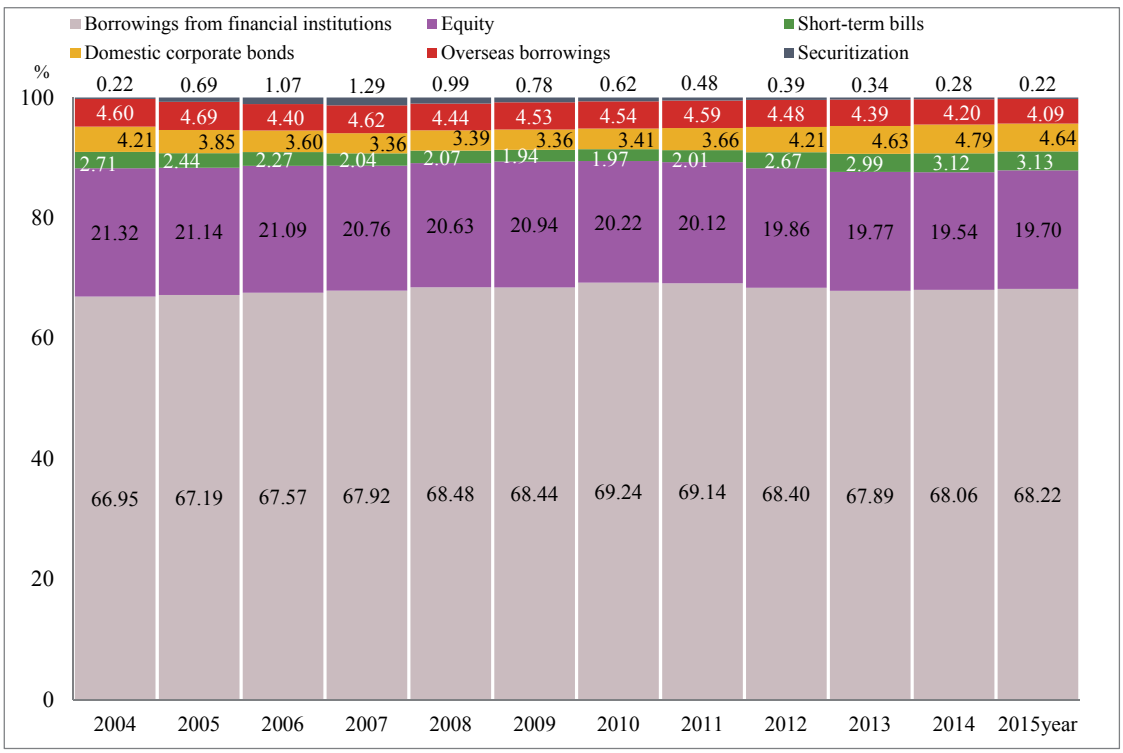


Source: Central Bank of the Republic of China, *Direct Financial and Indirect Financial Stock Analysis*, May 2016.

In terms of the structure of their liabilities, large, medium- and small-sized enterprises in Taiwan are all heavily reliant on borrowings from financial institutions and accounting for 68.22 percent of the total debt in 2015 for all enterprises (up 0.16 percentage points from 2014). The direct financing through equity accounted for 19.70 percent in 2015, up slightly from 19.54 percent in 2014. The direct financing through securitization accounted for a mere 0.22 percent in 2015 (Figure 3-3-2).

Share of domestic corporate bonds declined modestly to 4.64 percent while share of short-term bills picked up slightly to 3.13 percent. Since 2011, share of overseas borrowings has been down from 4.59 percent to 4.09 percent in 2015 (Figure 3-3-2).

Figure 3-3-2 Comparison of Enterprise Financing Channels, 2004-2015



Note:

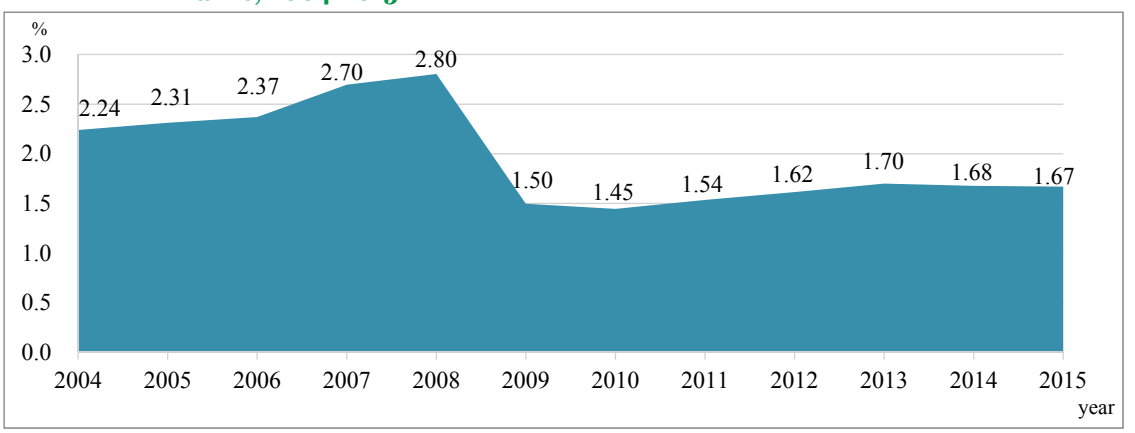
1. Financial institutions include Central Bank, other monetary institutes and life insurance companies.
2. Financial institutions loan includes collection and bad debt write-off.
3. Enterprise financing channels do not include financial institutions investments and government bond.

Source: Central Bank of the Republic of China, *Direct Financial and Indirect Financial Stock Analysis* (May 2016).

2. Borrowing Cost Has Been Down

From June 2010 to July 2011, the Central Bank increases its benchmark discount rate five times from 1.250 percent to 1.875 percent in order to avoid economic overheating and counter rising inflation expectation. It had held the discount rate steady until 2015, during which the Central Bank cut its benchmark discount rate from 1.875 percent to 1.625 percent in order to fight economic recession in Taiwan while global economic growth slowed down. The Central Bank data show that the average interest rate on new loans (weighted averages for the month of December in each year) extended by Taiwan's five largest banks had fallen steadily from 8.26 percent in 1998 to 2.24 percent in 2004. In 2005, the rate rose to 2.31 percent, and in 2008 it climbed further to 2.80 percent. The average interest rate on new loans then fell back to 1.50 percent in 2009 due to aggressive easing of the Central Bank amid global financial crisis and recession. In 2015, the average interest rate on new loans was slightly down to 1.67 percent from 1.68 percent in 2014 (Figure 3-3-3).

Figure 3-3-3 The Average Interest Rate on New Loans Extended by Taiwan's Five Largest Banks, 2004-2015



Note:

1. The interest rates given in the figure are weighted averages for the month of December in each year.
2. Up until October 2008, the five largest banks in Taiwan were the Bank of Taiwan, Taiwan Cooperative Bank, First Commercial Bank, Hua Nan Commercial Bank and Chang Hwa Commercial Bank; from November 2008 onwards the five largest banks were the Bank of Taiwan, Taiwan Cooperative Bank, First Commercial Bank, Hua Nan Commercial Bank and Land Bank of Taiwan.

Source: Central Bank of the Republic of China, Statistical Database, accessed May 2016, http://www.pxweb.cbc.gov.tw/dialog/statfile9.asp.

3. SMEs: Narrow Funding Sources

SMEs and their owners tend to have insufficient knowledge of the range of financing tools that are now available, and in many cases they are unable to provide the comprehensive financial statements needed to secure direct financing. As a result, small-sized enterprises' funding sources were mostly limited to borrowings from financial institutions (up to 55.48 percent from 2013) and commercial credit (down to 43.92 percent from 2013), a combined share of 99.40 percent in 2014; medium-sized enterprises' funding sources were also mostly limited to borrowings from financial institutions (up to 51.98 percent from 2013) and commercial credit (down to 46.42 percent from 2013), a combined share of 98.40 percent in 2014. Large enterprises' funding sources were not as heavily reliant on indirect financing as SMEs, but still highly dependent on borrowings from financial institutions (down slightly to 39.11 percent from 2013) and commercial credit (slightly up to 48.31 percent from 2013), a combined share of 87.42 percent in 2014 (Table 3-3-1).

4. Continuous Increase in Total Bank Loans to SMEs in 2015

As of the end of 2015, the total outstanding loans of SMEs from ordinary commercial banks in Taiwan (including the Taiwan branches of foreign banks, but excluding overseas loans) came to NT$5.47 trillion, a record high, representing an increase of 5.77 percent compared to the end of 2014, significantly higher than the 3.05 percent overall growth rate of outstanding loans to all enterprises from ordinary commercial banks in Taiwan, mostly driven by government measures to strengthen SME financing from domestic banks. Share of total outstanding loans for SMEs also increased to 24.48 percent from 23.85 percent in 2014 (Figure 3-3-4).

Table 3-3-1 Corporate Liability Structure as of the End of 2014

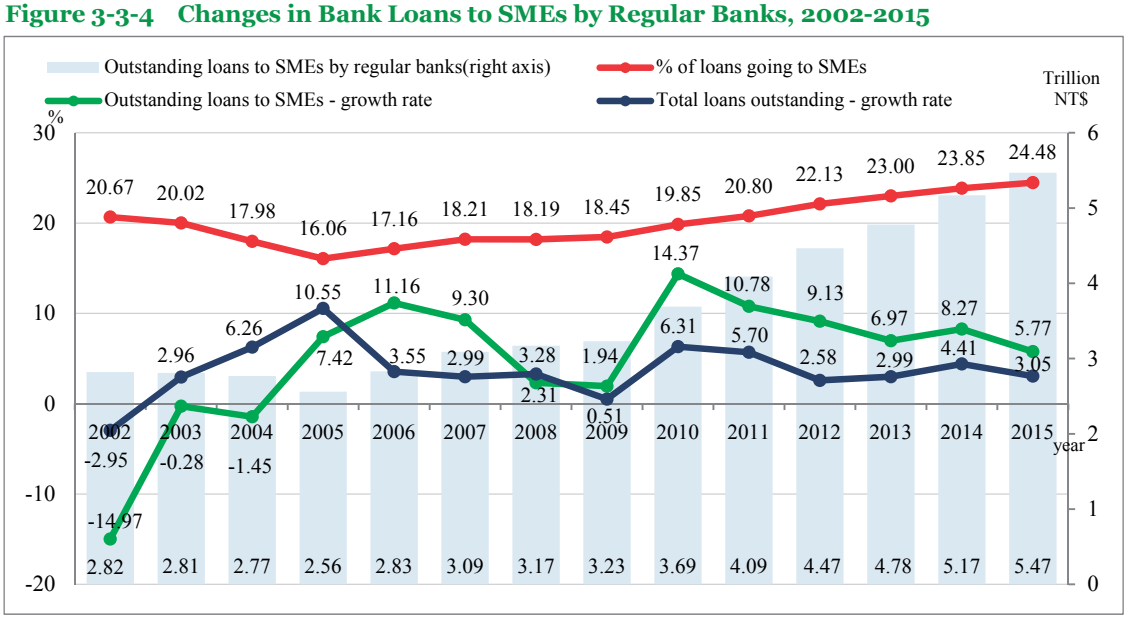
Unit: Thousand NT$; %

Item	Large enterprises		Medium-sized enterprises		Small-sized enterprises	
	Amount	Share	Amount	Share	Amount	Share
Total liabilities	21,155,183,638	100.00	4,862,330,925	100.00	810,626,850	100.00
Borrowings from financial institutions	8,274,385,585	39.11	2,527,486,112	51.98	449,764,356	55.48
Government loans	16,683,024	0.08	1,118,508	0.02	57,329	0.01
Borrowings from firms and individuals	281,592,853	1.33	44,464,840	0.91	4,359,999	0.54
Overseas borrowings	110,670,915	0.52	2,864,479	0.06	147,594	0.02
Transactions with repurchase clause	-	-	-	-	-	-
Short-term bills	530,414,880	2.51	8,102,066	0.17	10,711	0.00
Domestic corporate bonds	1,065,847,734	5.04	-	-	53	0.00
Overseas securities	79,195,715	0.37	-	-	-	-
Commercial credit (Trading liabilities)	10,220,516,632	48.31	2,256,930,308	46.42	356,022,634	43.92
Provisions and other liabilities	575,876,301	2.72	21,364,611	0.44	264,174	0.03

Note: 1. "-" denotes no data available or data uncertain; "0" is used to denote any figure of less than NT$500.
2. Data may not sum to total due to rounding.
3. An enterprise with total asset NT$300 million or more is classified as a large enterprise; a medium-sized enterprise: between NT$25 million and NT$300 million; a small enterprise: less than NT$25 million.

Source: Central Bank of the Republic of China, *Survey Report of the Financial Conditions of Private and Public Enterprises* (January 2016).

Figure 3-3-4 Changes in Bank Loans to SMEs by Regular Banks, 2002-2015



Note: Total loans oustanding= (regular banks' outstanding loans to SMEs, overdue loans included) ÷ (loans to SMEs as a percentage of total loans).
Source: Banking Bureau, Financial Supervisory Commission, *Statistics of Banking Business*.

5. The Concentration - Share of Top 10 and Top 8 Banks Was Down

The top 10 banks with loans outstanding to SMEs are mostly state-run banks, with the market share up to 72.45 percent in 2015, of which 64.46 percent came from the top 8 state-run banks. The concentration, share of top 10 and top 8 banks was down slightly from the previous year, at 72.61 percent and 65.85 percent, respectively (Table 3-3-2).

Table 3-3-2 Top 10 Banks by Amount of Loans to SMEs in 2015

Unit: Million NT$; %

Bank	Loans outstanding	Market share	Loans to SMEs as percent of total loans
Total	5,470,092	72.45	-
First Commercial Bank	608,232	11.12	49.93
Taiwan Cooperative Bank	561,766	10.27	31.49
Taiwan Business Bank	457,910	8.37	48.58
Hua Nan Commercial Bank	430,241	7.87	33.31
Mega International Commercial Bank	400,830	7.33	34.75
Chang Hwa Commercial Bank	385,264	7.04	34.26
Land Bank of Taiwan	343,131	6.27	21.47
Bank of Taiwan	338,493	6.19	15.37
E. Sun Commercial Bank	264,032	4.83	29.81
The Shanghai Commercial & Savings Bank	172,915	3.16	38.96

Note: "-": not applicable.
Source: Banking Bureau, Financial Supervisory Commission, *Statistics of Banking Business* (2016).

6. Private Banks Active in Lending to SMEs

Along with the introduction of various government measures of providing preferential loans to SMEs, private banks' SME loans increased substantially in 2014 and 2015 as showed in Financial Supervisory Commission data. In terms of annual growth rate from 2014 to 2015, the top ten private banks saw SME loans growth between 2.30 percent and 24.94 percent (except slight drop of one bank: Shin Kong Bank) with loan balances between NT$99 billion and NT$264 billion (Table 3-3-3).

Table 3-3-3 Top 10 Private Banks by Amount of Loans to SMEs in 2015

Unit: Million NT$; %

Bank	Loans outstanding by the end of 2014	Loans outstanding by the end of 2015	Annual growth rate
E. Sun Commercial Bank	239,965	264,032	10.03
The Shanghai Commercial & Savings Bank	156,315	172,915	10.62
Taichung Commercial Bank	161,224	164,928	2.30
CTBC Bank	128,686	150,250	16.76
Bank SinoPac	120,977	131,690	8.86
Shin Kong Bank	127,283	121,469	-4.57

Bank	Loans outstanding by the end of 2014	Loans outstanding by the end of 2015	Annual growth rate
Cathay United Bank	116,454	118,841	2.05
Taipei Fubon Bank	93,431	116,737	24.94
Yuanta Bank	94,360	105,114	11.40
Taishin International Bank	90,843	99,374	9.39

Source: Banking Bureau, Financial Supervisory Commission, *Statistics of Banking Business* (2016).

CHAPTER 4

SMEs: Human Resources

Taiwan's economic growth rate declined significantly to a mere 0.65 percent in 2015, amid worse-than-expected global economic recovery. However, human resource in Taiwan showed steady growth. According to Directorate-General of Budget, Accounting and Statistics of Executive Yuan, employed persons increased by about 119,000 people with a modest improved participation rate at 58.65 percent in 2015. The unemployment rate averaged 3.78 percent over the course of the year, a drop of 0.18 percentage points from 3.96 percent in 2014.

This chapter is divided into three sections. Section I examines SME human resources utilization (in terms of scales, industries, and characteristics of employed and unemployed persons such as age, sex, and education); Section II discusses working conditions (including average working hours and salary by industries); Section III covers talent development in 2015 (including government's subsidized programs, various SMEs' training and counseling results, and 2016 human resource demand).

An SME is defined as an enterprise with less than 200 regular employees in mining and quarrying, manufacturing, and construction industries, or an enterprise with less than 100 regular employees in other industries.

I Labor Utilization by SMEs

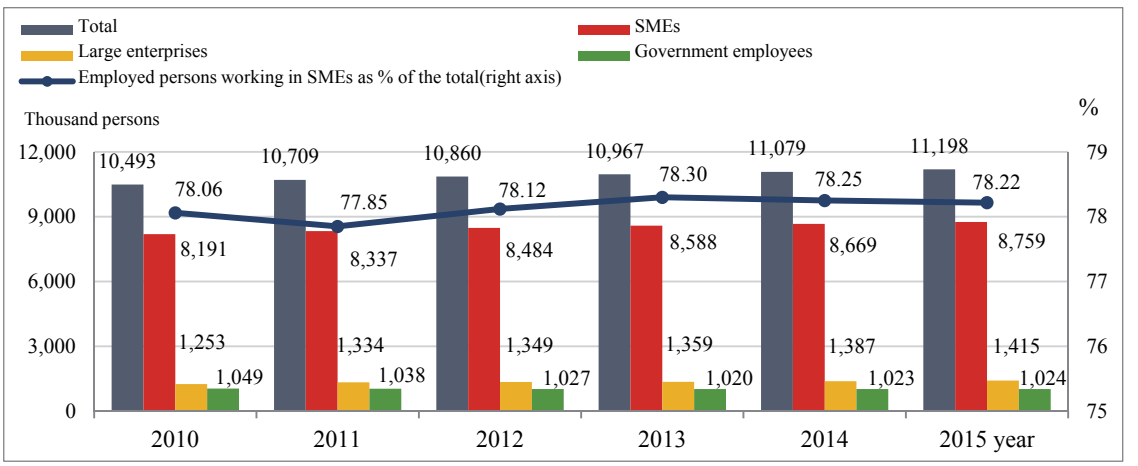
1. SMEs Provided Labor Market Stability

In 2015, employed persons (including employers, own-account workers, paid employees and unpaid family workers) in Taiwan totaled 11,198,000 people. The number of employed persons working in SMEs in Taiwan totaled 8,759,000, up 1.03 percent from 2014 and accounted for 78.22 percent of all employed persons in Taiwan; large enterprises employed 1,415,000 persons and accounted for 12.64 percent, up 2.04 percent; the government employed 1,024,000 persons and accounted for 9.14 percent, up 0.09 percent.

Compared to large enterprise, SMEs have functioned as a more stabilizing force in labor market through many business and economic cycles. In 2009, the total number of employed persons in Taiwan decreased by 1.19 percent after the global financial crisis; while number of employed persons in large enterprises fell 20.69 percent, SMEs still managed to hire 1.26 percent more persons (or 100,000 more). From 2010 to 2015, SMEs continued to hire more amid multiple challenges from tough business environment, showing consistent growth at 1.55 percent (or 125,000 in 2010), 1.78

percent (or 146,000 in 2011), 1.76 percent (147,000 in 2012), 1.22 percent (or 104,000 in 2013), 0.95 percent (or 81,000 in 2014), and 1.03 percent (or 90,000 in 2015), respectively (Figure 4-1-1).

Figure 4-1-1 Number of Employed Persons in Taiwan, 2010-2015



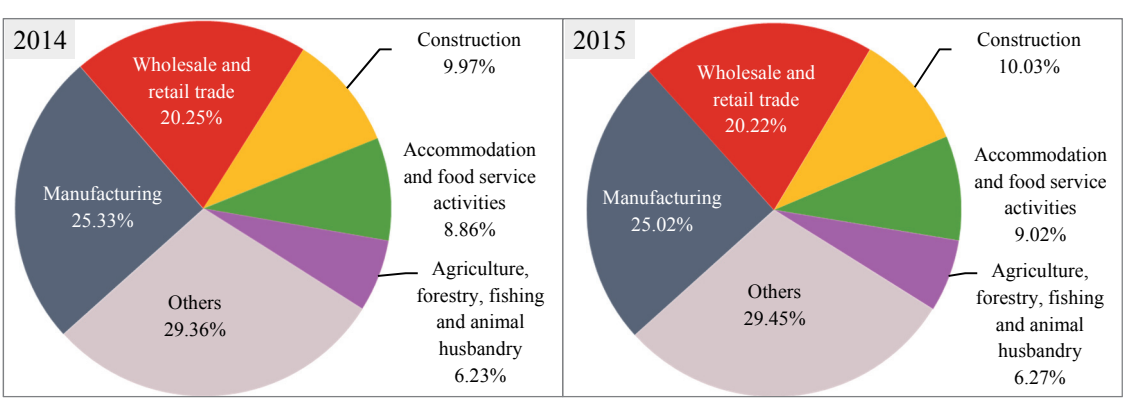
Note: An SME is defined as an enterprise with less than 200 regular employees in mining and quarrying, manufacturing, and construction industries, or an enterprise with less than 100 regular employees in other industries.

Source: Directorate-General of Budget, Accounting and Statistics, *Manpower Survey* data (2010-2015).

In terms of industries, the number of employed persons working in SMEs in the manufacturing industry in 2015 stood at 2,192,000, accounting for 25.02 percent of all SME employed persons. The wholesale and retail trade industry had the second largest number of employed persons working in SMEs, or 1,771,000 (20.22 percent), followed by the construction industry, with 878,000 employees (10.03 percent). 2015 saw employment growth in all sectors with stable distribution (Appendix C Table C-5, Figure 4-1-2).

In terms of shares of employed persons by sector, there has been a clear trend of decreased share of Industrial sector in the period from 2013 to 2015 (35.85 percent. 35.79 percent, and 35.52 percent, respectively) and increased share of Service sector in the same period (57.85 percent. 57.94 percent, and 58.21 percent, respectively).

Figure 4-1-2 Top Five Industry Shares of Employed Persons Working in SMEs, 2014-2015

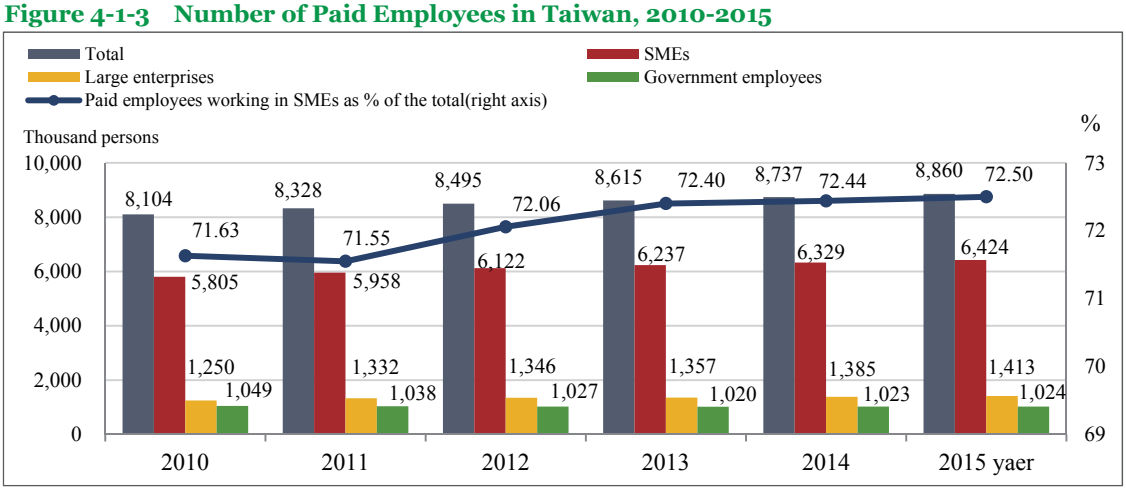


Source: Directorate-General of Budget, Accounting and Statistics, *Manpower Survey* data (2014-2015).

2. More Than 72 Percent Paid Employees Working for SMEs in 2015

The total number of paid employees in Taiwan averaged 8,860,000 in 2015 (including government employees and private company employees), representing an increase of 1.41 percent from 2014; the number of paid employees, 6,424,000 or 72.50 percent were working in SMEs, up 1.49 percent compared to 2014; paid employees working in large enterprises and government rose 1.99 percent and 0.09 percent, respectively. The number of paid employees working in SMEs as well as in large enterprises has increased consistently since 2011. The number of paid employees working in government fell consistently in the period from 2011 to 2013, and then increased slightly in 2014 and 2015 (Figure 4-1-3).

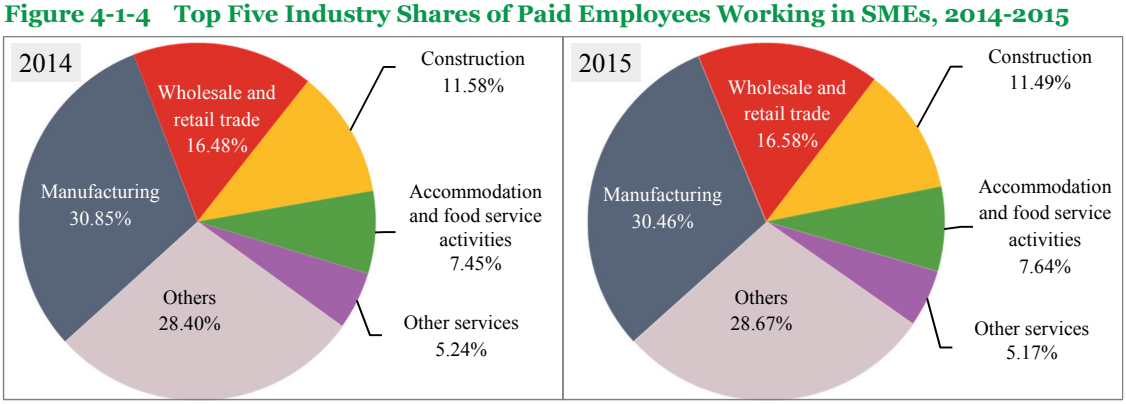
Figure 4-1-3 Number of Paid Employees in Taiwan, 2010-2015



Source: Directorate-General of Budget, Accounting and Statistics, Manpower Survey data (2014-2015).

In terms of industry distribution, paid employees showed the same pattern as employed persons. The number of paid employees working in SMEs in the manufacturing industry in 2015 stood at 1,956,000, accounting for 30.46 percent of all SME paid employees. The wholesale and retail trade industry had the second largest number of paid employees working in SMEs, or 1,065,000 (16.58 percent), followed by the construction industry, with 738,000 employees (11.49 percent) (Appendix C Table C-6, Figure 4-1-4).

Figure 4-1-4 Top Five Industry Shares of Paid Employees Working in SMEs, 2014-2015



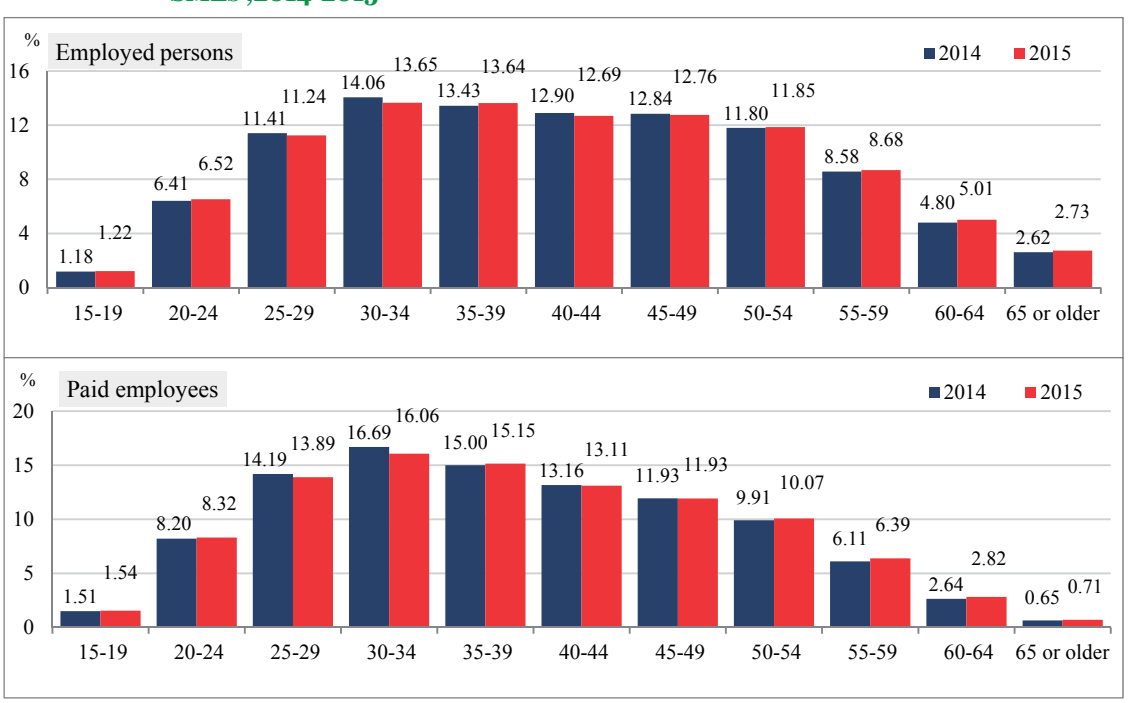
Source: Directorate-General of Budget, Accounting and Statistics, *Manpower Survey* data (2014-2015).

In terms of shares of paid employees by sector, there has been a clear trend of decreased share of Industrial sector in the period from 2013 to 2015 (43.05 percent. 42.98 percent, and 42.48 percent, respectively) and increased share of Service sector in the same period (55.59 percent. 55.71 percent, and 56.17 percent, respectively).

3. The Share of SMEs' Manpower with College Education Increased Gradually

In 2015, the proportion of employed persons working in SMEs was highest at 13.65 percent in between the ages of 30 and 34, followed by those between 35 and 39 at 13.64 percent and those between 45 and 49 at 12.76 percent; the proportion of paid employees working in SMEs was highest at 16.06 percent between the ages of 30 and 34, followed by those between 35 and 39 at 15.15 percent and those between 25 and 29 at 13.89 percent (Figure 4-1-5).

Figure 4-1-5 Age Structure of Employed Persons and Paid Employees Working in SMEs ,2014-2015



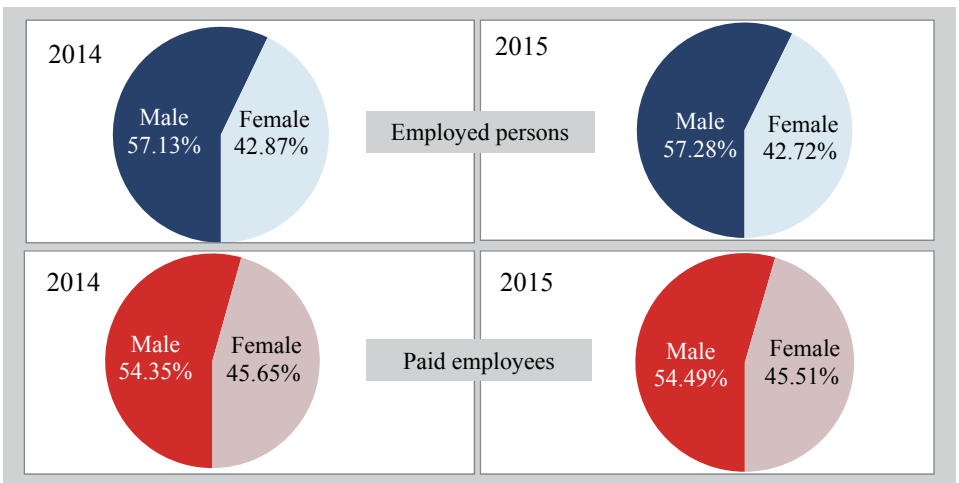
Source: Directorate-General of Budget, Accounting and Statistics, *Manpower Survey* data (2014-2015).

The male / female ratio of employed persons (57.28 percent / 42.72 percent) or paid employees (54.49 percent / 45.51 percent) in SMEs was far greater than one and more so in 2015; in 2014, the male / female ratio of employed persons (57.13 percent / 42.87 percent) or paid employees (54.35 percent / 45.65 percent) in SMEs was also greater than one, which shows that employment continues to be male-oriented and more so in 2015 (Figure 4-1-6).

As can be seen from the educational structure, the highest proportion of employed persons (or paid employees) working in SMEs consisted of those with a vocational education in 2015 at 27.19

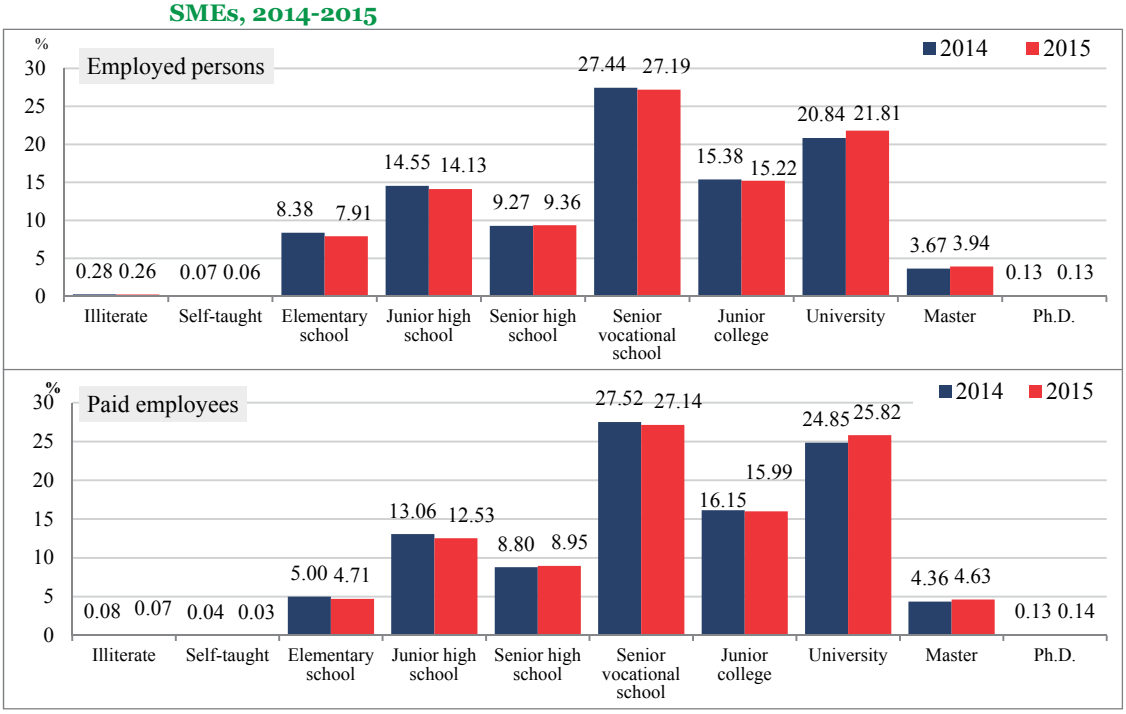
percent (or 27.14 percent of paid employees), followed by those with university education (21.81 percent employed persons or 25.82 percent of paid employees) and by those with junior college education (15.22 percent employed persons or 15.99 percent of paid employees). That was consistent with Taiwan's higher education expansion policy (Figures 4-1-7).

Figure 4-1-6 Male / Female Ratio of Employed Persons and Paid Employees Working in SMEs, 2014-2015



Source: Directorate-General of Budget, Accounting and Statistics, *Manpower Survey* data (2014-2015).

Figure 4-1-7 Educational Structure of Employed Persons and Paid Employees Working in SMEs, 2014-2015



Source: Directorate-General of Budget, Accounting and Statistics, *Manpower Survey* data (2014-2015).

4. The Number of SME Employers Declined in 2015

There were around 449,000 SME employers and approximately 2,240 large enterprise employers in 2015. The number of SME employers declined by about 8,000 or 1.71 percent from 2014 while the number of large enterprise employers increased by about 870 or 63.77 percent. The age structures of SME employers showed that they were younger than large enterprise employers, and the educational structure distribution was broader (Table 4-1-1).

Table 4-1-1 Characteristics of Employers, 2014-2015

Unit: Thousand persons; %

Item \ Year	2014		2015	
	SMEs	Large enterprises	SMEs	Large enterprises
No. of employers	456.84	1.37	448.76	2.24
Share of total	99.70	0.30	99.50	0.50
Age	100.00	100.00	100.00	100.00
15 – 19	-	-	0.02	-
20 – 24	0.27	-	0.26	-
25 – 29	1.91	-	1.61	-
30 – 34	5.50	-	5.65	-
35 – 39	9.18	14.79	9.52	10.61
40 – 44	14.39	2.94	13.52	1.97
45 – 49	18.10	12.27	17.65	1.45
50 – 54	19.41	27.04	19.43	9.49
55 – 59	16.57	12.67	16.37	34.95
60 – 64	10.19	5.92	10.58	16.91
65 or older	4.47	24.38	5.38	24.62
Sex	100.00	100.00	100.00	100.00
Male	80.96	49.96	80.94	81.61
Female	19.04	50.04	19.06	18.39
Education	100.00	100.00	100.00	100.00
Illiterate	0.05	-	0.02	-
Self-taught	0.01	-	0.08	-
Elementary school	7.69	-	7.02	-
Junior high school	14.42	-	14.32	-
Senior high school	10.36	-	9.96	4.63
Senior vocational school	26.05	24.66	26.91	4.56
Junior college	20.00	3.77	19.84	16.90
University	16.36	35.34	16.68	35.42
Master	4.57	36.23	4.72	35.22
Ph.D.	0.49	-	0.44	3.28

Note: "-" denotes no available data.

Source: Directorate-General of Budget, Accounting and Statistics, *Manpower Survey* data (2014-2015).

5. The Number of Self-Employed Persons Rose; the Share of Self-Employed in the 29-39 Age Group Increased in 2015

The self-employed either work alone or as part of a partnership, but they do not have any paid employees. Self-employed persons can thus all be classed as SMEs. The number of self-employed persons in Taiwan peaked in 1991-1992 at around 1,572,000, and then declined consistently, dropping to 1,310,000 in 2014, down about 7,000 from 2013. In 2015, however, the number of self-employed persons in Taiwan rose by about 3,000 and reached 1,313,000 from 2014.

As can be seen from the age structure, the shares of self-employed in the 50-54 age group was the highest at about 17.43 percent in 2015, followed by the 55-59 age group (15.88 percent), and the 45-49 age group (14.98 percent). The share of self-employed in the 20-39 age group increased in 2015. In terms of education, the share of self-employed with senior vocational education was the highest at 25.46 percent, followed by those with junior high school education at 21.39 percent, and by those with elementary school education at 21.31 percent. Compared to 2014, the shares of self-employed with university and master education degree increased slightly in 2015 while and the shares of self-employed with PhD degree declined slightly (Table 4-1-2)

Table 4-1-2 Characteristics of Self-Employed Persons, 2014-2015

Unit: Thousand persons; %

Item \ Year	2014	2015
No. of self-employed persons	1,310	1,313
Age	100.00	100.00
15 – 19	0.05	0.05
20 – 24	0.71	0.80
25 – 29	2.45	2.80
30 – 34	5.53	5.54
35 – 39	8.25	8.56
40 – 44	11.69	11.08
45 – 49	15.54	14.98
50 – 54	17.32	17.43
55 – 59	16.14	15.88
60 – 64	12.11	12.51
65 or older	10.19	10.36
Sex	100.00	100.00
Male	74.45	74.71
Female	25.55	25.29
Education	100.00	100.00
Illiterate	0.98	0.87
Self-taught	0.18	0.15
Elementary school	22.04	21.31
Junior high school	21.21	21.39
Senior high school	10.68	10.51
Senior vocational school	25.38	25.46
Junior college	11.23	10.93
University	7.05	7.91
Master	1.20	1.42
Ph.D.	0.06	0.05

Source: Directorate-General of Budget, Accounting and Statistics, *Manpower Survey* data (2014-2015).

6. Number of Unemployed Persons Previously Working for SMEs Fell in 2015

In 2015, the number of unemployed persons in Taiwan fell by approximately 17,000 (or 3.75 percent) and the unemployment rate fell to 3.78 percent from 3.96 percent in 2014. Apart from the first time job-seekers, the number of unemployed persons who had previously been working for SMEs fell significantly by 11.75 percent to 268,000 in 2015 from 303,000 in 2014; the number of unemployed who had previously been working for large enterprises declined by a mere 0.74 percent to 31,000 in 2015 from 32,000 in 2014; the number of unemployed who had previously been working for government declined 11.93 percent to 15,000 in 2015 from 17,000 in 2014; and the number of unemployed who were the first time job-seekers declined 3.62 percent to 101,000 in 2015 from 105,000 in 2014 (Table 4-1-3).

Table 4-1-3 Characteristics of the Unemployed, 2014-2015

Unit: Thousand persons; %

Item \ Year	2014				2015			
	SMEs	Large enterprises	Government	First time job-seekers	SMEs	Large enterprises	Government	First time job-seekers
No. of the unemployed	302.94	31.67	17.14	104.95	267.88	31.44	15.10	101.15
Share of total	66.33	6.93	3.75	22.98	60.94	7.15	3.43	24.34
Age	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
15 – 19	1.49	1.31	0.45	5.45	1.52	0.77	0.15	4.84
20 – 24	12.45	9.74	4.70	56.75	12.94	9.07	8.05	52.08
25 – 29	18.91	19.44	21.22	28.74	19.49	18.82	23.51	28.34
30 – 34	17.20	24.40	15.57	6.39	17.24	24.95	30.02	8.77
35 – 39	14.23	15.63	13.70	1.84	15.06	19.68	8.75	3.99
40 – 44	10.92	11.63	10.15	0.33	9.98	11.57	8.13	1.12
45 – 49	10.09	7.10	11.44	0.01	10.43	7.84	4.15	0.54
50 – 54	7.73	5.73	10.15	0.38	7.69	5.00	9.71	0.25
55 – 59	5.21	4.50	8.70	0.00	4.34	1.78	4.55	0.07
60 – 64	1.70	0.52	3.92	0.12	1.28	0.54	2.63	-
65 or older	0.08	0.00	0.00	0.00	0.03	-	0.35	-
Sex	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Male	63.30	60.98	43.24	53.98	61.17	63.81	38.99	53.47
Female	36.70	39.02	56.76	46.02	38.83	36.19	61.01	46.53
Education	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Illiterate	0.03	-	-	-	0.04	-	-	-
Self-taught	0.02	-	-	-	0.01	-	-	-
Elementary school	4.94	0.49	5.39	0.17	3.12	0.45	2.88	0.12
Junior high school	16.16	5.29	6.29	1.98	12.58	2.59	5.61	1.21
Senior high school	9.08	5.33	6.45	5.91	10.04	5.51	4.36	4.69
Senior vocational school	28.42	24.70	17.03	12.41	31.21	20.18	18.03	9.70
Junior college	14.02	17.92	18.38	5.99	13.91	19.33	10.11	4.67
University	24.39	36.80	39.02	62.89	26.05	42.91	48.01	65.85
Master	2.83	8.90	6.98	10.36	2.99	9.03	11.00	13.54
Ph.D.	0.10	0.56	0.46	0.29	0.05	0.01	-	0.23

Note: 1. "-" denotes no available data. 2. The enterprise size in the table is the size of the last company where the unemployed worked.
Source: Directorate-General of Budget, Accounting and Statistics, *Manpower Survey* data (2014-2015).

In terms of age distribution of unemployed persons: those who had previously been working for SMEs, most (19.49 percent) were in age 25-29 group while those who had previously been working for large enterprise or government, most (24.95 percent and 30.02 percent, respectively) were in age 30-34 group. For first time job-seekers, most unemployed were in age 20-24 group, accounting for 52.08 percent in 2015, showing serious youth unemployment problem (Table 4-1-3).

In terms of sex distribution of unemployed persons: those who had previously been working for government, most were women while those who had previously been working for large enterprise or SMEs, most were men (Table 4-1-3).

In terms of education distribution of unemployed persons: those who had previously been working for SMEs, most were people with vocational education (31.21 percent), followed by people with university education (26.05 percent); those who had previously been working for large enterprises or government, or were first time job-seekers, most were with university education (42.91 percent, 48.01 percent, and 65.85 percent, respectively). The youth unemployment problem seemed getting worse in 2015 as 65.85 percent of first time job-seekers who were unemployed had university education, higher than the ratio in 2014 (Table 4-1-3).

In terms of the reasons for leaving the previous jobs, "Dissatisfaction with previous jobs" was the No. 1 reason for leaving SMEs (50.90 percent) or large enterprises (61.38 percent). However, the No. 1 reason for leaving government was "End of seasonal or temporary jobs" (55.63 percent) (Table 4-1-4).

Besides, the number of unemployed due to "Downsizing or out of business" declined consistently from peak at 337,000 in 2009 to 114,000 in 2015.

Table 4-1-4 Reasons for Leaving the Previous Jobs, 2014-2015

Unit: Thousand persons; %

Item \ Year	2014			2015		
	SMEs	Large Enterprises	Govern-ment	SMEs	Large Enterprises	Govern-ment
No. of persons	302.94	31.67	17.14	267.88	31.44	15.10
Downsizing or out of business	38.07	31.57	14.93	34.37	27.84	19.10
Dissatisfaction with previous Jobs	46.22	55.96	20.84	50.90	61.38	19.81
Poor health	2.39	3.05	2.64	3.10	1.45	0.21
End of seasonal or temporary jobs	10.55	4.33	52.04	8.86	4.25	55.63
Women: marriage or giving birth	0.51	1.40	0.47	0.71	1.19	-
Retired	0.14	0.81	4.29	0.09	1.22	3.07
Housework too busy	0.76	1.09	0.16	0.61	0.97	0.17
Others	1.35	1.79	4.62	1.36	1.70	2.01

Note: 1. "-" denotes no available data.

2. The enterprise size in the table is the size of the last company where the employee worked.

Source: Directorate-General of Budget, Accounting and Statistics, *Manpower Survey* data (2014-2015).

7. Near 60 Percent Foreign Employees Worked in SMEs

2015 saw a continuous increase in both the number of applications to employ foreign laborers and the number of foreign laborers actually working in Taiwan. The number of approvals rose to 419,002, up 64,554 from 2014, while the number of foreign laborers actually working in Taiwan increased to 353,686, up 32,417.

Regardless of the size of enterprises that employ foreign laborers, both the number of applications to employ foreign laborers and the number of foreign laborers actually working in Taiwan rose in 2015. The number of foreign laborer approvals rose by 33,781 (or up 16.18 percent) for SMEs and by 30,773 (or up 21.12 percent) for large enterprises.

Similarly, the number of foreign laborers actually in Taiwan and working for SMEs rose by 13,347 (up 7.13 percent) in 2015, while the number of foreign laborers in Taiwan and working for large enterprises rose by 19,070 (up 14.22 percent). Near 60 percent of all foreign labors working in Taiwan worked for SMEs (Table 4-1-5).

Table 4-1-5 Number of Foreign Workers Introduced by Enterprise Size, 2008-2015

Unit: Persons; %

Year \ Size	Valid approved number			Number in Taiwan		
	Total	SMEs	Large enterprises	Total	SMEs	Large enterprises
2008	220,696	113,530 (51.44)	107,166 (48.56)	191,768	100,496 (52.40)	91,272 (47.60)
2009	188,185	104,502 (55.53)	83,683 (44.47)	169,621	95,623 (56.37)	73,998 (43.63)
2010	208,600	114,959 (55.11)	93,641 (44.89)	185,800	102,605 (55.22)	83,195 (44.78)
2011	250,498	142,639 (56.94)	107,859 (43.06)	219,136	123,412 (56.32)	95,724 (43.68)
2012	260,308	157,221 (60.40)	103,087 (39.60)	233,572	139,176 (59.59)	94,396 (40,41)
2013	307,278	184,008 (59.88)	123,270 (40.12)	269,131	159,334 (59.20)	109,797 (40.80)
2014	354,448	208,765 (58.90)	145,683 (41.10)	321,269	187,159 (58.26)	134,110 (41.74)
2015	419,002	242,546 (57.89)	176,456 (42.11)	353,686	200,506 (56.69)	153,180 (43.31)

Note:

1. Figures only include foreign workers in both manufacturing and construction industries. Hence, an SME is defined as an enterprise with less than 200 regular employees in mining and quarrying, manufacturing, and construction industries.
2. The figure in the parentheses denotes share of total by enterprise size.

Source: Figures provided by Workforce Development Agency, Ministry of Labor.

8. Part-Time Workers Increased in SMEs

According to the data presented in the *2015 Manpower Utilization Survey*, the part-time workers in SMEs rose by 6,000 to 366,000, while in large enterprises the part-time manpower rose by 1,000. There was an increase of 113,000 full-time workers in SMEs, and a small increase of 6,000 in large enterprises (no change for government) in 2015. The utilization of part-time workers is most common in the SMEs in service sector, especially in the wholesale and retail trade industry, followed by the accommodation and food service industry (Table 4-1-6).

Table 4-1-6 Full-Time and Part-Time Manpower Utilization by Industry and Enterprise Size, 2014-2015

Unit: Thousand persons

Industry \ Year / size	2014						2015					
	SMEs		Large enterprises		Government		SMEs		Large enterprises		Government	
	Full - time	Part - time	Full - time	Part - time	Full - time	Part - time	Full - time	Part - time	Full - time	Part - time	Full - time	Part - time
Total	8,307	360	1,338	23	1,011	15	8,420	366	1,344	24	1,011	14
Agriculture, forestry, fishing and animal husbandry	523	13	1	-	6	-	536	11	1	-	4	-
Mining and quarrying	4	-	-	-	-	-	3	-	-	-	1	-
Manufacturing	2,176	43	753	1	26	-	2,189	46	762	3	21	-
Electricity and gas supply	5	-	2	-	22	-	4	-	4	-	22	-
Water supply and remediation activities	37	2	2	-	43	-	35	1	1	-	46	-
Construction	831	30	10	-	7	-	844	31	8	-	8	-
Wholesale and retail trade	1,673	87	49	6	8	-	1,684	84	52	12	6	1
Transportation and storage	308	7	62	-	54	0	313	6	66	0	52	-
Accommodation and food service activities	689	74	21	4	-	-	708	81	21	-	-	-
Information and communication	158	4	76	1	-	-	168	5	71	1	-	-
Financial and insurance activities	299	9	94	3	13	-	315	8	81	2	15	-
Real estate activities	94	-	2	-	1	-	94	-	4	-	2	-
Professional, scientific and technical activities	273	11	47	-	20	-	287	6	39	-	28	-
Supporting service activities	243	12	19	-	-	-	242	16	22	-	-	-
Public administration and defense; compulsory social security	1	-	-	-	375	1	0	-	-	-	374	0
Education	194	30	60	7	345	12	203	31	57	5	342	13
Human health and social work activities	215	10	131	2	77	1	202	11	147	1	75	-
Arts, entertainment and recreation	74	7	5	-	10	-	76	7	4	-	11	0
Other service activities	511	20	4	-	3	-	516	22	3	-	3	-

Note: "-" denotes no available data; "0" denotes a figure is less than one unit (one unit=1000 persons).

Source: Directorate-General of Budget, Accounting and Statistics, *Manpower Utilization Survey* data (2014-2015).

9. A Slight Increase in the Number of SME Employees Changing Jobs

In 2015, a total of 571,000 SME employees changed jobs; this figure was up about 57,000 from 2014. The rate of those taking up a position with another SME remained high at 88.45 percent. Only 11.54 percent took a job in the government (3.02%) or a large enterprise (8.52 percent). The figure suggests that it is not easy for former SME employees to find jobs in large enterprises or public sector, but it could also mean that SMEs offer more opportunities than government or large enterprises for job seekers (Table 4-1-7).

Table 4-1-7 Choice of New Employer by Former SME Employees, 2008-2015

Unit: Thousand persons; %

Year	Total	Going to work for another SME		Going to work for a large enterprise		Going to work for a government agency	
		No. of persons	Share of total	No. of persons	Share of total	No. of persons	Share of total
2008	474	413	87.13	46	9.70	15	3.16
2009	518	472	91.14	24	4.69	22	4.17
2010	536	471	87.80	42	7.82	23	4.38
2011	532	461	86.75	48	9.03	22	4.22
2012	507	444	87.60	46	8.98	17	3.42
2013	509	453	88.99	38	7.38	18	3.63
2014	514	460	89.46	43	8.30	11	2.24
2015	571	505	88.45	49	8.52	17	3.02

Note: An SME is defined as an enterprise with less than 200 regular employees in mining and quarrying, manufacturing, and construction industries, or an enterprise with less than 100 regular employees in other industries.

Source: Directorate-General of Budget, Accounting and Statistics, *Manpower Utilization Survey* data (2008-2015).

II Labor Conditions in SMEs

1. SMEs in Accommodation and Food Services Had the Longest Average Working Hours

In 2015, for SMEs, the accommodation and food services industry had the longest average working hours at 46.69 hours per week (and employed 787,000 workers , accounting for 9.03 percent of all employed workers in SMEs), followed by real estate industry at 46.11 hours per week (and employed 96,000 workers, accounting for 1.10 percent of all employed workers in SMEs), and other service activities at 46.04 hours per week (and employed 536,000 workers, accounting for 5.15 percent of all employed workers in SMEs). The education had the shortest average working hours at 38.79 hours per week (accounting for 2.70 percent of all employed workers in SMEs) (Table 4-2-1).

Table 4-2-1 Working Hours per Week and Number of Employed Workers by Enterprise Size and Industry, 2015

Unit: Thousand persons; hours / per week

Item / Industry	No. of employed worker			Weekly working hours		
	SMEs	Large enterprises	Government employees	SMEs	Large enterprises	Government employees
Agriculture, forestry, fishing and animal husbandry	545.15	1.43	4.21	41.09	49.23	39.88
Mining and quarrying	3.30	0.04	0.70	44.91	44.72	41.12
Manufacturing	2,182.63	809.06	19.95	42.86	43.47	40.70
Electricity and gas supply	4.21	2.43	23.09	41.43	41.14	40.22
Water supply and remediation activities	33.85	2.03	45.52	43.52	41.83	41.35
Construction	871.97	8.35	8.62	41.21	43.20	40.27
Wholesale and retail trade	1,765.72	64.34	6.56	45.65	42.99	41.26
Transportation and storage	321.62	65.15	47.84	45.93	44.45	41.14
Accommodation and food service activities	786.86	22.26	0.38	46.69	45.22	44.18
Information and communication	170.88	74.30	0.35	42.47	42.81	38.42
Financial and insurance activities	322.37	79.70	17.01	42.13	42.45	41.22
Real estate activities	95.72	2.51	1.41	46.11	47.82	40.37
Professional, scientific and technical activities	291.06	44.05	25.37	42.06	42.07	40.39
Supporting service activities	253.73	25.27	0.33	44.94	48.53	39.39
Public administration and defense; compulsory social security	0.60	-	371.69	39.65	-	42.27
Education	235.28	55.17	308.73	38.79	37.37	38.20
Human health and social work activities	217.87	137.55	79.32	43.65	44.65	43.17
Arts, entertainment and recreation	79.84	5.31	13.71	43.97	45.06	39.70
Other service activities	535.90	6.00	2.18	46.04	43.06	41.68

Note:
1. Employed persons with non-zero main working hours are classified as employed workers. Hence the figure of the sum of employed workers in each industry is different from the number of employed persons by enterprise size as noted in Figure 4-1-1.
2."-" denotes no available data.

Source: Directorate-General of Budget, Accounting and Statistics, *Manpower Survey* data (2015).

2. The Highest Average Salary Level for SME Employees Was in the Financial and Insurance Industry

In 2015, the highest average salary level for SME employees was in the financial and insurance industry at over NT$45,000 per month (3.92 percent of all SMEs' paid employed persons), followed by professional, scientific and technical activities industry at about NT$44,000 per month (3.46 percent of all SMEs' paid employed persons), and information and communication industry at about NT$43,000 per month (2.10 percent of all SMEs' paid employed persons). The lowest average salary

level for SME employees was in the agriculture, forestry, fishing and animal husbandry at about NT$25,000 per month (5.02 percent of all SMEs' paid employed persons) (Table 4-2-2).

The average salary level for SME employees declined in 8 industries in 2015 from 2014. the sharpest decline came from public administration and defense; compulsory social security, down NT$8,150, followed by electricity and gas supply, down NT$5,950, mining and quarrying, professional, scientific and technical activities, human health and social work activities, transportation and storage, education, and supporting service activities. The average salary level for SME employees rose most at around NT$2,500 in real estate industry, followed by agriculture, forestry, fishing and animal husbandry at NT$1,600. The rest industries only showed limited increase in the average salary level in 2015 (Table 4-2-2).

Table 4-2-2 Number of Paid Employed Persons and Average Wage of Main Work by Enterprise Size and Industry, 2015

Unit: Thousand persons; thousand NT$ / per month

Item / Industry	No. of paid employed persons			Average wage of main work			
	SMEs	Large enterprises	Government employees	Total	SMEs	Large enterprises	Government employees
Agriculture, forestry, fishing and animal husbandry	411.42	0.74	4.36	25.48	25.31	25.46	41.71
Mining and quarrying	3.26	-	0.66	37.58	34.46	-	53.02
Manufacturing	2,173.27	765.03	20.69	36.19	34.65	40.23	48.56
Electricity and gas supply	4.42	3.65	22.24	55.80	35.89	48.95	60.88
Water supply and remediation activities	33.84	1.45	45.57	36.02	35.01	40.64	36.63
Construction	850.62	8.47	8.26	37.23	37.06	44.70	47.09
Wholesale and retail trade	1,572.22	63.71	6.53	35.72	35.61	37.97	38.62
Transportation and storage	315.87	66.59	52.40	39.86	36.65	49.33	47.16
Accommodation and food service activities	686.22	21.09	0.16	30.17	30.06	33.87	20.24
Information and communication	172.55	71.49	-	45.28	43.02	50.74	-
Financial and insurance activities	321.58	82.90	15.16	47.65	45.39	54.60	57.47
Real estate activities	92.52	4.00	1.91	40.63	40.15	55.08	33.79
Professional, scientific and technical activities	284.04	38.14	28.07	47.61	44.11	62.19	63.16
Supporting service activities	252.43	22.23	0.24	29.02	28.45	35.54	32.99
Public administration and defense; compulsory social security	0.06	-	374.38	47.94	40.00	-	47.94
Education	227.69	62.73	354.52	45.46	32.01	55.89	52.26
Human health and social work activities	209.44	148.10	75.34	45.07	40.37	46.36	55.60
Arts, entertainment and recreation	79.40	4.41	11.68	33.27	32.53	35.46	37.50
Other service activities	509.81	3.03	3.10	31.45	31.37	39.69	35.68

Note:

1. Employed persons with working hours 15 or more are classified as paid employed persons here. Hence the figure of the sum of paid employed persons in each industry is different from the number of employed persons by enterprise size as noted in Figure 4-1-1.
2. "-" denotes no available data.

Source: Directorate-General of Budget, Accounting and Statistics, *Manpower Survey* data (2015).

III Manpower Cultivation in SMEs

1. Various Subsidized Programs for SMEs in Talent Cultivation

Various government agencies such as the Ministry of Labor and the Small and Medium Enterprise Administration of Ministry of Economic Affairs (SMEA, MOEA) provides subsidies for individual enterprises and organizations to arrange training programs for their employees in line with operational needs ("individual training"), while also encouraging enterprises in related industries to join forces with one another to implement employee training on a joint basis ("joint training"). A few main programs and agencies are listed as followed covering main areas such as digital learning, incubation, professional training for various industries, R&D and technology management training, international trade, service, and executive training.

(1) Small and Medium Enterprise Administration, MOEA: Business and management training; incubation service; cultivation of international SME talent.

(2) Industrial Development Bureau, MOEA: Professional training by industries. In 2016, a total of 19 training courses will be offered to cover various industries, such as: chemical, food, textile, smart mobile devices, intellectual property, smart electronics, ICT services, green energy, digital content, smart printing, machinery and equipment, medical equipment, pharmaceutical and other key industries (site: https: //idbtrain.stpi.narl.org.tw/classinfo.htm).

(3) Department of Industrial Technology, MOEA: R&D and management cultivation.

(4) Bureau of Foreign Trade, MOEA: International business management training.

(5) Department of Commerce: Service talent training (213 people participated in 2015).

(6) Ministry of Education: Industrial Master Degree Program.

(7) Industry-specific Masters Degree courses are tailored to meet the needs of industry: The business enterprises and university concerned submit a joint curriculum proposal to the Ministry of Education. If the proposal is approved, the university in question can then launch an industry-specific Masters Degree program, to help cultivate the Masters-level human talent that firms need. The range of industry sectors for which industry-specific Masters Degree courses are available or planned covers: (A) electromechanical engineering; (B) optoelectronics; (C) ICT; (D) cultural and creative industries; (E) biomedicine (including biotechnology and pharmaceuticals manufacturing); (F) finance (including wealth management); (G) food, textiles and other manufacturing industries; (H) service industries; (I) other. Students need to sign the training contract that requires the students serve at least two years in sponsored enterprises when they enroll in the industry-specific Masters Degree program (http://imaster-moe.iiiedu.org.tw).

(8) Ministry of Labor: Talent enhance and entrepreneurship incubation (maximum subsidy of NT$70,000 per person in three years for training costs). In 2014, SME a new job training subsidy was created by the Ministry of Labor for SMEs with below 50 employees providing professional and individual counseling and training, no long requiring lengthy and costly application and expense verification process.

2. Results of Subsidized Training Programs for SMEs

(1) The Number of Individual Training and Joint Training Plans Reached Record High in 2014 and Remained High in 2015

In 2014, the number of individual training and the number of joint training plans reached record high at 2,802 and 242 respectively. In 2015, the number of individual training and the number of joint training plans remained high at 2,659 and 199 respectively (Table 4-3-1).

Table 4-3-1 Provision of Assistance to Enhance Manpower Cultivation by Business Enterprise, 2008-2015

Unit: Enterprises; classes; persons; projects

Item / Year	Individual training plans			Joint training plans			
	No. of firms receiving subsidies	No. of training classes	No. of training participants	No. of projects	No. of firms taking part	No. of training classes	No. of training participants
2008	1,415	38,282	733,638	112	2,088	4,583	131,971
2009	1,240	40,544	864,001	119	1,342	5,163	140,487
2010	1,793	40,902	869,520	126	775	3,617	130,244
2011	1,779	41,173	863,296	101	625	2,688	112,213
2012	1,204	27,269	600,480	127	463	1,730	58,624
2013	1,687	33,554	757,812	174	863	1,840	93,266
2014	2,802	45,151	753,720	242	966	2,766	91,412
2015	2,659	42,785	676,869	199	700	2,533	65,459

Source: Figures provided by Workforce Development Agency, Ministry of Labor.

(2) The Number of Business Enterprises Participating in Training Reached about 135,000 in 2014

According to data compiled by the Ministry of Labor in 2014, the number of participating in training reached 135,659. Majority of the business enterprises participating in training were SMEs. In terms of industry, business enterprises in water supply and remediation activities had the highest ratio in training participation at 81.5 percent, followed by arts, entertainment and recreation at 64.1 percent, professional, scientific and technical activities at 63.1 percent, and other service activities at 56.3 percent. Business enterprises in accommodation and food service activities had the lowest ratio in training participation at 16.3 percent (Table-4-3-2).

Table 4-3-2 Business Enterprises Participation in Vocational Training by Industry, 2014

Unit: Enterprises; %

Item	No. of enterprises		Not participating		Participating	
	No. of enterprises	Share of total	No. of enterprises	Share of total	No. of enterprises	Share of total
Total	489,260	100.0	353,601	72.3	135,659	27.7
Agriculture, forestry, fishing and animal husbandry	904	100.0	626	69.3	278	30.7
Mining and quarrying	150,663	100.0	103,338	68.6	47,325	31.4
Manufacturing	388	100.0	284	73.3	104	26.7

Item	No. of enterprises		Not participating		Participating	
	No. of enterprises	Share of total	No. of enterprises	Share of total	No. of enterprises	Share of total
Electricity and gas supply	99,892	100.0	69,092	69.2	30,800	30.8
Water supply and remediation	205	100.0	38	18.5	167	81.5
Construction	3,714	100.0	1,801	48.5	1,912	51.5
Wholesale and retail trade	46,464	100.0	32,122	69.1	14,342	30.9
Transportation and storage	337,693	100.0	249,637	73.9	88,056	26.1
Accommodation and food service	197,151	100.0	164,982	83.7	32,169	16.3
Information and communication	9,589	100.0	6,819	71.1	2,769	28.9
Financial and insurance activities	19,854	100.0	11,916	60.0	7,937	40.0
Real estate activities	10,401	100.0	6,661	64.0	3,740	36.0
Professional, scientific and technical	7,154	100.0	2,640	36.9	4,515	63.1
Supporting service activities	14,334	100.0	8,514	59.4	5,820	40.6
Public administration and defense; compulsory social security	32,452	100.0	23,934	73.8	8,519	26.2
Education	13,690	100.0	8,868	64.8	4,822	35.2
Human health and social work	21,800	100.0	10,524	48.3	11,276	51.7
Arts, entertainment and recreation	1,810	100.0	649	35.9	1,161	64.1
Other service activities	9,459	100.0	4,129	43.7	5,330	56.3

Source: Ministry of Labor, *2014 Report of Vocational Training Survey* (2015).

3. Government Actively Promotes Entrepreneurship

The Ministry of Labor sponsored the staged classes for entrepreneurs. A total of 13,419 people took the class in 2015 (7,107 for introduction class; 4,786 for mid-level class; 1,526 for advanced class); about 109,000 people took these classes from 2008 to 2015.

In 2015, the Ministry of Labor provided entrepreneurship consultation and counseling to a total of 4,432 people, and helped 1,228 people start their new businesses that created 3,114 new jobs. A total about 35,000 jobs were created through these programs from 2008 to 2015 (Table 4-3-3).

Table 4-3-3 Results of Entrepreneurship Consultation and Counseling by Ministry of Labor, 2008-2015

Units: Persons

Year	No. of participating persons	No. of persons to start up new business	No. of new jobs created
2008	2,693	1,168	2,819
2009	4,016	2,149	6,494
2010	5,916	1,715	5,328
2011	4,661	1,867	5,235
2012	4,689	2,008	5,176
2013	4,087	1,671	4,156
2014	3,944	1,321	3,366
2015	4,432	1,228	3,114
Total	34,438	13,127	35,688

Source: Figures provided by Workforce Development Agency, Ministry of Labor

4. Manpower Demand Expected to Rise

According to the results from the *2016 Manpower Requirements Survey* (conducted over the period January 11 to January 29 by the Ministry of Labor, targeting enterprises with 30 or more employees; a total of 3,010 SMEs answered the survey), enterprises as a whole showed slightly positive expectation over increasing hiring facing intensified competition, slow global recovery amid short-term stimulus of consumption, expansionary fiscal policy and continuous increase of private investment (Table 4-3-4).

Table 4-3-4 Anticipated Changes in the Number of Personnel Employed by Business Enterprises during the Period from January 31, 2016 to April 31, 2016 Unit:Persons

Item / Industry	Net increase in no. of employees	Change in manpower demand			Top 4 occupational categories		
		New positions	Positions eliminate	Craftsmen, machinery operators and assembly line workers	Technicians and assistant specialists	Service and sales personnel	Professional specialists
Total	19,334	30,537	11,203	7,073	6,101	3,317	2,671
Manufacturing	8,276	14,153	5,877	5,888	2,578	1,342	21
Remediation activities	88	115	27	- 12	15	-	-
Construction	- 240	736	976	- 172	49	30	-
Wholesale and retail trade	3,418	3,992	574	345	1,504	343	926
Transportation and storage	550	1,091	541	291	85	2	-
Accommodation and food service activities	1,501	2,583	1,082	-	58	-	999
Information and communication	973	1,301	328	- 21	433	362	26
Financial and insurance activities	575	791	216	-	555	93	-
Real estate activities	126	127	1	-	104	1	8
Professional, scientific and technical activities	963	1,125	162	175	186	342	40
Support service activities	1,845	2,901	1,056	567	296	- 19	543
Human health and social work activities	1,211	1,331	120	-	229	800	136
Arts, entertainment and recreation	35	220	185	12	7	21	- 45
Other service activities	13	71	58	-	2	-	17

Source: Ministry of Labor, *2016 Report of Manpower Requirements Survey* (January 2016)

It is anticipated that net manpower demand will rise by around 19,300 net jobs (adding 30,500 while eliminating 11,200 persons) from the end of January to the end of April 2016. For the same period, 68.97 percent of enterprises will keep the same level of manpower; 18.17 percent of enterprises will add net manpower; 18.17 percent of enterprises will add net manpower; 8.58 percent of enterprises choose "Unpredictable," and only 4.28 percent of enterprises will reduce net manpower.

The most increase in demand will be in the manufacturing, with a net increase of about 8,300, followed by about 3,400 in wholesale and retail trade, about 1,800 in supporting service activities, and about 1,500 in accommodation and food service activities. Most of the increased demand by occupation will be for craftsmen, machinery operators and assembly line workers (about 7,100), followed by technicians and assistant specialists (about 6,100), and services and sales (about 3,300).

Chapter 5

Strategies for SMEs in Response to Changes in the Business Environment

Global economic growth in 2015 was 2.6 percent, slightly lower than 2.7 percent in 2014. The slower global economic growth was mainly attributable to lackluster growth in most advanced economies and worse-than-expected economic activity in emerging markets and developing countries. Although the U.S. economy grew steadily, the pace of global economic growth remains slow and fragile. 2016 global economy is expected to grow at a similar slow pace in 2015, and the outlook remains challenging.

As an export-oriented economy, Taiwan is highly sensitive to the difficult macroeconomic and trade environment. Both Taiwan's exports and imports with major trading partners fell in 2015. However, Taiwan maintained trade surplus with mainland China, Hong Kong, the United States, and ASEAN 10 member countries, though growth of trade surplus in 2015 was slowed down (except growing surplus with the United States). Due to lack of export momentum, 2016 Taiwan economic growth will need more support from domestic demand, according to Directorate-General of Budget, Accounting and Statistics, Executive Yuan. "Productivity 4.0" development program in 2015 and the "Five Innovative Industries" promoted by the new government in 2016 will be important driving forces to facilitate Taiwan's industrial upgrade and transformation.

This chapter is divided into two sections. Section I reviews a series of policy measures in response to changes in the global environment; Section II examines opportunities and challenges for SMEs and the corresponding strategies.

I Government Measures in Response to the Changes in the Economic and Business Environment

Facing significant uncertainties and challenges to its economy, the government is taking a series of policy measures spanning short-, mid- and long-term to mitigate the risks and revive the economy. Major policy measures include "Five Innovative Industries Plan," "New Go South Policy," "Measures to Consolidate and Bolster Economic Structure," "Productivity 4.0 Development Plan," "Industrial Upgrade and Transformation Action Plan," "ide@ Taiwan 2020," "HeadStart Taiwan," "Regulatory Flexibility Project for Virtual World Development," "Project for Social Enterprises Action Plan," and so on.

1. Five Innovative Industries Plan

To seize the next generation industrial development opportunities, in 2016, the new government launched "Five Innovative Industries Plan," based on the core concept of "Innovation," "Employment," and "Distribution." The five major innovative industries - Green Energy Technology, National Defense, Asian Silicon Valley, Biomedical Industry, and Smart Machinery - together with Innovative Green Chemical Material and New Agriculture, were promoted to expedite and foster Taiwan's economic structural transformation from "efficiency-driven" to "innovation-driven" in order to improve corporate profits, increase labor wages and achieve sustainable development.

Strategies to promote the five major innovative industries include: emphasizing linkage among industries, local research resources and talent cultivation; balancing regional development as a prerequisite for the integration of government and local resources; and attracting the best and the brightest talent globally with special recruitment program directed at the specific requirements of the five major innovative industries. Further deregulation and innovative measures regarding visa, residence, tax and talent friendly living environment will be pushed ahead.

Under the whole promotion framework, local governments function as partners to assist SMEs in innovation, international marketing, and funding, and to strengthen cooperation among industries, universities and research institutions to enhance R&D capacities for SMEs and local industrial and talent development.

2. New Go South Policy

The New Go South Policy, promoted by the new government in 2016 is a five-year plan aimed at expanding industrial, educational, cultural and agricultural exchanges between Taiwan and the two markets - ASEAN ten member countries, and six countries in South Asia as the key development areas - by reducing the risk of "over-dependence" on the single market (i.e. mainland China which absorbs 40 percent of the island's exports).

A special presidential policy office for New Go South Policy will be set up with the main tasks to craft relevant strategies and measures for policy implementation, promote regional development and cooperation, and upgrade Taiwan's economic and industrial structure as well as its diversity.

3. Measures to Consolidate and Bolster Economic Structure

Taiwan's exports and investment performance have been lackluster, mainly due to global economic growth being weaker than expected and the substantial fall in oil prices. Nevertheless, the situation also reflects Taiwan's industrial competitiveness, export model, low investment and other structural issues. In 2015, the global economy did not grow as anticipated, impacting Taiwan's overall economic performance while also highlighting the nation's pressing need for industrial structural adjustments. To bolster the domestic economic structure and ensure stable growth, the government announced the Measures to Consolidate and Bolster Economic Structure on July 27, 2015. In the short term, these measures would energize the economy and strengthen its response to fluctuations in the business cycle. In the medium and long terms, it would create a virtuous cycle of innovation, investment and employment to enhance the nation's overall competitiveness and facilitate the

structural economic transformation from "efficiency-driven" (such as low value added OEM model) to "innovation-driven."

(1) Three Major Aspects

The Measures to Consolidate and Bolster Economic Structure focus primarily on three aspects:

A. Inducing industrial upgrade: Industries would turn from "competing on price" to "competing on value" when driven by innovation.

B. Expanding exports: System integration will be strengthened to transform the nation from an exporter of intermediate goods to a provider of systematic products and services.

C. Promoting investment: Channeling in both domestic and overseas private-sector capital as well as governmental resources would help boost industrial upgrading and export expansion.

(2) Promotion Measures and Concrete Methodology

Table 5-1-1 shows the measures and concrete methodology to execute the "Measures to Consolidate and Bolster Economic Structure."

Table 5-1-1 Measures to Consolidate and Bolster Economic Structure: Promotion Measures and Concrete Methodology

Strategy	Promotion measures	Concrete methodology
Industrial upgrade	Establish innovation and entrepreneurship ecosystem	■ Restrictions eased on employee rewards: restrictions eased on the ceiling of stock options and restricted stock awards received by a single employee. ■ Introducing startup talent and capital from overseas; actively promoting the HeadStart Taiwan Project and Taiwan Silicon Valley Technology Fund Investment Program.
	Promoting smart industrial chains	■ Promoting smart industrial chains; strategically selecting leading industries such as manufacturing, commercial services and refine agriculture to accelerate the process of vertical and horizontal digitalization and intelligentization of industry.
	Innovating service industry development mode	■ Accelerating financial digitalization; strengthening the development of smart medicine, education, culture, entertainment and experiential service, and promoting innovative life application. ■ Promoting cloud services (such as food cloud and agriculture cloud) to meet people's need for local, convenient and safe food.
	Upgrading SMEs to Mittelstand	■ Nurturing 50 Mittelstand per year (from nurturing 50 Mittelstand every two years).
	Consolidating the existing advantages of the five main industries	■ Fully supporting spotlight industries that equipped with global competitiveness and greatly challenged by mainland China's rising domestic supply chains (semiconductor, flat panel display, vehicles, machinery, and textile).

Strategy	Promotion measures	Concrete methodology
Exports expansion	Developing service industry, expanding global market	■ Promoting 10 turnkey projects / system integration export flagships. ■ Boosting the export of cultural and creative services industries; integration of cross-ministerial resources.
	Inward- developing service industry, expanding industrial scale	■ Promoting the Tourism Power Action Plan: combining cosmetic medicine, health examination, local cuisine, agriculture, cultural and creative industries, tourist factories etc., making Taiwan a high-quality, value- added tourism "great power." ■ Expanding tourism services export: implementing visa convenience measures for high quality tourist groups and waiving of visa fees; encouraging Taiwanese firms to have their overseas employees travel to Taiwan or hold meetings or conventions in Taiwan; lowering the threshold for tax refunds. ■ Encouraging silver hair industry.
	Exploring business opportunities globally	■ Exploring business opportunities and domestic demand in emerging countries; rearranging the US and European markets.
	Adding financial support	■ Promotion of globalization of e-commerce platforms covering emerging and ACEAN markets. ■ Capital increase of NT$20 billion within 3 years.
Investment promotion	Expanding public investment	■ Giving priority to public construction projects that can deliver the greatest benefits to investment climate in 2016 budget. ■ Expanding technology budget to fully enhance the digitalization and intelligentization of industries.
	Attracting private investment	■ Identifying industries with great potential in attracting private investments, such as green energy, bio-medicine, smart city and large scale infrastructure; lowering the current cap of the required annualized rate of return (2.875%) for insurance company when investing in real estate.
	Assisting enterprises in obtaining capital for investment and M&A	■ Providing a total of NT$500 billion loans to assist non-SMEs in obtaining operating capital and expand investment. ■ Increase loans to SMEs by NT$540 billion (18 months) assisting them with finance. ■ National Development Fund and private sector to jointly establish a M&A fund, and to loosen financing terms for M&A deals so as to assist enterprises in obtaining relevant funding.
	Evaluating the feasibility of establishment of a Sovereign Wealth Fund(SWF)	■ Strengthening horizontal communication and cooperation between government pension and insurance funds to increase operating efficiency and long term investment performance. ■ Evaluating SWF's organizational legal structure, funding sources, personnel system and salary structure.

Note: M&A stands for merger and acquisition.

Source: National Development Council (2016).

4. Productivity 4.0 Development Plan

In recent years, facing rapid market changes, shrinking workforce, limited land supply, eroding competitiveness, and the dual challenges of developing and emerging nations carving up the mass-production market (such as red supply chain from mainland China) and industrialized nations

occupying the high-end market for custom-made products, Taiwan is in urgent need for industrial innovation and transformation to enhance its global competitiveness. In response to such global manufacturing trends, in September 2015, Executive Yuan devised Productivity 4.0. Founded on smart automation and employing the Internet of Things (IoT), smart robots, and big data, coupled with efficient and proactive management, Productivity 4.0 will spearhead domestic industrial upgrades and transformation. 2016 Productivity 4.0 development plan has been integrated into the "Five Innovative Industries Plan" as mentioned above.

(1) Vision

Raise GDP per capita of manufacturing industry to 10 million NTD in 2024 (up 60% compared to 2014). The government is planning to spend NT$36 billion (US$1.12 billion) over the next nine years (2016-2024) as part of its Productivity 4.0 project to elevate Taiwan's status in the global supply chain by accelerating the process of vertical integration of industrial supply chain and horizontal digitalization and intelligentization of industries.

(2) Goals

A. Industry: Promoting industrial innovation and transformation

- Developing Cyber Physical Systems (CPS) throughout services, marketing, design, and vertical integration and horizontal cooperation in manufacturing; creating talent and business friendly environment to drive industrial structure optimization and transformation.
- Developing smart retail as the core (hypermarkets, supermarkets, brand chains) and smart logistics as the support system, to enhance consumer experience and service scale, and create service export opportunities.
- Boosting production efficiency and quality through advanced technology such as sensing technology, smart device, IoT and big data analytics, to enhance consumer trust in the product safety; establishing new tropical and subtropical agricultural business model driven by smart agriculture transformation.

B. Technology: Developing Taiwan's own key technologies

- Smart manufacturing and smart services, big data, industrial supply chain IoT, manufacturing CPS, and comprehensive system integration solutions.
- Developing 3D printing technology to promote niche equipment / materials / key components / software / integration of autonomous systems.
- Building Productivity 4.0 "Common Infrastructure" and driving SMEs' innovative applications.

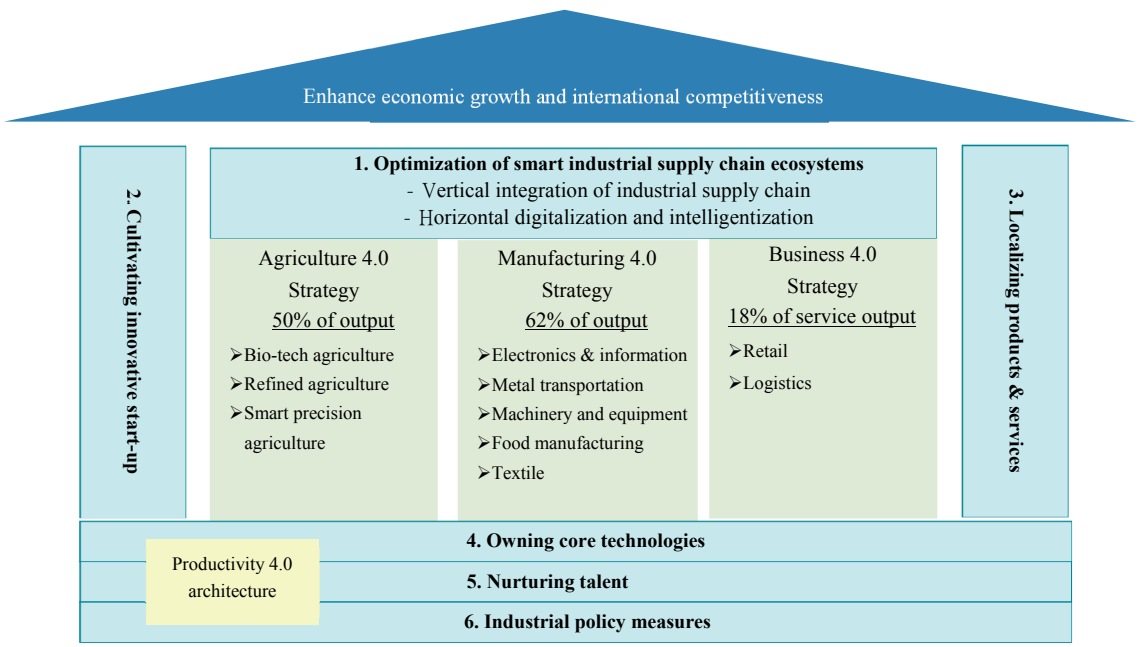
C. Talent: Cultivating industrial talent

- Cultivating Productivity 4.0 R&D talent.
- Enhancing the existing workers' Productivity 4.0 capability.

(3) Strategy

Focus on six main aspects: (1) optimization of smart industrial supply chain ecosystems; (2) cultivating innovative start-up; (3) localization of products and service; (4) owning core technologies; (5) nurturing talent; and (6) industrial policy measures (Figure 5-1-1).

Figure 5-1-1 Strategies for Productivity 4.0 Development Plan



Source：Executive Yuan, *Productivity 4.0 Development Plan* (September 2015).

5. Industrial Upgrade and Transformation Action Plan

To facilitate the "Three Industries, Four Reforms" Plan and optimize Taiwan's industrial structure, Taiwan's Executive Yuan approved and launched the "Industrial Upgrading and Transformation Action Plan", on the 13th of October 2014, focusing on three main themes: "revitalize the traditional industries," "solidify the main industries." and "incubate emerging industries." (note: to adjust the domestic industrial structure and create momentum for the next wave of economic growth, the government launched "Three Industries, Four Reforms" in October 2012, for the timeframe from 2012 to 2020, adopting the theme of a service-oriented manufacturing industry, an internationalized and high-tech services industry, as well as a specialty-oriented traditional industry to promote the upgrade and transformation of Taiwan's industrial structure and replace the past emphasis on "cost down" with a new focus on "value up").

(1) Vision

High quality, forward looking industries (timeframe: October 2014 to end of December 2020)

(2) Goals

The current action plan commences its implementation from October 2014 to end of December 2024. The expected industrial development outcomes are as follows: (1) total output value of the manufacturing sector starting from 2013 at NT$13.93 trillion is expected to grow in 2020 to NT$19.46 trillion and (2) total GDP of the service sector, starting at NT$3.03 trillion from 2011 is expected to grow in 2020 to NT$4.75 trillion.

(3) Implementation: Four Strategies

Four strategies aim at reforming traditional industries, reinforcing core manufacturing capacities and fostering innovative enterprises:

A. "Upgrading of product grade and value:" The manufacturing industry should strive to evolve itself to be more qualitative and value-added oriented, starting from the development of high-end products, including accordingly high-value research efforts in harnessing essential technologies, in the metallic materials, screws and nuts manufacturing sector, aviation, petrochemical, textile, food industries, etc. Action items include: furtherance of quality research, facilitating the formation of research alliances with upper-, mid- and downstream enterprises, integrative development assistance in testing and certification, and establishment of international logistics centre.

B. "Establishment of complete supply chain:" Establish a robust and comprehensive supply chain that is sovereign and self-sustaining, without having to depend on foreign corporations. This is attained through the securing of key materials, components and equipments manufacturing capabilities in the field of machine tool controllers, flat panel display materials, semiconductor devices (3D1C), high-end applications processor AP, solar cell materials, special alloys for the aviation industry, panel equipment, electric vehicle motors, power batteries, bicycle electronic speed controller (ESC), electrical silicon steel, robotics, etc. Action items include: review of industry gaps, coordination of research and development unions, application-theme-based research programs, and promotion of cross-industry cooperation to expand fields of mutual application.

C. "Setting-up of system integration solutions capability:" Expand turnkey-factory and turnkey-project system integration capabilities, in order to increase and stimulate export growth; combination of smart automation systems to strengthen hardware and software integration, hence, boosting system integration solution capacity, allowing stand-alone machinery to evolve into a total solution plant, thus creating additional fields of application and services, effectively expanding the value-chain. These type of transitions are to be seen in the following areas: turnkey-factory and turnkey-project exports, intelligent automated manufacturing, cloud industry, lifestyle (key example: U-Bike in Taipei City) industry, solar factory, wood-working machinery, machine tools, food / paper mills, rubber and plastic machines sector. Action items include: listing of national export capability - using domestic market as test bed for future global business opportunities, formation of system integration business alliances, and establishing of financial assistance schemes to help national enterprises in their overseas bidding efforts.

D. "Acceleration of growth in the innovative sector:" Given Taiwan economy's over-dependence on the growth of the electronics industry, a new mainstream industry replacement should be developed. Moreover, the blur distinction between the manufacturing, service and other industries, presses Taiwan to develop cross-fields of application markets, so that the market opportunities of the future can be fully explored. Examples of these markets include: Smart Campus, Intelligent Transportation System, Smart Health, Smart City, 4G/5G Communications, Strategic Service Industries, Next-Generation Semiconductors, Next-Generation Visual Display, 3D Printing, New Drugs and Medical Instruments, Smart Entertainment, Lifestyle industry (for instance the combination of plan factory and leisure tourism), and offshore wind power plant. Action items include: (1) promotion of cooperation between enterprises and research institutions to increase efficiency in the functioning of the national innovation process, (2) creating the ideal ecosystem for innovation industries, and (3) integration of Cross-Branch Advisory Resources and Deregulation to further support industrial development.

(4) Policy Measures as Listed in Table 5-1-2

Table 5-1-2 Industrial Upgrade and Transformation Action Plan

Main tools	Contents
Tax treatment	• Tax incentives to retain talent for technology transfer, stock compensation, etc.
Securing financing / funding	The National Development Fund • Plan to offer NT$100 billion loans for industrial upgrade and transformation
Venture investment	The National Development Fund • NT$10 billion investment in upgrade and transformation of strategic manufacturing industries • NT$20 billion investment in industrial revitalization
R&D budget	• Additional NT$10 billion budget for R&D subsidy in industrial upgrade and transformation
Infrastructure	• Building trial production/ testing infrastructure
Land acquisition	• Efficient use of existing land • Plan to set up new industrial parks
Talent cultivation	• Establishing industrial talent center: certification, training, cross-industry leadership cultivation, etc.

Source: Ministry of Economic Affairs, *Report of Industrial Upgrade and Transformation Action Plan* (2015).

6. ide@ Taiwan 2020 (Internet White Paper)

Internet White Paper "ide@ Taiwan 2020" aimed at mapping out the development of information communications technology-related policymaking and implementation in Taiwan was passed by the Cabinet on July 2nd, 2015. "ide@" stands for Intelligent, Digital, E-government, and Accessible (public access right).

"ide@ Taiwan 2020" lays a solid foundation for countrywide digitalization in five years and strategic promotion of related sectors. Proposed by the National Development Council, the initiative comprises 192 existing projects and 70 newly formulated plans aimed at enhancing Taiwan's

inclusive, interconnected and intelligent capabilities.

(1) Goals

Removing legal barriers, bring in international capital, and establishing international startup parks

(2) Policy Priorities

According to the National Development Council (NDC), top priority will be given to expanding transmission access, improving laws regulating the cyber world and protecting information security in regard to internet infrastructure development:

A. "Internet infrastructure development and friendly business environment:" The government is set to propose regulatory easing on a number of key issues relating to the virtual world such as cross-border transactions taxation, digital assets, online petitions and voting and virtual currency. In addition, efforts will be made to foster innovative startups, promote e-commerce and spur internet finance when it comes to expanding cyber economy; 4G fast internet and fiber to household: release 4G broadband and cumulative release of 410MHz by 2017.

B. "Transparent governance:" No stone will be left unturned in working to digitalize government services, encourage public involvement in policymaking and provide access to government data.

C. "Smart living:" Create smart holistic health care passport, build remote community care smart service system (including emergency system) for elderly people living alone, improve last-mile campus network infrastructure, strengthen IT education and information management mechanism; promote integration of actual / virtual and online/offline for industrial transformation.

D. "Cyber economy:" Establish a one-stop government resource site and government service window, create Taiwan's innovation and entrepreneurship ecosystems, set up domestic and international e-commerce platform to promote two-way cooperation, develop O2O (Online to Offline) and other e-commerce technologies.

E. "Intelligent homeland:" On intelligent homeland planning and smart living, a premium is to be placed on harnessing public information to create more opportunities in digital learning, disaster management and mitigation, health care services, integrated transportation and personal safety.

7. HeadStart Taiwan

With the rise of internet technology, soft power has become a key to competing in future markets, and industrial development now faces completely different challenges from those of the past. Not only have markets gone from regionalized to internationalized, the key to growth has moved from being technology-intensive to being creativity-intensive, and the growth evaluation model has moved from sales to valuation. Specifically, the increasing prevalence of network technology has greatly reduced the operating and marketing costs of startups, giving more young people with potential the opportunity and ability to compete in global markets.

In light of this, the National Development Council (NDC) has formulated the HeadStart Taiwan Project, which is intended to harness the power of the private sector and other countries and take good advantage of Taiwan's strengthen and niches to create a positive, complete, and effectively operated ecosystem for entrepreneurship. It is hoped that this will not only foster innovative, high added-value startups so that they may rapidly flourish and move into the global marketplace, but also shape Taiwan's international image as a place of outstanding innovation and entrepreneurship, bringing startups from abroad to Taiwan to generate further synergy.

(1) Vision

To become a regional innovation center.

(2) Goals

Three goals from 2014 to 2018: (1) generating domestic investment of NT$8.6 billion to promote the establishment of more startups and help existing startups to scale up, and increased private investment; (2) creating more than 5,000 jobs; and (3) increasing the value of output of startups by NT$17.6 billion.

(3) Implementation: Three Strategies

Three strategies strive to bring together local private-sector and global businesses to create a positive, comprehensive and effective entrepreneurial ecosystem in order to mold Taiwan into a hub for innovative businesses with international branding:

A. “Remove legal barriers to innovative startups:” Coordinate with related agencies, and amend laws and regulations not conducive to the development of innovative startups. Examples: relaxing restrictions on equity crowd-funding, entrepreneur visa, and the issues of preferred stock conversion into multiple common stocks or multiple voting stocks; deregulating non-publicly held companies’ issuance of convertible corporate bonds and corporate bonds with warrants attached.

B. “Bring in international capital and professional knowledge:” Usher in cooperation among venture capitalists at home and abroad and employ creative incentive mechanisms to funnel investment capital into startup businesses, especially in their early phase. Raising NT$13.6 billion from Silicon Valley 500 Startups, the Prudential Venture Capital, TransLink Capital Partners, Infinity e.ventures Asia, etc.

C. “Set up international startup parks:” Use Taipei Expo Park as the base for innovative startups, and bring in domestic and overseas startup accelerators, venture capital, professionals and other resources to create a positive startup ecosystem; in the future, establishing collaboration with Silicon Valley, BLK71 in Singapore and Tech City in London.

8. Regulatory Flexibility Project for Virtual World Development

The Regulatory Flexibility Project for Virtual World Development was launched by National Development Council and approved in December 2012 by Executive Yuan in response to the trends of virtual-reality integration and sharing economy to promote new business model development and

encourage entrepreneurs at home and abroad to use Taiwan as a venue to incorporate their businesses.

9. Project for Social Enterprises Action Plan

A social enterprise is a new type of organization that incorporates civil society's reciprocities and market efficiency. It applies commercial strategies to maximize improvements in human and environmental well-being rather than maximize profits for external shareholders.

To promote the continuous innovation, growth, and development of social enterprises in Taiwan and to encourage young people to join social enterprises, the Executive Yuan approved the Project for Social Enterprises Action Plan in September 2014. In order to facilitate the implementation of the plan, the Small and Medium Enterprise Administration of the Ministry of Economic Affairs (SMEA, MOEA) commissioned KPMG in 2014 to be in charge of its execution. Three consecutive social enterprise conventions were held in Northern, Central, and Southern Taiwan to consolidate social enterprise resource networks from various industries in Taiwan and link up social enterprises in different locations to build a social enterprise network platform.

The SMEA will continue to work with relevant departments, industries, and academia to manage four program strategies: (1) adjustment of laws and regulations - to create a reasonable legal environment for social enterprises., (2) platform building - to promote cross-sectional collaborations, and global connections: mutual learning and sharing will be conducted to help discover the unique and favorable environments for social enterprises and create a mutual learning platform in Central Taiwan, (3) fund raising - to provide multiple funding sources through angels, VCs, credit guarantee, and so on: the SMEA will commence with the nurturing of social enterprises and providing them with the necessary capital, and will integrate different industries and resource networks by linking Taiwan social enterprise startups with venture capitalists and facilitate the sharing of business experience between local students, teachers and entrepreneurs, and (4) nurturing of social enterprises - to build supporting system for social enterprises' developments: benchmark social enterprises will be selected for case studies and used as learning models for other social enterprises. This will complement the development of social enterprises and achieve the Social Enterprise Action Plan objectives, including providing a friendly social enterprise development environment, building social enterprise networks and platforms, strengthening social enterprise management, and building an ecological environment in Taiwan that is beneficial to social enterprise innovation, establishment, growth, and development.

II SMEs: Strategic Direction in Navigating the Challenging Business Environment

Based on the changing global macro dynamics in the period of 2015 to the first half of 2016 as well as the performance analysis of SMEs 2015, we will discuss how Taiwanese government and SMEs can craft strategies to adapt and thrive in navigating the changing environment, that has posed both intensified challenges from lackluster global recovery, competition of emerging and advanced supply chains, labor shortage and aging society, and at the same time opportunities in the new economic era

of IoT, Smart Manufacturing, and Fintech with technology and market dispersion not driven by large firms.

1. Strengthening Enterprises' Cooperation and Integrated Marketing; Promoting SMEs' Upgrade and Transformation

SMEs' total export sales declined to NT$ 1.48 trillion in 2015; SMEs' export-orientedness (SME export sales' share of the SMEs' total sales) also was near bottom at 12.52 percent in 2015, down 0.1 percentage points from 2014, near the lowest in seven years. Although in 2015, SMEs' export contribution rate (SME export sales' share of total exports) was 15.21 percent, up 0.59 percentage points from 2014, it is still a significant 2.53 percentage points below the export contribution rate of 17.74 percent in 2012, near the low end in seven years. SMEs' exports downturn in recent years was primarily attributable to relative strength of New Taiwan Dollar (NTD), intensified challenge from international supply chain such as mainland China's rising domestic supply chains, weak global recover, and unfavorable macro and business environment.

In response to declining trend in exports, government should provide assistance and guidance to SMEs to build and operate cross-border e-commerce websites, use both virtual and real export channels to grasp overseas business opportunities, and make full use of Taiwan's ICT advantages to develop total solution providers and drive new export models. Besides government's policy measures and assistance to promote SMEs' exports, SMEs should consider forming partnerships or strategic alliances to combine resources to drive integrated marketing, transformation from technology upgrade, and diversified business models. It is important to select core markets for cultivation and more diversification of export markets.

2. More Counseling and Assistance Needed for New Start-ups in Relatively High Volatile Industries

One of the major features of SMEs is that they are more flexible in market entry and exit than large enterprises. This is particularly true for newly-established SMEs, defined as those that have been in existence for less than one year. In 2015, number of the newly-established SMEs increased by 4,352 or 4.43 percent from 2014. In terms of the industries, about 61 of all newly-established SMEs were in wholesale and retail, and accommodation and food service activities in 2015. In recent two years, some industries saw very high volatility in terms of the changing number of newly-established SMEs: accommodation and food service activities (down 3.45 percent in 2014; up 18.06 percent in 2015), art, entertainment and recreation (down 39.92 percent in 2014; up 16.70 percent in 2015), financial and insurance activities (up 15.64 percent in 2014; down 4.06 percent in 2015), electricity and gas supply (up 13.46 percent in 2014; down 21.65 percent in 2015), human health and social work activities (down 55.17 percent in 2014; up 6.19 percent in 2015), and mining and quarrying (up 1.27 percent in 2014; down 35.59 percent in 2015).

The intense fluctuations in these industries can be primarily attributable to the macro economic growth patterns (domestic or exports oriented), business and industrial cycle, and government policy measures. The government and SMEs tend to take on unnecessary expenses and too much risk when

times are good, but this can cause severe consequence if a recession strikes.

The government, as well as SMEs, needs to avoid taking shotcut measures based on short-term projection for highly cyclical businesses and industries. The government has implemented numerous programs to bolster innovation and start-up vitality for SMEs in recent years. Based on the business volatility in recent two years such as the distribution of the newly-established SMEs, the government can provide target measures to help SMEs navigate the challenging business environment and cyclicality. The government could combine its open information and real-time data from taxation and trade with big data analytics to track the performance and evaluate the effectiveness of related government policies, counseling, and guidance, so as to provide customized strategic mid- to long-term measures as well as short-term response and adjustments in a timely manner to reflect the needs of SMEs.

3. The Fintech Era: Alternative Funding Source for SMEs

Funding is the lifeline of an enterprise, and this is particularly true for SMEs that typically lack adequate fund. Reasons for this issue are manifold: the finances of SMEs are characterized by high complexity, yet are low scale. For traditional lenders such as banks, extending credit to SMEs is often too costly, given the small loan size. In Taiwan, SMEs' owners tend to have insufficient knowledge of the range of financing tools that are now available. As a result, SMEs' funding sources were mostly limited to borrowings from financial institutions through credit guarantees mechanism (such as direct credit guarantees by the SME Credit Guarantee Fund) or from commercial credit.

In recent years, FinTech - a contraction of "finance" and "technology," and defined as the use of technology and innovative business models in financial services - has become a powerful trend. From 2013 to 2014, equity investment into FinTech companies has quadrupled from $4 billion to more than $12 billion. FinTech embodies a new set of products tailored to the needs of small businesses. These include marketplace P2P ("peer-to-peer") lending, merchant and e-commerce finance, invoice finance, online supply chain finance and online trade finance.

P2P is one of a plethora of disruptors in the FinTech area who, with their innovative ways to originate, assess credit risk and fund SME loans, have provided alternative ways for SMEs to secure funding for their growth. It is the practice of lending money to individuals or businesses through online services that match lenders directly with borrowers. Since the peer-to-peer lending companies offering these services operate entirely online, they can run with lower overhead and provide the service more cheaply than traditional financial institutions. As a result, borrowers can borrow money at lower interest rates, even after the P2P lending company has taken a fee for providing the match-making platform and credit checking the borrower. This trend has the potential to become a game changer for small businesses. Because FinTech solutions are efficient and effective at lower scale, small businesses will be one of the main beneficiaries of FinTech's disruptive power.

4. Long-Term Talent Development Strategy Needed to Address Aging Workforce in SMEs

According to Directorate General of Budget, Accounting and Statistics (DGBAS), Taiwan's economic growth rate declined significantly to a mere 0.65 percent in 2015, amid weak global recovery and tough comparison with 2014. Although number of employed persons increased during sluggish economic growth, the share of aging employees including owners of SMEs has been rising in recent years. Aging workers amid shrinking workforce is a major issue not to be taken lightly.

In terms of human resources development strategy, government need comprehensive long-term plan to address aging workers and shrinking workforce to (1) provide subsidies for individual enterprises and organizations to arrange training programs for their employees in line with operational needs; (2) encourage enterprises in related industries to join forces with one another to implement employee training on a joint basis; (3) better utilize the rich professional experience of senior workers in industries as well as in public services to offset the labor shortage; (4) promote digital learning, incubation, R&D and technology management training, and executive training for SMEs, particularly for senior workers.

5. Promoting SMEs' Upgrade and Transformation through Smart Manufacturing

Germany, Europe, USA, Japan, South Korea and Taiwan all have launched their own smart manufacturing programs. Germany and USA, based on their own unique manufacturing advantages in response to the risks of manufacturing decline and outsourcing, launched "Industry 4.0" (starting 2012, Germany) and "AMP 2.0" (Advanced Manufacturing Partnership 2.0 starting 2014, U.S.A.), respectively; Japan formulated Industry Promotion Program and formed industrial alliances in Information and Communication Technology (ICT), cloud, robotics, automation and e-factory; Taiwan initiated "Productivity 4.0" in 2015 that served as a major tool for Taiwan's industrial transformation in the global trend of smart manufacturing. To seize the next generation industrial development opportunities, in 2016, the new government also launched "Five Innovative Industries Plan," based on the core concept of "Innovation," "Employment," and "Distribution."

The core concept of smart manufacturing lies in the intelligent automation, and is based on Cyber Physical System (CPS), Internet of Things (IoT), big data, and lean management to establish a smart value chain system applied in smart industries, services and agriculture. It serves as a major tool for promoting industrial transformation and enhancing national competitiveness. Smart manufacturing is the next revolution in manufacturing that will rewrite the rules of competition. Can SMEs take advantage of this trend to upgrade and transform their businesses, or are they at risk of being left behind or knocked down? Though not a deciding factor, the government can playing a leading role to help spur SMEs' innovation and enhance their competitiveness linking to smart manufacturing value chain by increasing SMEs' awareness and understanding of smart manufacturing and helping SMEs understand their current industrial stage, and giving appropriate counseling. Further discussion could be found in Chapter 6: "Promoting SMEs' Upgrade and Transformation through Smart Manufacturing."

6. Internet of Things (IoT): Opportunities for SMEs

The IoT brings together people, process, data, and things to make networked connections more relevant and valuable than ever before - turning information into actions that create new capabilities, richer experiences, and unprecedented economic opportunities for businesses, individuals, and countries. McKinsey estimates that the economic impact of IoT applications could be from $3.9 trillion to $11.1 trillion per year in 2025.

IoT ecosystem needs SMEs' innovation and flexibility in the development of technologies, platforms and products; the competition among major IoT platforms and demand of packaged services can also facilitate SMEs and their innovative teams to develop new services and business models more easily by adopting IoT applications via IoT ecosystems. Gartner says that in the near future, more than half of IoT solutions will come from startup companies founded within 3 years. Therefore, IoT opens doors to many new business opportunities and revenue streams for SMEs and start-up companies that can seize upon through effective use of data and analytics to inform strategic and operational decisions. Digitization lowers entry barriers, causing long-established boundaries between sectors to tumble. At the same time, the "plug and play" nature of digital assets causes value chains to disaggregate, creating openings for focused, fast-moving competitors. Knowledge, not labor, land and capital, becomes the most powerful factor of production.

The essence of IoT is openness and cooperation. IoT is not mainly driven by large companies as traditional view claims because most large enterprises are too slow in product development process and too ROI driven. This approach is not suitable for the development of a large number of IoT products and services using different technologies. SMEs' typical strengths in speed, flexibility and innovation fit well in IoT era to develop their own niche markets by offering diverse, customized products and services in small quantity batches. SMEs can innovate quickly in IoT ecosystem: a variety of open IoT platforms provides easy and simple process to promote a wide spectrum of application development, making it possible for SMEs to scale up swiftly at low cost and grow rapidly as more customers join the network. Further discussion could be found in Chapter 7: "Internet of Things (IoT): Opportunities for SMEs."

Part Two
Special Topics on SMEs

Smart manufacturing promotes an ecosystem among material suppliers, equipment manufacturers, distributors and end users. An SME excels in its niche market does not necessarily try to become a consolidator or a leader in smart manufacturing. However, it must be prepared to be linked in the ecosystem and find the right position in the value chains. Smart manufacturing is the next revolution in manufacturing that will rewrite the rules of competition. Can SMEs take advantage of this trend to upgrade and transform their businesses, or are they at risk of being left behind or knocked down? Though not a deciding factor, the government can play a leading role to help spur SMEs' innovation and enhance their competitiveness linking to smart manufacturing value chains. Further analyses are presented in Chapter 6.

The essence of Internet of Things (IoT) is openness and cooperation. IoT is not mainly driven by large companies as traditional view claims because most large enterprises are too slow in product development process and too return-on-investment (ROI) driven. This approach is not suitable for the development of a large number of IoT products and services using different technologies. SMEs' typical strengths in speed, flexibility and innovation fit well in IoT era to develop their own niche markets by offering diverse, customized products and services in small quantity batch. SMEs can innovate quickly in IoT ecosystem: a variety of open IoT platforms provides easy and simple process to promote a wide spectrum of application development, making it possible for SMEs to scale up swiftly at low cost and grow rapidly as more customers join the network. Case studies in Chapter 7 also indicate that forming partnerships is essential for SMEs to quickly grasp opportunities in IoT market and attract more funding and strategic alliances with third-party services, brands, and hardware.


NEWS & EVENTS

CHAPTER 6
Promoting SMEs' Upgrade and Transformation through Smart Manufacturing

We are living in the era in which "Smart" technology spreads to all fields of the economy and is permeating all aspects of consumers' daily life, such as telecommunications, transportation, utilities, payment systems, and public services. Whereas the 2000s were dedicated to "e-" (e-commerce, e-education, e-healthcare, etc.), the 2010s will be those of the "Smart" (smartphone, smart home, smart grid, smart city, etc.). "Smart" is not only an adjective but also stands for an ongoing major transformation force in full swing, particularly in major industrial countries.

Germany, Europe, USA, Japan, South Korea and Taiwan all have launched their own smart manufacturing programs. Germany and USA, based on their own unique manufacturing advantages in response to the risks of manufacturing decline and outsourcing, launched "Industry 4.0" (starting 2012, Germany) and "AMP 2.0" (Advanced Manufacturing Partnership 2.0 starting 2014, USA), respectively; Japan formulated Industry Promotion Program and formed industrial alliances in ICT (Information and Communication Technology), cloud, robotics, automation and e-factory; Taiwan initiated "Productivity 4.0" in 2015 and "Five Innovative Industries Plan" in 2016 (five innovative industries are: biomedicine, Asian Silicon Valley, intelligent machinery, green energy technology and national defense) that serve as major tools for Taiwan's industrial transformation in the global trend of smart manufacturing to grow new businesses, improve Taiwan's overall business environment, and create a cluster effect that links local and global industries.

This chapter is divided into four sections. Section I presents an overview of the rise of smart manufacturing and the ensuing challenges; Section II examines the major policy measures of governments worldwide to promote SMEs' upgrade and transformation through smart manufacturing; Section III offers interview and case studies of selected Taiwanese SMEs in development of smart manufacturing; Section IV provides recommendations to Taiwanese SMEs in development of smart manufacturing.

I Rise of Smart Manufacturing and Its Ensuing Challenges

1. Germany, USA, Japan, and Taiwan: in Response to the Rise of Smart Manufacturing

From a technical and management perspective, smart manufacturing can be divided into smart production and smart factory. Smart production is the intelligent management of the whole sphere of

manufacturing and operation. It enables all information about the manufacturing processes to be available when it is needed and where it is needed to enable intelligent automation. Smart factory is the link between smart manufacturing and the field equipment automation. The terms “Smart Factory,” “U-Factory (Ubiquitous Factory),” “Factory of Things,” “Real-Time Factory” and “Intelligent Factory of the Future” all describe a vision of what industrial production will look like in the future.

Radziwon et al. (2014) proposed a definition of a smart factory based on an analysis of related literature: a smart factory is a manufacturing solution that provides such flexible and adaptive production processes that will solve problems arising on a production facility with dynamic and rapidly changing boundary conditions in a world of increasing complexity. This special solution could on the one hand be related to automation, understood as a combination of software, hardware and/or mechanics, which should lead to optimization of manufacturing resulting in reduction of unnecessary labour and waste of resource. On the other hand, it could be seen in a perspective of collaboration between different industrial and nonindustrial partners, where the smartness comes from forming a dynamic organization. These concepts have been detailed in the above mentioned smart manufacturing programs launched by Germany, USA, Japan and Taiwan.

The term “Industry 4.0” was first used in 2011 at the Hannover Fair. In October 2012 the Working Group on Industry 4.0 presented a set of Industry 4.0 implementation recommendations to the German federal government. In response to the trend of globalization, shortened production cycles, decreasing labour force in aging society, and the significant risks of potential web monopolies posted by internet giants such as Google and Amazon, German federal government launched ""Industry 4.0" program to strengthen its traditional manufacturing industry and maintain the competitive advantage in industrial development. It focuses on key industries such as processing, automotive, machinery, electronics and ICT, and core technologies in sensor systems, robotics, ICT, etc.

Davies (2015) thinks that the term “Industry 4.0” largely overlaps the concept of “Smart Factory.” Industry 4.0 depends on a number of new and innovative technological developments: (1) the application of ICT to digitize information and integrate systems at all stages of product creation and use (including logistics and supply), both inside companies and across company boundaries; (2) Cyber-Physical System (CPS) that uses ICTs to monitor and control physical processes and systems. These may involve embedded sensors, intelligent robots that can configure themselves to suit the immediate product to be created, or additive manufacturing (3D printing) devices; (3) network communications including wireless and internet technologies that serve to link machines, work products, systems and people, both within the manufacturing plant, and with suppliers and distributors; (4) simulation, modeling and virtualization in the design of products and the establishment of manufacturing processes; and (5) collection of vast quantities of data, and their analysis and exploitation, either immediately on the factory floor, or through big data analysis and cloud computing.

Facing increasing manufacturing sector’s offshore outsourcing and high unemployment rate after global financial crisis, the Obama administration launched several major policies to encourage the reindustrialization of the largely service-based U.S. economy: (1) “A Framework for Revitalizing

American Manufacturing" (for what Obama called "Manufacturing Renaissance") in December 2009; (2) AMP (Advance Manufacturing Partnership) in 2011 to bring together industry, universities, and the federal government to invest in the emerging technologies that will create high quality manufacturing jobs and enhance global competitiveness; (3) NNMI (National Network for Manufacturing Innovation) in 2012 to build a network of up to fifteen Institutes for Manufacturing Innovation (in emerging technologies such as 3D printing, power electronics manufacturing, digital manufacturing and design, lightweight metal, and advanced composite materials) around the country, serving as regional hubs of manufacturing excellence that will help make manufacturers more competitive and encourage investment in the United States.

Japan does not have a specific program similar to "Industry 4.0." However, Japan did mention the related concept and the key industries such as 3D printing, robotics, regenerative medicine and healthcare in its "*2014 White Paper of Manufacturing Industries*." Japan further indicated in "*2015 White Paper of Manufacturing Industries*" that its manufacturing value chain should be able to help Japan enter the industry 4.0 era. Japan conducted Industry 4.0 analysis, and in 2015 proposed the New Robot Strategy focusing on human-machine coexistence and the factory of the future, focusing the technologies in sensors, control systems, cloud computing, AI (artificial intelligence) robot, and machine to machine. At the same time, several industrial alliances were formed in cloud, robotics, automation and e-factory. For example, 30 Japanese companies, including Mitsubishi Electric, Fujitsu, Nissan Motor, and Panasonic, launched the Industrial Value Chain Initiative to establish a structure that will connect large enterprises as well as SMEs via the Internet beyond affiliates and across sectors, and create common communications standards for linking factories and facilities as well as standardizing security technology.

Facing challenges of labor shortages and rising competition from emerging countries in mass production as well as from developed countries in advanced and customized markets, Taiwan's Ministry of Economic Affairs (MOEA) implemented "Productivity 4.0" in 2015 to stimulate economic growth and upgrade industries. Built upon smart automation, the Productivity 4.0 aims for smart automatic production, service, and agriculture to renovate industries like machine tools, metal processing, consumer electronics, food, healthcare, logistics, and agriculture. Combining technologies of robots, cyber-physical systems, IoT, and big data, the time is ripe for smart automation, smart service-oriented System of Systems (SoS), and technological diffusion to help drive business upgrade and transformation for large enterprises and SMEs.

In 2016, MOEA initiated the Intelligent Machinery Program, combined with Productivity 4.0, with the vision of "Industrialization of Intelligent Machinery" and "Smart Industries," to develop Taiwan into a global manufacturing hub for intelligent machinery and high-end equipment. The Program will facilitate advanced technologies such as cloud, big data, IoT, and intelligent robots to establish Intelligent Machinery Ecosystem, set up field trial sites, promote local, international, and future linkage, and transform the sector's focus from precision machinery to intelligent machinery. The Smart Industries cover various industries such as aerospace, semiconductor, ICT, metal transportation, food, retail, logistics, and textile.

2. SMEs' Challenges in Response to the Rise of Smart Manufacturing

According to Techconsult's (a German ICT market research and consulting firm) 2014 survey of a thousand SMEs in manufacturing industry in Germany, Australia and Switzerland, only about one third (35.7 percent) of them had a clear understanding of the Industry 4.0 concept. Radziwon et al. indicate that most SMEs have a need for automation solutions in the area of manufacturing, which could be developed and applied in order to optimize their current operations. However, the key characteristics would be affordability especially in terms of potential financial investment in smart manufacturing technologies. Based on DIGITIMES (2014), the most important reason why SMEs are hesitant or unwilling to dive in the deep end of smart manufacturing is due to the substantial associated costs and risks that are barriers to even large companies: these costs include, but not limited to, systems, equipments, consulting, training, and repair and maintenance. However, the return on investment is not clear in short-term and is hard to evaluate in long-term. Former Premier Chang San-Cheng noted (Economic Daily, 2015) that the IoT era provided business opportunities for Taiwan in many areas from front-end sensors, back-end cloud, to big data analysis. However, it is impossible for business owners to take advantage of IoT without first changing their mindset that prevents them from investing in ICT technologies. Chen Shi-Duan (2016) argued that SMEs don't need to install sensors and other monitoring equipments for data analysis as they do not have many machineries with which they are very familiar; they should focus more on enhancing product differentiation, quality and stability.

Smart manufacturing promotes an ecosystem among material suppliers, equipment manufacturers, distributors and the end users. Zhang Jian-Yi (2015) noted that an SME excels in its niche market does not necessarily try to become a consolidator or a leader in IoT and smart manufacturing. However, it must be prepared to be linked in the ecosystem and find the right position in the value chain. He also suggested that, SMEs with solid IT and automation foundation should seek help from government's counseling platforms.

Smart manufacturing is the next revolution in manufacturing that will rewrite the rules of competition. Can SMEs take advantage of this trend to upgrade and transform their businesses, or are they at risk of being left behind? Though not a deciding factor, the government can playing a leading role to help spur SMEs' innovation and enhance their competitiveness linking to smart manufacturing value chain. The following Sector II will introduce major international policies to promote smart manufacturing for SMEs.

II Major Policy Measures of Governments Worldwide to Promote SMEs' Upgrade and Transformation through Smart Manufacturing

1. EU (European Union)

In EU's manufacturing industry, SMEs link closely to large global enterprises through complex value chain as satellite vendors to supply components, products, and services for large firms. EU must help SMEs keep up with the trend of smart manufacturing.

Compared to large enterprises, the reason why SMMs cannot dive in the deep end of smart manufacturing right now are the much high barriers such as lack of understanding, limited capital, substantial initial investment and ongoing expenses with low certainty of potential return, lack of talent or difficulty to attract talent, and so on. To lower the barriers of SMEs' entry into Industry 4.0 market and its supply chain, EU adopted the recommendations from the Federal Ministry for Economic Affairs and Energy (Germany): the public sector should explain and transfer the latest research information to SMEs, to partly reduce SMEs' R&D costs and provide a relatively level playing field.

(1) Horizon 2020

Horizon 2020 is the biggest EU Research and Innovation program ever with nearly €80 billion of funding available over 7 years (2014 to 2020), of which about €8.6 billion will be allocated to SMEs, in addition to the private investment that this money will attract. It promises more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market. The goal is to ensure Europe produces world-class science, removes barriers to innovation and makes it easier for the public and private sectors to work together in delivering innovation.

Horizon 2020 is open to everyone, with a simple structure that reduces red tape and time so participants can focus on what is really important. This approach makes sure new projects get off the ground quickly – and achieve results faster. By coupling research and innovation, Horizon 2020 is helping achieve this with its emphasis on excellent science, industrial leadership and tackling societal challenges.

A. Excellent Science: Activities under this Pillar aim to reinforce and extend the excellence of the Union's science base and to consolidate the European Research Area in order to make the Union's research and innovation system more competitive on a global scale (Table 6-2-1).

B. Providing dedicated support for research and development in key enabling and industrial technologies; providing SME-tailored support to stimulate all forms of innovation in SMEs, targeting those with the potential to grow and internationalize across the single market and beyond; aiming to overcome deficits in the availability of debt and equity finance for R&D and innovation-driven companies and projects at all stages of development.

C. Societal Challenges: Reflecting the policy priorities of the Europe 2020 strategy and addresses major concerns shared by citizens in Europe and elsewhere, with focus on areas such as health, food security, sustainable agriculture and forestry, clean and efficient energy, smart, green and integrated transport, climate action, and so on; about 20 percent of budget will be allocated to SMEs.

Table 6-2-1 Excellent Science: Four Specific Objectives

Four sections	Four specific objectives
European Research Council (ERC)	Provide attractive and flexible funding to enable talented and creative individual researchers and their teams to pursue the most promising avenues at the frontier of science, on the basis of Union-wide competition.
Future and emerging technologies (FET)	■ Foster scientific collaboration across disciplines on radically new, high-risk ideas ■ Accelerate development of the most promising emerging areas of science and technology ■ Accelerate development of Union-wide structuring of the corresponding scientific communities
Marie Sklodowska-Curie Action (MSCA)	Provide excellent and innovative research training as well as attractive career and knowledge-exchange opportunities through cross-border and cross-sector mobility of researchers
Research infrastructure (E-infrastructures included)	Develop European research infrastructure for 2020 and beyond, foster their innovation potential and human capital, and complement this with the related Union policy and international cooperation.

Source: Based on EU's *Horizon 2020* program.

2. Germany

Germany manufacturing industry is well known for its quality and technology. It has developed a flexible and effective way of moving its best ideas from the university labs to the factory floor. SMEs are an integral part of Germany's Industry 4.0. SMEs have powered Germany's export-driven economy for more than a century. Some top SMEs or "Hidden Champions" are those who have low public visibility but command leading market share in certain markets (No. 1 or No. 2 in a world market or in their European market), and key technologies of Industry 4.0.

Professor Henning Kagermann, Co-chair of the Industry 4.0 Working Group, indicates that SMEs may need some government funding support, but money does not necessarily bring about industrial upgrade; research is the key that really needs government funding. However, too much financing could cause SMEs to lose control and have negative impact on their transformation pace. His view has significant influence on policy measures regarding SMEs' R&D, as well as on guidance of Industry 4.0.

(1) Intelligent Technical Systems OstWestfalen-Lippe (It's OWL)

In February 2012 the German Federal Ministry of Education and Research announced the "it's OWL" high-tech strategy as one of the winners of its Leading-Edge Cluster competition. It is involved in 46 research projects to develop intelligent technical systems and make Industry 4.0 a reality. The technology platform developed by universities and research institutes in the Leading-Edge Cluster for intelligent technical systems serves as the basis for technology transfer. To help SMEs, the technology platform developed by universities and research institutes in the Leading-Edge Cluster for intelligent technical systems serves as the basis for technology transfer. The transferors are eligible for subsidy for all expense while the transferees should cover their own cost.

(2) Industry 4.0 Competence Centers for SMEs

Since September 2015, the German Federal Ministry of Economic Affairs and Energy (BMWi) has appointed its ten Centers of Competence to help support the SMEs in manufacturing industry in the development and adoption of Industry 4.0 technologies. It is estimated that six more Centers of Competence will be established by January 2017. Each Competency Center is led by research institutions, universities or enterprises, which collaborate with government agencies. Each centre will focus on four key tasks - establishing five demonstration projects over the three year period, consultancy services to help SME's adopt Industry 4.0 approaches and technologies, worker training for shop floor level employees, and information search and dissemination facilities.

(3) Central Innovation Program for SMEs

The Federal Ministry for Economic Affairs and Energy has set up the Central Innovation Program to foster market-driven technology-based R&D work within German SMEs. The program is designed to enhance companies' capacity to innovate and to strengthen their long-term competitiveness. Under the program, companies and the research institutes they work with can be awarded grants for ambitious R&D projects. There are three funding options from which companies can choose the one that best suits their needs (Table 6-2-2).

Table 6-2-2 Central Innovation Program for SMEs

Projects	Qualifications
Individual Project Funding	Provide funding for individual companies doing their own in-house R&D work
Cooperation Project Funding	Provide funding for R&D work carried out jointly by two or more companies, or by one company and one or more research institutes
Cooperative Network Project Funding	Provide funding for external network management work carried out by innovative networks that comprise at least six SMEs which jointly develop a common innovation.

Source: German Federal Ministry of Economic Affairs and Energy (BMWi), *Technology-Neutral Project*.

(4) Information Channel

The Federal Ministry for Economic Affairs and Energy has set up a quick checking list tool to address the question regarding uncertain economic value raised by firms that are hesitant to dive in the deep end of smart manufacturing (Table 6-2-3).

Table 6-2-3 Quick Checking List

Step 1: Choose motivations	Step 2: Potential 4.0 functions	Step 3: Required technologies
5 main categories： ▪ Cutting expense ▪ Enhancing flexibility ▪ Transparency ▪ Attracting talent ▪ Enhancing customer satisfaction	5 main 4.0 functions： ▪ Data collection and management ▪ Operation system ▪ Network connection / integration ▪ Remote service-oriented operation ▪ Automation and automated management	Required technologies are classified by the potential value and degree of difficulty in implementation

Source: Federal Ministry for Economic Affairs and Energy, *Industrie 4.0 für den Mittelstand*.

3. Japan

Compared to Europe, Japan seems late to the game in the industrial revolution of smart manufacturing. Not to be left behind while facing decreasing labour force in aging society, Japanese leaders have scrutinized German's industrial efforts for the last 24 months and concluded they can no longer afford to merely stand-by. They are aware that their highly praised manufacturing model is in danger of being outclassed of a new smart manufacturing system. Japan has been catching up quickly, particularly in IoT and robotics areas as its strategic priorities. Its "2015 White Paper of Manufacturing Industries" pointed out that Japan fell relatively behind in ICT applications in manufacturing. Compared to USA, Japan had lower ratio of IT talent in the non-IT industries.

(1) Industrial Value Chain Initiative (IVI)

In June 2015, 30 Japanese companies, including Mitsubishi Electric, Fujitsu, Nissan Motor, and Panasonic, launched the initiative. "We aim to establish a structure that will connect even small and mid-sized companies via the Internet beyond affiliates and across sectors," said Yasuyuki Nishioka, a professor of information and industrial engineering at Tokyo's Hosei University, who is the driving force behind the initiative.

IVI aims at building a mutually connected system architecture, based on collaboration areas between companies. This means, IVI does not start from the area where an enterprise has its own competitive advantage (which should be kept), but investigates scenarios where companies naturally collaborate, and by this step by step gathers a broader understanding of more general connection models (reference models), without an urgency to build THE one general model out of it. This is why it employs the term "loose standard", as it means an adaptable model instead of a rigid system. A rigid new system would face many challenges in manufacturing environments, which are complex and typically heterogeneous, with a mixture of "old" and "new" elements. A pragmatic reality-based approach, starting from state-of-the-art today, seems therefore the most suitable to develop the next level of manufacturing. So, using the "loose standard" based connectivity, IVI works to increase the value for each enterprise by cyber-physical production systems.

The Business Scenario workgroups builds up real-life scenarios connecting different enterprises. These projects lead to connection models, out of which in turn the IVI reference models will emerge.

(2) Robot Revolution Initiative (RRI)

the Strategy of 2015 Robot Revolution Initiative aims to do the following: (1) Make Japan the world's center of robot innovation by basically reinforcing Japan's ability to create robots; (2) make Japan the world leader in utilizing robots in society; and (3) demonstrate Japan's initiative to the world by leading the new era of robots that includes the coming of IoT.

Four Working Groups (WG): (1) WG on the IoT-Driven Transformation in Manufacturing; (2) WG on the Promotion of Robot Utilization; (3) WG on Robot Innovation; and (4) WG on Training and Securing Human Resources. Plans target SMEs: (1) establishing the SMES Sub Executive Committee to promote the IoT applications for SMEs; and (2) collaboration among local universities, technology centers, and medium to large enterprises to establish local institutions to help SMEs conduct transformation and R&D in robotics.

In April 2016, Plattform Industrie 4.0 and its Japanese counterpart - the Robot Revolution Initiative - reached joint agreement on future cooperation in areas such as network security, international standardization, regulatory reform, the promotion of SMEs, human resource development, and R&D.

III Interview and Case Studies of Selected Taiwanese SMEs in Development of Smart Manufacturing

This section offers interview and case studies of selected Taiwanese SMEs in development of smart manufacturing and discusses the driving forces in adopting and promoting smart manufacturing.

1. Case Studies of Selected Taiwanese SMEs and Start-up Companies in IoT Development

(1) Textile Industry Promotion Office

Textile Industry Promotion Office was established in 2008. It has since built service platforms, recruited experts and consultants, and facilitated collaboration among manufacturers, universities, research institutions, and industrial associations to enable alliances in supply chain throughout upstream, midstream, and downstream as well as cross-industry cooperation, and promote development of functional textiles, technological differentiation, and high quality products.

A. Driving Forces for Textile Smart Manufacturing

For many years, Taiwan's textile industry faced tremendous competitive pressure and struggled to overcome the hurdle of changing global market conditions as the industry, particularly downstream suppliers, kept moving to low labour cost countries and regions (from England during the early Industrial Revolution, to Germany, the United States, Japan, Taiwan, South Korea, Mainland China, and then to Vietnam, Bangladesh, Burma, Cambodia, and in the future to Africa). Only core technologies in midstream or upstream could stay for local development. What Taiwan's textile can do locally are dyeing and weaving.

Automation is an important and basic smart manufacturing element. Currently, about 70 percent of the outdoor leisure clothing brands, especially in functional apparel, are linked to Taiwan's textile industry. Functional fabric's core technologies and automation are closely linked, especially in the textile dyeing and finishing. Automation is of critical importance to reduce labor cost and meet the quality requirements of global brands.

B. Smart Manufacturing Awareness and Practices

Due to textile industry's high degree of internationalization, textile companies are among the earliest adopters of ERP (Enterprise Resource Planning) system to cope with the global factory layout and meet global brands' demand. Many international clients will not place orders to suppliers who have no ERP system. Smart manufacturing demands much more advanced technologies and systems than

ERP. Textile Industry Promotion Office has held seminars in public and industrial associations to promote the concept that the smart manufacturing is indispensable to textile industry for its development.

Two prerequisites for an enterprise to move towards smart manufacturing are: owner's determination, and its existing capabilities such as the degree of factory automation and ERP. Capable enterprises should take advantage of the government's promotion plan for smart manufacturing, which could help enterprises extend their existing automation, digitization, and information technology to link clients and cut cost more effectively.

C. The Role of Textile Industry Promotion Office

The role of Textile Industry Promotion Office is a promotion platform. the Office will (1) ask an applicant (enterprise) to complete self-assessment form and find out what stage of smart manufacturing at which the enterprises are; (2) understand enterprises' real need through consultants' on-site interviews; (3) ask legal entities, Taiwan Textile Federation, Industrial Technology Research Institute, textile industrial association, and so on to help the enterprise make proposal to obtain government's assistance; (4) work with legal entities that act as integrator to find vendors in textile dyeing and finishing, ERP vendors, and equipment OEMs to connect hardware, software, and firmware; (5) conduct training for industry personnel; (6) help three industrial associations in man-made fiber, cotton dyeing, and silk printing and dyeing to promote smart manufacturing; and (7) help establish three committees, focused on matching and collaboration.

D. How to Promote Smart Manufacturing for SMEs

Strategies to promote smart manufacturing for SMEs are: (1) use backbone SMEs as industry demonstration plants (such as Everest Textile, as discussed below) and build corporate demonstration production line, to drive SMEs to learn and move forward; (2) advise SMEs to take gradual upgrade to ease the burden of high initial cost; for SMEs determined to drive smart manufacturing, the most cost-effective incentive we suggest is tax credit to automation equipment investment; and (3) offer follow-up consulting on solutions and innovative business models.

(2) Everest Textile Co., Ltd.

Founded in 1988, Everest Textile is an R&D oriented and vertically integrated textile manufacturer that specializes in yarn spinning, twisting, weaving, dyeing, finishing, printing, coating, laminating and special finishing. Everest develops and supplies high value-added and innovative products to global leading brands in sports, outdoor, city, casual and industrial materials. Currently Everest has three production factories in Taiwan, China and Thailand, and 10 sales & marketing offices in major cities of the world (i.e. New York, Paris, Dubai, Shanghai, Honk Kong, Tokyo and Osaka etc.). Everest Textile expects to gradually complete its smart manufacturing framework in a few years.

A. Driving Forces for Smart Manufacturing

The global competition in textile industry is fierce. Everest stays highly vigilant for the changing trends in the world as it has more than 300 business partners around the world. International sports, outdoor and fashion brands Nike, The North Face, Columbia and Lululemon have been working closely with Everest. Everest has maintained its leading position in innovation through

transformation and upgrade. In 2014, Roger Yeh, president of Everest, came across an article on industry 4.0 that fascinated him so much that he kept looking for more literature on the subject. Noticing that advanced countries including Germany, USA and Japan all made foray into the smart manufacturing, He led managers of factories in Taiwan, China and Thailand to read and research the trends in textile industry in the context of Industry 4.0. Facing rising labour cost worldwide, Yeh figured that for Everest, the genuinely lucrative opportunities would not lie in the traditional low-end market crammed with rivals seeking low labour cost and tussling over low-hanging fruit. The real opportunities would be found in creating cutting-edge products that tickle the fancy of global fashion and sports clothing designers. Yeh has championed intelligent automation since 2014. This undertaking reflects his firm belief in the value of business innovation. "We are the first smart textile firm in Asia employing big data, cloud computing and smart networking technology to re-engineer operations," Yeh said.

B. Everest's Smart Manufacturing Approach

Everest estimated that it was at Industry 1.5 ~ 2.0 stage based on self-assessment. Yeh proposed "Everest 4.0 Plan" and "Smart Everest" vision, from the basic process control and equipment data collection, to automation and integration, and further to the intelligent automation.

Yeh set up an intelligent manufacturing workgroup with himself at the top. He scouted the electronics industry for talent with expertise in automated control systems. Cautiously, the company explored the way forward, gradually learning by doing directly on the production line. Step one is transformation of infrastructure: to connect a lot of textile equipment (mostly stand-alone devices). If equipment OEMs are unwilling to make modification, then seeking help from outside consultants, ICT providers, and system integrators to evaluate and customize to meet the requirement of Supervisory Control and Data Acquisition (SCADA). Step two is Manufacturing Execution System (MES) and ERP upgrade (adopting SAP's ERP) for intelligent integration and optimization.

Within two years' time, Everest managed to bring online a smart model production line at its dyeing and spinning mill in Tainan, Taiwan. The company plans to invest in artificial intelligence and big data applications to maximize results by looking into customer applications, market trends and target marketing.

This NT$350 million-plus (US$10.59 million) root-and-branch upgrade should raise Everest's production efficiency by 30 percent while eliminating 30 percent of manual labor processes by year-end. "We expect to fully recover our capital outlay in 18 months," Yeh added. Entrepreneurs like Yeh who dare to make massive investments are few and far between in Taiwan. Most manufacturers doubt that such investment would generate direct cost benefit and therefore shrink from taking action. Taiwan's textile industry, however, is quite aggressive and willing to try.

C. Collaboration with Equipment Suppliers, Industrial Associations, and Legal Entities

To encourage equipment OEMs to make modification, Everest uses its negotiation power as a large manufacturer and proposes win-win solution: (1) cost sharing, and (2) potential benefit for new orders as Everest grows (Ever year Everest attends most of the important global textile exhibitions such as PV, ISPO, Outdoor Retailer, European Outdoor, Texworld, etc. to deliver its own brand "EverTek" and shows various innovative products).

Everest works with a dozen partners on its way toward textile industry 4.0. Everest, with vision of open collaboration, has made its factories a showcase of the success of its partners as well as a demo site for other manufacturers. Advantech and SAP view Everest as a successful case of transformation. Microsoft also expresses interest to form strategic alliance with Everest. In addition, Everest has actively cooperated with public industrial associations, legal entities (Institute for Information Industry, Industrial Technology Research Institute, etc.), and manufacturers to exchange ideas and seek government resource (for example: implementation of smart dyeing factory demonstration).

D. How to Promote Smart Manufacturing for SMEs

Strategies to promote smart manufacturing for SMEs are: (1) the government should actively promote the concept of smart manufacturing and encourage manufacturers to invest in it; (2) SMEs take gradual upgrade to ease the burden of high initial cost; government could offer subsidy to SMEs that are capable and willing to invest in smart manufacturing technologies.

(3) Taiwan Electrical and Electronic Manufacturers' Association

A. Promoting Smart Manufacturing for SMEs: Opportunities and Challenges

Most SMEs obtain orders from large enterprises. It is important for SMEs to upgrade and transform their businesses in the trend of Industry 4.0 to keep up with product delivery requirements, otherwise they run the risk of being left behind or eliminated.

Taiwan Electrical and Electronic Manufacturers' Association has over 3,000 member enterprises. Members have realized the problem of labor shortage for a long time. Some had moved production overseas. Others continue to operate in the domestic market, the size of which determines the scale of production, hence affecting the investment decision. Overseas factories are closer to the market, and may have sufficient scale to support investment in smart manufacturing. However, SMEs are less likely to investment in smart manufacturing in the period of poor general economic conditions, and unknown market demand.

Companies have long history and thorough knowledge of processes, equipment, and maintenance may be unwilling to invest in new automation equipment because (1) it could mean layoff of employees who may, for example, do good maintenance jobs, and (2) it needs substantial initial investment. At the same time, smart manufacturing emphasizes the collection, analysis and use of information, particularly the need to invest in IT personnel and equipment, of which SMEs typically lack.

B. SMEs' Timing to Adopt Smart Manufacturing

Not every SME need to reach the higher stage of smart manufacturing. SMEs at stage of Industry 2.0 or 3.0 may be sufficiently competitive. The more complex the production process (for example: three shifts of production), the more value in factory IoT monitoring and big data analysis. Many SMEs mostly operate single-machine production, therefore smart manufacturing is not necessarily needed in the operation.

In a period of poor macro environment, an SME should focus on its competitiveness. if its competitiveness could be enhanced after initial automation upgrade, then the SME could gradually invest in Industry 2.0, 3.0, and even toward 4.0 after macro environment improves and its profit rises, hence the considerations to scale-up.

C. How Can Government and Industrial Associations Help SMEs Develop Smart Manufacturing

Industrial Development Bureau has set up its Smart manufacturing Promotion Office under the framework of the Smart manufacturing Development Programs. The Office, collaborated with several public industrial associations, invites experts to hold seminars and workshops, followed by the field visits, to assist in the diagnosis and counseling for manufacturers in urgent needs such as funding and direct tax credit for investment on software and hardware.

D. How to Promote Smart Manufacturing for SMEs

The Small and Medium Enterprise Administration (SMEA) can assist SMEs in two ways in promoting smart manufacturing: (1) setting up platform - SMEA can base on its single service window of Instant Service Center to setup a platform to link other major promotion webs (of Industrial Development Bureau, Technology Department, Council of Agriculture, etc.) and smart manufacturing commissions of public industrial associations to offer manufacturers reward, incentive, mentoring, recruiting and financing; and (2) establishing industrial demos: focusing on capable SMEs that are willing to invest in smart manufacturing technologies through professional diagnosis and follow-up assistance; selecting successful SMEs as industrial demos.

(4) Be Be Cotton Knitting Co., Ltd.

Founded in 1974, Be Be Cotton is an SME engaged in production of chemical fibers and elastic fiber knitted fabrics made with medium and high count yarn of natural fibers including pure cotton, linen and wool. In recent year, it has continuously focused on the highest quality management with production specialists, the use of latest raw materials with inherent characteristics, and the contemporary fashion trend with excellent designers. Be Be Cotton attentively develops the new fabrics in line with eco-friendly concepts and good quality control, and meet the demand from well-known brand companies in the textile industry.

A. Be Be Cotton's Understanding of Smart Manufacturing

Be Be Cotton feels that the smart manufacturing is a must for some companies in the new era but not suitable for all SMEs. For decades, Taiwan SMEs have been industrial OEMs supplying electronic parts and other components to developed countries, and are able to delivery mass production of cheap products quickly. However, to fend off fierce competition from OEMs in emerging and developing countries such as Mainland China, Taiwan SMEs must have their own unique products / services and niche positioning. To follow smart manufacturing without the upgrade of its industry, an SME could fall into the same vicious cycle of price-based competition in low cost pursuit.

B. Cloud Data Storage

Be Be Cotton has doubt in security of cloud data storage, fearing potential leakage of its data accumulated for years. It feels comfortable of the current data management system, but will seek experts' assistance in the future for more effective way of data collection and management.

C. How Can Government Help SMEs

Be Be Cotton thinks that SMEs should start from the change of their own concept. Instead of relying on government, SMEs must focus on discovering new markets, consumer satisfaction, and upgrading themselves. To assist enterprises in target industries, government should consider enterprises that can create jobs and grow in domestic market.

2. Analysis

Followed are the conclusions based on the cast studies and interviews mentioned above.

(1) Global Competition and Rising Labor Cost Are the Main Driving Forces to Promote Smart Manufacturing

Taiwan is highly dependent on international trade. Facing global competition, changing demands of international customers, and tremendous pressure of rising labor cost, SMEs in all industries including textile and ICT are forced to craft new strategies to improve productivity and create customer value. Everest shows how to break through the limitation of labor shortage and productivity by investing boldly in Industry 4.0 equipment and software. Be Be Cotton keeps a vigilant watch on the current trends in textile and develops the new fabrics in line with eco-friendly concepts and good quality control that meet the demand from well-known brand companies in the global textile industry. Although backbone medium-sized company (such as Everest) may have different thoughts and approaches regarding smart manufacturing, they all firmly believe in staying away from vicious cycle of price-based competition in low cost pursuit, and adopting blue ocean strategy through innovation and upgrade.

(2) First Step toward Smart Manufacturing: Understanding the Strength and Weakness of Your Competitiveness

Different industries compete in different competitive environments, which, together with an enterprise's own conditions decide the productivity stages at which it operates. As Textile Industry Promotion Office points out: owner's determination, and its existing capabilities such as the degree of factory automation and ERP are the two prerequisites for an enterprise to move towards smart manufacturing. Taiwan Electrical and Electronic Manufacturers' Association indicates that in a period of poor macro environment, an SME may focus on gaps of its competitiveness. if its competitiveness could be enhanced after initial automation upgrade, then the SME could gradually invest in productivity at fit stage after macro environment improves and its profit rises, hence the considerations to scale-up.

(3) Lowering Entry Barriers for Latecomers through Demos and Diffusion

The public industrial associations and legal entities have collaborated with enterprises to established smart manufacturing demos, focusing on capable SMEs and enhance their willingness to invest in

smart manufacturing technologies through professional diagnosis and follow-up assistance. Everest case reveals that its success on its way toward textile Industry 4.0 also promotes the upgrade and business expansion of its partners, and lowers entry barriers for latecomers through demos and diffusion.

IV Recommendations to Taiwanese SMEs in Development of Smart Manufacturing

1. Increasing SMEs' Awareness and Understanding of Smart Manufacturing

SMEs in Taiwan have in-depth knowledge of their equipment and industrial environment, but not much understanding of smart manufacturing. According to Techconsult's 2014 survey of a thousand SMEs in manufacturing industry in Germany, Australia and Switzerland, only about one third (35.7 percent) of them had a clear understanding of the Industry 4.0 concept, which was launched in 2012, 2 years before the survey. As Everest pointed out: most SMEs do not have enough understanding of smart manufacturing concept, nor realize existing incentive measures. Government should actively promote the concept of smart manufacturing. The best channel is establishing smart manufacturing Instant Service Center by SMEA under the framework of smart manufacturing development program to setup a platform linking other major promotion offices' webs and smart manufacturing commissions of public industrial associations to offer SMEs information on quick checklist, incentives, mentoring, talent cultivation, technologies and financing.

2. Helping SMEs Understand Their Productivity Stage, and Giving Appropriate Counseling

For capable SMEs willing to invest in smart manufacturing, SMEA could follow the practices of Taiwan Electrical and Electronic Manufacturers' Association and Textile Industry Promotion Office: (1) inviting experts to help find productivity stage of SMEs; (2) understanding SMEs' real urgent need through professional diagnosis and consultants' on-site interviews; (3) asking legal entities to help SMEs make proposal to obtain government's assistance; and (4) cultivating backbone SMEs through professional diagnosis and follow-up assistance and selecting successful SMEs as industrial demos to convince SMEs by lowering entry barriers for latecomers through demos and diffusion. In addition, it is vital to strengthen the integration of SMEs' counseling resources on smart manufacturing, financial assistance to SMEs' investment in smart manufacturing equipment, and talent cultivation.

CHAPTER 7

Internet of Things (IoT): Opportunities for SMEs

The Internet Era began on August 9, 1995 - the day shares of Netscape Communications, maker of the first widely adopted internet browsing software, more than doubled on their first day of public trading - and has since brought enduring and rapid changes to human life and industries. With the rapid development of information and communications technology (ICT) industry, the concept and the term "Internet of Things" (IoT) was created - known to be invented by Kevin Ashton, executive director and cofounder of the Auto-ID Center at the Massachusetts Institute of Technology (MIT) in 1998, to describe a system where the Internet is connected to the physical world via ubiquitous sensors - i.e., a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies. Cisco later extended the concept of IoT and defined the Internet of Everything (IoE) as bringing together people, process, data, and things to make networked connections more relevant and valuable than ever before - turning information into actions that create new capabilities, richer experiences, and unprecedented economic opportunities for businesses, individuals, and countries, such as machine learning, smart cities, and smart earth.

With the potential to streamline and deliver greater time and cost savings to a broad spectrum of enterprise tasks, in recent years, IoT, driven by the widespread adoption of smart mobile communication and falling prices of sensors and cloud computing, is about to come to fruition. According to BI Intelligence, IoT devices will outnumber smartphones in 2017, and 2018 will see outbreak of opportunities for IoT adoption. Major international companies, such as Microsoft, Google, Apple, Intel, Samsung, Taiwan's Acer and Advantech, have been aggressively transforming and positioning themselves in IoT economy, and hope to establish ecosystems through open IoT platforms to stimulate technology innovations and applications in all fields.

IoT ecosystem needs SMEs' innovation and flexibility in the development of technologies, platforms and products; the competition among major IoT platforms and demand of packaged services can also facilitate SMEs and their innovative teams to develop new services and business models more easily by adopting IoT applications via IoT ecosystems. Big Data is the core value of IoT. However, McKinsey&Company estimates that less than 1% data are effectively used at present. Gartner says that in the near future, more than half of IoT solutions will come from startup companies founded within 3 years. Therefore, IoT opens doors to many new business opportunities and revenue streams for SMEs and start-up companies that can seize upon through effective use of data and analytics to inform strategic and operational decisions.

Eyeing the huge market potential of the coming outbreak of IoT opportunities, COMPUTEX TAIPEI 2016, an influential and important global ICT event in Taiwan, targeted 4 main themes: IoT applications, business solutions, innovations and startups, and gaming. It also showcased results of many Taiwanese companies in transforming component OEM model toward IoT application, innovation, and solutions. InnoVex is a special startup exhibition during COMPUTEX TAIPEI 2016, linking global entrepreneurs to Taiwan's ICT supply chain. Internet has brought many opportunities for innovation and business opportunities, as well as creative destruction. For the first time in industry history, the era of digitization is rewriting the rules of competition, with big incumbent companies most at risk of being left behind or knocked down by young startup companies. Digitization lowers entry barriers, causing long-established boundaries between sectors to tumble. At the same time, the "plug and play" nature of digital assets causes value chains to disaggregate, creating openings for focused, fast-moving competitors. Knowledge, not labor, land and capital, becomes the most powerful factor of production. New market entrants, no longer subject to restrictions of physical resources, often can scale up rapidly at lower cost than legacy players do, and return on investment (ROI) may grow rapidly through network effects as more customers join the network. IoT era will start another wave of the digital revolution, opening doors to young entrepreneurs and SMEs in particular.

In response to the coming outbreak of IoT application that is perceived as the driving force of the next digital revolution, governments worldwide have introduced many policy measures designed to spur innovation and enhance their national competitiveness.

This chapter is divided into four sections. Section I presents an overview of the IoT trend and its impact on industrial development; Section II examines the major policy measures adopted by governments worldwide for IoT development; Section III offers case studies of selected Taiwanese SMEs in IoT development; Section IV provides strategic direction to assist SMEs' development in IoT economy.

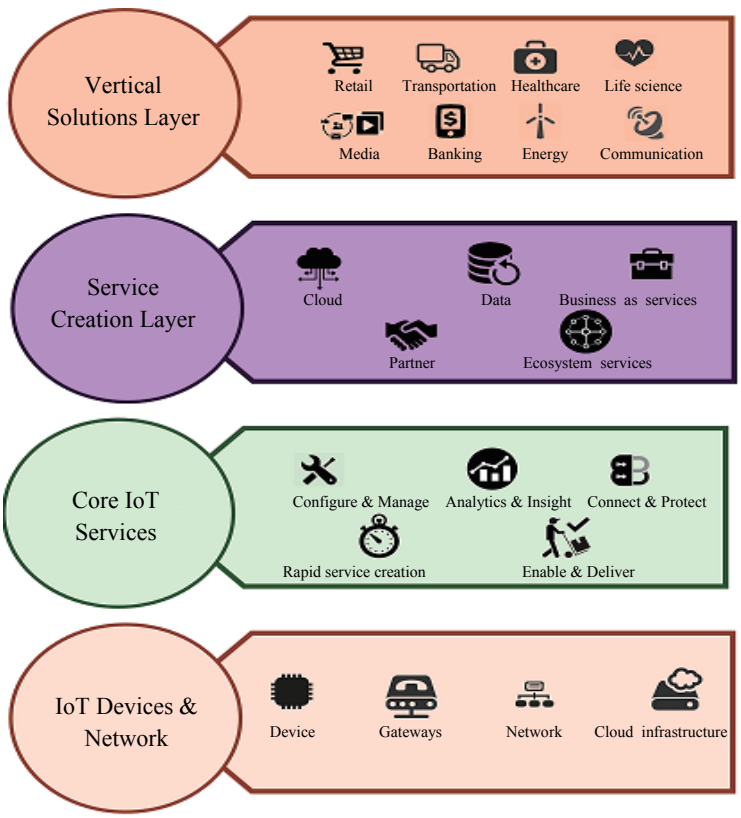
I IoT Trend and Its Impact on Industrial Development

This section discusses IoT ecosystem, its impact on industrial development, and IoT opportunities.

1. IoT Ecosystem

An ecosystem is a natural system consisting of all plants, animals and microorganisms in an area functioning together with all the non-living physical factors of the environment. Using ecological metaphors to describe business structure and operations is increasingly common especially within the field of information technology. Figure 7-1-1 below showed the IoT ecosystem that consists of four layers: (1) IoT Devices and Network - devices & things, gateways, network and cloud infrastructure; (2) Core IoT Services - enabling connection and safety, configuration and management, analytics and insight, and rapid services creation and delivery; (3) Service Creation Layer - supporting application programming interfaces (API) of various standards - cloud as a service, data as a service, and business services; (4) Vertical Solutions Layer in various industries (retail, banking, transportation, healthcare, life science, communication, social media, etc.).

Figure 7-1-1 IoT Ecosystem



Source: Somasundaram Jambunathan, *Internet of Things- Security and Privacy Consideration* (2015).

Major companies such as Amazon, Google, Microsoft, and Intel have committed substantial capital as well as their own expertise, combined with external hardware and software resources, to create their own IoT platforms that fit into IoT ecosystems as described in Figure 7-1-1 above. For example, in 2014 Intel presented "Intel IoT Platform" architecture. It includes end-to-end reference architectures model and family of products from Intel and its ecosystem that works with third-party solutions to provide a foundation for seamlessly and securely connecting devices, delivering trusted data to the cloud, and delivering value through analytics. Intel IoT Platform can be divided into four layers: (1) Connect Things and Devices - seamless sensor data collection and machine enabled actions; (2) Intelligence at Edge - performing edge analytics based on device communication and data collection terminal that filters through actionable data to the data center; (3) Turn Data into Insight - performing cloud analytics, processing data and storage, and managing devices, policies, and network; (4) Visualize Data and Monetize Insight - API development and analysis, automatic operating decisions, and business services and solutions.

While Intel uses its expertise in software and hardware equipment development to establish its IoT platform, Amazon, Google, and Microsoft, on the other hand, leverage their core competencies in cloud architectures, visualization, big data, and software systems, to build their IoT platforms. The common denominator is to integrate external resources to build an open architecture, which facilitates

technology, hardware / software and service innovation, and enables enterprises to scale up rapidly at lower cost by focusing on the development of value-added features with lower entry barriers and less restrictions of physical resources.

Because (1) no company owns all the core technologies in developing IoT and related business models, and (2) the real value of IoT comes not from hardware but from the innovative services through networking, which can create and meet market demands, and further enhance hardware and platform services, IoT ecosystem lowers entry barriers, creating a larger market pie and the following opportunities for focused, fast-moving SMEs, start-ups and new market entrants:

(1) SMEs can innovate quickly in IoT ecosystem: A variety of open IoT platforms provides easy and simple process to promote a wide spectrum of application development, making it possible for SMEs to scale up swiftly at low cost and grow rapidly as more customers join the network. Further, competition among enterprise IoT platforms and their ecosystems to attract SMEs and start-ups in order to enhance technology, value, and innovative ideas creates opportunities and favorable terms for SMEs. For examples: Google gives high-potential start-up teams US$100,000 to use its cloud platform; Amazon offers free access to its platform, technical support, training, favorable service terms using third-party partner sites and other incentives to attract startups and SMEs.

(2) Increased opportunities for cooperation with large companies: In addition to attracting SMEs to join their ecosystems, many large companies reach for start-ups' R&D through direct capital investment or acquisition. Google acquired Nest for its smart appliances development; Xiaomi's founder announced that it will invest in 100 smart hardware companies; Hon Hai Precision Industry Co. also announced that it would set aside 20% to 30% of resources to invest in new start-ups for its IoT strategy.

2. IoT Impact on Industrial Development

(1) Industrial IoT: Four-Phase Evolution

IoT consists of consumer IoT and industrial IoT. The former mainly covers areas to enhance consumer health, safety and convenience; the latter is mostly applied to the industrial upgrade and transformation in manufacturing, energy supply, agriculture, mining, transportation, healthcare, etc. According to World Economic Forum (WEF), the future evolution of the industrial IoT will likely follow four distinct phases: (1) Operational Efficiency - asset utilization, operational cost reduction, worker productivity, etc.; (2) New Products and Services - pay-per-use, software-based services, data monetization, etc.; (3) Outcome Economy - pay-per-outcome, new connected ecosystems, platform-enabled marketplace, etc.; and (4) Intelligent Economy (autonomous, pull-based economy) - continuous demand-sensing, end-to-end automation, resource optimization and waste reduction, etc.

For most incumbent manufacturers, energy companies, agriculture producers and healthcare providers, the initial business case to justify the adoption of the industrial IoT is based on incremental results in increased revenues or savings. As shown in Table 7-1-1, WEF survey indicates that companies are turning to digital technology either to drive down cost or increase top-line growth: 79% of respondents indicate that "optimizing asset utilization" is a "very to extremely important"

driver for adoption, while 74% say the same about creating alternative revenue streams through new products and services. Other main benefits are: reducing operational cost, improving worker productivity, enhancing worker safety, creating new revenue streams through new products and services, improving sustainability, and enhancing customer experience.

Table 7-1-1 How Important Are the Following Benefits in Driving Businesses to Adopt the Industrial IoT?

Unit: %

Degree \ Benefit	Optimize asset utilization	Reduce operational cost	Improve worker productivity	Enhance worker safety	Create new revenue by new products and services	Improve sustainability	Enhance customer experience
Extremely important	36	36	20	16	40	25	19
Very important	43	45	54	26	34	42	45
Important	16	16	22	28	25	30	26
Somewhat important	4	3	4	28	0	3	10
Not important	1	0	0	2	1	0	0

Source: World Economic Forum (WEF), *Industrial Internet of Things: Unleashing the Potential of Connected Products and Services* (2015).

However, before moving towards intelligent economy, the industry must address various technical and non-technical challenges facing end customers and solution providers alike, such as technology progress, equipment and system interoperability and standards, solution provider fragmentation, data security and privacy, intellectual property rights, business models and government regulations. Machine-to-machine (M2M) technologies, and artificial intelligence (AI) and machine learning are vital to realizing full benefits of IoT. R&D-oriented enterprises should make the bold and decisive moves to invest in these key areas.

(2) Trend of Cross-Platform and Service-Oriented Manufacturing

Due to ever declining hardware margin in the IoT era, many hardware manufacturers have stepped into software and system management services across platforms. Unitech, a technology company founded in 1979 in Taiwan, is a global provider of automatic identification and data capture (AIDC) technologies and manufactures a wide range of enterprise mobile computers, industrial tablets, and other smart living devices. Unitech developed Mobolbink, an IoT platform that offers cloud application management interface through mobile device management and data exchange management to enable manufacturers' cross-system integration. It cooperates with Microsoft to provide big data services such as logistics management (at present) and preventive maintenance service (in the near future).

Another well-known case is Qualcomm Life, founded in 2011 and operates as a subsidiary of Qualcomm (global leader that develops, designs, manufactures, and markets digital communications products and services). Qualcomm Life provides device connectivity and data management solutions that enable medical device manufacturers to deliver wireless healthcare. The company operates 2net Platform, a cloud-based system that facilitates a set of wireless healthcare solutions for capturing and delivering medical device data to integrated portals or databases from the wireless medical devices of various customers or technology partners for storage in a system designed for security. In 2013, Qualcomm Life acquired San Diego-based HealthyCircles, a software-as-a-service startup that helps

different care providers share patient information securely in a hospital setting. HealthyCircles and 2net Life will both continue to be sold as individual offerings, but also in combination as a more complete offering, particularly valuable as more hospitals turn to home care to reduce readmission rates. Qualcomm has strategic collaboration with about 500 companies including Roche to expand its healthcare network scale.

(3) Business Service Trend: Smart and Interactive

In addition to service-oriented manufacturing, logistics, retail and other services are expected to follow a more transparent, diverse, interactive and personalized trend. In business service, IoT applications will be mainly focused on improving consumer experience, optimizing supply chain and creating new channels and opportunities. In terms of consumer experience, IoT applications, through micro-positioning technology, combined with consumers' personal characteristics and purchase history, can be used to conduct more accurate customized marketing (merchandise information, gift exchange, discounts, recommended shopping lists, target stores, price comparison, QR code scanning, digital payment, etc.), and to help vendors adjust merchandise layout, price, and advertising based on real time consume information such as consumers' moving directions. Supply chain optimization, particularly smart logistics support, is vital for retail success. IoT tools can effectively help retailers better grasp the global supply chain information, trade data and logistics tracking, as well as manage inventory and risk.

Many large department stores and retailers such as Tesco, Walmart, and Taiwan's 101 Department Store, Family Mart, Tsann Kuen and other small businesses have adopted IoT to enhance service experience and efficiency. As consumers seek unique and more personalized experience, specialized SMEs can increase their product & service visibility through data analysis enabled by IoT service platforms; SMEs can offer diverse specialty products and achieve win-win by cooperation with large retailer. For example, the Ministry of Economic Affairs (MOEA) of Taiwan, R.O.C. announced joined forces with the Institute for Information Industry (III) to launch smart shopping services available in Taipei 101 Mall and Kaohsiung City’s Dream Mall. A smart shopping area is one that offers consumers personalized shopping services through interactive technologies. This is made possible by linking local shopping information and services to online social networks while integrating sensing devices with information infrastructure. Merchants can also benefit from these tools by gaining a better understanding of consumer behavior and preferences. The three key components that make up a smart shopping district are shopping services, audiovisual content and IoT. Through data analysis and matching, the system can integrate payment and logistics services for front-end stores and maintenance/transport companies. It can also perform back-end analysis of shopping information to boost revenue and satisfaction for stores and customers alike, creating a win-win situation and fostering prosperity in the area. Taipei 101 Mall’s smart shopping experience includes a range of novel features. Shoppers can use their cell phones to access a mini-shopping directory. After stipulating a price threshold for a particular item, the interactive guide will show where matching items can be found and display them on screen, saving the effort of running around looking for them. The intelligent network can integrate information about times, weather conditions and queue numbers to give expected waiting times. A Wi-Fi positioning service will help shoppers locate their parked cars when they leave and the system can provide traffic information and

recommend which exit to take. At Kaohsiung's Dream Mall, customers can take advantage of the network's mobile shopping facility. By sweeping the cell phone over the product's barcode, items can be picked up at a designated information desk 30 minutes after payment, eliminating the need to push a shopping trolley or lug bags around. In the mall's mobile beauty spa, shoppers can input their personal preferences to obtain product recommendations. They can also personalize such aspects as music and scent accompanying a beauty treatment.

3. IoT: Expected Business Opportunities

Gartner, Inc. forecasts that 6.4 billion connected things will be in use worldwide in 2016, up 30 percent from 2015, and will reach 20.8 billion by 2020. It estimates that IoT hardware spending will amount to $1,414 billion in 2016, and will support total services spending of $235 billion in 2016, up 22 percent from 2015. Growth of IoT opportunities is still at an early stage. IoT service value is expected to be significantly higher than IoT hardware value once IoT applications enter into its maturing phase.

Based on a range of IoT adoption rates, economic and demographic trends, and the likely evolution of technology over the next ten years, McKinsey&Company estimates that the economic impact of IoT applications could be from $3.9 trillion to $11.1 trillion per year in 2025 in the following nine settings (Table 7-1-2).

Table 7-1-2 Potential Economic Value of IoT in 2025, Including Consumer Surplus

Unit: Billion US$

Settings	Economic value in 2025	Major applications
Human	170 - 1,590	Monitoring and managing illness, improving wellness
Home	200 - 350	Energy management, safety and security, chore automation, usage-based design of appliances
Retail	410 - 1,160	Automated checkout, layout optimization, smart CRM, in-store personalized promotions, inventory shrinkage prevention
Offices	70 - 150	Organizational redesign and worker monitoring, augmented reality for training, energy monitoring, building security
Factories	1,210 - 3,700	Operations optimization, predictive maintenance, inventory optimization, health and safety
Worksites	160 - 930	Operations optimization, equipment maintenance, health and safety, IoT enabled R&D
Vehicles	210 - 740	Condition-based maintenance, reduced insurance
Cities	930 - 1,660	Public safety and health, traffic control, resource management
Outside	560 - 850	Logistics routing, autonomous cars and trucks, navigation
Total	3,900 - 11,100	

Source: McKinsey Global Institute, *The Internet of Things: Mapping the Value Beyond the Hype* (2015).

The IoT industry is at an early stage, and what constitutes competitive advantage and successful business models will evolve in facing multiple challenges in the areas of technology, economy, and regulation. However, the so-called challenges could be opportunities in disguise if SMEs can figure out how to compete against big companies by finding low-cost ways to incorporate IoT into their

operations. SMEs' typical strengths in speed, flexibility and innovation fit well in the IoT era to develop their own niche markets by offering diverse, customized products and services in small quantity batches to meet the demand from specific ethnic groups, regions and industries.

II Major Policy Measures Adopted by Governments Worldwide for IoT Development

As Singapore, South Korea and Taiwan share similar industrial structures, this section will briefly examines IoT policies in Singapore, South Korea and Taiwan to help SMEs understand the tools and opportunities promoted by relevant government policies.

1. Singapore

In 2006, Government of Singapore promoted "Intelligent Nation 2015" (iN2015), a 10-year master plan to improve Singapore's infocomm infrastructure over the next decade. It is the blueprint to navigate Singapore's transition into a global city, universally recognized as an enviable synthesis of technology, infrastructure, enterprise and manpower. By 2014, 86 percent of enterprises with less than 10 employees had broadband internet access, and 97 percent of enterprises with at least 10 employees had broadband internet access, making Singapore the country with the highest broadband access rate in the world. Based on the success of iN2015, Singapore's current vision to become the world's first Smart Nation in the IoT era grew out of its new master plan "Smart Nation 2025" adopted in 2015. The core of Smart Nation 2025 is a concept of Smart Nation Platform (SNP), built around three focal areas - Connect, Collect and Comprehend. Big data is collected and shared through nationwide sensors and the national ICT infrastructure that is safe, high-speed, economical, and scalable. Technology allows people to use the collected data to anticipate the needs and improve the city services.

Since the announcement of the Smart Nation 2025, there has been significant progress, especially in addressing traffic congestion and labour shortage in aging labour markets. In 2015, Heterogeneous Network (HetNet) technology trials in the Jurong Lake District - the designated test-bed for the Smart Nation - was conducted to enable high-quality and uninterrupted network service (faster and smoother surfing, free calls with voice over Wi-Fi capabilities, seamless data connectivity, etc.) for users on the move among different networks. The National University of Singapore launched the IoT demo-program for remote rehabilitation. Healthcare professionals use wearable devices to monitor patients' rehabilitation and data, and give advices through smart phones or tablets. Further, Smart Nation 2025 priorities include smart logistics to help SMEs reduce risks and cost of inventory, improving the transportation system through big dada insight, establishing comprehensive network security system to ensure the safe flow and exchange of information, driverless vehicles, and industrial and service robots. Singapore government hopes to make the whole nation as a demonstration area to aggressively attract new startup companies to Singapore, and delivers innovative smart nation solutions.

Every Singapore company is required to join an industrial association, such as Singapore Manufacturing Federation. Executives of an industrial association include not only industrial leaders but government officials as well, who very actively share and promote a variety of government policies and measures to its members as well as to the public through mass media. Businesses and people in Singapore know government policies and measures very well. That helps the implementation of the policy measures. In helping SMEs participate in smart nation program, Singapore has the following practices:

(1) Productivity and Innovation Credit (PIC) Scheme: The guide details how business entities registered in Singapore can enjoy a 400% tax deductions/allowances and/or 60% cash payouts for investment in innovation and productivity improvements in any of the six qualifying activities (the tax benefits under PIC are available from 2011 to 2018): (A) acquisition and leasing of PIC information technology (IT) and automation equipment; (B) training of employees; (C) acquisition and in-licensing of intellectual property (IP) rights, (D) registration of patents, trademarks, designs and plant varieties; (E) research and development activities; (F) design projects approved by Design Singapore Council.

(2) Piloting New Sector Solutions: It encourages ICT vendors (or providers of ICT solutions) and SMEs to take the lead in piloting new or emerging solutions in transforming the SME sectors in Singapore such as retail, food and beverage, construction, logistics, transport, tourism, cleaning, security services, landscaping and many more. High potential SMEs will be able to receive support of up to 80% capped at US$1 million per SME for piloting new and emerging sector solutions, dependent on the expected sector impact.

(3) Accreditation@IDA (Information and Infocomm Development Authority): SMEs being accredited will open up more opportunities for their products and solutions to be showcased and eventually bought. For buyers from the government and large enterprises, the accreditation process would provide an independent third party evaluation of the companies' claimed product core functionalities and ability to deliver. The government procurement process has also been streamlined to allow accredited companies to be considered first by government agencies. Additionally, IDA has tied up with various strategic industry partners which can provide useful resources and expertise to the accredited companies when bidding for larger projects.

(4) Data-as-a-Service (DaaS): The DaaS pilot was launched in October 2014 and lasted till March 31, 2016. It seeked to study the feasibility of addressing the issue of dataset discovery in the private sector through a federated approach. There was no coherent mechanism for users to easily discover private sector datasets made available from data providers across various industry sectors. A key feature of DaaS was the Federated Dataset Registry (FDSR), intended to enable a mechanism to ease dataset discovery. As a federated platform, it is collectively made up of individual Dataset Registries (DSRs) based on the open-source data portal platform Comprehensive Knowledge Archive Network (CKAN).

(5) Partnership and cooperation between SMEs and large enterprises: Standards, Productivity and Innovation Board (SPRING) and Advisory Group (ARC) cooperate with Intel, Microsoft and other companies to provide SMEs guidance, advice, technical support, networking, and assistance in pursuing IoT opportunities. Intel has formed partnership with 9 local SMEs;

Microsoft has also established partnership with more than 50 local ICT companies to jointly resolve the challenges related to aging population and smart buildings.

(6) Regulation: Government officials adopt a positive attitude and actively participate in discussions and offering ideas to assist in removing regulatory obstacles to new technologies or services such as mobile fin-tech and driverless vehicle.

2. South Korea

South Korea boasts advanced high-speed internet infrastructure. However, its IoT competitiveness is not on par with Europe, America and Mainland China. In 2014, South Korea Government launched the "Master Plan for Building the Internet of Thing" that leads the hyper-connected, digital revolution. The goals are: by 2020 - (1) domestic IoT market size increases to KRW 30 trillion from KRW 2.3 trillion in 2013; (2) the number of SMEs and mid-grade export businesses increases to 350 from 70 in 2013; (3) the number of employees in SMEs and mid-grade businesses increases to 30,000 from 2,700 in 2013; (4) productivity and efficiency increases 30 percent in user companies from 2013.

South Korea announced four IoT development strategies - (1) "Increase Collaboration Among Players in the Ecosystem:" the government will collaborate with global businesses, large businesses, and communication service providers to develop an open platform, upon which other businesses that make up the entire ecosystem can participate and further cooperate in developing IoT products and services; (2) "Promote Open Innovation:" anyone can develop and provide services using an open platform (rather than old closed manner). In such an open innovation ecosystem, ideas are then developed into services, creating an environment where the potential for each individual can be maximized; (3) "Develop and Expand Services Targeted toward the Global Market:" the government will develop products and services under cooperation with global businesses, and step up partnerships and cooperation so that both can enter the global market together. Application of new software services that are based on an advanced manufacturing industrial sector will innovate the added-value of products and increase productivity and efficiency, further enabling mutual growth of both the traditional industries and new software service industries; (4) "Develop Customized Strategies for Large Businesses, SMEs, and Startups."

The target strategy for SMEs is focused on:

(1) Develop and provide an open platform and test-bed to reduce development costs and time-to market, and support collaboration among businesses of different areas such as software, sensors, devices, and user businesses.

(2) Strengthen alliances to secure platform competitiveness and lead open partnerships based on mutual growth and cooperation between large businesses and SMEs.

(3) Establish an ecosystem for start-up entrepreneurs to realize ideas into products and businesses, such as open source hardware or software and D.I.Y. (i.e. where users can develop products on their own).

One can learn a lot from South Korea government's pilot projects - smart city demonstration zones. For example, Songdo was still a marshy stretch of tidal flats in the Yellow Sea, home to a

scattering of fishermen in 2000. The government insisted on the concept of advanced information technology covering home, waste disposal, healthcare, transportation, retail, entertainment, electricity, energy and construction during the planning period. Three years later, the Korea government filled it with 500 million tons of sand in an effort to build a business district near the international airport. In addition to luring foreign business, the government hoped to create a sustainable city that demonstrated South Korea's technological prowess. The city is expected to be completed in 2020.

In 2015, South Korea government announced that it would establish 14 "regulation-free zones" across the country to help boost provincial economies by nurturing region-specific industries. The zones, in 14 cities and provinces, will be free of all red tape for development of key industries identified as future growth engines for the region, as well as the country, such as IoT, drones, bio-health and smart devices. South Korea government, after its world Go champion Lee Sedol lost to Google DeepMind's artificial-intelligence program, AlphaGo on March 19, 2016, announced that it would invest US$863 million (about 1 trillion won) focused on artificial intelligence (AI) in the next five years, attracted investment by related businesses.

Through its smart city plan, the South Korea government has created many opportunities for cooperation with SMEs and start-up companies, including game design to enhance the experience of tourists, local residents sharing parking spaces with tourists, and the application of garbage collection and transportation arrangement. With the help of solid ICT foundation and target policy promotions, SMEs in South Korea are expected to quickly integrate into the IoT ecosystem and grow significantly.

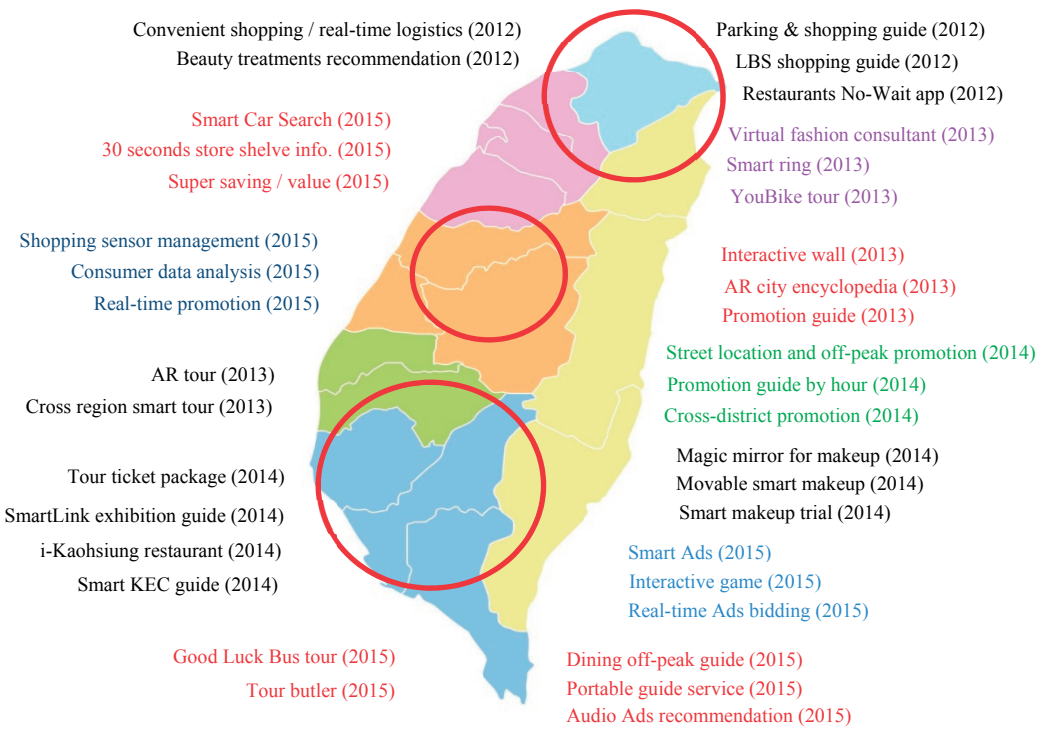
3. Taiwan

Taiwan government has been promoting ICT infrastructure since 2002, with three main staged policy programs: e-Taiwan, u-Taiwan, and i-Taiwan, focusing on nationwide high-speed broadband internet and wireless networks, e-government, closing digital gap, and promoting private investment in smart industries. Among them are the late i-Taiwan 12 Projects, which focus primarily on public infrastructure, scheduled for completion by 2016 at a projected cost of NT$4.3 trillion (around US$130 billion), about one-third of which is expected to come from private investors.

Based on the Executive Yuan's IoT-Enabled Industrial Development Strategy (2011), Economic Power-up Plan (2012), and Three Industries, Four Reforms Plan (2012), formulated by the Ministry of Economic Affairs (MOEA) to create service-oriented manufacturing, internationalized and high-tech services, and specialty-oriented traditional industries, the Innovative Service Application Center of Institute for Information Industry (III) led the execution of the IoT-Enabled Smart Commercial Districts Integration Demonstration Plan. The Plan has been promoted as part of the Executive Yuan's mobile broadband services and industrial development plan to encourage service providers to team up to participate in commercial districts demonstration project, which will not only enhance the value of commercial services, but also cultivate service providers and innovative start-up teams through demos and help them develop solutions and scale up to other regions and abroad.

During the period of 2012 to 2015, 37 IoT innovative services were promoted in many commercial districts such as Xinyi, Great Guanghua, Zhongxiao, Yongkang, Simon, Tianmu, Shihlin, Kaohsiung Exhibition Center, Cijin, Yancheng, and Chimei (Figure 7-2-1).

Figure 7-2-1 Results of IoT-Enabled Smart Commercial Districts Integration Demonstration Plan



Source: Innovative Application Research Institute, Institute for Information Industry.

Since 2014, internet and IoT applications have grown rapidly and at the same time significantly changed people's lives and industries. Developed countries all over the world have been accelerating the development and applications of core IoT technologies that provide solutions to industries and societies. Taiwan also quickly adjusted its ICT and industrial policies toward intelligent nation and smart applications.

In 2015, Taiwan government launched two major policy measures: “ide@Taiwan2020” and “Productivity 4.0” to boost Taiwan’s global competitiveness. In 2016, the new government proposed and promoted five major innovative industries: Green Energy Technology, National Defense, Asian Silicon Valley, Biomedical Industry, and Smart Machinery to facilitate Taiwan industrial upgrade and transformation, and hoped to drive Taiwan IoT application development through its “Asia Silicon Valley” plan. The IoT related parts of these policy measures are summarized in Table 7-2-1.

Table 7-2-1 IoT Related Policy Measures in Taiwan

Policies	IoT related content of the policy
ide@Taiwan2020	▪ Vision: Utilize collective wisdom gathered though the internet to create a New Taiwan equipped with intelligent network by 2020 to shape future quality life for the people of Taiwan. ▪ 5 main aspects: "Infrastructural Environment," "Transparent Governance," "Intelligent Lifestyle," "Internet Economy," and "Smart Homeland," and 18 sub areas for dynamic adjustments. ▪ Infrastructural environment aspect: Virtual World Regulation 2.0, smart ICT; Intelligent lifestyle, internet economy and smart homeland are innovative applications of IoT.
Productivity 4.0	Six main aspects: ▪ Optimization of smart industrial supply chain ecosystems ▪ Cultivating innovative start-up ▪ Localization of products and service ▪ Owning core technologies ▪ Nurturing talent ▪ Industrial policy measures Industry and technology: ▪ Accelerating vertical and horizontal integration of industrial value chain. ▪ Based on intelligent automation, applying IoT, intellectual robotics, big data and lean management, promoting smart manufacturing, and smart service-oriented system of systems (SoS). ▪ Focused on 7 major industries.
Five major innovative industries	Five major innovative industries: ▪ Biomedicine, Asian Silicon Valley, Intelligent Machinery, Green Energy Technology, and National Defense To develop IoT industry: ▪ Selecting cities as IoT and big data applications' experimental field for smart urban development, and prioritizing investment in smart logistics, transportation and healthcare. ▪ Selecting Taoyuan as Asia's Silicon Valley base, establishing Asian Innovation and Start-up Center, and Youth Innovation IPO Center. ▪ Pursuing business opportunities through innovative R&D and international cooperation.

Source: *Taiwan Policy White Book on Innovation*, "ide@Taiwan2020," "Productivity 4.0" and five major innovative industries.

Under the above policy measures, the related development strategies for SMEs include:

(1) Promoting demos and the concept of productivity 4.0 through cooperation between industrial associations and the Productivity 4.0 Promotion Committee; developing IoT and shared technology platforms that meet SMEs' needs; assisting SMEs in participating smart manufacturing market.

(2) Carrying out Government Open Data project to establish a two-stage consultation system and to perfect a legal environment for open data, and in cooperation with the private sector's datacenters, provide a variety of new innovative services of cross-border integration; promoting industrial counseling, innovative applications competition, talent cultivation, and incentivizing innovative start-up companies to use open data.

(3) Through a sound legal system and government's funding, introducing global connections and molding Taiwan into a hub for innovative start-ups; consolidating start-up resource under youth entrepreneur dream-building program and start-up services through a single service window by the Small and Medium Enterprise Administration (SMEA).

III Case Studies of Selected Taiwanese SMEs in IoT Development

This section describes the IoT business success stories in Taiwan, and discusses the opportunities and challenges facing SMEs in the IoT era based on case studies, analysis above and several in-depth interviews with related industrial associations. Selected cases of SMEs include ThroughTek, MoBagel, Umbo CV, and Gogoro. Although Gogoro has grown into a large enterprise from a start-up team of 20 peoples in a short period of time, its accomplishment and the path of success exemplifies the great value of a worthy product / service idea for a focused, fast-moving new market entrant who can execute and offer real solutions in the IoT era, which is likely to cause major market leader reshuffle or flip industry characteristics. Therefore, it is included in the following SME cases.

1. Case Studies of Selected Taiwanese SMEs and Start-up Companies in IoT Development

(1) ThroughTek

A. Company History and Current Status

Established in 2008, ThroughTek is an IoT total solution provider for cloud connection platforms, originally focusing on integration of cloud connection into surveillance systems for police department.

As surveillance systems for large-scale constructions and businesses reached market saturation, ThroughTek gradually moved toward consumer market. To solve the problems of product returns and customer complaints resulted from difficulties in IP camera software installation and complicated network equipment settings, ThroughTek developed point to point (P2P) connection technology for its consumer video surveillance products that are easy to set up and operate. ThroughTek also developed Unique Identification Number (UID) recognition technology in the form of Quick Response (QR) code attached to a device. Users can simply scan the QR code and easily complete the configuration and settings of the device's network connection. In addition, ThroughTek supported over 180 system-on-chip (SOCs) that are compatible with iOS and Android mobile phone systems, as well as Window and Mac OS systems, and designed firmware (that provides control, monitoring and data manipulation of engineered products and systems) automatic update mechanism to help users remove the trouble of manual updates.

ThroughTek's former Chinese name "物聯智慧" came from the translation of "ThroughTek." Chairman Guo Qiming late changed the name to ThroughTek or in Chinese "物聯智慧"- literally means "IoT Wisdom" - long before IoT became popular in Taiwan. In 2012 ThroughTek formally

transformed itself into a pure IoT software company. It currently does not sell hardware products. Its revenue comes from licensing its technology solutions such as P2P and QR code to OEM and ODM manufacturers.

ThroughTek has its headquarter and R&D center in Taipei, and sales offices in Shenzhen, Tokyo, Shanghai, Hong Kong and London. It had consolidated revenue of more than NT$100 million in 2015.

B. How to Use IoT to Develop Products and Services

Since 2012, ThroughTek has been applying its leading connection technology to support enterprise entry to IoT markets with the Kalay Platform. The word "Kalay" comes from the Taiwan Orchid Island Yami (Tao) dialect, which means "hand-in-hand," a symbol of connections across IoT cloud platforms on different operating systems. The Kalay Platform, a combination of Kalay Connect, Kalay Cloud, and Kalay Apps, is an end-to-end IoT solution and software service, enabling solution providers and device manufacturers to easily create their own IoT ecosystems. With an extensive partnership with OEM/ODM, technology brands, and integration support from a growing variety of SOCs, the Kalay Platform provides rapid deployment for a variety of devices. Complemented by exceptional modular features including video transmission, cloud recording, automation and data analytics, Kalay seamlessly integrates IoT managed services for products, including IP camera, appliance, consumer electronics, wearables, storage devices, and set top box systems. There are more than 10 million video surveillance devices connected to Kalay Platform worldwide.

With a comprehensive cloud solution, ThroughTek helps enterprises build and design scalable IoT services to maximize business opportunities (enterprise solutions for manufacturing, retail, agriculture, construction, healthcare, etc.) and offers consumers smart devices from electronics products, smart wearables, security monitoring, cloud storage, and TV boxes, to robots for smart home applications. Looking forward, ThroughTek will cooperate with IC design companies, telecom operators, and home appliance manufacturers for continued implementation of vertical integration into the marketplace.

C. Major Partners and Clients

As an IoT platform with a complete industrial ecosystem, Kalay Platform has completed over 180 system integrations. Kalay has over 40 partners worldwide, including Qualcomm, Realtek, MediaTek, Texas Instrument, Ambarella, Intel, Broadcom, and Hisilicon. With an extensive partnership with major global OEMs and ODMs, technology brands, system integrators, and chip makers, Kalay Platform provides rapid product deployment in response to different types of customer needs and helps accelerate time to market and cut operating costs. Its partners include Amazon, Microsoft, IBM, Alibaba and other cloud service providers, as well as leading semiconductor designers and manufacturers.

In the future, ThroughTek will deepen its cooperation with IC designers, and lay the foundation in the field of security and surveillance systems. It will continue to develop smart home surveillance DIY market, expand its integration applications for carriers, LTE-Vehicle, smart factories, smart appliance makers, and gradually extend into different IoT vertical markets.

(2) MoBagel

A. Company History and Current Status

Founded in 2009 by a group of professionals with strong technical background, MoBagel originally focused on developing Apps, games and cloud service software products. Fast forward to 2013 and the rise of IoT, many large enterprises entered the IoT market and eroded competitiveness of small firms such as MoBagel and forced it to find a new way to survive. MoBagel changed its company direction and launched IoT cloud platform "Meeti" to enable analytics in IoT devices and hoped to sell smart software solutions to traditional appliance brands. However, lack of demand from related manufacturers at the early stage of IoT development in Taiwan made it difficult for Mobagel to promote its IoT services.

Like most start-ups, MoBagel faced the two biggest challenges - difficulties in operation and lack of funding. The turning point came in 2014 when MoBagel attended Dreamforce 2014 (Salesforce $1 Million Hackathon), also known as the largest hackathon in the world, and received the 6th place in the Heroku category using an innovative app and cloud design that helped hardware manufacturers proactively engage with customers. MoBagel later secured funding from a US venture capital firm. In 2015, MoBagel officially established its new headquarter in Silicon Valley with its business development moved to USA office while its R&D and operation remained in Taiwan. Also in 2015, MoBagel became the only Taiwanese team that was accepted into the renowned startup accelerator 500 Startups' Batch 13 in USA to learn how to further improve product market fit and go-to business strategies. Since graduating from 500 Startups, the MoBagel team recruited top talent from Stanford, UC Berkeley, and National Taiwan University to further the technical development and business operations. Presently, as a part of Softbank's Innovation Program, MoBagel uses big data and predictive analytics to help high-tech companies analyze office and home appliances, and will seek further opportunities in Japanese market.

B. How to Use IoT to Develop Products and Services

MoBagel is an advanced device management and predictive analytics solution for IoT companies. Similar to Google Analytics or Mixpanel for Web and mobile analytics, MoBagel is an analytics solution designed specifically for IoT devices. It enables IoT companies to know everything from failure rates to forecasted usage all setup in a matter of hours. It helps IoT companies collect data, gain insights from their current business, and understand their customers better. Unlike most IoT platforms that focus on statistical analysis of historical data, at the heart of MoBagel's solution is the Decanter™ technology. Decanter™ is a Big Data AI engine that automatically filters out meaningless data and optimizes machine learning models. Since Decanter™ does not require human interference in order to function, it allows anyone to use deep learning and predictive analytics for their devices.

Compared to Google and other IoT platforms, MoBagel offers simple and elegant services with fast update of new versions, which fits well for the rapidly changing IoT industry. MoBagel provides customized services and designs software based on clients' requests. Unlike traditional high-priced software packages, MoGagel provides cost-effective IoT solutions and currently offers two software subscription services with monthly fee of US$99 and US$499, that are very competitive in the

enterprise IoT market.

In the area of service applications, MoBagel assisted Taiwan External Trade Development Council in visitor path tracking and vendor matching in the World Trade Exhibition. MoBagel also participates in Panasonic's smart home solutions and Philips' monitor smart building monitor to provide analytics for environmental quality, air quality, customer flow, and store shelf awareness.

C. Major Partners and Clients

At present, MoBagel has secured funding from National Development Concil (NDC), Silicon Valley 500 Startups, FundersClub, SingTel innov8 (SinTel: Singapore's largest telecom company), and Softbank. MoBagel also received platform sponsorships from Salesforce, Google, Microsoft Ventures, Amazon, and Digtal Ocean. It has formed strategic alliances with Salesforce, Microsoft, Google, Amazon and ElectricImp in developing IoT services.

Currently MoBagel focuses on two major markets: American and Japanese markets. On IoT opportunities, Silicon Valley has top talent and rich financial resources, and great investment atmosphere. Companies are open and eager to learn, and therefore easier to find partners for cooperation and / or investment. Although Japan was initially conservative and late in IoT development, once started, it moved forward very fast in the second half of 2015. At the right time and the right place, MoBagel was selected by Softbank's Innovation Program. In addition to direct investment, Softbank also help MoBagel develop the Japanese market through cooperating with Japanese well-known brands. MoBagel uses big data and predictive analytics to gain the No 1 position in Japanese mobile appliance IoT analytics market, such as public washing machines, vending machines, and printers. As Mainland China has growing demand of air quality monitoring and shows high degree of acceptance of innovative services, MoBagel has begun to enter the Chinese market.

(3) Umbo CV

A. Company History and Current Status

Founded in 2014 by seasoned leaders and technologists in AI, robotic vision and surveillance. Umbo CV is a US-based security camera and artificial intelligence company provides AI solutions for the professional security market. It is one of a few companies in the world that have both image recognition and machine learning AI technologies. Shawn Guan, CEO of Umbo CV who spent over seven years in the surveillance sector, noted that tech giants like Google and Facebook have been in hot pursuit of these AI technologies, (i.e., deep neural networks using big data) with projects like self-driving cars and facial recognition in photos. Yet, the surveillance industry, which captures 7.2 billion hours of footage a day, still relies primarily on human labor to process the data. Global security surveillance market has been growing over 10 years, but there are still many problems remained unresolved, and hence more opportunities for Umbo CV to explore with its AI technologies and solid security surveillance background.

In 2014, Taiwan's business environment for new start-up companies was not yet matured, Umbo CV, like many start-up teams, chose Silicon Valley as its base. Although Silicon Valley boasts great resources for ambitious entrepreneurs, it lacks hardware supply chain manufacturers. Many overseas

companies pick Shenzhen, China as the No. 1 choice to find their hardware suppliers for its famous hardware supply chains, low cost, mass production capacity, large number of suppliers that respond quickly and are ready for negotiation. However, after directly contacting suppliers in Shenzhen, Umbo CV found that their product quality was unstable, therefore it decided to cooperate with manufacturing partners in Taiwan, well known for its complete supply chain, large number of hardware manufacturers, and good quality.

Taiwan's biggest advantage is its large number of hardware and software talents. However, it still is very challenging to find the right and top talent in Taiwan to join a small start-up like Umbo CV. In the beginning, it took about 6 months of intense recruiting effort to hire one employee. Later Umbo CV gradually grew into a team of 20 plus people (more than half of them are in software R&D with the rest in business, hardware design, and product development) after it secured funding and orders.

B. How to Use IoT to Develop Products and Services

Security surveillance industry is an aging industry of old technologies, old products, and old business model. Up to now, the security industry has grappled with ways to receive real-time notifications of intruders or incidents, and a lot of human and technical loopholes need to be fixed. Umbo CV aims to solve these problems. The company has brought IoT solutions to security surveillance, and developed algorithms to link images from multiple cameras, thus giving machines a more in-depth understanding of real-time occurrences. Once the cameras are connected, the AI begins to learn from the scene and alerts the security officer of what it thinks is an anomaly. For example, when a person has just climbed over the fence or when a car is driving in the opposite direction on a freeway. Umbo CV currently use Amazon cloud computing services, and also pay close attention on different cloud ecosystems, such as IBM, Google and Microsoft's cloud services, in order to understand the differentiated services of these cloud providers and to take advantage of the strengths of each platform in response to various business and functional expansion.

Umbo CV has developed its first hardware product, Umbo SmartDome, the self-learning cloud camera with the ability to detect anomalies and their types, and in turn, alert security officers to crimes, accidents or disasters in real-time to reduce the chance of misunderstanding or ignorance and speed up responses to crisis. Umbo SmartDome works along with Aqua SmartCloud, Umbo CV's web management platform with its own AI image recognition software.

C. Major Partners and Clients

Shawn Guan, CEO of Umbo CV, has over seven years experience in the surveillance industry. He brought the prototype to the United States, Australia, Dubai and other countries to show the market potential for AI based security surveillance IoT platform, and obtained US$40 million worth of orders. On March 29, 2016, Umbo CV raised US$2.8 million in a seed round led by Taiwanese venture capital firm AppWorks Ventures. Later the seed round also saw participation from Mesh Ventures, Wistron Corporation, and Phison Electronics. While AppWorks Ventures and Mesh Ventures are both investment firms, Wistron Corporation and Phison Electronics are Taiwanese manufacturing and electronics companies. Having the latter on as investors will give Umbo CV competitive advantage and knowledge in software and hardware integration.

Currently, Umbo CV adopts a B2B model. Its Umbo SmartDome, the self-learning cloud camera has been on the market and closed to mass production. USA is the major market for Umbo SmartDome camera, and the pricing of which is within the affordable range to most SMEs. Umbo CV is talking to Asian clients and planning to expend into Asia.

(4) Gogoro

A. Company History and Current Status

In 2011 Horace Luke (former chief innovation officer of HTC) and Matt Taylor (former chief technology officer of HTC) founded Gogoro, a company developed and sold battery swapping infrastructure that provided energy management, smart mobility, and connectivity. The idea of "GoStation," a smart modular battery swapping station with size of a vending machine for electric vehicles that can be deployed across a city to provide portable power won investors' approval. In its year of inception, Gogoro secured US$50 million in seed funding from Dr. Samuel Yin of Ruentex Group and Cher Wang (Chairman of HTC).

Since the founders and the team have their personal brands and deep industrial connections, Gogoro, from a core team of 20 Taiwanese elites with overseas experiences, quickly grew into a large company with a team of over 600 people. The battery swapping kiosks might seem like a mundane idea, but they are actually one of the most daring strategies on Gogoro's part. Many companies worldwide have tried to make battery swapping systems for electric vehicles successful for years, mostly to no avail. Gogoro also faced multiple challenges in its early days, such as no existing successful business model and lack of interest from major vehicle manufacturers due to its untested new concept. Gogoro had to find a partner to design and manufacture its own electric vehicle.

In January 2015, Gogoro unveiled Gogoro Energy Network and Smartscooter at Consumer Electronics Show (CES) in Las Vegas. In July 2015, Gogoro Smartscooter was launched in Taiwan, a country with the highest scooter density in the world. Gogoro Smartscooter targeted consumers who are trendy, have mid-to-high income, and love 3C products. Through bold investment and decisive execution, Gogoro quickly resolved the initial setback in the market due to its premium pricing. By the end of the same year, more than 4,000 Smartscooters were sold and its market share in Taiwan's electric scooter market hit 34%.

In October 2014, Gogoro raised an additional US$100 million in Series B funding from a collection of investors. In November 2015, Gogoro announced a new round of investment from Panasonic and Taiwan's National Development Fund, increasing Gogoro's capital up to US$180 million. In October 2015, Gogoro, the so-called Tesla of scooters, became the only Taiwanese company on Forbes magazine's 2015 list of the world's top 100 startups of IoT. Gogoro raised US$150 million, ranking it seventh in the top 100 IoT start-ups. Gogoro also had the second-highest growth score of 1,123 in the rankings. The Mattermark growth score is a measure of how quickly a company is gaining traction at a given point in time. It incorporates the mindshare score (Web traffic, social traction), as well as business growth metrics (such as employee count over time and funding). In its official website Gogoro states that the core value of Gogoro's innovations is not only in electric scooter, but in breakthroughs from traditional technologies in the IoT era for daily life applications as well.

B. How to Use IoT to Develop Products and Services

Smartscooter is powered by core EV battery, jointly developed by Gogoro and Panasonic. Each battery has 25 sensors to monitor battery life and usage, as well as enable thermal and overcharge protection, shock detection and wireless NFC communication. Smartscooter also has 30 sensors to collect data, track rides, monitor systems, and get diagnostics - all in real time. In addition to dashboard display, driver can also access information through exclusive App to find more information such as the nearest battery swapping station.

Gogoro Energy Network takes only six seconds to change the battery. Gogoro utilizes wireless connectivity to manage and notify battery owners the state of charge; a simple power outlet and a WiFi connection is all you need to add a GoCharger™ battery charging Hub. Gogoro's Smart Mode utilizes your unique riding pattern data to tailor generating a smoother, more energy efficient power output, maximizing your riding comfort and most importantly, longer rides per swap. Gogoro offers multiple customizable combinations: riders can set colors of digital dashboard displays, adjust sound, program custom light patterns for headlights and taillights, and so on.

C. Major Partners and Clients

Gogoro's major partners include (1) Panasonic to develop its core EV battery using the same technologies as Tesla's; (2) Gates (the largest manufacturer of power transmission belts) to provide key components such as Carbon belts; and (3) Maxxis (the ninth largest tire company in the world) to design Hybrid Racing Tires.

Gogoro also coorperates with Carrefour and convenience stores to setup battery swapping stations. The rapid growth of megacities has introduced new challenges and opportunities on how to improve energy efficiency and distribution, reduce traffic jam, and achieve their goals of being smart cities, Gogoro's eletrical vehicle helps relieve urban traffic jam and air pollution, and its energy network and battery can adjust to peak and off demand and be a valuable power source during peak hours. In 2016 Gogoro will form partnership with Amsterdam's Smart City programme, a union among companies, governments, and knowledge institutions aimed at promoting innovative ideas and solutions for urban issues. Amsterdam's Smart City Experience Lab will also play host to Gogoro, allowing its staff to demonstrate the Smartscooter EV, the battery swapping stations, and explain the Gogoro Energy Network to visitors.

2.Analysis

Based on the analysis in Section I, the business opportunities for SMEs in the IoT era include: (1) fast entry into IoT ecosystem through IoT platforms; (2) more cooperation between SMEs and large enterprises; (3) significant potential in developing innovative products and services; and (4) in every challenge there lies opportunity for SMEs to seek IoT solutions. From the growing processes of ThroughTek, MoBagel, Umbo CV, and Gogoro in the above cast studies, the common threads of their success are: (1) founder(s) with extensive experience in high-tech industry, (2) figuring out business opportunities in IoT applications, and (3) becoming market pioneer through fast execution.

ThroughTek and MoBagel are professional IoT solution providers through cloud services platforms. Both join IoT ecosystems of Amazon, Google, IBM and other major platforms, so they

can leverage on these cloud services platforms to develop their own niche markets (video surveillance, smart home, and smart construction) with flexibility, customization, and low cost. Umbo CV leverages on Amazon and other cloud services platforms for rapid development of technologies and products. It has brought IoT solutions to labor and efficiency in security surveillance industry by partnering with Taiwan's strong hardware suppliers. These three cases show that AI, imaging technologies, and machine learning are major opportunities in IoT development.

Gogoro starts off the idea of solving megacities' problems in energy efficiency and distribution by grasping technological trends in smart mobile devices, IoT platforms, and big dada. The core value of Gogoro's innovations is not only in electric scooter, but in breakthroughs from traditional technologies in the IoT era for daily life applications as well.

At present, IoT development is still at its early stage. Rapid innovation and commercialization are the key. Funding is vital for R&D teams to make bold attempts, learn quickly from mistakes and feedback, and try a variety of technologies and modules provided by IoT platforms. These case studies also indicate that forming partnerships is essential for these enterprises to quickly grasp opportunities in IoT market. Besides leverage on IoT platforms and partnership, it is vital to establish strategic alliances with third-party services, brands, and hardware manufacturers for SMEs to attract investment from NDC, enterprises, and venture capital worldwide and quickly go to market and scale up.

ThroughTek and MoBagel made the IoT transformation under tremendous competitive pressure. In the early days of the transformation, both companies faced difficulties in finding clients, partners, and talents when IoT concept was not popular in Taiwan and no successful IoT business models for references. It is worth noting that these companies all have teams with significant international experience and compete in global markets. Due to domestic clients' conservatism in investment and new technology acceptance, although MoBagel and Umbo CV established R&D and manufacturing bases in Taiwan, both had targeted international markets and gained recognition abroad before they returned to Taiwanese market. Gogoro went the similar path - it won international exhibition recognition before being well received in Taiwan. The IoT industry is at an early stage, and what constitutes competitive advantage and successful business models will evolve in facing multiple challenges in the areas of policy measures, regulation, as well as domestic business environment for investment and innovative culture.

3. Opportunities and Challenges Facing Taiwanese SMEs in IoT Era

(1) Opportunities

The essence of IoT is openness and cooperation. IoT is not mainly driven by large companies as traditional view claims because most large enterprises are too slow in product development process and too ROI driven. This approach is not suitable for the development of a large number of IoT products and services using different technologies. SMEs' typical strengths in speed, flexibility and innovation fit well in the IoT era to develop their own niche markets by offering diverse, customized products and services in small quantity batches. SMEs can innovate quickly in IoT ecosystem: a variety of open IoT platforms provides easy and simple process to promote a wide spectrum of application development, making it possible for SMEs to scale up swiftly at low cost and grow

rapidly as more customers join the network. The above case studies also indicate that forming partnerships is essential for SMEs to quickly grasp opportunities in IoT market and attract more funding and more strategic alliances with third-party services, brands, and hardware manufacturers.

Based on strong ICT foundation, Taiwan boasts the highest density of technology companies and software / hardware talent in the world. Companies selected for case studies all have teams with significant technology and international experience. Eyeing the huge market potential of the coming outbreak of IoT opportunities, in addition to attracting SMEs to join their ecosystems, many large companies reach for target SMEs through direct capital investment or acquisition. With the support of the government and enterprises, Taiwanese start-ups and SMEs are expected to gain more exposure to global investors and large enterprises.

(2) Challenges

Various factors hindering most companies to adopt IoT include: (1) decision makers do not understand the value of IoT and lack of vision and leadership; (2) lack of adequate benchmarks / business models for reference; (3) not familiar with the current technologies; rapid technological change affects willingness to invest; (4) significant initial investment with uncertain ROI; (5) risk of changing processes or business model; (6) inadequate infrastructure and lack of application development tools; and (7) lack of adequate talent.

Based on Taiwan's specific industrial development history and its corporate culture, some challenges deserve special attention: (1) past success of OEM model leading to hardware bias in IoT market where most value comes from software and innovative services; (2) Taiwan has great pool of software engineers but still needs talent in hardware and software integration; (3) conservative investment environment and lack of angel investors; (4) compared to Mainland China and Silicon Valley, more passive innovation / following successful business models; less active innovation / creative destruction; (5) relatively unfriendly business and investment environment in attracting high-end foreign talent, such as lengthy and cumbersome application processes for visa and start-ups, capital and revenue limit for companies to hire foreign workers, and less attractive taxation; and (6) lack of large-scale IoT demonstration sites to attract start-ups and talent. Table 7-3-1 summarizes the opportunities and challenges facing Taiwanese SMEs in the IoT Era.

Table 7-3-1 Opportunities and Challenges Facing Taiwanese SMEs in the IoT Era

Opportunities	Challenges
■ High density of technology companies and software / hardware talent ■ Improving environment for innovation and entrepreneurship; global firms and capital willing to invest in start-ups and talent ■ IoT at early stage; opportunities for collaboration between large firms and SMEs; SMEs' opportunity to be first in certain markets ■ Technology and market dispersion; not driven by large firms; SMEs fit well in flexibility, low cost, customization, and small quantity batch	■ Focus on hardware business model; not enough software / hardware integration and network / system integration talent ■ SMEs' OEM model: short-term profit oriented, accustomed to current production process, and focused on low cost or geographic market opportunities; lack of active innovation ■ Conservative investment environment and lack of angel investors; affecting start-ups' efficiency in competition ■ Conservatism: more passive innovation / following successful business models; less creative destruction through innovation

Opportunities	Challenges
■ SMEs leverage on IoT platform - low cost entry; move fast and scale up ■ Government policy promotions and demonstration sites to attract start-ups and talent	■ Taiwan network / IoT application environment has yet to be established; low IoT adoption compared to Singapore, USA, and mainland China ■ Lack of large-scale IoT demonstration sites to attract start-ups and talent as compared to Singapore, USA, and mainland China

Source: Summarized by the author.

IV Strategic Direction to Assist SMEs' Development in IoT Economy

1. Strengthening Promotion of IoT Applications and Business Opportunities

The common denominator hindering many companies, most SMEs in particular, to adopt IoT applications and / or find the right partners is the lack of vision and leadership of decision makers who do not understanding the true value of IoT and are fearful of initial cost without adequate benchmarks and / or successful business models to follow. However, many IoT platforms and services providers are able to provide resources and services that are affordable to SMEs and lower their funding and technology barriers of entry into IoT ecosystem. Therefore, government and industrial associations should actively strengthen the promotion of the value of IoT as well as government policy measures, such as successful case demos, tax exemption, subsidies and other incentives, to enhance the willingness of SMEs to adopt and invest in IoT applications and reduce the technical and financial obstacles facing SMEs.

2. Large Enterprises and Industry Experts Assisting SMEs in IoT Development

Take Singapore for example: Standards, Productivity and Innovation Board (SPRING) and Advisory Group (ARC) cooperate with Intel, Microsoft and other companies to provide SMEs guidance, advice, technical support, networking, and assistance in pursuing IoT opportunities. Joint development is the norm in IoT economy. Taiwan has many large global ICT enterprises such as Advantech, Acer, Foxconn, and TSMC, who have been vigorously developing their IoT platforms for business transformation and / or system integration. Therefore, Taiwan should promote and strengthen the strategic alliance between SMEs and large international or domestic enterprises in IoT development. In addition, industrial and public associations should take a more active role, collaborating with policy, industrial and academic experts, in forming IoT diagnostic groups to offer advisory services to SMEs.

3. Resource Integration to Build an SME IoT Platform

The essence of IoT is openness and cooperation. SMEs typically lack of capital and talent, particularly in software and hardware integration, of large enterprises with which they compete. To effectively reduce the financial obstacles, technical barriers, and time for start-ups or SMEs to secure funding, find partners, and understand characteristics and solutions of different IoT platforms, the government can establish an SME IoT Platform similar to the youth entrepreneur dream-building program and start-up services through a single service window by the Small and Medium Enterprise Administration (SMEA), offering IoT knowledge, case studies, training and talent cultivation, consulting, resource sharing, partnership, and promotion.

4. Public Sector Introducing IoT Applications

South Korea's approach is recommended. For example, South Korea government's pilot projects - smart city demonstration zones that apply advanced information technology and IoT applications in home, waste disposal, healthcare, transportation, retail, entertainment, electricity, energy and construction. Taiwan can organize a variety of commercial or cultural events, and actively introduce IoT technologies and services such as games provided by domestic companies, for example, in the shopping districts, night markets, historic areas, museums or flower season exhibitions to trigger visitors' interest, collect data of tourist routes and consumer behavior, and offer consumers' personalized shopping services through interactive technologies. In addition, the public sector should expand its IoT applications in law enforcement, garbage collection, parking lots, water and energy management, smart transportation, smart buildings and smart healthcare. It also should seek IoT solutions from private sector to problems faced by cities and the government.

5. Accelerating the Establishment of Large-Scale IoT Demonstration Sites

Taiwan government has recently established legislations for virtual world, and policy measures for internet economy and innovation and entrepreneurial environment with encouraging preliminary results. For example, the IoT-Enabled Smart Commercial Districts Integration Demonstration Plan has been promoted as part of the Executive Yuan's mobile broadband services and industrial development plan to encourage service providers to team up to participate in commercial districts demonstration project, which will not only enhance the value of commercial services, but also cultivate service providers and innovative start-up teams through demos and help them develop solutions and scale up to other regions and abroad. However, compared to Singapore and South Korea's smart city demonstration regions, Taiwan's demonstration sites are still more focused on commercial application level (consumer information, marketing, promotion, etc.). Taiwan should accelerate the establishment of large-scale IoT demonstration sites that showcase educational, scalable, practical, and economic benefits, as well as enable deep IoT applications, as evidenced by South Korea government's smart city demonstration pilot project "Songdo," a sustainable city that demonstrates South Korea's technological prowess. The government can also make plan for "regulation-free zones" to cut all red tapes, attract more international start-ups, talent, and investment, and foster cooperation between domestic and foreign enterprises.

Part Three
Government SME Policies and Prospects

Many SMEs in Taiwan possess unique technology and innovative products, but lack the scale, capital, technology, and talents of many large businesses with which they regularly compete. The Taiwanese government has for many years been implementing policies designed to resolve the hurdles facing SMEs and provide proactive support and assistance to them.

The government's development strategy for SMEs in 2015-2016 has focused on (1) Financial Services and Investment in SMEs; (2) R&D, Upgrade and Transformation for SMEs; (3) Start-ups and Incubation & Acceleration Mechanism; (4) Local Industries and Regional Branding; and (5) Other Government Measures to Support SMEs, such as government procurement , policy loans for special projects and regulatory flexibility.

A large number of projects and ancillary measures have been implemented in order to help achieve these goals. Each year, the government revises its SME development strategy to reflect changes in the economic environment in Taiwan and the global economy as a whole and carries out planning and implementation of related ancillary measures to boost the competitiveness of Taiwan's SMEs and contribute to their stable, continued development. New guidance and measures recently instituted by the government include "Five Innovative Industries Plan," the new regulation on equity-based crowdfunding, "Industrial Upgrade and Transformation Action Plan," "ide@ Taiwan 2020," "Project for Social Enterprises Action Plan," and the Amendments to the Article 36-2 of the Act for Development of Small and Medium Enterprises to promote innovation, research and development of new start-up companies and SMEs.


NEWS & EVENTS

CHAPTER 8

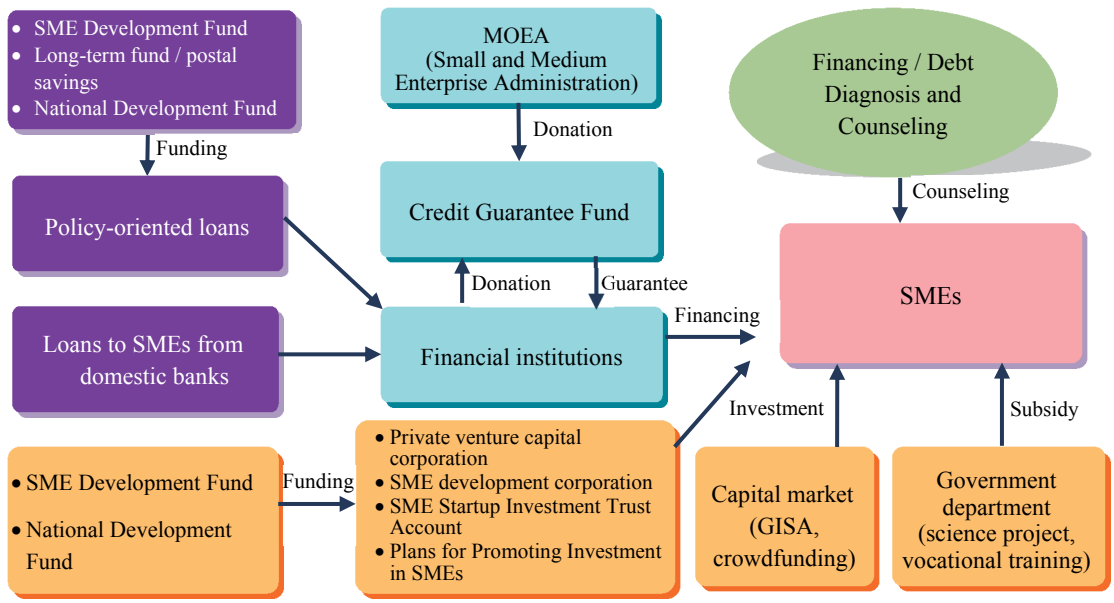
Improving Financial and Funding Services and Strengthening Investment in SMEs

Many SMEs in Taiwan possess unique technology and innovative products, but generally find it very difficult to obtain funding either from the capital market or venture capital due to unproven business models and lack of track records, or from banks due to unstable financial performance, volatile cash flow and lack of tangible assets that could be used as collateral. This situation has a direct negative impact on the SMEs' ability to survive and grow, and there is thus a clear need for the government to provide financing guidance and credit guarantees.

In order to provide comprehensive assistance for SME development, and achieve a further strengthening of financing channels, the Small and Medium Enterprise Administration, Ministry of Economic Affairs (SMEA, MOEA) has been working actively to provide financial and funding services such as credit guarantees, short-term financing, and funding guidance. These measures are aimed at helping SMEs obtain financing; arrange the provision of direct credit guarantees by the SME Credit Guarantee Fund; provide assistance to business startup; launch the Phoenix Loan scheme for micro-enterprises; use the Firefly Mutual Guarantee scheme to help SMEs in the upstream, midstream and downstream segments of particular industries to obtain loans at preferential interest rates; and organize SME investment plans, thereby giving SMEs a wider range of financing channels to choose from. Further in 2014 to 2015, as part of government efforts to help small innovative startups, the GreTai Securities Market (GTSM) launched the Go Incubation Board for Startup and Acceleration Firms (GISA) in January 2014, and Executive Yuan approved the establishment of the private online equity crowdfunding platform in April 2015.

This chapter is divided into three sections. Section I discusses measures to improve financial and funding services. Section II focuses on SME credit guarantees. Section III covers government's measures to strengthen investment in SMEs. Figure 8-0-1 outlines the general framework to strengthen financing for SMEs in Taiwan.

Figure 8-0-1 Framework to Strengthen Financing for SMEs



Source: Small and Medium Enterprise Administration, Ministry of Economic Affairs (2016).

I Improving Financial and Funding Services

The government has been working actively to establish effective financing guidance mechanisms. Besides encouraging SMEs to make use of the various types of policy loans that are available from the government, establishing "SME Financing Service Windows" at major banks to give SMEs better access to financing information, and encouraging SMEs to make full use of the various low-interest loan schemes that the government provides, the government also uses the SME financing guidance system and the SME Troubleshooting Center to provide various types of guidance and information to help SMEs with requests for emergency assistance, and to provide consulting services. In addition, the government works with financial institutions to provide financing help for SMEs that are experiencing financial difficulties, help SMEs establish sound financial and accounting systems and enhance their financial management capabilities, and use the SME Credit Guarantee Fund to provide credit guarantees, thereby increasing banks' willingness to extend loans to SMEs.

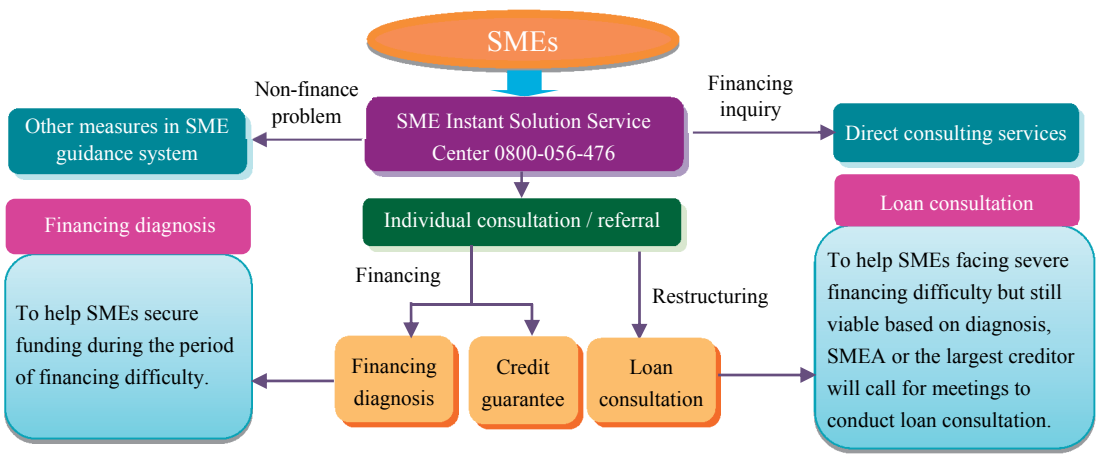
1. Providing SME Financing Counseling and Value Added Service

(1) SME Financing Service Windows: SME Instant Solution Service Center

The Small and Medium Enterprise Administration (SMEA) has established the SME Instant Solution Service Center to provide SMEs with consulting services in line with their individual needs. It provide quick and effective assistance in a wide range of areas, including financing diagnosis and consulting, financing and loans related referral, guidance, refinance, extension, line of credit, and so on for both borrowers and creditors to enhance SMEs' financing capacity and risk management. 2015

accomplishments include: 20,884 calls for phone counseling (through toll free number 0800-056-476), 370 cases of referral counseling, 185 cases of counseling conduced in "Professional Counseling Day," 323 cases of on-site counseling, and so on. The consultation mechanisms are outlined in Figure 8-1-1.

Figure 8-1-1 Financial and Funding Consultation Mechanism



Source: Small and Medium Enterprise Administration, Ministry of Economic Affairs (2016).

(2) SME Financing Diagnostic Service Plan

SME Financing Diagnostic Service was set up through the SME Financing Services Platform to improve SMEs' condition, provide financing, and offer financial diagnosis and counseling service. The Plan's two main work items are: (1) professional consulting service: consulting service for real-time business issues, and (2) in-depth diagnosis and counseling that include general financing, corporate field visits, debt restructuring and/or refinance, and accounting and business management counseling. To help provide SME owners and managers with the financing information they need, and to expand the range of financing service channels available to SMEs, the SMEA has arranged for the establishment of SME Financing Service Contact Windows in the branches of major financial institutions. These Contact Windows provide inquiry and consulting services related to financing guarantees, investment and financial management. SMEs can use the Contact Windows to obtain comprehensive financial information, and to find out about the various types of low-interest loans that the government makes available to SMEs, thereby helping to solve SMEs' financing problems. On the other hand, SMEs can provide feedback through the Window to the government for policy formulation.

2015 accomplishments are: 400 cases of on-site counseling, including 248 cases of corporate financing diagnosis and counseling and 44 SMEs securing bank financing amounting to NT$ 287.65 million; 192 cases of debt restructuring coordination between SMEs and banks, including 116 SMEs obtaining refinance of NW$150,404 million (site: http://smefinance.moeasmea.gov.tw/).

(3) SMEs' Value and Innovation Application Plan

Platform for Financial Data and Innovative Trends: FinDit was established in 2015 to use big data analytics technology, provide customized searching services, and offer financial news, 20 research reports, forums and workshops, newsletters, and benchmark big data application cases. The Plan (plan site: http: //findit.org.tw) also sponsored "Innovation & Start-up and Big Data Applications International Forum" in 2015 (two international lecturer, 4 start-ups and a total of 295 people attended the forum).

(4) Enhance SMEs' Financial Autonomy Plan

Enhance SMEs' Financial Autonomy Plan was set up to help SMEs cultivate good financial habit and establish sound accounting management system. The Plan's three main work items are: (1) joint counseling: simple money management and bookkeeping, and on-site visits / individual counseling; (2) CPA advisory services; and (3) promoting the new version of the business accounting.

2015 accomplishments are: 2,053 cases of CPA counseling, establishing accounting system for 351 SMEs, CPA on-site counseling for 109 SMEs, and sponsoring SMEs' financial and accounting sharing forum (23 sessions with 1,022 participants)(plan site: http://www.careernet.org.tw/accounting/index.php).

2. SME Financing Services Platform

SME Financing Services Platform was established by SMEA, MOEA to make it easier for SMEs to secure bank loans by providing financial diagnosis and clear, transparent details about SME operations that banks can use as a basis for decision-making when determining whether or not to grant loans to SMEs. If banks have a clearer picture of the business models that SMEs are using and of what their funding needs are, they are more likely to expand the provision of loans to SMEs, creating a win-win situation for SMEs and the creditors.

3. The Taiwan Small Business Integrated Assistance Center (SBIAC) – Providing Financial Management Support Services

The Taiwan Small Business Integrated Assistance Center (SBIAC) was founded in 1982 through the provision of donations by seven financial institutions – the Bank of Taiwan, Land Bank of Taiwan, Taiwan Cooperative Bank, First Commercial Bank, Hua Nan Commercial Bank, Chang Hwa Commercial Bank and Taiwan Business Bank – with the aim at strengthening SMEs' managerial capabilities and competitiveness through the provision of comprehensive guidance, assistance with financing, advice on improving financial management, and assistance with the cultivation of specialist talent, in line with government strategy regarding SME development. The SBIAC provides a comprehensive range of guidance and funding support services for SMEs with significant development potential that have experienced difficulty in obtaining financing from financial institutions (http://www.sbiac.org.tw/index.jsp).

4. Plan for Increasing Loans to SMEs by Domestic Banks

To encourage the development of a long-term partnership relationship between SMEs and banks, and thus help SMEs obtain working capital, the Financial Supervisory Commission (FSC) decided that implementation of the Plan for Increasing Loans to SMEs by Domestic Banks should continue into the eleventh stage in 2016 with the plan target of NT$240 billion. In 2015 (tenth stage), domestic banks made loans to SMEs amounting to net increase of NT$288.5 billion from 2014, and NT$48.5 above the plan target of NT$240 billion. As of December 2015, domestic banks' total outstanding loan balance to SMEs reached NT$5.452 trillion.

The range of SMEs that are eligible for assistance under this scheme was expanded by deeming that small commercial enterprises as defined by Article 5 of the Commercial Registration Law that conform to the criteria for SME Credit Guarantee Fund credit guarantees can be classed as SMEs; in addition, "Special Award for Contributions to Balanced Regional Development" and "Special Award for Financing E-commerce Industry" has been instituted (plan site: http://www.banking.gov.tw/).

5. Special Award for Financing Innovative Industries by Domestic Banks

To encourage the development of a long-term partnership relationship between innovative industries and banks, the Financial Supervisory Commission (FSC) decided to launch the Award Plan for Increasing Loans to Innovative Industries by Domestic Banks starting from 2014. As of December 2015, domestic banks' total outstanding loan balance to innovative industries reached NT$357.3 billion, up NT$99.1 billion from the balance by the end of 2014, or reaching 165.2 percent of the target growth of NT$60.0 billion in 2015 (plan site: http://www.banking.gov.tw/).

6. Policy Loans for Special Projects to Help SMEs

The government provides SMEs with various types of policy loans, either directly or through collaboration with banks. What distinguishes these loans from ordinary loans is that the loans are granted for specific purposes, and have preferential interest rates. In 2016, altogether, 23 different types of policy loan are available in 8 categories: SME upgrading loans, loans for the purchase of production equipment, business start-up loans, R&D loans, tourism development loans, export and overseas investment loans, loans for entrepreneurs who have returned to Taiwan from overseas, and other loans.

II SME Financing and Credit Guarantees

To help strengthen the provision of credit guarantees to SMEs, the government established the SME Credit Guarantee Fund in 1974. More recently, as part of the government's efforts to ensure that the operation of the credit guarantee system and industry guidance system conform to the needs of the government's industrial policy (thereby facilitating effective policy implementation), on May 15, 2003 the Executive Yuan approved the replacement of the Ministry of Finance by the Ministry of Economic Affairs as the regulatory authority with oversight over the SME Credit Guarantee Fund; from this point on, the SME Credit Guarantee Fund was able to provide both direct and indirect credit guarantees.

1. SME Credit Guarantee Fund: Operating Mechanism and Application Process

The main purpose that the SME Credit Guarantee Fund was established to provide credit guarantees to SMEs, and to work closely with financial institutions in the development of financing guidance services for SMEs, helping SMEs obtain the funding they need from financial institutions and thereby contributing to the healthy development of Taiwan's SME sector and promoting Taiwan's economic growth and social stability. The SME Credit Guarantee Fund's main functions are as follows:

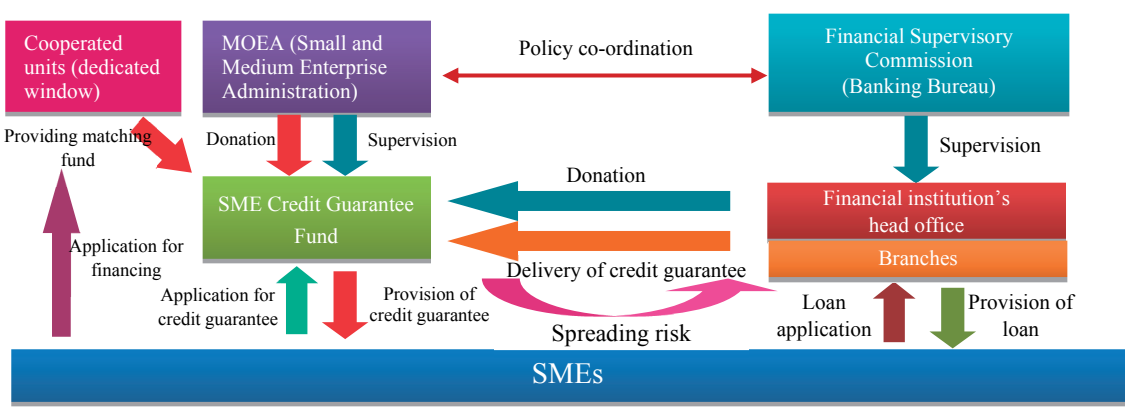
(1) Helping SMEs overcome the difficulties that they experience when trying to provide the collateral needed to secure loans.

(2) To make financial institutions more willing to provide loans to SMEs.

(3) To maximize the efficacy of guidance projects undertaken by other SME guidance organizations.

The mechanisms for the establishment and operation of the SME Credit Guarantee Fund involved the allocation of a supporting budget by the government and the signing of contracts with financial institutions whereby they agree to provide additional funding to boost the Fund's ability to provide credit guarantees, and to share some of the potential loss (Figure 8-2-1), thereby enabling the Fund to continue providing guarantees and helping SMEs that have significant development potential but lack sufficient collateral secure the financing they need from financial institutions.

Figure 8-2-1 Establishment and Operation of the SME Credit Guarantee Fund



Source: SME Credit Guarantee Fund (2016).

Application for a credit guarantee can be made either via a financial institution, or directly to the SME Credit Guarantee Fund, or a dedicated window, depending on the requirements of the individual enterprise making the application.

(1) Application via a Financial Institution

The SME Credit Guarantee Fund has signed credit guarantee agreements with 40 leading Taiwanese financial institutions. Business enterprises can submit their application for a credit guarantee at any of over 3,000 branches belonging to these 40 financial institutions throughout Taiwan; the financial institution in question will then pass the application on to the SME Credit Guarantee Fund.

To improve overall service quality and create a more user-friendly online handling environment, the SME Credit Guarantee Fund has restructured the existing "authorized guarantee" and "special project guarantee" systems so that applications received via financial institutions are now handled by a single, unified contact window; the new credit guarantee online processing system was launched on July 1, 2012.

(2) Application Made Directly to the SME Credit Guarantee Fund

In line with government policy regarding industrial development and the strengthening of SME financing, SMEs with significant R&D, operational or market development potential and SMEs recommended by government agencies or cultivation units may now apply directly to the SME Credit Guarantee Fund for credit guarantees, which they can then use to secure financing from financial institutions.

(3) Application via a Dedicated Window

To assist a specific industry (such as cultural and creative industry), a related government institution provides a dedicated window, via which an eligible SME in the industry can apply for a credit guarantee, with preferential terms.

2. The Benefits Achieved through Credit Guarantee Fund

After 42 years of hard work, the Credit Guarantee Fund has achieved impressive results, and the total volume of credit guarantees provided has grown rapidly and reached record high.

(1) Help SMEs Secure Funding

As of the end of June 2016, the SME Credit Guarantee Fund had helped a total of 381,585 enterprises. The total number of credit guarantees provided through financial institutions was over 6.25 million with a cumulative credit guarantee volume of NT$10,856.0 billion for loans of NT$14,734.9 billion. The performance of the SMES Credit Guarantee Fund in the last 5 years is outlined in Table 8-2-1.

Table 8-2-1 The Performance of the Credit Guarantee Fund in Credit Guarantee Provision, 2011-June 2016

Unit: Recipients; items; million NT$

Item / Year	No. of credit guarantee recipients	No. of credit guarantee applications accepted	Combined value of credit guarantees	Total amount of financing secured	Outstanding credit guarantees at year-end	Outstanding financing at year-end
2011	136,244	342,770	808,423	1,011,831	554,119	699,848
2012	139,095	370,144	911,183	1,142,475	610,065	767,883
2013	145,648	394,645	1,056,065	1,312,363	681,357	851,181
2014	115,879	405,113	1,140,854	1,425,826	698,933	885,961
2015	118,309	382,936	1,020,753	1,336,580	634,274	838,395
2016(Jan.-June)	111,991	181,980	475,611	635,559	622,997	831,571

Note:
After the global financial crisis in 2008, the Credit Guarantee Fund launched multiple measures to step up its support for economy, helping mitigate the negative impact that enterprises experienced during the downturn and in the stages of the recovery by raising the amount of credit guarantees each year from 2009 to 2014; in the period of 2013 to 2015, the annual amount of credit guarantees was aboveNT$1 trillion for three consecutive years.

Source: Credit Guarantee Fund (2016).

(2) Reducing the Negative Impact of the External Economic Downturn on SMEs

The downturn in the global economy often leads financial institutions to adopt cautious lending policies. Over the years, whenever Taiwan's economy was depressed, the SME Credit Guarantee Fund stepped up its support for SMEs, helping mitigate the negative impact that SMEs experienced during a downturn and in the early stages of the recovery. After the global financial crisis in 2008, the Credit Guarantee Fund launched multiple measures to support enterprises by raising the amount of credit guarantees each year from 2009 to 2014; in the period of 2013 to 2015, the annual amount of credit guarantees was aboveNT$1 trillion for three consecutive years.

(3) SME Credit Guarantee Fund Has Great Impact on the Growth of SMEs

The vast majority of SMEs that received credit guarantees from the SME Credit Guarantee Fund find that, within a few years, they were able to raise money on the capital markets or obtain loans directly from banks. Furthermore, As of June 2015, 2,668 of the SMEs that have been granted credit guarantees in the past have since grown sufficiently large to be classed as "large enterprises," and 873 have secured a stock market, OTC, or GISA listing.

As of June 2016, most winners of the Employment Contribution Award, National Award of Excellent SMEs, Rising Star Award, SME R&D Innovation Award, and National Quality Award had previously been recipients of credit guarantees from the SME Credit Guarantee Fund.

3. Government Policy Measures Being Implemented and Supported by Credit Guarantee Fund

Complying with the government policy of promoting enterprises' innovation and R&D, the Taiwan SMEG (Small and Medium Enterprise Credit Guarantee Fund) launches the Counterpart Guarantee Project, which aims to help raise the enterprises' production value and competitiveness. Under this mechanism, the Taiwan SMEG joins the leading companies of various industry sectors in appropriating counterpart funds for providing credit guarantees for SMEs.

For "Credit Guarantee Programs Supported by Separate Funds," the Taiwan SME Credit Guarantee Fund's credit guarantee is provided on a risk-sharing basis. The credit risk beyond the Fund's guarantee coverage percentage shall be assumed by related financial institutions. Examples of "Credit Guarantee Programs Supported by Separate Funds" are: Firefly Counterpart Fund (Eligible Client: SMEs recommended by the donating enterprises), Micro/Women Start-up Loans, Micro Loans and Strategic Industry Loans Sponsored by Kaohsiung City Government, Strategic Industry Loans Sponsored by Taipei City Government, and Youth Business Start-up Loans Sponsored by Taipei City Government (Eligible Client: Individuals aged 20-45 approved by Taipei City Government; Maximum Guarantee Coverage of 95% with Annual Guarantee Fee of 0.5%).

(1) Young Entrepreneur Start-up Financing Loans

The MOEA launched the Young Entrepreneur Dream Building Financing Loans in August 2012 and later merged with the Young Entrepreneur Financing Loans in 2014 into Young Entrepreneur Start-up Financing Loans. Young entrepreneurs aged between 26 and 45 who are eligible for the Young Entrepreneur Start-up Financing Loans can apply for this start-up loans at preferential interest rates

when they are getting their new businesses off the ground, and benefit from the provision of direct credit guarantees to the 80%-95% range by the SME Credit Guarantee Fund with the maximum loan amount at NT$18 million. As of June 2016 (starting from January 2014), the SME Credit Guarantee Fund had helped a total of 6,760 loans, amounted to a total of NT$671.5 million.

(2) Special Project Loan for Innovation and Development of SMEs

As of June 2016 (starting from January 2014; target total loan amount up to NW$30 billion; provision of direct credit guarantees to the 80%-95% range), the Credit Guarantee Fund had helped a total of 412 loans, amounted to a total of NT$2,094 million.

(3) Micro Business Loans

As of June 2016 (starting from October 2012), the SME Credit Guarantee Fund had helped a total of 8,986 loans, amounted to a total of NT$12.287 billion.

(4) Counterpart Guarantee

Sources of Counterpart Funds are from donation by the leading companies of various industry sectors. The Taiwan SMEG then provides counterpart funds to help the production/supply chains of the donating companies obtain financing especially for R&D. The donation for each enterprise is NT$50 million in principle, which can be adjusted by the industrial traits, and the minimum is NT$20 million.

As of June 2016, the SME Credit Guarantee Fund had helped (1) collaborated with central government, a total of 13,668 loans, amounted to a total of NT10,354 million; (2) collaborated with local government, a total of 5,810 loans, amounted to a total of NT3,920 million; and (3) collaborated with companies, a total of 29,908 loans, amounted to a total of NT24,371 million.

III Strengthening Investment in the SMEs

SMEs have always been the foundation on which Taiwan's economy rests, and they play an important role in ensuring social stability through job creation. To enhance the competitiveness of Taiwan's SMEs and create new financing channels for them, on March 26, 1993 the government promulgated the Regulations Governing the Establishment, Operation and Management of SME Development Corporations, with the aim at investing in the SME sector and providing SMEs with managerial and consulting guidance through the establishment of SME Development Corporations. In October 2003, to help SMEs overcome the difficulties that they often experience in securing equity investment, the SMEA established the SME Start-up Investment Trust Account system; in August 2007, the National Development Fund, Executive Yuan allocated NT$10 billion for use in this project, with the SMEA being commissioned to implement the Plan for Promoting Investment in SMEs. Further in 2014 to 2015, as part of government efforts to help small innovative startups, the GreTai Securities Market (GTSM) launched the Go Incubation Board for Startup and Acceleration Firms (GISA) in January 2014, and approval of private online equity crowdfunding platform by Executive Yuan in April 2015.

1. Establishment of the SME Startup Incubation Investment Trust Account

In 2013, SME Start-up Incubation Investment Trust Account was established to support innovative SMEs, SMEs' upgrade and transformation, and SMEs through incubation centers., Investment from the SME Start-up Incubation Investment Trust Account began in October 2003 with the funds in question (NT$900 million) to be entrusted to the custody of designated banks (http://www.moeasmea.gov.tw/ct.asp?xItem=1284&ctNode=609&mp=1).

2. The National Development Fund's Plan for Promoting Investment in SMEs

To stimulate investment in the SME sector by venture capital firms and other private-sector companies, on April 17, 2007 the National Development Fund approved the Plan for Promoting Investment in SMEs; the Fund allocated NT$10 billion for investment in SMEs. This Plan is being implemented over a period of 10 years, with the actual investment taking place during the first eight years, and the remaining two years being devoted to the disposal of remaining investments. The formal launch of the Plan for Promoting Investment in SMEs took place on August 30, 2007.

Originally, under the Plan for Strengthening Investment in the SME Sector, venture capital firms were invited to invest in SMEs with significant growth potential at a 1:1 ratio with the Executive Yuan National Development Fund. In September 2010, the Implementation Measures for the Plan for Strengthening Investment in the SME Sector were revised, with adjustments made to the capital provision ratio, with the aim at promoting SME development, making it easier for early-stage SME start-ups to secure funding, and supporting the Executive Yuan's strategy of promoting service sector development to create more job opportunities in Taiwan:

(1) For enterprises at the seed-capital / start-up stage, the capital provision ratio was set at a ratio of NT$3 from the Executive Yuan National Development Fund for every NT$1 provided by the investment management firm.

(2) For enterprises in the cultural and creative industries, the capital provision ratio was set at a ratio of NT$3 from the Executive Yuan National Development Fund for every NT$1 provided by the investment management firm.

(3) For enterprises in key service industries, the capital provision ratio was set at a ratio of NT$2 from the Executive Yuan National Development Fund for every NT$1 provided by the investment management firm.

(4) For enterprises that have added at least 30 new employees (in Taiwan) during the year prior to appraisal by the professional management firm, the capital provision ratio was at a ratio of NT$2 from the Executive Yuan National Development Fund for every NT$1 provided by the investment management firm.

It is anticipated that the measures outlined above will give investment management firms more incentive to invest in emerging industries, encouraging private-sector firms to support government policy by investing in those industries the development of which the government is seeking to

prioritize. As of the end of March 2016, investment had been secured for a total of 218 enterprises, with the National Development Fund providing a total of NT$7.0 billion in investment and venture capital and investment firms providing matching fund over NT$6.6 billion, for a combined total of NT$13.6 billion. Total induced investment from private sector reached NT$27.2 billion; 65 enterprises helped by the Plan have secured a stock market or OTC listing (http://www.moeasmea.gov.tw/ct.asp?xItem=1283&ctNode=609&mp=1).

3. The National Development Fund's Plan for Promoting Investment in Strategic Service Industries

To stimulate investment in the strategic service industries to promote service industries and employment, service exports, and the financing of SMEs in service industries, on May 2012, the National Development Fund approved the Plan for Promoting Investment in Strategic Service Industries. The key elements of the Plan are: the Fund was allocated NT$10 billion for investment in strategic service industries, such as information services, Chinese e-commerce, digital content, cloud computing, the MICE industry, gourmet Taiwan, international logistics, healthcare, and design service.

This Plan is expected to be implemented over a period of 13 years, with the actual investment taking place during the first ten years, and the remaining three years being devoted to the disposal of remaining investments. The capital provision ratio was set at a ratio of NT$3 from the National Development Fund for every NT$1 matching investment. As of the end of 2015, investment had been secured for a total of 46 enterprises, with a total of over NT$5.0 billion (http://www.issip.org.tw/ctlr?PRO=Index).

4. Go Incubation Board for Startup and Acceleration Firms (GISA)

As part of government efforts to help small innovative startups, the GreTai Securities Market (GTSM) launched the Go Incubation Board for Startup and Acceleration Firms (GISA) in January 2014. It has been designed as the platform to provide small-sized non-public companies that have innovative and creative ideas. GISA focuses on actively helping local small-sized non-public innovative companies to smoothly finance required funds. They also work in conjunction with Small and Medium Enterprise Administration, Ministry of Economic Affairs (including guarantee funds, counseling center, etc.), accounting firms, Securities & Futures Institute and other related associations to provide comprehensive counseling in finance, accounting, internal control, marking, legality and company management, etc. The aim is to help companies establish internal control, plan and construct accounting and financial systems, and carry out effective company management.

Target audiences that are permitted to register on GISA are corporation limited companies with creative ideas and great potential, and hold a capital amount under NT$50 million.

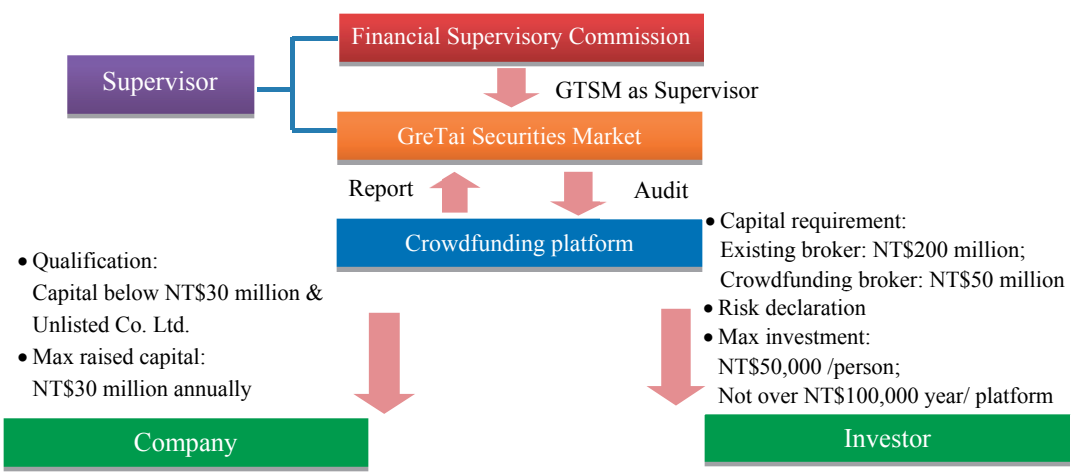
After being registered on GISA, small-sized innovative companies will be able to acquire needed capital, which in turn will make it easier to broaden the business. Advantages of registering on GISA: raising capital at lower cost, no public offering procedures, improving visibility, and expanding operations. As of the end of May 2016, NT$219 million capital has been raised through

GISA for a total of 87 enterprises.
(http://www.tpex.org.tw/web/regular_emerging/creative_emerging/Creative_emerging.php?l=zh-tw).

5. Crowdfunding

Executive Yuan approved the private online equity crowdfunding platform in April 2015. The platform will help young entrepreneurs raise money, as well as be a type of personal venture capital. Contrasting with GISA, crowdfunding websites may give small businesses and entrepreneurs a quicker leg up. Target audiences that are permitted to raise fund (max NT$30 million annually) through crowdfunding platform are corporation limited companies (not listed) with creative ideas and great potential, and hold a capital amount under NT$30 million. As of the end of May 2016, NT$12 million capital has been raised through crowdfunding platform for 2 enterprises (Figure 8-3-1).

Figure 8-3-1 Framework for Crowdfunding Plan



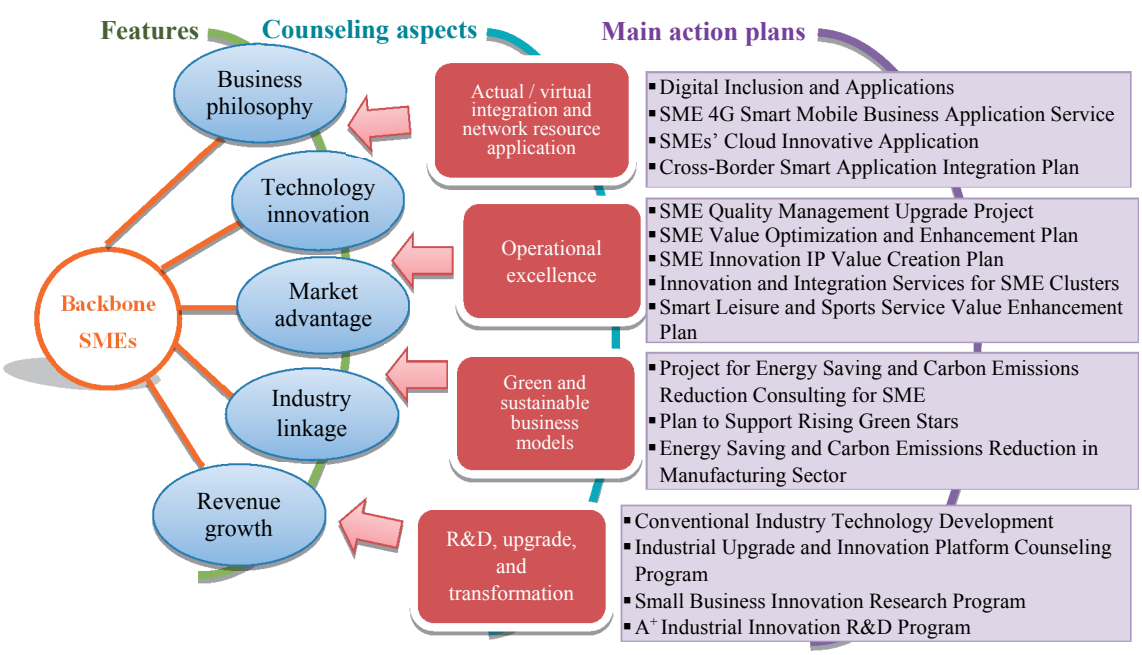
Source: Financial Supervisory Commission (2016).

CHAPTER 9

Enhancing R&D and Promoting Upgrade and Transformation for SMEs

The Small and Medium Enterprise Administration, Ministry of Economic Affairs (SMEA, MOEA) has launched various measures to promote SMEs' R&D, upgrade and transformation, and in particular, to cultivate high-potential SMEs to become the "Backbone Enterprises" or "Mittelstand." These measures provide one-stop counseling services for different stages of SME development: (1) selecting potential winners (high-potential SMEs); (2) injecting customized resource for growth; (3) linking them to leading industry supply chain; and (4) helping accelerate development in emerging industries. Four main strategic focuses are: (1) actual / virtual integration and network resource application, (2) operational excellence, (3) green and sustainable business models, and (4) R&D, upgrade, and transformation (Figure 9-0-1).

Figure 9-0-1 Counseling Strategies for Backbone Enterprises



Source: Compiled by editors of this book.

This chapter is divided into four sections. Section I covers actual / virtual integration and various network resource applications for SMEs; Section II examines measures to enhance SME operation, quality and innovation; Section III reviews guidance on energy conservation, green opportunities, and sustainable growth models; Section IV discusses measures to promote up-, mid-, and down-stream cooperation and innovation, in pursuit of high-value transformation and upgrade for SMEs with high growth potential.

I Measures Related to Actual / Virtual Integration and Network Resource Applications for SMEs

1. Digital Inclusion and Applications

In 2005 MOEA launched the "Bridging Industry Digital Divide Project" focusing on the digital development of rural industries. The main targets of this program are micro-enterprises with less than 20 employees. Local community-based training activities are provided to increase the ability of micro-enterprises in rural communities to conduct digital business, incubate talents, and further extend online opportunities and improve competitiveness.

2013 saw the launch of the "Digital Inclusion for Small and Medium Enterprises Project." From "Digital Divide" to "Digital Inclusion" represents an in-depth thinking change. This project aims at encouraging the owners of SMEs to integrate their business into today's digital economy and help traditional business in remote or rural areas use information technology to improve their business. More than that, the project aims at assisting groups like middle-aged or senior women and aborigines to improve their livelihood through using information technology. 2016 results and action items include (1) further promoting digital applications in remote or rural areas, (2) establishing e-clusters, (3) assisting in cluster expansion and marketing, (4) helping SME e-enablement (5) fostering SMEs' information technology upgrade, and (6) cultivating sustainable development of clusters. In 2015, the project helped promote digital learning for a total of 256,431 people, establish 24 SME e-clusters, and counsel 11 SMEs. The main areas of emphasis in the project in 2016 are outlined below (plan site: http://e98.sme.gov.tw/):

(1) Enhance digital application: Tailored training to help SMEs build and use web pages, blogs, and social media tools to enhance their networking, digital marketing, and e-commerce capability.

(2) E-enablement and marketing: Identifying SMEs that already have significant e-enablement potential and providing guidance service and experience sharing to help them achieve advanced level of e-enablement management and marketing capability.

(3) Advanced counseling for selected SMEs: Helping SMEs with significant potential upgrade their business models from e-enablement, operation, value added product development, and marketing (physical and virtual); advanced counseling though case study and sharing.

(4) SME e-cluster: Promoting SME clusters through integrated resources of IT, e-enablement, services and marketing to achieve synergy in exploring digital business opportunities.

2. SME 4G Smart Mobile Business Application Service Plan

The Small and Medium Enterprise Administration, MOEA launched SME 4G Smart Mobile Business Application Service Plan. 2016 main action items are (plan site: http://www.sme4g.com.tw): (1) promoting 4G mobile commerce C-A-N-D integration application services; (2) in-depth development of 4G mobile business intelligence services; and (3) exploring multi-channel approach to market expansion for SMEs as Taiwan has entered the 4G mobile era with its unprecedented speed and scale. As of March 2016, main results included (1) completing 59 service applications in 4G lifestyle and e-commerce, attracting participation of 3.75 million people, and (2) generating incremental revenue over NT$1.31 billion.

3. SMEs' Cloud Innovative Application Development Plan

The Small and Medium Enterprise Administration, MOEA launched SMEs' Cloud Innovative Application Development Plan to promote business model innovation, cloud applications such as IaaS, PaaS, SaaS, DaaS at all levels, and further diffusion of innovation in cloud technologies and services.

2016 main action items are (1) promoting SMEs' cloud based innovations, (2) in-depth development of government's cloud linkage and data applications, and (3) accelerating diffusion of cloud applications for SMEs to enhance business opportunities and output.

4. Cross-Border Smart Application Integration Plan

To encourage innovation and establish smart cross-border service platform to improve agriculture and farmers' income, the Small and Medium Enterprise Administration, MOEA launched Cross-Border Smart Application Integration Plan. 2016 main areas for counseling are (1) integration of agriculture, food processing, logistics services, e-commerce and other industrial resources through industrial clusters, and (2) improving the industrial value chain to drive innovation and development of related industries.

5. Taiwan e-Learning and Digital Archives Program (TELDAP) – SME Online University

Taiwan' SME Online University has been recognized as the first e-learning website developed for SMEs in Asia, boasting over 1,000 free online courses in six major categories, including ICT, human resource, finance, marketing, entrepreneurship, and comprehensive knowledge. Traffic to the site has climbed steadily with tens of millions visitors. The learning at the SME Online University is free; anyone who could access to the internet via his or her subscribed ISP is eligible for enrolling as a student of the University.

In addition to the courses, there are many learning facilities and services for the online learning students as well as a physical university, such as University Book Store. The SME Online University provides voice reviews for current business book titles for members to download. There are also business celebrity speech videos available for members to use. Under TELDAP, SME e-learning service expands the application of e-learning in formal education and lifelong learning to nurtured

SME talents. The 2015 results included (1) helping 101 SMEs use TELDAP, and (2) serving 256,431 people in e-learning. In 2016, the program will focus on: (1) offering over 700 online courses, (2) establishing special learning areas, counseling, personalized learning recommendations, customer service line, learning community services, (3) providing electronic passport for lifelong learning for qualified SME employees, and (4) providing business forms and workflow templates (plan site: http://www.smelearning.org.tw).

6. ICT Applications for Manufacturing Industries: Moving Upward along the Value Chain from OEM toward ODM and OBM

The manufacturing industries ICT value-added application plan launched by Industrial Development Bureau (IDB), MOEA, focuses on helping manufacturing industries move upward along the value chain from OEM model toward ODM and OBM through ICT applications and pro-innovation, pro-business environment.

In view of the less promising outlook of OEM business, companies are expected to increasingly engage in activities beyond manufacturing. Entering into ODM is a step towards this trend. Prototype creation, detailed product design and development of product concepts, the core activities of ODM, may prove feasible for Taiwanese companies to master as those activities rely largely on one's expertise in the manufacturing process. But moving up the front-end of the value chain will involve devoted personnel to these newly added activities.

In order to avoid over-reliance on buyers, achieve product differentiation and nurture customer loyalty, Taiwanese manufacturers may choose to adopt OBM, stepping into the back-end of the value chain. Rather than just expanding the range of manufacturing-related services into ODM, these companies will try to capture greater profits by building their own brands and the marketing and distribution capability. However, OBM is a difficult business model, and the tenet of success is the commitment to invest in the brand over the long term. Given a lack of brand development expertise and financial resources, Taiwanese companies can incubate their brands in some small pilot markets. After becoming successful, the brands may be promoted in other potential markets. The 2015 results included (1) helping 12 manufacturers with servicing and innovation features lead value chain integration of 385 enterprises, and (2) generating incremental revenue and cost saving of NT$730 million and new private investment of NT$63 million as well as additional business opportunities in information service valued at NT$25 million (http://www.ecos.org.tw).

7. Commercial Service Value Enhancement Plan

To facilitate commercial service providers to use ICT, integrate service value chain, and jointly develop high quality service models (such as O2O - Online to Offline - e-commerce mode) to create unique consumer experience, thereby strengthening the market expansion and end users' service value, Department of Commerce, MOEA launched "Commercial Service Value Enhancement Plan," including "Commercial Service Value Enhance Counseling" and "Commercial Service Application Expansion Model."

The 2015 results included: (1) completing counseling of 8 high quality smart commercial service application cases, (2) a total of 1,043 enterprises adopting smart commercial service applications, (3) helping enterprises and their partners subsidized by the Plan reduce annual costs up to NT$114 million (plan site: http://gcis.nat.gov.tw/ecpp).

II Promote Operational Excellence and Innovation

To stay ahead of competitors, SMEs must improve the overall quality of their products and services by shifting the whole value chain upward. Among others, this upward shift involves offering better designs and features, building brands and intellectual property, and using integration services for innovation and industrial clusters, improving warehousing and logistics, as well as strengthening marketing and distribution.

1. SME Quality Management Upgrade Project

In order to assist SMEs in carrying out the requirements of quality management systems, training high-quality management talents, and creating a new quality image for Taiwan's SMEs, the Small and Medium Enterprise Administration, MOEA has continued to promote the "SME Quality Management Upgrade Project," including innovation, industrial guidance, personnel training and promotion.

2016 action items are: (1) the industrial guidance portion focuses on SME short-term quality service diagnosis, top-quality enterprise guidance for successful SMEs (such as winners of National SME Award, the Rising Star Award, the SME Innovation Research Award, etc.), general enterprise guidance (focused on six emerging industries and ten servicing industries) and value chain guidance (such as industry cluster, ODM, and OBM); (2) the personnel training includes: organizing quality management awareness and application promotion seminars; international certification series, business management quality series, key industry management practices, tourism and leisure services series and other online courses; tailor-made corporate internal training programs to meet the manpower development needs of SMEs; and (3) the promotion part covers advertising, commercials, and promotion of quality awareness.

2015 results were: (1) completing counseling of 140 enterprises including 4 value chains, system innovation, and training of 1,210 people in quality control area; (2) helping 10 SMEs establish quality management systems meeting domestic and/or international customers' requirement of standards and tests, and counseled 5 SMEs to win national award of quality; and (3) helped enterprises generate incremental revenue of NT$686 million, reduce annual costs of NT$78 million, and create 171 jobs (plan site: http://smeq.moeasmea.gov.tw).

2. SME Value Optimization and Enhancement Plan

The Small and Medium Enterprise Administration implemented the SME Value Optimization and Enhancement Plan with the goal of using value chain optimization, differentiated technologies, technological applications and services to strengthen SMEs' core competency, partnership, upgrade

and transformation. The main action items in 2016 are (1) SME counseling and diagnosis on business analysis, competitiveness enhancement, and use of resources from government measures; (2) strengthening quality-related basic capabilities, building model enterprises with an outstanding reputation for quality, and achieving high-level quality that has a real impact on moving upward along the value chain; (3) helping SME innovate and transform through quality management and the right business model in particular value added activities (R&D, design, production, logistics, distribution, branding, services, etc.); (4) counseling on coordinated quality tests; (5) counseling on global quality management and conforming to international certification requirements; and (6) quality control talent.

2015 results were: (1) completing counseling and diagnosis of 25 enterprises, and 3 value chains for 15 enterprises (2) helped enterprises generate incremental revenue of NT$276 million, innovation value at NT$ 24 million, and reduce annual costs of NT$11 million (plan site: http://smeq.moeasmea.gov.tw).

3. SME Innovation IP Value Creation Plan

The Small and Medium Enterprise Administration has been implementing the SME Innovation IP Value Creation Plan, to help SMEs that have been undertaking technology innovation gain economic value from their intellectual property (IP), and evaluate the potential for diversified IP utilization. Under this Plan, experts provide individual firms with guidance regarding their IP organization, and SMEs are encouraged to attach more importance to IP. The guidance provided under the Plan helps SMEs reduce the time and cost needed to complete R&D projects. It aims to achieve coordinated linkage and effective evaluation guidance service with respect to the entire IP value chain, including IP management and protection, IP acquisition and technology transfer, IP distribution and utilization, etc. The Plan's main work items in 2016 include (1) customized counseling on IP evaluation, acquisition, commercialization, and management; and (2) operation of the SME IP Value-Added Service Center, to help optimize SMEs' IP-related capabilities.

2015 results were: (1) counseling 108 cases / 72 enterprises and helping 20 enterprises enhance their economic value of intellectual property and R&D benefit; and (2) helped enterprises generate incremental investment and related revenue of NT$215 million, induced by counseling of IP enhancement (http://ipcc.moeasmea.gov.tw/).

4. Innovation and Integration Services for SME Clusters

SME clusters and export consortia development are a noteworthy form to enable the SMEs to link and integrate to regional and global value chains. They critically function as a means to improve the competitiveness of SMEs productivity and competitiveness within the regional and global economy. In order to promote the upgrading of industrial technology and knowledge and to utilize cluster-based guidance models to help enterprises upgrade and transform themselves and to enhance their competitiveness, SMEA launched Innovation and Integration Services for SME Clusters to provide (1) technology, product and management guidance for intensive SME clusters, (2) guidance to help SMEs in service industry clusters adopt innovative technology, and (3) guidance to help SMEs in manufacturing clusters adopt innovative services. Main work items in 2015 were: (1) strengthen

cluster development mechanism; (2) promote counseling on integration of cluster and innovation; (3) cross-border and cross-industry cooperation and innovation; and (4) promote knowledge sharing and social value of clusters.

2015 results were: (1) helping promote 11 innovative SME clusters, including 211 SMEs in technology, service, and business model innovation; and (2) creating 246 jobs, and generate incremental revenue of NT$2,135 million (plan site: http://www.smecluster.org.tw/).

5. Smart Leisure and Sports Service Value Enhancement Plan

The Small and Medium Enterprise Administration launched the Smart Leisure and Sports Service Value Enhancement Plan to apply industrial counseling experience, combined with the efforts by Ministry of Education to promote recreational sports, to large-scale sports events as well as regional activities to drive smart technological applications and services in the development of local SMEs and economy.

III Guidance to SMEs on Energy Conservation, Green Opportunities, and Carbon Emission

1. Project for Energy Saving and Carbon Emissions Reduction Consulting for SMEs

In order to provide guidance for SMEs on energy conservation and reduced carbon emissions as well as to enhance the capacity of SMEs to respond to changes and explore new business opportunities, “Project for Energy Saving and Carbon Emissions Reduction Consulting for SMEs” has been initiated with the following key tasks: (1) providing consultation and recommendations on improving production efficiency, carbon footprint and energy consumption, (2) guidance for energy-saving technology and reduction management, (3) demonstration of guidance for industries, and (4) cultivating green elites.

In 2016, main work items include (1) on-site diagnosis and counseling, (2) industrial cluster demo and counseling, (3) regulation and verification counseling such as on international green product directives, compliance with green product standards and certification, and the green procurement requirements of major international manufacturers, and (4) green talent cultivation. 2015 results were: (1) completed counseling of 75 enterprises, and helped reduce annual costs of NW$63.7 million, (2) helped 10 enterprises establish standards and obtain international certificates, and (3) completed counseling of 20 industry clusters, and helped reduce annual costs of NW$5.3 million (plan site: http://GHGinfo.moeasmea.gov.tw/).

2. Plan to Support Rising Green Stars in SMEs

To help SMEs respond to domestic and international green product directives and the green procurement requirements of major international manufacturers, establish a capability for green supply chain management, effectively adapt to customers’ green supply chains and create green

business opportunities, the Small and Medium Enterprise Administration has promoted the Plan to Support Rising Green Stars in SMEs with the 2016 priorities in on-site diagnosis and counseling, "Bright-Spot" SMEs' one on one counseling, green supply chain management, and green capability cultivation and promotion. 2015 results were: (1) completing counseling of 120 SMEs, (2) completed counseling of 14 enterprises, 5 industry clusters and/or supply chains covering expansion of 103 SMEs, and (3) and helping reduce costs of NW$360 million and generate green revenue of NW$1,055 million, and (plan site: http://green.pidc.org.tw /).

3. Energy Saving and Carbon Emissions Reduction in Manufacturing Sector

In order to provide greater assistance to manufacturing sector in energy conservation and carbon reduction, costs reduction, and response to international environmental guidelines/standards, the IDB, MOEA has formed the a service team for energy saving and carbon emissions reduction in manufacturing sector to offer guidance and counseling on green technologies, diagnosis tools, case studies, industrial collaboration, and talent cultivation. The 2016 priorities are: (1) technology counseling on energy saving and carbon emissions reduction, (2) diagnosis and counseling of SMEs on energy saving and carbon emissions reduction, (3) guidance and test of efficiency of energy-consuming equipment, (4) demonstration of smart energy saving and detection technology application, (5) greenhouse gas swap project demonstration, and (6) talent cultivation. 2015 results were: (1) completed counseling and/or on-site examination of 275 SMEs, and helped promote diagnosis tools to 160 enterprises, and follow up greenhouse gas swap projects for 19 enterprises, and (2) helped enterprises reduce costs through energy saving of NW$1 billion (plan site: http://www.ftis.org.tw/tigers/index.asp).

IV SMEs: R&D Enhancement and Technology Upgrade

In order to encourage businesses to invest in R&D to enhance core strengths in international competition, MOEA has offered many guidance measures and funding sources for innovative R&D. These are expected to increase the input of R&D, upgrade the industry and improve the competitiveness of the country.

1. Industrial Working Environment Improvement Project

In order to reduce industrial occupational hazards in the country, the IDB, MOEA has implemented the "Industrial Working Environment Improvement Project" with the following key tasks in 2016: (1) basic technical guidance on working environment improvement; (2) guidance on risk management; (3) guidance on safety and health; (4) policy awareness promotions and campaigns. 2016 results were: (1) completed counseling of 218 enterprises, most of them were SMEs, and (2) overall improvement ratio at 79.19% including establishment of risk management systems for 2 enterprises (http://www.cesh.twmail.org).

2. Instant Technical Assistance to SMEs

In order to help SMEs upgrade and transform, the IDB, MOEA has implemented the "Instant Technical Assistance Program of SME" since 2009 by utilizing existing mature technological capabilities of the corporate world, academic community and technical services industry to provide R&D, design, production, logistics, automation and electronic technologies necessary for upgrading the industry and to provide real-time, small scale, short-term technical guidance, so that the technology levels of SMEs can be upgraded and their competitiveness enhanced. The 2016 priorities are: (1) one on one short-term, small scale, or comprehensive counseling on technological upgrade, and (2) case counseling management and promotion.

In 2015, a total of 293 SMEs received counseling for technology upgrade and transformation, resulting in NT$624 million output increase and NT$147 million cost saving (plan site: http://proj2.moeaidb.gov.tw/itap/index.php).

3. Industrial Upgrade and Innovation Platform Counseling Program

In 2015, IDB, MOEA merged the "Plan of Bellwether New Product Innovation and R&D" into the new "Industrial Upgrade and Innovation Platform Counseling Program" to help and subsidize bellwether firms, who have great potential in market expansion of their high value added new products or services, thereby enhancing their innovation and R&D. The main areas of subsidy are: (1) plan of leading new product development (for new products with great potential and at least domestically leading technology content), (2) plan of innovation application services and R&D (including Proof-of-Concept, Proof-of-Service and Proof-of-Business), and (3) theme-based development plan (themes initiated by IDB).

In 2015, a total of 86 cases (from 181 applications) approved with government subsidy of NT$1,498 million, which induced business investment of NT$2,423 million; expected incremental sales amounting to NT$36,600 million (plan site: http://tiip.itnet.org.tw).

4. Conventional Industry Technology Development (CITD)

Most Taiwanese exporters have traditionally engaged in OEM, under which products ordered are designed mainly by customers who usually own a brand name. Suppliers only focus on the manufacturing process, and the keys to success are low cost and high flexibility in response to customer demand. However, competition from suppliers in developing Asia, especially mainland China, has been rising, initially in terms of price, later in quality and other aspects over time. Taiwanese SMEs are therefore continually compelled to develop strategies that help them stay ahead of competitors.

CITD is a government-funded program that provides enterprises with R&D subsidies which are used to encourage conventional industries to develop new products and new technologies to expand service offerings and make R&D endeavors more prevalent in conventional industries. The 2016 priorities are: (1) product development, (2) product design, and (3) R&D alliance: joint development model for industrial clusters.

In 2015, a total of 419 enterprises approved with government subsidy of NT$266 million and private investment of NT$487 million, resulting in NT$7,230 million output increase. Plan site is: http://www.citd.moeaidb.gov.tw/CITDweb/Web/Default.aspx.

5. Small Business Innovation Research Program (SBIR)

To encourage SMEs to engage in innovating industrial technologies, products and services, Taiwan's government has continually promoted the "Small Business Innovation Research Program" (SBIR) in February 1999. In 2008, the "Promotion of Innovative R&D for Local Industries Program" (Local SBIR) was implemented, which is to assist in funding so that each municipal, county, city government can allocate more founds for R&D addressing the needs of industries with local characteristics. To ensure more SMEs can take advantage of this Program to grow stronger, upgrade and transform in response to fast industrial changes, the Department of Industrial Technology (DOIT), MOEA will regularly and properly review funds allocated for innovative R&D projects applied by local industries to ensure that funds are catering to demands of SMEs.

Through grants and subsidies provided by SBIR, the risks and costs borne by SMEs engaging in innovation and R&D activities will be reduced. The program encourages SMEs to carry out active innovation and helps to expand private-sector investment in R&D so that the results and achievements will help the country further its economic development.

From the inception of the SBIR program in 1999 until April 2016, a total of 6,107 cases of innovation and R&D projects were approved and implemented, with government subsidies exceeding NT$10.71 billion and SMEs' investment of NT$20.54 billion. This has been instrumental in enhancing the technological capabilities of SMEs in this country and improving the industry's competitiveness, as well as in providing assistance on upgrading and transformation to conventional industries (plan site: http://www.sbir.org.tw/SBIR/Web/Default.aspx).

6. Measures to Promote Conventional Industry Technology Innovation

In order to help SMEs transform and innovate, and adopt the new ways of thinking that will be needed to cope with the ever changing global environment, in 2008 DOIT, MOEA began implementation of multiples technology development programs (TDP), such as the Plan for the Provision of Assistance to SME Technology Development by the University Sector (launched in 2009), and the Southern Taiwan Alliance of Researchers and Scholars, to help Taiwanese industry upgrade itself by making effective use of the extensive R&D capabilities of the universities and other research institutions. Expert diagnostic service is provided to help enterprises to develop their R&D activity, and to make use of the R&D subsidies available from the government. The idea is to make the university sector a long-term partner for enterprise development, thereby strengthening SMEs' core technology capabilities and enhancing the competitiveness of Taiwanese industry.

Main action plans in 2016 and results in 2015 are:

(1) Value Added Transformation Plan for Conventional Industry: Selecting nine industries to support for their value added transformation, including fitness equipment, footwear, mold, non-

woven fabric, aluminum manufacturing, sewing machines, kitchen appliance, printing industry and sporting goods; as of 2015, helping 18 enterprises obtain subsidies, and inducing a total of NT$960 million investment, NT$590 million output, and 23 new jobs (plan sites: http://tipo.stars.org.tw/).

(2) Plan for the Provision of Assistance to SME Technology Development by the University Sector: Providing special project counseling and (6 month free) one on one counseling; as of 2015, helping 10,421 SMEs by 6,912 experts from over 140 universities or colleges, and inducing a total of NT$5,440 million private investment and output of NT$5,500 million (plan sites: http://sita.stars.org.tw/).

(3) Eastern Taiwan Industry Technology Service Center: Providing counseling for microenterprises (small firm with no more than 5 employees); as of 2015, helping 2,027 microenterprises apply for 707 cases of government counseling and subsidies, facilitating establishment of 26 industrial alliances, and inducing a total of NT$930 million private investment, output of NT$1,130 million, and 335 new jobs (plan sites: http://www.eitsc.org.tw/).

7. A^+ Industrial Innovation R&D Program

To lead businesses into investing potential technologies in advanced industries, the DOIT announced that it would replace "Industrial Technology Development Program (TDP)" with "A^+ Industrial Innovation R&D Program" to constantly encourage businesses into innovation in 2014. In the hope of guiding businesses to invest in high-end technology with higher industrial value, the DOIT encourages vertical- and cross-domain cooperation in order to tap industrial demands and develop comprehensive industrial ecosystem and the maximum efficiency.

By means of government subsidization, the A^+ Industrial Innovation R&D Program is able to enhance the enterprises' willingness to engage in technology R&D that is forward-looking but high-risk, and make a long-term R&D deployment in advance. In addition to inducing the industry to engage in R&D activities, it also encourages the enterprises to increase and accumulate the value of intellectual properties, cultivate and promulgate R&D personnel, start up new business units or new companies, and engage in innovative product development and services, which all serve to boost the competitiveness of the enterprises.

In 2016, A^+ Industrial Innovation R&D Program can be divided into five types of programs: (1) Industrial Technology Foresight Research Program (emerging technologies, products, and services), (2) Integrated R&D Program (vertical- and cross-domain cooperation to tap industrial demands and develop comprehensive industrial ecosystem and the maximum efficiency), (3) Industrial Technology Innovation Center Program (R&D management system, encouraging foreign firms to set up R&D in Taiwan, intellectual property right, etc.), (4) Special Programs, and (5) Global R&D New Partnership Program.

From the inception of the original TDP until May 2015, a total of 1079 cases were approved covering 1,678 enterprises, with their investment exceeding NT$53.1 billion; and each NW$1 subsidy generated output of NW$11.56. From the inception of the A+ Industrial Innovation R&D Program in 2014 until December 2015, a total of 123 cases were approved with government subsidy

of NW$4.89 billion and private investment of NT$7.09 billion (plan site: http://aiip.tdp.org.tw/index.php).

8. Service Industry Innovation Research Program (SIIR)

In order to foster the development of the commercial services industry and encourage enterprises to engage in research on "new service products," "new business models" and "new marketing models" or the development of "new business application technologies," the Department of Commerce has initiated the "SIIR" program to provide case-based subsidies, thus facilitating the introduction of new aspects and categories of business activities and enhancing the core competitiveness of the industry, while increasing its added value and creating a competitive advantage.

In 2015, a total of 82 cases were approved with incremental sales of NT$530 million generated and 302 new jobs created (plan site: http://gcis.nat.gov.tw/neo-s/Web/Default.aspx).

Chapter 10

Strengthening Start-ups and Incubation & Acceleration Mechanism

GEM 2015-2016 Global Report (GEM denotes Global Entrepreneurship Monitor), published in 2016, showed that Taiwan's Motivational Index for entrepreneurship was 3.8, ranked No. 13 globally; Taiwan ranked No. 7 in the category of "Entrepreneurship is a good career choice" upon which 74 percent Taiwanese agreed. Both indicators reflect an entrepreneur-friendly environment promoted by government agencies' joint efforts in Taiwan.

To further the development of a high-quality environment for new business creation in Taiwan, and facilitate the identification of promising early-stage start-ups so that they can be matched with "angel" investors and benefit from regional industrial resources, while at the same time putting in place a comprehensive support network, the Small and Medium Enterprise Administration, Ministry of Economic Affairs (SMEA, MOEA) launched various programs such as Emerging Industries Accelerator Program and Entrepreneur Visa, to establish a complete ecosystem for stimulating innovative ideas and strengthening the start-up function, improving incubation to speed up new business growth, and optimizing the support network for new businesses.

Due to the accelerated pace of globalization, industrial evolution and the flow of capital, smart technology, sound business model, and cost advantage are not enough to excel for an enterprise without the "speed" which is becoming an important competitive edge. Business accelerator, or acceleration program has becomes a global trend. In 2014 "Young, Energy, Start-up" or "YES Taiwan" became the key theme of the "Start-up Taiwan Program," which embodies "Youth Entrepreneurship Program" and "Youth Entrepreneurship Work Platform" by joint effort of government agencies to integrate mentoring and incubation resources and form entrepreneur clusters.

This chapter consists of three sections. Section I discusses in-depth entrepreneurship counseling and incubation; Section II focuses on incubation, emerging industry accelerator, and global connection; Section III covers government counseling and supporting projects for youth and female entrepreneurs.

I In-Depth Entrepreneurship Counseling and Incubation

The key theme "YES Taiwan" promoted in 2014 under the "Start-up Taiwan Program" comprises various programs including "Entrepreneurship Consultation Services" and "Entrepreneurship Dream

Building Plan" through joint efforts of 13 government agencies. It covers 4 main areas: start-up dream development, dream building incubation, financing and investment, and R&D and innovation, to promote resource integration and sharing through large business platform, with a concept similar to "Entrepreneur Café" in the U.S.

1. Entrepreneurship Consultation Services Plan

The SMEA, MOEA launched entrepreneurship consultation service plan in 2013 to help potential entrepreneurs stimulate innovative ideas, provide business information and advisory services, and to prepare them before starting new businesses, thus increasing the success rate. The plan will facilitate domestic entrepreneurial innovation, spread innovation awareness and shape entrepreneurial society (http://sme.moeasmea.gov.tw/startup/).

As of April 2016 (from January 2015), a total of 13,244 people received counseling, and 70 new businesses were founded with the help of the Entrepreneurship Consultation Services. Main services in 2016 are:

(1) Free counseling service: Access to over 100 professional entrepreneurship consultants through "0800-589-168" toll-free entrepreneurship counseling line and "youth entrepreneurship dream building" online consultation system;

(2) Multi-level resources for entrepreneurs: (A) Entrepreneur Café: promote would-be entrepreneurs, entrepreneurs and mentors to share ideas, knowledge, and resources; (B) Start-up Taiwan Product Show: offer free marketing platform to increase visibility and business / investor matching opportunity for entrepreneurs; and Start-up Knowledge Bank, Start-up Taiwan Newsletter, forums, and other in-depth publications;

(3) International community link, including International Council for Small Business (ICSB), Global Entrepreneurship Week (GEW) and Global Entrepreneurship Monitor (GEM), to strengthen entrepreneurial culture and international participation.

2. Entrepreneurship Incubation Education Program

The entrepreneurship incubation education program offers education and training opportunities for members of the public interested in setting up their own business, and for start-up owners, through the organizing of basic entrepreneurial skills courses, industry-specific courses, entrepreneur "boot camps," and the SME Online University digital learning portal site. It helps both existing and would-be entrepreneurs keep pace with new trends and access the latest information of management, technology, funding and international business start-up, thereby enabling entrepreneurs to make effective use of their own operational characteristics and sources of competitive advantage to enhance their market competitiveness. A diversified range of innovative educational methods are used to provide multi-faceted support, increasing the success rate for new start-ups and stimulating the growth of entrepreneurial drive in society as a whole, while also effectively promoting the concept of lifelong learning and stimulating knowledge-intensive business start-up. Three main categories of the program are: (1) entrepreneurship incubation courses for existing and would-be entrepreneurs, with priority treatment for economically disadvantaged people and aborigines; (2)

industrial forums on competition, benchmarks, sharing and teaching from industrial elites; (3) start-up counseling website on SMEA services, start-up funding, young entrepreneur financing, and so on.

From January 2015 to April 2016, a total of 4,405 people received training in 32 entrepreneurship incubation classes and 20 start-up theme classes (plan site: http://www.learningup.tw/index.php).

3. Entrepreneurship Dream Building Plan

Entrepreneurship Dream Building Plan, a start-up service network launched by SMEA, is to help firms (mostly within five years from inception) with great potential enhance the operation, increase the visibility of products and services, expand more business cooperation opportunities and create a new vision of the business. The ultimate goal is to shape the benchmark of entrepreneurial companies and to assist in its sustainable operation. Main services in 2016 are: (1) the use of start-up consultants to help firms that have been in existence for less than five years evaluate their business model and development strategy, thereby helping them to stay competitive in business, (2) layered counseling for start-ups, including general counseling, mentorship, and mid- to long-term team assistance, product exhibitions, B2B, B2C, and international commercial exhibitions, multi-media marketing and promotions, and (3) evaluating and granting "Business Startup Awards," the only SME national award given to start-ups that had been in existence for less than 3 years, and exhibited excellent innovation in technology, product/service, and/or business model.

As of May 2015 (from January 2014), a total of 415 start-ups (in existence for less than five years) received counseling, resulting in incremental private investment of NT$3.68 billion and 2,554 jobs (created or maintained) (plan site: http://sme.moeasmea.gov.tw/startup).

II Incubation and Acceleration Programs

To help SMEs get established, undertake innovation and grow at various stages, strengthen start-ups and incubation, and accelerate forward-looking SMEs' global connection, since 1997 the SMEA has been working with other government agencies, research institutions, universities and private-sector companies to implement the government's incubation center policy and encourage the establishment of new incubation centers.

1. SME Incubation Center

A business acceleration program usually lasts between 3-6 months. The emphasis of the business accelerator is on rapid growth, and to sort out all organizational, operational, and strategic difficulties that might be facing the business. It can be understood as a holistic business advisory service, often bearing strong resemblance to traditional management consulting practices, but adjusted to fit SMEs. While incubators help companies stand and walk, accelerators teach companies to run.

An incubation center is a facility that cultivates new businesses, new products and new technologies, and helps SMEs upgrade and transform themselves. It provides a wide range of resources in an efficient, integrated manner (including the provision of office space, access to

equipment, R&D technology, help in finding funding, business services, management consulting, etc.), thereby reducing the costs and risk that new businesses need to bear in the start-up stage and in the early stages of R&D projects. By creating a first-class cultivation environment, incubation centers increase the likelihood that a new business will be a success. The following sections describe the current state of incubation center operation in Taiwan.

(1) Incubation Centers: Current State

There were over 130 incubation centers in Taiwan, located in 20 different counties and cities. In 2015, SMEA, MOEA subsidized 73 incubation centers, amounting to NW$159 million. The five main innovative practices of these incubation centers are: (1) focusing on upgrade and transformation of core competencies in key industries, (2) developing special module such as youth and women entrepreneurship, innovative application, cross-border / network, and outreach projects in specialization, (3) cutting the red tapes and simplify the application process (4) designing exit mechanism, and (5) supporting incubation by networking (http://incubator.moeasmea.gov.tw/).

Performance of all Incubation Centers: in 2015, 73 incubation centers received subsidy of NT$159 million from SMEA which successfully induced incremental capital investment of NT$17 billion. The ratio of increased capital over subsidy was 106.91. 9 of the 1,951 firms that had been cultivated in incubation centers had secured stock market or OTC listing.

By the end of 2015, SMEA had provided subsidy to 120 incubation centers and induced cumulated incremental capital investment of NT$110.2 billion. 86 firms that had been cultivated in incubation centers had secured stock market or OTC listing. The total number of people working at these firms was 223,266 (Table 10-2-1) (plan site: http://incubator.moeasmea.gov.tw).

Table 10-2-1 Incubation Center Performance, 2011-2015

Unit: 100 million NT$; enterprises; persons; items

Item	Year	2011	2012	2013	2014	2015
Input	SMEA subsidy	1.41	1.52	1.57	1.52	1.59
Output	No. of incubated SMEs	1,954	2,065	2,181	2,000	1,951
	No. of incubated startups	1,226	1,250	1,354	1,327	1,294
	Employees	30,489	34,185	29,368	27,138	26,346
	Patents secured	361	206	157	176	121
	Instances of technology transfer	195	84	62	71	118
	Ratio of increased capital over subsidy	45.11	36.43	49.32	63.16	106.91
	Increased capital	64	57	77	96	170
	No. of enterprises listed in stock market or OTC	3	2	5	9	9

Source: Small and Medium Enterprise Administration, Ministry of Economic Affairs (2016).

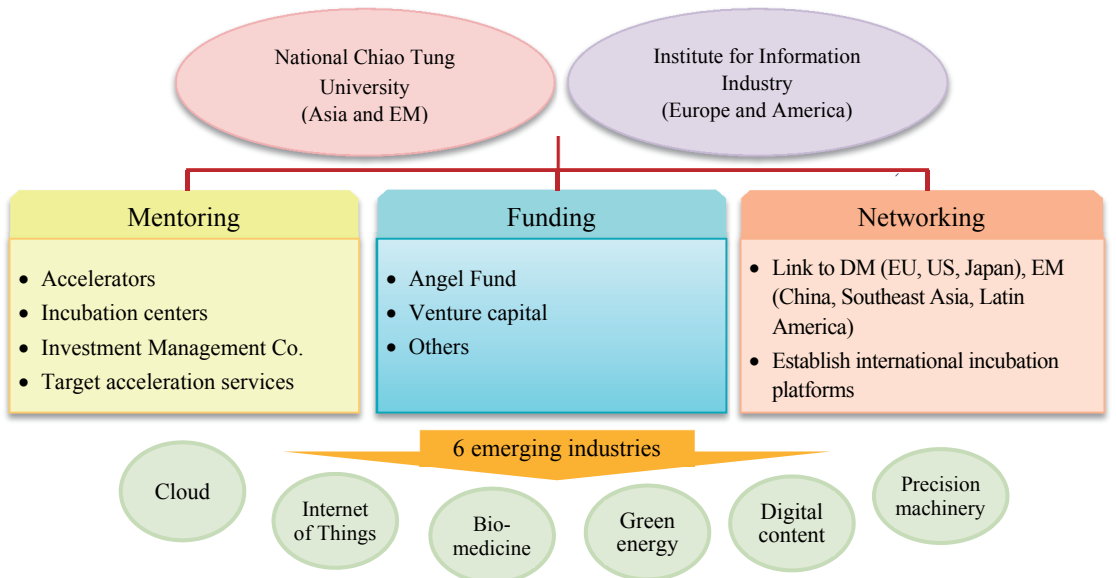
(2) Five Incubation Centers Operated Directly by SMEA

To cultivate R&D of key high-tech industries, MOEA has established five incubation centers through direct investment since 2002 to offer technology support and services in consultancy, resource sharing, brand marketing and business matching for startups and SMEs, and help them transform, enhance R&D abilities and boost their international presence. They are: (1) Nankang Software Incubation Center (e-commerce, embedded systems, software, and network communications), (2) Nankang Biotech Incubation Center (pharmaceuticals, medical equipment, and healthcare, agricultural biotechnology), (3) Kaohsiung Software Incubation Center (digital content, software, and technology services), (4) NCKU Incubation Center (biotechnology and health care, green energy and environmental protection, and precision machinery), and (5) the Hsinchu Biomedicine Industrial and Incubation Center, which integrates the links in the biotech industry development chain - R&D, trial production, clinical trials, patent transfer, and company incubation - within a single park, and provides "one-stop shop" support and regulatory verification services. This will deepen biotech research capabilities, accelerate the commercialization of R&D results, and enhance production efficiency. It focuses on optoelectronic imaging, information technology, biomedical chips, biomedical materials, regenerative medicine, orthopedics, and combination products. The information and communications technology (ICT) advantages of the neighboring Hsinchu Science Park will be employed to attract participation and investment and produce a biotech industry cluster effect.

2. Emerging Industries Accelerator Program

From 2013, SMEA launched Emerging Industries Accelerator Program focusing on seven major industries: cloud computing, ICT, biomedicine, precision machinery, green energy, cultural and creative industries, and logistics. The SMEA also established international incubation cooperation platforms in the U.S., Europe, Asia, and emerging market (such as NBIA, EBN, AABI, and AAN). It will select high quality firms with great potential from over 200 incubated firms for the Accelerator Program. The accelerator provides intensified consultation and offer target acceleration service toward medium to large enterprise from mentoring, funding, to networking. The goal of the program is to bring increased investment and help over selected firms join supply chain of the large enterprises, obtain international orders, and facilitate international cooperation. In 2016, six major emerging industries become new strategic focus: Cloud, Internet of Things, Digital Content, Bio-medicine, Green Energy, and Precision Machinery, executed jointly by National Chiao Tung University (NCTU) and Institute for Information Industry (III) (Figure 10-2-1).

Figure 10-2-1 Emerging Industries Accelerator Program



Note: EM indicates emerging market; DM indicates developed market.

Source: Small and Medium Enterprise Administration, Ministry of Economic Affairs (2016).

3. Characteristics of Accelerator

In 2012, SMEA actively promoted "Start-up Taiwan" plan, integrating regional industries and incubation resources, to provide a comprehensive "one-stop shopping" incubation services (including accelerator).

There are a number of elements that distinguish an accelerator from an incubator. At the same time, there is indeed overlap across incubator and accelerator services, both helping firms grow by providing guidance and mentorship. Incubator programs last for varying durations and include several forms of mentorship and support, and nurture the business for the time it takes for it to get on its feet, sometimes for many years. On the other hand, an acceleration program usually lasts between 3-6 months. The emphasis of the accelerator is on rapid growth, and to sort out all organizational, operational, and strategic difficulties that might be facing the business. It is a holistic business advisory service, often bearing strong resemblance to traditional management consulting practices, but adjusted to fit SMEs. "Start-up Taiwan" plan integrates these two programs as follows.

An "Idea Factory" uses a selection mechanism to evaluate the potential of innovative start-up ideas, and then provides the necessary environment and support at every stage from initial conception through sample fabrication to prototype creation. It then leverages the capabilities of a team of expert consultants to provide a comprehensive, "one-stop shopping" range of services that include technology evaluation, R&D input support, market research and business environment analysis, incubation guidance, international business matching and assistance with securing venture capital funding, so as to help speed up the commercialization of the original innovative concept.

As regards the "Incubation Accelerator," once a start-up has passed selection, it begins to receive business opportunity-oriented, systematic guidance provided by experts, with a "one-stop shopping" service that covers technology appraisal, R&D input assistance, market research and business environment analysis, incubation guidance, international business matching and assistance with securing venture capital funding, with the aim of enhancing the success rate for new start-ups, and realizing the ideal of accelerating the transformation of innovative ideas into new technology, the transformation of new technology into new products, and the successful commercialization of those new products.

The wealth of new ideas created in the Idea Factory or in incubator centers can be brought into the Incubation Accelerator for the provision of business-opportunity-oriented, systematic guidance, so that the start-ups in question can grow and become more competitive, eventually being transformed into "Innovation-Oriented Core SMEs."

4. A^+ Start-up Action Plan

To promote industrial upgrade and cultivate promising early-stage start-ups, the SMEA, MOEA launched A^+ Start-up Action Plan in 2015. The Plan can be divided into two parts: (1) Start-up Diagnosis and Recommendation System offers tools to conduct real-time evaluation of the start-up teams, and (2) Start-up Action Plan (layered counseling for start-ups, including general counseling, mentorship, and mid- to long-term team assistance, closing gaps in resources and business models, partnering with the "Backbone Enterprises" or "Mittelstand" (often winners of National Award of Small and Medium Enterprises, Rising Star award, and so on) for win-win alliances. 6 partnerships has been formed in 2015 under the Plan (http://aplus.org.tw/).

5. Entrepreneur Visa

In recent years, Singapore, South Korea, Chile, Canada, the United Kingdom and other countries all launched the "Entrepreneur Visa" in order to attract international talent. Taiwanese government also launched the Resident Visa for Entrepreneurs in July 2016 as part of its ongoing efforts to attract foreign talent to invest and start businesses in Taiwan. The goal is to build an innovation and entrepreneurship ecosystem, increase incentives for retaining and recruiting talent, and introduce foreign startup capital and technology. In coordination with the launch of Entrepreneur Visa, the government provides various services to overseas entrepreneurs in Taiwan, such as establishing the network platform between Taiwan and Silicon Valley, to attract international innovation talent to work and invest in Taiwan.

Under this program, qualified companies can get Visas for up to 3 people. Initially they can get one year of Taiwan residence. The resident permit can then be extended another 2 years for entrepreneurs who can provide evidence they are really running a bona fide business. There are a few ways to qualify for this entrepreneur visa: (1) getting domestic or foreign venture capital investment of NT$2 million or getting funding from a government recognized crowdfunding platforms. The government will issue a list of crowd funding companies they pre-approve like Kickstarter and IndieGoGo; other platforms might be accepted as well; (2) participating in a national entrepreneurial park such as the Taiwan Startup Stadium - http://www.startupstadium.tw/; (3) holding patents

overseas; (4) those who have won international startup or design competitions such as IDG Demo Show, Red Dot, iF design; (5) an entrepreneur who has invested at least NT$1 million in an innovative startup and is the representative of that company.

III Youth and Female Entrepreneurship Counseling

Female-owned enterprises account for over 36% of all enterprises in Taiwan and generate annual sales of NT$5.4 trillion in 2015. About 99% female-owned enterprises are SMEs. Funding is the most vital resource for youth and female entrepreneurs. Two major sources of low cost loans available to them are:

(1) Young Entrepreneur Loans: To be eligible, candidates must be aged between 20 and 45, and must be the registered owner, or shareholder in, a company or other business enterprise that has been in existence for less than five years.

(2) Phoenix Micro-Enterprise Loans: To be eligible, candidates must be women aged between 20 and 65 who have undergone a government training course within the past three years and received start-up consulting and guidance, and whose enterprise employs less than 5 people (excluding the business owner). The individual loans is capped at a maximum of NT$1 million up to 7 years; interest is waived for the first two years of the loan period, with the loan rate equal to two year postal saving rate plus some extra basis points (typically around 100 bps including credit guarantee cost per year).

1. Youth Entrepreneurship Program

"Youth Entrepreneurship Program" is a three-year program (2014-2016) launched by the Executive Yuan through joint efforts of 13 government agencies (Small and Medium Enterprise Administration, Industrial Development Bureau, Department of Industrial Technology, Bureau of Foreign Trade, Department of Commerce, Ministry of Labor, Ministry of Education, etc.). The Program offers the "Youth Entrepreneurship Work Platform," and covers 4 main areas: "start-up dream development", "dream building incubation", "financing and investment", and "R&D and innovation", to promote resource integration and sharing through large business platform, with a concept similar to "Entrepreneur Café" in U.S.

Diverse entrepreneurship activities will be organized by government agencies, universities, incubation centers, and private organizations to fully tap young entrepreneurs and would-be entrepreneurs' potential for creativity, entrepreneurship, and innovation, and encourage youth who aspire and dream of becoming entrepreneurs to take part in a series of entrepreneurship courses, competitions, lectures, and product presentations. On the funding side, the SMEA will continue to show full support for enterprises, and will promote venture capital and angel funding for startups as well as merge the "Youth Start-up Loan" with the "Youth Dream-Building Program" into the "Young Entrepreneur Start-up Loan."

Budget of the three-year program is NT$2.7 billion. In 2015, a total of 3,625 star-ups (covering youth entrepreneurship, emerging agriculture, cultural & creative industry, social enterprises, and so on) have been supported by the Program with about 52,000 job created or maintained (plan site: http://sme.moeasmea.gov.tw/SME/).

2. Youth Entrepreneurship Dream Building: Online Consultation

Youth Entrepreneurship Dream Building provides online consultation and free counseling service (access to over 100 professional entrepreneurship consultants through "0800-589-168" toll-free entrepreneurship counseling line; http://sme.moeasmea.gov.tw/startup/).

3. Promotion Plan for Start-ups in Science and Technology

Promotion Plan for Start-ups in Science and Technology was launched by SMEA, MOEA to provide comprehensive policy measures for promoting industrial upgrade and cultivating promising early-stage start-ups in science and technology. The plan established the "Aplustart" resource platform for innovation and start-ups, and played the role of the domestic entrepreneurship competition Hub and idea factory. The platform has introduced 2,722 start-up ideas and explored 376 promising early-stage start-ups (https://www.aplustart.org.tw).

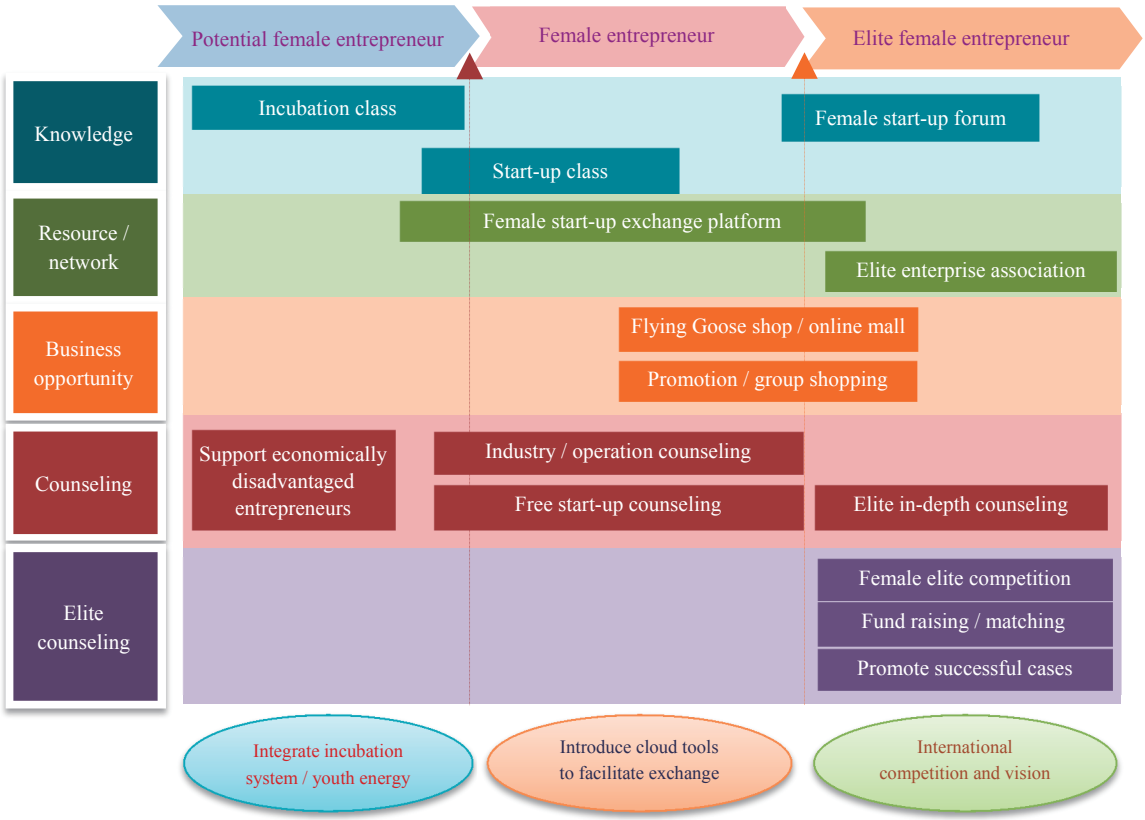
4. U-start: A College Graduate Entrepreneurship Service Program

The Ministry of Education launched "U-start" in 2009 to prepare college graduates to be entrepreneurs through industry-university cooperation mechanism. 2016 College Graduate Entrepreneurship Service Program is divided into 3 industries: service, manufacturing, and personal, cultural and recreational, for college graduates. As of 2015, a total of 654 start-up teams obtained subsidies from the Ministry of Education , of which 330 launched their new businesses (plan site: http://ustart.moe.edu.tw/).

5. Female Entrepreneurship Flying Goose Program

In 2016, MOEA's Flying Goose Program helps more female entrepreneurs with incubation services, such as incubation courses, team member type consultation, start-up funding, and so on to increase the success rate of female-owned start-ups, and enhance their operational efficiency and competitiveness. In 2015, a total of 2,300 female entrepreneurs obtained subsidies in training, and 146 female owned enterprises received counseling, attracting incremental investment of NT$92.4 million (Figure 10-3-1) (plan site: http://www.sysme.org.tw/woman).

Figure 10-3-1 Female Entrepreneurship Flying Goose Program – Implementation Measures

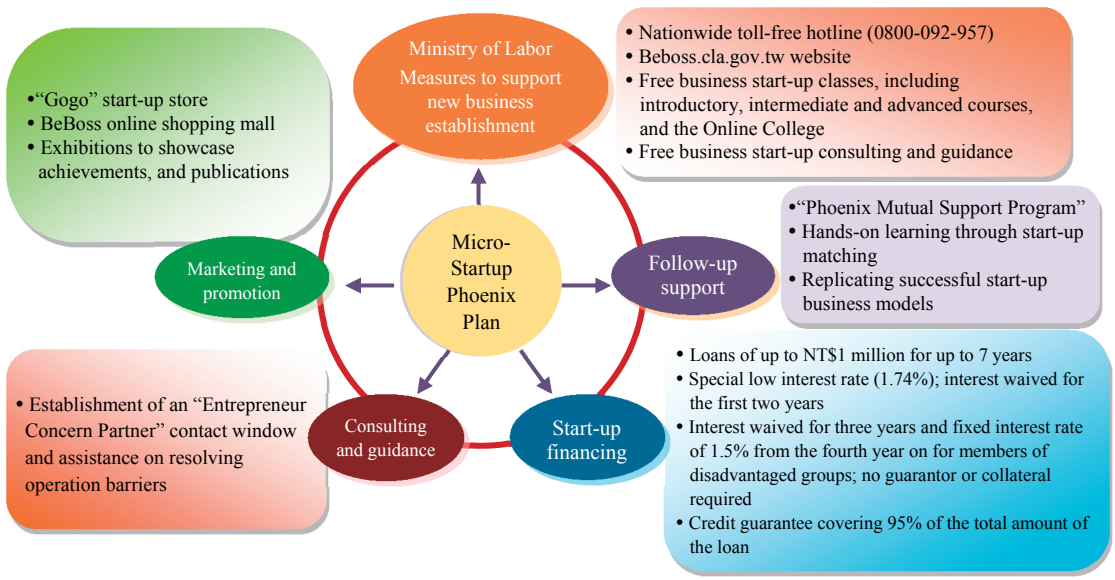


Source: Small and Medium Enterprise Administration, Ministry of Economic Affairs (2016).

6. Business Startup Phoenix Plan for Microenterprises

The Ministry of Labor launched the Micro-Startup Phoenix Plan to boost labor-force participation by women (20-65 year old) and the middle-aged (45-65 year old), establish a business environment conducive to new business creation, and help women and the middle-aged to start their own microenterprises, thereby creating new jobs. The Plan also provides entrepreneurs with advisors, and help in securing credit guarantees and loans. As of 2015 (from 2007), a total of 35,882 women received counseling, of whom 14,385 female entrepreneurs launched their new businesses and created a total of 38,671 new jobs, along with securing start-up loans amounting to NT$2.7 billion. The structure of the Business Startup Phoenix Plan and the implementation measures are shown in Figure 10-3-2.

Figure 10-3-2 Micro-Startup Phoenix Plan – Implementation Measures



Source: Ministry of Labor (2016).

CHAPTER 11

Revitalizing Local Industries by Outreach Development and Seizing Business Opportunities

Local specialty industries are expected to play a more important role in nations' economic growth, as many global companies employ a local brand strategy that targets specifically to local populations, with locally-controlled marketing strategies that are as unique as the regions themselves. Over the last few years, the government has been actively working to promote the development of local specialty industries. The Executive Yuan established the Local Industry Development Fund to promote local economic prosperity by providing funding assistance. The Small and Medium Enterprise Administration, Ministry of Economic Affairs (SMEA, MOEA) launched Factory Tourism Guidance Plan and One Town One Product (OTOP) program to offer traditional SMEs an alternative for transformation and bring glamour to all corners of Taiwan. Selected products can be exhibited in OTOP centers and fairs organized by SMEA to promote these quality products into domestic and international markets. Other promotional plans were launched to revitalize regional economies that reflect the theme of "Three Linkages: Future, International and Local Linkages" by the new government through value-added creation, development of local tourism, innovation, and encouraging SMEs to actively participate in local specialty industry R&D, marketing, and business development.

This chapter is divided into three sections. Section I discusses plans to promote development of local industrial clusters; Section II focuses on measures to help local industries build marketing capabilities; Section III covers measures promoting business matching opportunities for local SMEs.

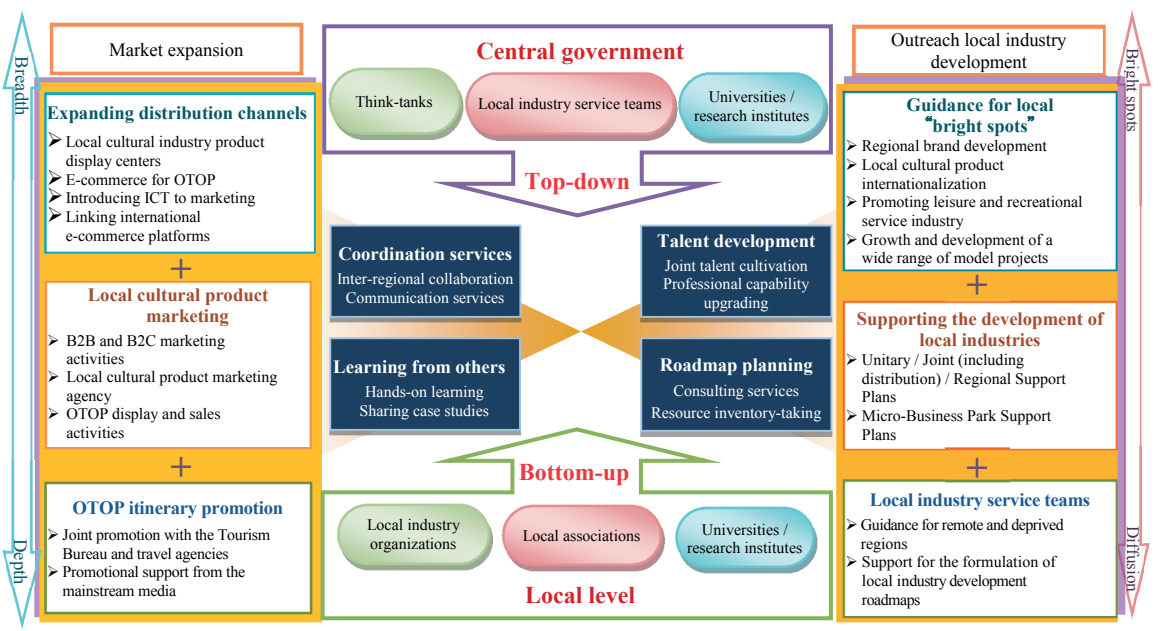
I Promoting Development of Local Industrial Clusters

1. Development Strategy for Local Specialty Industry

The term "local specialty industries" is normally used to refer to local industry clusters that have evolved in a particular township, rural township, city or community and which are engaged in manufacturing or service provision involving special local products with particular historic or cultural significance, or uniqueness, and making use of local materials, natural resources, traditional handicraft techniques, and local labor. Various programs were launched to revitalize local economies, create jobs in local communities, and form local industrial clusters. For example: "One Town, One

Product" - local specialty industry products can be divided into six broad categories: processed food products, cultural and handicraft products, innovative lifestyle products, local cuisine, leisure and recreational services, and traditional festivals and cultural traditions. The program does not simply develop one product, but takes a very holistic approach to the 319 local economies that it has identified for economic aid. Assistance Projects were identified in every locality to make the chosen industry of each village attractive to buyers. Another program is Local Cultural Industry Guidance Plan based on the vision of building competitive Taiwanese local cultural industries. The main emphasis is on helping domestic local cultural industries strengthen the development of industry organizations, enhance firms' operational capabilities, improve the visual appearance of local communities, encourage local industries to internationalize, build "bright spot" local cultural industries that can serve as a model for others, strengthen the economic potential of local cultural industries, and promote job creation at the local level. The strategy and framework for local specialty industry development are outlined in Figures 11-1-1.

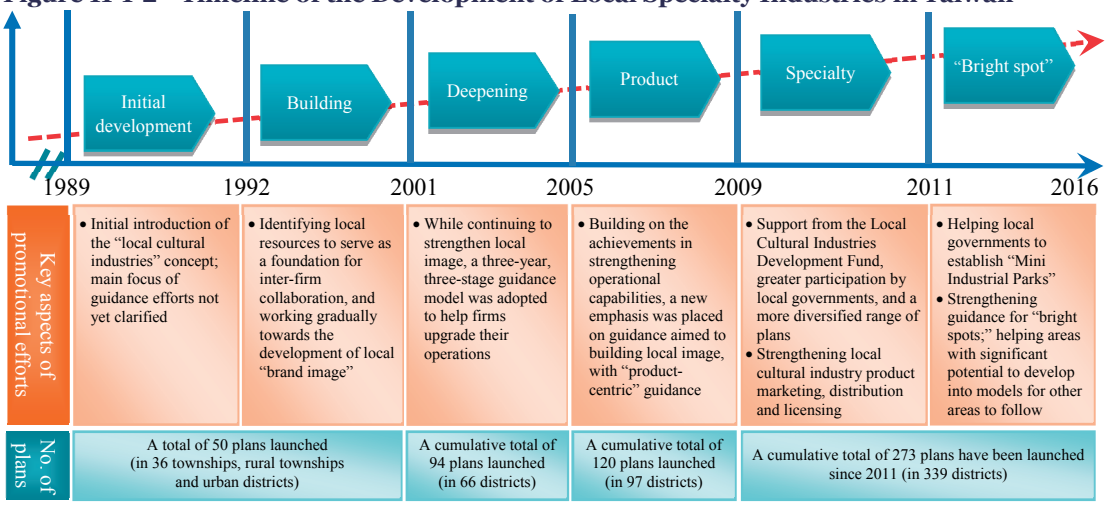
Figure 11-1-1 Framework and Strategies: Local Specialty Industry Development



Source: Small and Medium Enterprise Administration, Ministry of Economic Affairs (2016).

In 1989, the SMEA, MOEA began to allocate resources to support the development of local specialty industries. Over the years, the support and guidance measures have focused on different aspects of local specialty industry development, from "Initial Development," "Deepening," to "Bright Spot" as shown in Figure 11-1-2.

Figure 11-1-2 Timeline of the Development of Local Specialty Industries in Taiwan



Source: Small and Medium Enterprise Administration, Ministry of Economic Affairs (2016).

2. Local Industry Development Fund: Promote Local Specialty Industry Development

In 2009, the Executive Yuan established the Local Industry Development Fund to promote local economic prosperity by providing funding assistance in line with the development needs of local industries at the county and city level. It was anticipated that the Fund would help to transform the face of Taiwan's local communities, encouraging people to move back to their home areas from the big cities and from overseas, creating new job opportunities, and imbuing local economic development with new vigor (plan site: http://fund.sme.gov.tw/index.php).

In 2015, a total of NT$153 million subsidies went to 18 projects (individual funding support projects and integrated funding support projects combined). Since the Fund inception in 2009, government resource has covered 92.12% of all 339 administrative districts (vs. 17% before 2009).

The 4 types of subsidies are as follows:

(1) Individual funding support projects: The proposals are submitted by city and county governments covering only a single urban district, city, township or rural township. The total funding per project is capped at NT$6 million over a three-year period. Plans are to be implemented over a period of 3 years.

(2) Integrated funding support projects: The proposals are submitted by city and county governments covering 3 or more urban districts, cities, townships or rural townships. The total funding per project is capped at NT$15 million over a three-year period (note: for distribution channel type project - capped at NT$20 million over a three-year period). Plans are to be implemented over a period of 3 years.

(3) Regional funding support projects: The proposals covering the regional development plan are submitted by the central government. The total funding per project is capped at NT$15 million over a three-year period. Plans are to be implemented over a period of 3 years.

(4) Micro Park funding support projects: The proposals are submitted by central, city and county governments covering micro parks for low pollution local specialty SMEs. The total funding per project is capped at NT$55.5 million over a three-year period (note: for development project - capped at NT$50 million over a three-year period). Plans are to be implemented over a period of 3 years.

3. Factory Tourism Guidance Plan

Recognizing the global trend towards "industry tourism" and the need for Taiwanese industry to upgrade itself, in 2003 the Industrial Development Bureau and the Central Region Office launched the Factory Tourism Guidance Plan. By developing factory tourism, traditional factories would be transformed into "tourist factories" with significant cultural and educational value, giving the enterprises concerned an opportunity to restructure themselves, and giving the general public new tourism and leisure options that are both fun and educational; factories that already have distinctive local character will be able to develop new business models through tourism that enable people to learn while they are enjoying themselves. 2015 results were: counseling of 28 cases and 22 million visitors, resulting in investment of NT$575 million, output value at NT$892 million, and 291 new jobs (plan site: http://taiwanplace21.org).

4. Competition Enhancement Plan for Shopping Districts

Department of Commerce, MOEA launched the Competition Enhancement Plan for Shopping Districts in 2012 (for 2012-2015) to strengthen shopping districts through integration of government and local resources. 2015 key action items are: (1) enhance the shopping districts' competitive advantage through integration of trends and technologies; (2) customized counseling; (3) create hot topics and enhance shopping districts' image through integrated specialty marketing strategy. 2015 key strategies were (1) integrating trends and technologies to enhance the competitive advantage of commercial districts; (2) introducing appropriate counseling resources; (3) creating consumer "Bright Spots" to match specialty marketing strategy and enhance visibility of commercial districts. 2015 main results were: attracting private investment of NT$517 million and creating 2,290 new jobs and total sales of NT$9,020 million.

II Help Local Industries Build Marketing Capabilities and Regional Brands

1. OTOP (One Town One Product) Program

Taiwan OTOP is a guiding program aimed at promoting and developing local specialty industries. Based on the municipal units of township and city, products that are historic, cultural, or unique in the local communities are deemed as the local specialty products; therefore, the scope covered is broad and products including processed foods, living crafts, creative living products, rural leisure, creative gourmet, and festival events.

In 2016, Local Specialty Product Marketing Plan of the Taiwan One Town One Product policy implemented several main projects: (1) conducting Taiwan's local specialty product licensing service, providing consumers convenience with identification of high-quality specialty products; collecting, voting, selecting, and marketing specialty tourist routes and itineraries; (2) uncovering high quality OTOP enterprises and specialty tourist itineraries and products; (3) organizing competition for OTOP Design Award, OTOP Tour Award to promote OTOP value-added design and service networks.

OTOP program is implemented with techniques and integration of innovation that result in new products and services with value-added features and brands that drive growth and development of local special industries. The Government sees the soft power of Taiwan companies' innovation and design by providing relevant counseling program that assists the industries to use their innovative aspiration and aesthetics to tell stories for the products and to add points for the brand, thereby to increase added-value for industries. With the long-term counseling and cultivation from the SMEA, the local specialty industries gradually exhibit unique and refined new image, presenting both cultural and fashion taste that highlight the touching Taiwan OTOP style.

2. OTOP (One Town One Product) International Marketing Alliance Program

The specialty and recreational tourism industry of each town is upgraded from industry technology and service to industry co-marketing alliance through the counseling of local cultural industry program, so that the characteristics of each town or city will disseminate to whole Taiwan and show at international stage. Theme industries counseling project selected internationally competitive potential of the industry (for example: tea, ceramics, glass, pastry, bamboo) for counseling, and established OTOP International Marketing Alliance. Content of counseling through network collaboration, features enhanced, access provisioning, marketing and other ways to enhance the theme industrial product characteristics, industry characteristics and marketing of energy to improve the overall industry value.

2015 results were: promoting tea theme industry, resulting in incremental investment of NT$58.20 million, sales of NT$41.56 million, and 1,190 jobs maintained.

3. Building Regional Brands: "Bright Spot" and "Town Brands"

In 2009, the SMEA, MOEA launched the Local Industry Development Fund Plan, the objective of which was to support the development of local "bright spots," using the "local government authorities submit applications, and the central government commissions service providers give guidance" model. It was anticipated that the creating of local specialty industry "bright spots" would contribute to the ongoing development of local industries, while also enhancing their overall production value, strengthening the image of local specialty industries and their appeal as tourist attractions, and helping to build strong "town brands" that can boost international visibility, strengthen local competitiveness, and serve as a model for other regions and other industries to follow.

III Measures Promoting Business Matching and Exchange for SMEs

The Small and Medium Enterprise Administration, Bureau of Foreign Trade, Commerce Department, and other government departments and agencies have formulated a number of business development and marketing plans to help Taiwan's SMEs develop new business opportunities at home and expand into overseas markets. The aim of these projects is to assist SMEs in the development of new markets, in expanding their marketing and distribution channels (both in Taiwan and overseas), in raising the export competitiveness of their products, and in developing their own brands. The following sections examine the plans implemented in 2015-2016, focusing on business matching and exchange for SMEs.

1. Promoting Collaboration between Taiwan and Japan SMEs

Developments in recent years have created excellent opportunities to further deepen the already strong and longstanding industrial and trade co-operation between Taiwan and Japan. In January 2012, the Executive Yuan approved the Taiwan-Japan Industrial Co-operation Bridge-Building Plan. In 2014 SMEA, MOEA initiated the plan for cooperation and exchanges between Taiwan and Japan SMEs, and in particular the establishment of "Taiwan-Japan SME Cooperation and Exchange Platform," paving the way for closer industrial ties between SMEs in Taiwan and Japan, focusing on the key industries whose growth the two countries are seeking to promote, and aiming to create a win-win situation through the development of a new model for Taiwan-Japan SME collaboration.

Recently, a number of measures were implemented under the plan to boost Taiwan-Japan collaboration in the SME sector including Taiwan-Japan SME Cooperation and Exchange Plan; the establishment of Taiwan-Japan SME Cooperation and Exchange Promotion Platform, served as a service window and integrating Taiwan-Japan SME exchange channels; and the setting up of a venture capital fund to provide related financing and to encourage cooperative research and development efforts (http://www.tjsme.org.tw). Results as of 2015 were: 28 strategic partnerships with expected potential business opportunities amounting to NT$355 million (plan site: http://www.technomart.org.tw/).

In 2016, main projects include:

(1) Business matching service platform for SMEs: Providing latest industrial business news, establishing resource network and promoting substantive, practical collaboration between Taiwanese and Japanese enterprises.

(2) Exploring innovative products and technologies, and providing business visibility and matching opportunities: Covering domestic and international matching arrangements, such as technology and / or product launching and exhibitions, one-on-one matching and follow-up services, and promoting strategic alliances.

(3) Enhancing SME business matching effectiveness: Cross-border cooperation and experience sharing to strengthen Taiwan-Japan network contacts, partnership and heritage among government, industries, and academy.

2. Global Marketing Plan for SME Linkage to Industry Value Chain

In 2015, SMEA, MOEA launched the Global Marketing Plan for SME linkage to Industry Value Chain, to offer counseling and help SMEs link to global value chains, enhance value added through innovative products or services, and strengthen design, branding, marketing and service capabilities, and their international competitiveness. 2016 main projects are: (1) global value chain counseling services, including establishing global value chain promotion demos (2) introducing high value added innovations and technologies (3) improving export opportunities in products, services and cloud technologies (http: //www.taiwanscm.org.tw/).

3. Smart Marketing for SMEs' International Market Development

Recognizing the urgent need for SMEs to develop international market through multiple marketing approaches, in 2016 SMEA, MOEA began to promote smart marketing for SMEs' international expansion, with the aim of helping SMEs apply various technologies to smart marketing in the international market, strengthen cross-border business cooperation, cultivate overseas' marketing talent, and promote creative business models and international expansion (http://info.moeasmea.gov.tw).

4. Micro-Enterprises and Sole Proprietorships Support and Counseling Plan

The Micro-Enterprises and Sole Proprietorships Support and Counseling Plan was launched by SMEA, MOEA in 2012 to provide SMEs with less than 5 employees consultation, diagnosis, knowledge sharing, resource matching, business opportunities and other counseling and support services to help them reduce operational risks, cut costs, and seize growth opportunities. 2016 major projects include: (1) providing real-time online consultation and services; (2) one-on-one and cluster counseling; (3) promoting target career training for owners of micro-enterprises and sole proprietorships; (4) exploring business opportunities and facilitating cooperation; (5) studying and submitting research analysis reports on development of micro-enterprises and sole proprietorships (plan site: http: //micro.sme.gov.tw/index.php).

5. Trade Promotion Working Plan

The Bureau of Foreign Trade, MOEA has launched Trade Promotion Working Plan to promote export market diversification, with particular focus on increasing exports share in emerging market. Main projects include: (1) assisting in the development of the international market; (2) providing business intelligence; (3) providing services for overseas operations and branches; and (4) cultivating talent in international marketing (plan site: http: //info.taiwantrade.com/CH/).

6. International Market Development Subsidy Plan

The Bureau of Foreign Trade, MOEA launched the International Market Development Subsidy Plan in 2013 to encourage manufacturers to apply diversified, innovative and integrated marketing to international market expansion through special project subsidy. 2016 subsidies included 30 cases covering enterprises in chemical industry, biotechnology, medical device, ICT, metal machinery, and business services, with a total subsidies amounting to NT$114 million. About 347 overseas distribution channels and 457 overseas distributors and agents are projected to receive subsidies in 2016 (plan site: http: //www.imdp.org.tw/index.php).

7. Service Industry Overseas Marketing Plan

The Bureau of Foreign Trade, MOEA has selected medical tourism, cultural and creative (including crafts and digital content), information services, franchise / chain store, management consulting, and so on, as key service industries to promote international expansion. Main projects include: (1) enhancing service industries' global competitiveness through seminars, forums, international marketing talent training; (2) inviting international services buyers to Taiwan, enhance international collaboration, and facilitating strategic alliances; (3) assisting enterprises in seeking international collaboration, and expanding footprint in target markets; (4) organizing overseas promotion and exhibition in target markets. 2015 results were: (1) helping 11 service enterprises conduct overseas marketing, resulting in sales of NT$8.82 million; and (2) helping 5 service enterprises establish overseas footprint, resulting in sales of NT$13.80 million (plan site: http://www.taiwantrade.com.tw/CH/).

8. Most-Valued Products in Emerging Markets (MVP)

Emerging markets possess a rapidly growing middle class that is looking for a high-quality but affordable lifestyle. This "good enough" consumption model, with its emphasis on reasonably-priced luxury and value-for-money, is creating new market opportunities. In 2010, the MOEA launched the Project to Promote Most-Valued Products in Emerging Markets (MVP), which was implemented over a three-year period (2010-2012), targeting emerging markets such as mainland China, India, Indonesia and Vietnam. To implement the MVP project, the MOEA coordinated the Bureau of Foreign Trade, adopting a four-pronged approach (market demand, innovative R&D, product design, and international marketing) and a framework based around three key axes - innovative R&D and production platforms, integrated international marketing platforms, and environment-building platforms - to help provide enterprises with coordinated guidance and support that addresses technology, production, design, branding and marketing related issues, to help them develop business opportunities in emerging markets. As part of MVP, the Bureau of Foreign Trade launched the Emerging Market Integrated Marketing Communication Project, targeting emerging markets such as mainland China, India, Indonesia and Vietnam (http://www.taiwanexcellence.com.tw). Its main working tasks in 2013-2014 were: (1) organizing marketing and sales events for Taiwan's high quality products; (2) assisting in building distribution channels; (3) conducting advertising and communication domestically and internationally; (4) managing websites and digital marketing; (5) setting up Taiwan pavilion in international professional exhibitions in target markets; (6) boosting

the overall image of Taiwanese industry; (7) conducting visibility survey, promotion, and market research.

In 2016, main projects are: (1) business intelligence optimization; (2) customized counseling for exports; (3) promoting innovative marketing models; (4) multiple channels for diffusion of successful experience and results (plan site: http://mvp-plan.cdri.org.tw/).

CHAPTER 12

Other Government Measures to Support SMEs

Based on the Article 4, the Act for Development of Small and Medium Enterprises, in formulating policy, the government shall aim at furtherance of improvement and development of the business operations of SMEs without unfair treatment in respect of financial and taxation systems and other related matters. The government has also tried to enhance policy effectiveness by learning and sharing internationally, to enhance the global visibility of SMEs through expanding the substantial exchange and collaboration with the international community, and to help SMEs in finance and human resource.

This chapter comprises three sections that will discuss other SME supporting resources and measures not covered in previous chapters. Section I presents the utilization of government resources to assist SMEs, such as government procurement and SME financing. Section II examines government's regulatory flexibility relating to SMEs to help create a first-class legal environment for SMEs. Section III outlines the active role of government agencies in organizing and participating in international affairs and activities of SMEs.

I Government Resources Allocated to SMEs and National Awards Won by SMEs

It is explicitly stated in the Act for the Development of SMEs that the government should clearly specify in the SME White Paper the amount of resources allocated to SMEs. In addition to the resources expended by the government on SMEs, this section will also contain statistics pertaining to the government's procurement of property, public works or labor from SMEs as well as special loans made available to SMEs. However, statistics on government guidance resources and financing are limited to those from agencies at the central government level. The details are explained as follows:

1. Assistance to SMEs Totaled NT$27.418 Billion

The statistics on resources allocated by the government for SME guidance purposes include funding to government agencies that have a significant relationship with SMEs, e.g., the Small and Medium Enterprise Administration, Ministry of Economic Affairs (SMEA, MOEA), Industrial Development Bureau, Bureau of Foreign Trade, Department of Commerce, Department of Industrial Technology and Department of Investment Services, as well as training expenses of the Ministry of Labor.

As for government agencies with a substantial involvement in providing guidance to SMEs, the total amount was NT$34.273 billion in 2015, of which NT$24.447 billion was allocated to SMEs, representing 71.33 percent in the final accounts. When viewed by government agencies, the Department of Industrial Technology was ranked the first with NT$11.564 billion in terms of allocation to SMEs, followed by the Bureau of Foreign Trade with NT$4.911 billion and Industrial Development Bureau with NT$4.269 billion. The SMEA, was ranked the fourth, with NT$ 3.123 billion (Table 12-1-1).

In 2015, total amount allocated to SMEs declined by NT$3.117 billion, or down 11.31 percent from 2014, due to the decreased amount of NT$3.399 billion (or down 52.11 percent), NT$0.640 billion, and NT$0.700 billion from the Small and Medium Enterprises Administration, Department of Commerce, and Department of Industrial Technology, respectively; partly offset by the increased amount of NT$0.309 billion and NT$0.105 billion from Industrial Development Bureau and Bureau of Foreign Trade, respectively (Table 12-1-1).

Table 12-1-1 Ministry of Economic Affairs Resources and Funding Allocated to SMEs

Unit: Thousand NT$; %

Annual funding / Organizer	Fiscal year final accounts		Total amount allocated to SMEs		Increase (decrease) (3)=(2)-(1)
	2014	2015	2014 (1)	2015 (2)	
SMEA (SME Development Fund included)	6,522,304	3,123,233	6,522,304 (100.00)	3,123,233 (100.00)	-3,399,071
IDB (Industrial technology guidance and Industrial Park Development and Management Fund included)	6,311,938	6,510,477	3,959,094 (62.72)	4,268,590 (65.56)	309,496
BOFT (Overseas marketing and marketing consultation, and Trade Promotion Fund included)	6,355,431	6,312,812	4,805,279 (75.61)	4,911,177 (77.80)	105,898
DOC (Promotion of trade modernization and commercial technology development included)	1,129,881	1,009,493	644,303 (57.02)	580,121 (57.47)	-64,182
DOIT	17,300,847	17,316,559	11,633,422 (67.24)	11,563,878 (66.78)	-69,544
Total	37,620,401	34,272,574	27,564,402 (73.27)	24,446,999 (71.33)	-3,117,403

Note:
1. SMEA stands for Small and Medium Enterprise Administration; IDB stands for Industrial Development Bureau; BOFT stands for Bureau of Foreign Trade; DOC stands for Department of Commerce; DOIT stands for Department of Industrial Technology.
2. Figures in parentheses represent the percentages in the final accounts.

Source: Various government agencies.

In 2015, in addition to the relevant government resources allocated to SMEs by agencies such as the MOEA, 40 financial institutions also contributed a total of NT$2.6 billion to the Small and Medium Enterprise Credit Guarantee Fund of Taiwan to enhance the Fund's strength. Training

expenses of the Council of Labor Affairs for SMEs totaled NT$0.371 billion (NT$0.525 billion for all enterprises). Therefore, government guidance resources allocated to SMEs totaled NT$27.418 billion in 2015.

2. Providing SMEs with Special Loans Totaling NT$1.196 Billion

Eligible SMEs in Taiwan have access to the following six types of special loans: SME Upgrade Guidance Loans, Youth Entrepreneurship Guidance Loans (including two categories, A and B), SME Development Fund Special Loans, Assistance for SMEs to Take Root Special Loans, Indigenous Integrated Development Fund Loans (Indigenous Youth Business Loans, Indigenous Economic Industry Loans, and Indigenous Micro-Business Activities Loans), and Micro-Business Start-up Phoenix Loans (Ministry of Labor). A total of NT$1.196 billion in government-funded SMEs loans was made in 2015 (Table 12-1-2).

Table 12-1-2 Special Loans to SMEs Funded by the Government in 2015

Unit: 100 million NT$

Name of loan	Eligible applicant	Structure	Status	
			Total loan amount	Government funding
SME Upgrade Guidance Loan	SMEs	Each loan is funded by the Development Fund, Executive Yuan (25%) and lending institution (75%)	3.80	0.95
Youth Entrepreneurship Guidance Loan A and B	Youth aged 20-45 engaging in business start-ups	Each loan is funded by lending institution alone or lending institution along with Development Fund, Executive Yuan	28.75	0.00
SME Development Fund Special Loan	SMEs	SME Development Fund	5.14	5.14
Assistance for SMEs to Take Root Special Loan	SMEs	Earmarked funds from CEPD Long-Term Fund	40.99	3.50
Indigenous Integrated Development Fund Loans (Indigenous Youth Business Loans, Indigenous Economic Industry Loans, Indigenous Micro-Business Activities Loans included)	Indigenous people	Fully funded by the Council of Indigenous Peoples	2.37	2.37
Micro-Business Start-up Phoenix Loan	Women aged 20-65 and women aged 45-65	Loans provided by banks' own funds and interests subsidized by the Ministry of Labor	2.34	0.00
Total			83.39	11.96

Source: Various government agencies.

3. Government Procurement from SMEs Reached NT$661 Billion

According to Government Procurement System statistics on awarded contracts published in March, 2016, in 2015 the total amount of government procurement totaled NT$1,026.0 billion, a substantial

decrease of NT$110.7 billion from NT$1,136.7 billion in 2014; the total amount contracted or subcontracted by SMEs (including all cases over NT$0.1 million) in government procurement totaled NT$661.0 billion, an decrease of NT$16.4 billion from NT$674.4 billion in 2014. Share of government procurement from SMEs in 2015 was 68.68%, up 13.82 percentage points from 54.86% in 2014.

4. National SME Awards from Ministry of Economic Affairs

Various national awards granted to SMEs offered by MOEA with the purpose of encouraging the upgrade and development of SMEs with sound management, outstanding performance according to various management criteria, as well as sustainable contribution to the society.

(1) "National Award of Outstanding Small and Medium Enterprises" was set up in 1992, through the joint efforts of the SMEA and MOEA. The National Award of Outstanding Small and Medium Enterprises were seen as the Academy Awards (Oscars) for small and medium enterprises in Taiwan, representing the highest honor of the industries. The management styles, innovations, brands, services, quality, and / or images of the award-winning small and medium enterprises form an important role model or benchmarks in each of the relevant industries, particularly for upgrade and transformation. In the past 24 years (as of the end of 2015), 260 SMEs have won the award. Among the award-winning companies, some are leaders in the global market for specific major products they manufacture, the top three in a specific industry, or holders of a significant market share. The winners of the award are widely spread through diversified industries, including textiles, food, construction, printing, electronics, information technology, environmental protection, as well as the medical & biotechnology sector. 12 SMEs are expected to win the Award in 2016. (http://smeaward.moeasmea.gov.tw/moeasmea/wSite/mp?mp=00208)

(2) "The Rising Star Award" was set up in 1998 and given to SMEs that display excellence in global trading. The selection and awards ceremony is organized by SMEA, MOEA and the awards are officially conferred on SMEs that have their management base rooted domestically and that have enthusiastically developed their international orientation through progressive operations and management. The award recognizes their exceptional efforts in gaining an entrance into the global community and their contribution to development of the country's economy and trade activities. The award thus encourages more enterprises to strive together to grow the country's economy and its global trading prospects. In the past 18 years (as of the end of 2015), 263 SMEs have been recognized as "Rising Stars." These winners have developed a spirit of small but ingenious, strong, and elegant. No matter whether the winning enterprises are in the field of electronics, information, metals, mechanics, materials, or chemicals, they can rely on their uniquely advantageous positions to play an active part in the international market (award site: http://award.moeasmea.gov.tw/).

(3) "Taiwan SMEs Innovation Award" was set up in 1993 and given to SMEs that exhibited excellent performances in innovation and research. The purpose of the award is to create a climate promoting innovative R&D to inspire the prosperity of SMEs. In the past 23 years (as of the end of 2015), 770 have won the award. Among the award-winning companies, 54 are

publicly listed companies in Taiwan. 30 SMEs are expected to win the Award in 2016 (award site: http://tsia.moeasmea.gov.tw).

(4) "Business Startup Awards" is the only SME national award given to start-ups that had been in existence for less than 3 years, and exhibited excellent innovation in technology, product/service, and/or business model. As of the end of 2015, 196 start-ups have won the award. Among the award-winning companies, 17 are publicly listed companies in Taiwan, 37 won other national awards as mentioned above, and 38 have received investment from venture capital and/or been acquired by large enterprises, showing excellent competitive advantage of these award winners. (award site: http://sme.moeasmea.gov.tw/startup/modules/funding/detail/?sId=21).

In addition, in view of most recent events of food safety, MOEA has set up the award revocation mechanism in 2014 (applied to winners of above mentioned awards who breach the related laws) to maintain the credibility of the national awards.

II Regulatory Flexibility to Create a First-Class Legal Environment for SMEs

Taiwan SMEs have been recognized as the key driving force of the country's economic development over the past half century. Although the SME sector has changed its structure and operations over time, it will maintain its position as the mainstay of Taiwan's economy for years to come with continued government support in business environment and transformation of technology and export strategies.

In order to help create a first-class environment in which SMEs can grow and prosper, the SMEA, MOEA strives to function as a bridge for communications via which SMEs and government agencies can coordinate the making of necessary changes to laws and regulations. The Administration has worked to establish a comprehensive set of legal and regulatory adjustment mechanisms, and has formulated standard operating procedures covering every stage from the collection and evaluation of data relating to problems affecting the legal and regulatory environment, through the establishment of a legal and regulatory monitoring center, to follow-up work.

The SMEA, MOEA uses two mechanisms: Instant Response and Coordination and Proactive Planning and Management to remove barriers and bolster competitiveness:

(1) "Instant Response and Coordination:" The SMEA, MOEA uses multiple channels gathering SMEs' needs - relevant activities involving government officers, opinion leaders, and businessmen, service line, online consulting, special project window, investment and financing forum, local service network and other platforms that link internal and external resources - for quick response and coordination. Instant Response and Coordination comprises "information service and policy announcement" and "regulatory examination, adjustment and follow-up."

(2) "Proactive Planning and Management:" The SMEA of MOEA actively promoted policy measures for counseling and cultivating SMEs in emerging industries and for effective strategic government resource allocation.

Major legal and regulatory adjustments relating to SMEs undertaken in 2015-2016 are listed in Table (12-2-1).

Table 12-2-1 Major Legal and Regulatory Flexibility Relating to SMEs in 2015-2016

Major Projects	Content and action items
Amendment / revision	• Amendments to the Article 36-2 of the Act for Development of Small and Medium Enterprises
Regulatory flexibility	• Adding "Close Company" section
	• Relaxing the 7-day right to cancel a purchase in Article 19-1 of Consumer Protection Law
	• Raising the salary cap for employees working for Proprietorship or Partnership
	• Encouraging listed companies to participate in social enterprises
	• Extension of the time limit for foreign workers in Taiwan

Source: Small and Medium Enterprise Administration, Ministry of Economic Affairs (2016).

1. Amendments to the Article 36-2 of the Act for Development of Small and Medium Enterprises

The Amendments to the Article 36-2 of the Act for Development of Small and Medium Enterprises have been coming into force since January 1st, 2016. It is enacted to promote innovation and research and development of new star-up companies and small and medium enterprises. A new start-up company or a small and medium enterprise, during the period when the Composite Leading Indicators (MEI) are above certain levels, by investing to certain amount, hiring certain number of people and reaching certain total payroll amount certain amount, may select to get applicable tax credit.

2. Regulatory Flexibility Relating to SMEs

The MOEA will continue to actively promote SME regulatory examination and analysis to reduce regulations that are unfair or improper, enhance industrial regulation coordination and service network, integrate inputs from SMEs, and integrate regulatory adjustment platform to improve effectiveness of regulatory examination. Major regulatory adjustments relating to SMEs in 2015-2016 are:

(1) Adding "Close Company" section: A close company is a non public offering company whose shares shall be held by not more than 50 persons, and whose Articles of Incorporation shall impose restrictions on transfer of shares of a company. A close company shall choose either par value or no par value shares when issuing shares. The new Amendment has been coming into force since September 4th, 2015. It is enacted to make a close company easy to (A) retain start-up team through flexible equity arrangement, (B) lower barriers to start-up companies and foreign direct investment (FDI), (C) issue special shares and / or make surplus earning distribution to help attract and retain talent, (D) simplify corporate governance and increase operational efficiency, and (E) protect minority shareholders and the security of transactions. As of May 31, 2016, over 162 closed companies had completed the registration.

(2) Relaxing the 7-day right to cancel a purchase in Article 19-1 of Consumer Protection Law. It has been coming into force since June 2, 2015.

(3) Raising the salary cap for employees working for Proprietorship or Partnership: monthly salary cap raised to NT$82,000 (general staff salary cap raised to NT$57,000 from NT$50,000).

(4) Encouraging listed companies to participate in social enterprises.

(5) Extension of the time limit for foreign workers in Taiwan.

III Participating in International SME Meetings and Events

Taiwan has for many years been an active participant in the SME-related meetings and activities undertaken by international organizations such as Asia Pacific Economic Cooperation (APEC), the International Small Business Congress (ISBC), Organization for Economic Cooperation and Development (OECD), the International Council for Small Business (ICSB), the Asian Association of Business Incubation (AABI), International Business Innovation Association (InBIA) and National Business Incubation Association (NBIA), and uses these events and activities as an opportunity to share Taiwan's experience in SME development with other countries. In recent years, Taiwan has also been actively involved in international collaboration with regard to SME incubation and industry-university collaboration, which provide opportunities for the exchange of ideas and for collaborative growth, while also contributing to the development of a more international outlook and bilateral exchange. Followed are a list of important events Taiwan hosted or participated in 2015 and 2016.

1. Hosting or Participating SME International Conference and Events

(1) 40th and 41st APEC Small and Medium Enterprises Working Group, SMEWG (June and September 2015)

Taiwan participated both events on June 8-11, 2015 in the United States and September 21-24, 2015 in Philippines

40th APEC Small and Medium Enterprises Working Group, June 8-11, 2015: Led by Taiwan, the "APEC Start-up Accelerator Initiative" is one among successful projects that significantly support the development of start-ups in the APEC regions. Through mentoring, training and live pitching sessions, participating start-ups have succeeded in increasing their visibility and securing fund for their businesses. For instance, Gogolook was acquired at USD 18 million. ServTech, one of the six winning startups of the 2014 APEC Challenge, was invited to participate in the Intel Global Challenge in Silicon Valley and won the Innovator Award. In addition, the project created the Accelerator Network Directory, a useful reference for SMEs and start-ups when soft landing in new geographic markets. In 2015, the Initiative continued with focus on early-stage investment. Major activities include two Forums on "From Start-up to Scale-up", and the APEC Accelerator Network Summit and the APEC Challenge 2015. The Forum offers sessions with over 500 participants from

20 APEC member economies, including Mr. Yunlong Ye, Director of SMEA (Taiwan), Mr. Bruce Andrews, Deputy Secretary of Commerce (USA), and Mr. John Andersen, APEC SMEWG Chairman and Deputy Assistant Secretary for the Western Hemisphere, International Trade Administration, Department of Commerce (USA).

41st APEC Small and Medium Enterprises Working Group, September 21-24, 2015: Led by Taiwan, the "APEC Start-up Accelerator Initiative" and "APEC Symposium on Promoting SME Business Continuity Plans" are among successful projects that significantly support the development of start-ups and sustainable growth of SMEs in the APEC regions. Through mentoring, training and live pitching sessions, participating start-ups have succeeded in increasing their visibility and securing fund for their businesses. In 2015, the Initiative continued with focus on early-stage investment. The Forum offers sessions with over 500 participants from 20 APEC member economies.

(2) 22nd APEC Small and Medium Enterprises Ministerial Meeting (September 2015)

On September 25, 2015, the 22nd APEC Small and Medium Enterprises Ministerial Meeting was held in Philippines. The emphasis given that year on strengthening MSMEs' (MSME: in referring to micro, small and medium enterprises) participation in regional and global markets as one of the priorities under the APEC 2015 theme, "Building Inclusive Member economies, Building a Better World."

Taiwan has been able to make numerous important contributions towards the achievement of APEC goals. During the Ministerial Meeting, Vice Minister (of MOEA) Cho gave three addresses, on the topics of "APEC Accelerator Network," "APEC SME Business Continuity Plans," and "APEC SME O2O (Online-to-Offline) Initiative."

(3) 2015 APEC Global Challenge

The SMEA, MOEA, Intel, and Siemens officially kicked off the 2015 APEC Accelerator Network Summit & Global Challenge on April 12. Participating entrepreneurial teams will receive counseling from international experts, potential for financial investment, and a chance for media exposure. The event will also connect Taiwan's innovative energy with the global entrepreneurial ecosystem, highlighting island nation's thriving and abundant creative energy, under the themes "Interactive Learning," "Immersive Collaboration," "Smart Mobility," and "Smart Home." The four areas are believed to be where breakthroughs will be made for the information technology and industry of the next generation and will be driving innovation in the transformation, upgrading, digitalization and even smartization of industries. Taiwan's entrepreneurial teams won 6 of the total 10 awards. They are iStaging, GHOSTA, Zuvio, Loopd, sense-i, Docceo, and iStaging. Among them, iStaging won the Gold Award for the "Application Tools and Platform" category and received $100,000 from Intel.

Minister Deng stated that, due to the fruitful results of the past two years' challenges, APEC members actively expressed a desire to host the challenge with Taiwan overseas. As a result, the challenge has been expanded to a global scale. A series of meetings will be convened in the United States on June 8 in Atlanta, and in the Philippines in September to warm up for the global finals that will be held on October 19 and 20 and to recruit more excellent entrepreneurial teams to join. Mr. Yeh, the Director General of the Small and Medium Enterprise Administration, pointed out that the APEC accelerator network set up by Taiwan already has 15 member countries and 47 business

incubators and accelerators. The network includes well known American accelerators such as 500 Startups, Mass Challenge, Plug & Play, and many more. Moreover, in the past challenges hosted by APEC, Taiwan has had many successful cases that promoted APEC accelerators and the global entrepreneurship challenge, establishing the competition as a springboard for startup companies to receive investment and enter the global market. Taiwan's startup team Gogolook was purchased by Naver, the parent company of Line, in 2013 for US$18 million; the winner of the 2014 challenge, ServTech, also won first place for the Internet, Mobile, and Software Computing Category in the Intel Entrepreneurship Program in November this year in Silicon Valley. ServTech became the first team from Taiwan to have won first place in the Intel Entrepreneurship Program. AirSig also received a US$ 2 million investment from Hon Hai after the challenge, and set a new record for the value of a startup company in Taiwan.

(4) 24th European Business & Innovation Center Network, EBN (October 2015)

SMEA, MOEA participated the event on October 21 - November 1, 2015 in Belgium to develop relationship and partnership between Taiwan's Incubation Centers and Start-up Accelerators and European Start-up ecosystem and EBN.

(5) 2015 International Entrepreneurship and Innovation Forum (November 2015)

Taiwan hosted the forum based on the theme of global entrepreneurship and environment for start-ups. Experts have been invited from The Global Entrepreneurship Monitor (GEM), The International Council for Small Businesses (ICSB), Asia Council for Small Businesses (ACSB) and other international bodies to share international entrepreneurship trends, analyze global economic development factors, and create a stimulating environment for global entrepreneurship.

(6) 2015 Global Entrepreneurship Week (November 16-22, 2015)

Taiwan hosted the Global Entrepreneurship Week event, in order to enhance Taiwan's entrepreneurial power under the theme "YES Taiwan"

(7) Taiwan and Vietnam Co-organized APEC SME O2O Forum I (April 2016)

With the aim of helping SMEs in Chinese Taipei and APEC identify emerging business opportunities in the O2O market, Lin Mei-Hsueh, Deputy Director General, Small and Medium Enterprise Administration, Ministry of Economic Affairs led a delegation to attend the 42nd APEC SME Working Group Meeting in Ho Chi Minh City on April 24-28, 2016. During the meeting, Chinese Taipei and Vietnam co-organized the APEC SME O2O Forum I on April 26. More than 100 active participants including senior officials from 21 member economies and representatives of the ABAC, APEC cross-border e-commerce platforms, accelerators and incubators exchanged their views on digital economy and mobile commerce. Additionally, 10 startup teams from 14 APEC member economies conducted demos and generated new business opportunities through cross-border sharing.

On April 26, Ms. Lin Mei-Hsueh, Mr. John Andersen, Chair, APEC SMEWG & Principal Deputy Assistant Secretary for Global Markets, International Trade Administration of US Department of Commerce; Mr. Nguyen Hoa Cuong, Deputy Director-General, Agency for Enterprise Development, Ministry of Planning and Investment, Government of Vietnam gave opening remarks at the APEC SME O2O Forum I. In her remark, Ms. Lin commented that digital economy has

extensively changed SMEs' business activities. In response to the new challenge, it is crucial to make use of mobile commerce, sharing economy, collaborative industry and next-generation innovation for further development. In the Forum, David Kuo, CEO of iiiNNO from Chinese Taipei was invited to share his views on the development and trends of innovation and entrepreneurship ecology. Also, 2015 APEC Global Challenge winner iStaging and EZTABLE, a company that offers 24hr online restaurant reservation service joined 14 outstanding startup teams from 10 APEC member economies including Vietnam, Thailand, the Philippines, Malaysia, Papua New Guinea, China, Mexico, Chile and Peru and shared their success stories of expanding to the global market through O2O model.

2. Promoting SME International Exchange and Collaboration

SMEA of MOEA signed Taiwan SME Memorandum of Cooperation with India and with El Salvador; participated in bilateral annual ministerial meetings with India, Philippines and so on, and promoted plurilateral and multilateral cooperation, such as TPP, WTO, and between Taiwan and New Zealand. Taiwan attends annual Minister-level meetings with Philippines, Singapore, Thailand, India, the European Union and so on.

CT APEC (Chinese Taipei Asia-Pacific Economic Cooperation Association of SMEs) signed Memorandum of Cooperation with FSI (Federation of Sabah Industries), Malaysia in April 2016. Malaysia's SMEs see technology as a means of acquiring cutting-edge competitive advantages in the global arena. This is also driving the FMM (Federation of Malaysian Manufacturers) to explore avenues of cooperation with Taiwan's SMEs. To increase its interaction with Taiwan's SME sector, the FMM is entering into a formal relationship with its Taiwan counterpart. The two sides have exchanged correspondence on bilateral cooperation. Taiwan has already sent a proposal to the FMM, which has agreed on a framework for cooperation.

APEC and OECD are two of important international organizations that Taiwan has been participating actively to foster the commitment. For enhancing the collaboration and interaction among APEC member economies, the SMEA has been proposing initiatives to APEC, hosting APEC fora, symposiums and related activities. Besides, it has launched official delegation to annual APEC Ministerial Meeting and related meetings, and SME delegation for APEC SME Forum and exhibition. The SMEA has been joining the OECD related meetings and activities, such as the 2nd SME Ministerial Meeting, the automobile case study of Enhancing the Role of SMEs in Global Value Chains. For promoting international SME collaboration, the SMEA attempts to propose bilateral initiatives and invite the foreign SME-related officials to share policymaking and development experiences for SMEs. The SMEA has also been participating in the activities of non-governmental organizations, for instance, the ICSB, ISBC, APO, and other international conferences for SMEs.

Appendix


NEWS & EVENTS

Appendix A

Act for Development of Small and Medium Enterprises

Publically announced in accordance with the Presidential Decree dated February 4, 1991.

Revised in accordance with the Presidential Decree dated May 21, 1997.

Revised in accordance with the Presidential Decree dated January 21, 1998.

Revised in accordance with the Presidential Decree dated December 27, 1990.

Revised in accordance with the Presidential Decree dated December 21, 2001.

Revised in accordance with the Presidential Decree dated December 17, 2003.

Revised in accordance with the Presidential Decree dated November 25, 2009.

Revised in accordance with the Presidential Decree dated June 4, 2014.

Revised in accordance with the Presidential Decree dated January 6, 2016.

Chapter 1 General Principles

Article 1

This Act is enacted for the furtherance of sound development of small and medium enterprises by helping them improve their operation environments, promoting mutual cooperation, and assisting them in striving for growth with their own efforts. With regard to matters not provided for in this Act, the provisions of other relevant acts and regulations shall apply.

Article 2

The term “small and medium enterprises” used in this Act shall refer to the enterprises which have legally completed company registration or commercial registration under the Act and conform to the standards for identifying small and medium enterprises.

The standards referred to in the preceding paragraph shall be drawn up by the central competent authority according to the category, capital stock, amount of operating revenue and the number of regular employees and shall be submitted periodically to the Executive Yuan for approval.

Other government authorities, which administer small and medium enterprise assistance and guidance may, in accordance with their respective operational requirements, formulate separate criteria with loose requirements for objects of assistance and guidance.

Article 3

The term "competent authority" used in this Act shall be the Ministry of Economic Affairs at the central government level, the provincial (municipal) government at the province (municipality) level, and the county (city) government at the county (city) level.

Where any of the matters set forth in this Act involves the functional duties of an authority in charge of a particular enterprise, the competent authority referred to in this Act shall handle such matters in coordination with the said authority in charge of such enterprise.

For enforcement of this Act, government at various levels shall set up or designate a government agency to provide assistance and guidance.

Article 4

For achieving the objectives of this Act, the competent authority concerned shall take appropriate assisting or encouraging measures in respect of the following:

1. Market research and development;
2. Furtherance of rationalization of business operations;
3. Promotion of mutual cooperation;
4. Acquisition and securing of production factors and technology;
5. Education and training of competent personnel; and
6. Other matters relating to the establishment or sound development of small and medium enterprises.

In formulating the policy, acts and regulations, and measures in the preceding paragraph, the competent authority concerned shall aim the contents at the furtherance of improvement and development of the business operations of small-scaled enterprises without unfair treatment in respect of financial and taxation systems and other related matters.

The central competent authority shall publish a white paper, at the end of each fiscal year, on small and medium enterprises given the enforcement status, the review results and the prospective development of the provisions of the preceding two paragraphs.

Article 5

For furthering small and medium enterprises to conduct market research and development activities, the assistance and guidance provided by the competent authority to small and medium enterprises shall be emphasized on the provision of information services, the creation of exclusive brands for their own products, arrangement of marketing channels and/or development of potential market.

Article 6

For furthering small and medium enterprises to rationalize their business operations, the assistance and guidance provided by the competent authority shall be emphasized on the following:

1. Research and development and development of new products;
2. Modernization and renovation of production facilities and improvement of production technology;
3. Improvement of the methods of operational management;
4. Expansion of market and acquisition of necessary information;
5. Conversion and adjustment of the field of business; and
6. Acquisition of resources and technical know-how for business operation.

Article 7

For encouraging mutual cooperation between small and medium enterprises, the assistance and guidance to be provided by the competent authority shall be emphasized on the following:

1. Vertical amalgamation of businesses of the trade and establishment and promotion of the satellite-factory system;
2. Horizontal amalgamation of businesses of the trade and establishment and promotion of joint production and marketing system;
3. Mutual fund or cooperative enterprise;
4. Technical cooperation and development of common technology;
5. Procurement of common equipment; and
6. Establishment of strategic marketing points.

Article 8

For assisting small and medium enterprises to acquire and secure production resources and technology, the assistance and guidance to be provided by the competent authority shall be emphasized on the following:

1. Formation and accumulation of capital;
2. Capital accommodation;
3. Acquisition of land, plant building, equipment, business site and business information;
4. Personnel training and upgrading of labor productivity;
5. Securing the sources of agricultural and industrial raw materials and technical know-how;
6. Assisting small and medium enterprises to obtain fund from capital market; and
7. Upgrading of the level of services and technical skill.

Article 9

The central competent authority shall set up small and medium enterprise development fund, with the use thereof to be confined to the following:

1. To finance the operating expenses required for carrying out assistance plans,
2. To take part in investment and development projects or provide financing assistance and guaranty jointly with financial institutions under the condition that such financial institutions or credit guarantee institutions can not provide financing or guaranty under normal terms and conditions,
3. To make investment in small and medium enterprise development companies, or to take part in investment in small and medium enterprise with small and medium enterprises development companies, financial institutions and identified investment institutions.
4. To provide financial support to the juridical persons institutions that are incorporated to conduct the activities specified in Article 4 , and
5. Other purposes relating to the furtherance of sound development of small and medium enterprises and as specified in this Act.

For the income-expenditures, safeguarding and utilization of the small and medium enterprise development fund, a small and medium enterprise development fund management committee shall be formed, with its organization structure and the regulations for income and expenditure, safeguarding and utilization of the fund to be stipulated by the Executive Yuan.

Article 10

The small and medium enterprise development fund shall be derived from the following sources:

1. Appropriation from the annual budget programmed by the central government,
2. Appropriation from other special-case funds,
3. Donation from individuals or public and private business organizations or groups,
4. Interests accrued on the fund, and
5. Other associated income.

The donation referred to in item 3 the preceding paragraph may, when certified by the competent authority, be deductible from the total income of the current year, free from any restriction on the amount, in accordance with the Income Tax Act.

Article 11

The provincial (municipal) and the county (city) competent authority (henceforth referred to as “local competent authority”) may, taking into account of the specific development requirements of small and medium enterprises, under its jurisdiction, draw up assistance plan and formulate budget, and shall be responsible for the execution.

To carry out the assistance plan referred to in the preceding paragraph, the local competent authority may apply to the small and medium enterprise development fund for subsidy or assist the small and medium enterprises to obtain capital accommodation under special projects.

Article 12

The competent authority may, taking into account of actual requirements, cooperate with or consign to public and/or private research and service institutions, financial institutions, credit guarantee institutions, trade promotion institutions, industrial and/ or commercial organizations or other agencies for execution of the assistance activities under this Act; and shall set up separate assistance systems in connection with respectively the operations including financial accommodation, operational management, production technology, research and development information management, industrial safety, pollution control, marketing, mutual cooperation, and quality reinforcement, etc.

The regulations governing establishment up and supervision of the assistance systems shall be drawn up by the central competent authority and submitted to the Executive Yuan for approval.

Article 12-1

In enacting or adjusting acts related to small and medium enterprises, governments at various levels shall review the operation scales or characteristics of small and medium enterprises to facilitate observance by small and medium enterprises.

The central competent authority shall periodically review the acts related to small and medium enterprises on term, and judge the adapt ability of small and medium enterprises, and the influence to small and medium enterprises, and take a review report to the Legislative Yuan yearly.

Chapter 2　Financing Facilities and Guaranty

Article 13

In order to meet the capital requirements for small and medium enterprises, the central competent authority shall coordinate with financial institutions and credit guarantee institutions to enhance their respective functions of providing financing and guaranty to small and medium enterprises.

In order to meet the capital requirements for small and medium credit guarantee institutions, the central competent authority shall allocate budget for donation to such credit guarantee institutions for the maintenance of their guarantee capacity. Financial institutions which contract with such credit guarantee institutions shall also cooperate with the donation whereas and the central competent authority may also solicit donation from private businesses.

The total amount of donation from various financial institutions mentioned in the preceding Paragraph, taking into account the actual requirements, may be adjusted upward annually until reaching 35% of the total donation amount and be determined by the central competent authority according to the safekeeping amount, overdue ratio, substitute pay off amount, credit remainder, net value, profit and loss status, and the donated amount.

The central competent authority shall actively help small and medium enterprises get the loan from banks, and report the review results of each fiscal year to the Legislative Yuan.

Article 14

All banks throughout the Republic of China shall, within the scope of their respective business, elevate the ratio of financing facilities provided to small and medium enterprises and shall set up small and medium enterprises assistance center in order to enhance the provision of relevant services.

Article 15

The competent authority shall coordinate various agencies to make ample budget available for providing special loans to small and medium enterprises, and instruct sponsoring banks to provide special or emergency financing facilities or to extend loans to meet with the requirements of enterprises implementing business converting projects or adapting to the change of economic situation; and to elevate, when necessary, the ceiling of such financing, loans and guaranty.

Article 16

The term “special financing” used in the preceding Article shall refer to the financing provided to small and medium enterprises carrying out any of the following projects:

1. Operational project for reinforcement of competiveness;
2. Research and development, pollution control or market expansion project;
3. Project for creation of new product(s) or upgrading the quality of product(s);
4. Factory relocation project which must be carried out so as to meet with the requirements of environment protection, urban planning, or road construction or other infrastructural projects sponsored by the government;
5. Any other special projects as approved by the competent authority.

Article 17

The term “emergency financing facilities” as used in Article 15 shall refer to the following financing provided to small and medium enterprises:

1. Loan provided as revolving fund in support of production and sales during the period of significant economic crisis;
2. Loan required for recovery of significant natural disaster;
3. Other loan as required to cope with emergency events.

Article 18

The term "loans to meet with the requirements of enterprises implementing business converting projects or adapting to the change economic situation" used in Article 15 shall refer to any of the following loans extended to small and medium enterprises:

1. Loan provided as revolving fund in support of production and sales during the period of economic recession;
2. Loan required for procurement of replacement or additional machinery and equipment in the course of business conversion; or
3. Loan required for procurement of automation equipment for improvement of productivity.

Article 19

Funds appropriated from the small and medium enterprise development fund for participate in the loans or guaranties sponsored by financial institutions or credit guarantee institutions in accordance with the preceding three Articles; the ratio of such appropriations may be determined by the competent authority in accordance with the actual requirements.

With regard to the bad debts resulted from causes which are not attributable to the intentional act, gross negligence or malpractice of the personnel handing the relevant matters set forth in the preceding Paragraph, they shall be fully indemnified from damage liabilities and exempt from disciplinary measures, according to the provisions of item 1,Article 77 of the Audit Act.

Article 20

The competent authority concerned may coordinate the financial institutions and/or credit guarantee enterprises to give priority to small and medium enterprises, which have sound management, financial and accounting systems and have paid up all taxes due, in providing financing facilities and guaranties.

Article 21

Where the operation of a small or medium enterprise is affected or it has to move to another place in order to meet with the requirements of environmental protection, urban planning, or road construction or other projects sponsored by the government, the competent authority shall assist it to apply for operating revolving loan or relocation loan from financial institution, and assist it to acquire the land required for factory relocation, when it is deemed necessary.

Article 22

Where a small or medium enterprise suffers great damages caused by natural disaster, the competent authority shall coordinate the financial authority for tax exemption or reduction or other remedies.

Article 23

In order to prevent small and medium enterprises from involvement in domino effect resulted from the close-down of their respective related enterprises, the competent authority may coordinate and assist industrial associations to establish, either separately or jointly, mutual guaranty fund(s) for prevention of chain close-down of small and medium enterprises so as to provide credit guarantee in respect of special financing facilities for the small and medium enterprises having financial or operational difficulties in such cases.

The small and medium enterprise development fund may, when necessary, contribute to such mutual guaranty fund(s) at the initial stage upon its (their) establishment.

Chapter 3 Operation Management, Market and Product Development

Article 24

The competent authority may establish or assist the private sector to establish a small and medium enterprise guidance and service center, and may cooperate with relevant public and private institutions to provide small and medium enterprises with the following guidance and services:

1. Business operation diagnosis;
2. Improvement of the marketing and production technology, operation management and financial structure of small and medium enterprises;
3. Training of management or technical personnel of small and medium enterprises;
4. Production and market information and consultation services; and
5. Other relevant businesses activities.

Article 24-1

The competent authority may set up funds to assist in the development of local culture industries for local economic prosperity.

Article 25

For improvement of the operating efficiency and reinforcement of the competitiveness of small and medium enterprises, the competent authority may assist small and medium enterprises to jointly engage in activities such as production, marketing, procurement, transportation, cooperation in technology development, and research and development.

Article 26

The central competent authority may work jointly with relevant institutions, universities and colleges in the training of professionals in the fields of operation diagnosis and business administration so as to provide small and medium enterprises with guidance and services.

Article 27

The competent authorities may provide necessary assistance to various industrial associations or industrial and commercial organizations which have a dedicated service unit responsible for providing services to small and medium enterprises.

Article 28

For encouraging small and medium enterprises to manufacture quality and/or high value-added products or service, and to expand export market, the competent authority shall provide, in conjunction with institutions concerned, technical and marketing guidance and assist medium and small enterprises to participate in overseas exhibition, acquire market information, make joint advertising activities, trademark registration, patent application, or establish joint distribution warehouses abroad.

Where the plan of a small or medium enterprise for manufacturing quality and/or high value-added products or service planning has been evaluated and approved by the competent authority in conjunction with authorities concerned, the said small or medium enterprise may apply to the small and medium enterprise development fund to subsidize the expenses incurred in product and market developments.

Article 29

For upgrading the level of production skill of small and medium enterprises, the competent authority may entrust technical service institutions or retain technical experts to make research and development for new products or to acquire advanced technology for providing relevant guidance and services to various industries.

For transfer of new products or advanced technology, the competent authority may collect reasonable charges for amortization of costs incurred; If necessary, these charges may also be partly subsidized by the small and medium enterprise development fund.

Article 30

In order to assist small and medium enterprises for research and development, the competent authority may cooperate with appropriate technology research institutes in the establishment of institutes or places for exclusive use by small and medium enterprise conducting research , testing and development of technical skill and/or new products.

Small and medium enterprises may apply for use, by paying necessary charges, the equipment and facilities of the institutes or places set forth in the preceding to conduct experiment and research activities.

Article 31

The competent authority may, when it deems necessary, negotiate with public or private enterprises for appointment of their respective technical personnel, and support and assistance system to provide guidance in the fields of production skill or service know-how as required by small and medium enterprises.

Article 32

The central competent authority may establish or assist in the establishment of small and medium enterprise development companies to invest directly or indirectly in the small and medium enterprises having development potential and to provide consulting services and other relevant services in connection with domestic and/or overseas technical cooperation, market and product development or investment.

The central competent authority shall provide assistance to the institutes and juridical persons established for carrying out the activities specified in Article 4 of this Act.

The central competent authority may coordinate with the competent authority in charge of banking business under the Banking Act for approval of the participation of banks in the said small and medium enterprise development company so as to enable them to directly provide services referred to in the preceding paragraph.

The small and medium enterprise development fund may take part in the investment for capital formation of small and medium enterprise development companies.

The regulations governing the establishment and operation of the small and medium enterprise development companies and the standard and proportion of investment made by the small and medium enterprise development fund shall be stipulated by the Executive Yuan.

Chapter 4 Tax Remittance

Article 33

Where an investor provides a parcel of land in an industrial zone as his capital investment in a small or medium enterprise, and the said medium or small enterprise agrees to allow the investor to furnish the stock(s) of the said small or medium enterprise acquired by the said investor as the security for his payment of taxes, then the land value increment tax payable by the said investor may be paid in five equal installments in five consecutive years from the year in which the said parcel of land is committed to the investment.

The land to be invested under the preceding paragraph shall be used only by the said small or medium enterprise for its own. If the land is not used by the said small or medium enterprise for its own or is transferred to any other person, the outstanding land value increment tax shall be paid, in a lump sum, by the investor.

Article 34

Where a small or medium enterprise has moved, on account of any of the following causes, its factory or plant into an industrial zone, an industrial zone under an urban plan, or an industrial land designated in accordance with the act for Encouragement of Investment prior to the enforcement of this Act, the land value increment Tax payable on the sale or transfer of its original factory or plant site (land) shall be levied at the lowest tax rate:

1. Where the original factory land does not meet with the zoning requirements upon implementation of the urban planning or zoning plan;
2. Where the relocation of factory or plant is applied by the said small or medium enterprise and is approved by the competent authority due to the difficulties in making necessary improvement to meet with the requirements for pollution control, public safety or maintenance of natural landscape; and

3. Where the relocation of factory or plant implemented under the initiative assistance of the government.

Where the new factory land of a small or medium enterprise is transferred to another party (or other partied) within three years after the factory relocation made under the preceding paragraph, the reduced portion of land value increment tax reduced while assessing such tax on the original factory land sold or transferred prior to the factory relocation shall be assessed supplementarily in accordance with the act.

Article 35

This article is enacted to promote innovation and research and development of small and medium enterprises. A small and medium enterprise, by investing in research and development, may select to get the amount of tax credit up to 30% of the current year profit-seeking enterprise income tax payable between the following two methods. No change of the method is allowed once the choice is made.

1. Tax credit up to 15% of the research and development expenses, applied to the current year profit-seeking enterprise income tax payable.
2. Tax credit up to 10% of the research and development expenses, applied to the annual profit-seeking enterprise income tax payable for three years, starting from the current year.

For any instrument and equipment used for research and development, experiment or quality inspection purposes, if its service life is more than two years, the depreciation thereof may be accelerated by one half (1/2) of the number of years applicable as listed in the table of service life of fixed assets annexed to the Income Tax Act. Balance of service life in a length of less than one year after the depreciation acceleration shall not be taken into account.

The standards referred to the tax credit from investment in this Article, regarding scope, application deadline, application procedure, approving authority, applicable period, tax credit rate and other related matters shall be stipulated by the Executive Yuan.

Article 35-1

To promote circulation and application of innovation and R&D results, new shares of stock issued to a small and medium enterprise in exchange of its intellectual property rights, by an enterprise that is not listed in the Taiwan Stock Exchange, OTC, or the Emerging Stock Board, shall be excluded from the current year profit-seeking enterprise taxable income of the said small and medium enterprise.

New shares of stock issued to an individual in exchange of her (his) intellectual property rights, by an enterprise that is not listed in the Taiwan Stock Exchange, OTC, or the Emerging Stock Board, shall be excluded from the current year taxable consolidated income of the said individual.

When shares of stock mentioned in preceding Paragraph 1 and 2 are transferred through an actual transaction, stock gift, or inheritance, the total stock value shall be included in the current year taxable income of the recipient(s), calculated based on the actual transaction price or the fair market value of the stock at the time of the transfer, minus the related expenses or cost, incurred but not recognized yet, in obtaining the stock.

The above mentioned enterprise that issues new shares of stock to obtain intellectual property rights should report to the local tax authority within 30 days from the day after the date of the stock transfer. The said enterprise is subject to a 20% fine based on the actual transfer amount and required to resubmit the report with voucher(s) in required format if it fails to meet the reporting deadline, to report the fact, or to report with voucher(s) in required format.

In case the said small and medium enterprise or the individual who receive the shares of stock through intellectual property transfer is unable to provide the cost basis of the transfer for income calculation, a default 30% of the transaction price shall be applied to the cost basis of obtaining the stock.

Article 36

A small and medium-sized enterprise may retain and withhold from distributing a surplus earning in an amount not exceeding double the amount of its paid-in capital. In case the retained and undistributed earnings exceed the aforesaid limit, any additional surplus earning retained in each year thereafter shall be free from the restriction stipulated in the Income Tax Act after as profit seeking enterprise income tax at the rate of 10% has been surcharged.

The retain and withhold from distributing a surplus earning after 1998 until then, shall obey the Income Tax Acts, and not apply to the preceding paragraph.

Article 36-1

Small and medium enterprises development companies may raise the preparation to investment loss, under 20% of the investment amount, so as to compensate for actual loss. If there is no actual loss situation within 5 years, they shall turn the raising preparation to be the benefit of the 5th year.

When corporations calculate the clearing accounts income due to cancellation, rescission, revocation, mergence, or transference with Article 75, of the Income Tax Act, the accumulate remaining amount from the investment loss preparation within the preceding paragraph, shall turn to be the benefit of the same year.

Article 36-2

This article is enacted to respond to changes in the international economic situation and promote the willingness of domestic small and medium enterprises to invest and raise the domestic employment rate. During the period when the Composite Leading Indicators are above certain levels, a newly created small and medium enterprise or an existing small and medium enterprise that commits certain amount of capital expansion, hires certain number of additional people and increases its aggregate gross salary payments, it can deduct up to 130% of the annual gross salary payments to the additional domestic hires from its current year profit-seeking enterprise income.

Of the additional domestic hires mentioned in the preceding Paragraph who are 24 years old or younger, the small and medium enterprise can deduct up to 150% of the annual gross salary payments to these young domestic hires from its current year profit-seeking enterprise income.

During the period when the Composite Leading Indicators are above certain levels, if a small and medium enterprise raises the average salary paid to the domestic junior employees, it can deduct up to 130% of the incremental annual gross salary payments, excluding statutory basic wage adjustment, to the junior employees from its current year profit-seeking enterprise income. However, the additional salary paid to the new hires shall not be deducted here as it has been used for tax benefit applied to the provisions in the preceding two Paragraphs.

During the applicable period of this Article, if the said small and medium enterprise fails to meet the preceding three key requirements in a year, it shall calculate its profit-seeking enterprise income and income tax payable based on the provisions of the Income Tax Act, starting from that year.

The standards referred to Paragraph 1, 2 and 3 of this Article, regarding levels of the Composite Leading Indicators, applicable period, investment amount, number and types of additional people hired, aggregate gross salary payments, the range of junior employees, calculation of the average salary paid, approving authority, application deadline, application procedure, and measures of other related matters, shall be stipulated by the central competent authority and the Ministry of Finance.

The amendment as stipulated in Paragraph 2, 3, 4 and 5 on December 18, 2015, shall be effective on January 1, 2016 until May 19, 2024. The proviso in Article 40 of the Act shall not be applied.

Article 36-3

In case a small and medium enterprise is qualified for the tax benefit of the same nature in the Act for Industrial Innovation, it can only select one Act for this tax benefit.

Chapter 5 Public Procurement Projects or Public Works

Article 37

Governments at various levels and government-owned enterprises shall assist small and medium enterprises to acquire business opportunities in making public announcements for procurement projects or construction of public works.

Article 38

For making public announcement for procurement projects, construction of public works or for entrustment of research and development tasks, government at various levels and government-owned enterprises shall, based on actual requirements, establish qualification requirement and registration system in respect of small and medium enterprises eligible for acting as a supplier or bidder.

Chapter 6 Supplementary Provisions

Article 39

The Executive Yuan may form a Small and Medium Enterprise Policy Deliberation Committee to be in charge of planning and reviewing the small and medium enterprise development policy. The organizational rules shall be stipulated by the Executive Yuan.

Article 40

This Statute shall come into force from the date of promulgation. However, Article 35, Article 35-1, and Article 36-2 come into force for 10 years from May 20, 2014.

APPENDIX B

Standards for Identifying Small and Medium Enterprises

Approved by Executive Yuan Order Tai (80) Jing #33054 on October 19, 1991.

Promulgated by Ministry of Economic Affairs Order Jing (80) Chi Tzu #059364 on November 25, 1991.

Revision approved by Executive Yuan Order Tai (84) Jing #32284 on September 4, 1995.

Revision promulgated by Ministry of Economic Affairs Order Jing (84) Chi Tzu #84029087 on September 27, 1995.

Revision approved by Executive Yuan Order Tai (89) Jing #10056 on April 8, 2000.

Revision promulgated by Ministry of Economic Affairs Order Jing (89) Chi Tzu #89340202 on May 3, 2000.

Revision approved by Executive Yuan Order Yuan Tai Jing #0940022741 on June 14, 2005.

Revision promulgated by Ministry of Economic Affairs Order Jing Chi Tzu #09400561550 on July 5, 2005.

Revision approved by Executive Yuan Order Yuan Tai Jing #0980048943 on August 17, 2009.

Revision promulgated by Ministry of Economic Affairs Order Jing Chi Tzu #09800639470 on September 2, 2009.

Revision approved by Executive Yuan Order Yuan Tai Jing #1040008378 on March 4, 2015.

Revision promulgated by Ministry of Economic Affairs Order Jing Chi Tzu #10404601530 on March 30, 2015.

Article 1

The Standards have been drawn up in accordance with the provisions of Paragraph 2, Article 2 of the Small and Medium-sized Enterprise Development Statute (hereinafter referred to as the "Statute").

Article 2

The term "SME" as used in the Standards shall mean an enterprise which has completed company registration or business registration in accordance with the requirements of the laws, and which conforms to the following standards:

1. The enterprise is an enterprise in the manufacturing, construction, or mining and quarrying industry with either paid-in capital of NT$80 million or less, or less than 200 regular employees.

2. The enterprise is an enterprise in the industry other than any of those mentioned in the Sub-paragraph immediately above and either had its sales revenue of NT$100 million or less in the previous year, or has less than 100 regular employees.

Article 3

The term "small-scale enterprise" as used in Paragraph 2, Article 4 of the Statute shall mean a SME with less than 5 regular employees.

Article 4

The term "sales revenue" as used in the Standards shall be determined based on the figure as approved by the tax authorities in the year immediately prior to the year of determination. If the approval has not been given by the tax authorities, the determination shall be made in accordance with the following provisions:

1. Sales revenue shall be based on the operating revenue noted on the income tax declaration form for the most recent year bearing the "Documents Received" seal of the tax authorities.
2. If the enterprise is unable to obtain the document referred to in the Sub-paragraph immediately above, sales revenue shall be based on the sales value noted on the sales and tax declaration form for the full year of the most recent year, with commissioned sales and non-operating income deducted.
3. In the case of sale representatives required to pay business tax by the tax authorities according to the laws, sales revenue shall be presumed to be NT$100 million or less.

If the enterprise was established in the previous year and less than one year has elapsed since business registration, or if business registration took place in the current year, sales revenue for the full year shall be calculated on the basis of the conversion from the figure already declared for each period.

Article 5

The "number of regular employee" as used in the Standards shall be based on the average monthly number of insured persons for whom labor insurance registration has been made with the Labor Insurance agency for the Taiwan and Fukien Region in the most recent 12 months.

Article 6

An enterprise shall be deemed to be a SME if any of the following is applicable:

1. In the case of a SME which has received guidance for expansion, where after expansion the size of the enterprise exceeds the standards listed in Article 2, such enterprise shall continue to be deemed to be a SME for two years immediately after the date of expansion.
2. In the case of a SME which has received guidance for merger, where after the merger the size of the enterprise exceeds the standards listed in Article 2, such enterprise shall continue to be deemed to be a SME for three years immediately after the date of the merger.

3. Where a guidance agency, guidance system or relevant agency undertakes the provision of collective guidance for SMEs in a given industry, if some of the enterprises exceed the standards listed in Article 2, and if the guidance agency, guidance system or relevant agency determines that there is good reason for providing joint guidance, such enterprises shall be deemed to be SMEs during the period of collective guidance.

Article 7

The Standards shall come into effect on the date of promulgation.

APPENDIX C

SME Statistics by Industry

Table C-1 Number of Enterprises by Industry and Enterprise Size, 2013-2015

Unit: Enterprises; %

Industry / year \ Enterprise size		Total	SMEs	Share	Large enterprises	Share
Total	2013	1,363,393	1,331,182	97.64	32,211	2.36
	2014	1,386,128	1,353,049	97.61	33,079	2.39
	2015	1,416,738	1,383,981	97.69	32,757	2.31
Agriculture, Forestry, Fishing and Animal Husbandry	2013	12,088	12,027	99.50	61	0.50
	2014	11,638	11,568	99.40	70	0.60
	2015	11,649	11,580	99.41	69	0.59
Mining and Quarrying	2013	1,192	1,166	97.82	26	2.18
	2014	1,177	1,151	97.79	26	2.21
	2015	1,157	1,130	97.67	27	2.33
Manufacturing	2013	144,760	139,099	96.09	5,661	3.91
	2014	147,404	141,817	96.21	5,587	3.79
	2015	148,800	143,118	96.18	5,682	3.82
Electricity and Gas Supply	2013	553	423	76.49	130	23.51
	2014	680	546	80.29	134	19.71
	2015	790	658	83.29	132	16.71
Water Supply and Remediation Activities	2013	7,506	7,211	96.07	295	3.93
	2014	7,480	7,155	95.66	325	4.34
	2015	7,527	7,237	96.15	290	3.85
Construction	2013	108,779	107,498	98.82	1,281	1.18
	2014	113,400	112,164	98.91	1,236	1.09
	2015	118,230	117,000	98.96	1,230	1.04
Wholesale and Retail Trade	2013	683,983	666,857	97.50	17,126	2.50
	2014	686,183	668,428	97.41	17,755	2.59
	2015	694,057	676,791	97.51	17,266	2.49
Transportation and Storage	2013	31,345	30,283	96.61	1,062	3.39
	2014	31,399	30,281	96.44	1,118	3.56
	2015	31,782	30,636	96.39	1,146	3.61
Accommodation and Food Service Activities	2013	131,083	130,653	99.67	430	0.33
	2014	134,809	134,326	99.64	483	0.36
	2015	143,692	143,177	99.64	515	0.36

Table C-1 Number of Enterprises by Industry and Enterprise Size, 2013-2015 (Continued)

Unit: Enterprises; %

Industry / year \ Enterprise size		Total	SMEs	Share	Large enterprises	Share
Information and Communication	2013	18,521	17,794	96.07	727	3.93
	2014	18,882	18,141	96.08	741	3.92
	2015	19,694	18,937	96.16	757	3.84
Financial and Insurance Activities	2013	17,381	14,947	86.00	2,434	14.00
	2014	17,989	15,490	86.11	2,499	13.89
	2015	18,650	16,107	86.36	2,543	13.64
Real Estate Activities	2013	31,499	29,986	95.20	1,513	4.80
	2014	34,318	32,766	95.48	1,552	4.52
	2015	36,114	34,614	95.85	1,500	4.15
Professional, Scientific and Technical Activities	2013	41,881	41,167	98.30	714	1.70
	2014	43,675	42,932	98.30	743	1.70
	2015	45,545	44,796	98.36	749	1.64
Support Service Activities	2013	29,039	28,607	98.51	432	1.49
	2014	28,857	28,376	98.33	481	1.67
	2015	29,692	29,184	98.29	508	1.71
Education	2013	1,630	1,622	99.51	8	0.49
	2014	1,866	1,852	99.25	14	0.75
	2015	2,112	2,098	99.34	14	0.66
Human Health and Social Work Activities	2013	616	604	98.05	12	1.95
	2014	683	667	97.66	16	2.34
	2015	745	731	98.12	14	1.88
Arts, Entertainment and Recreation	2013	23,899	23,791	99.55	108	0.45
	2014	26,685	26,572	99.58	113	0.42
	2015	25,425	25,304	99.52	121	0.48
Other Service Activities	2013	77,638	77,447	99.75	191	0.25
	2014	79,003	78,817	99.76	186	0.24
	2015	81,077	80,883	99.76	194	0.24

Note:

1. The term "SME" shall mean an enterprise which has completed company registration or business registration in accordance with the requirements of the laws, and which conforms to the following standards: (1) the enterprise is an enterprise in the Manufacturing, Construction, Mining and Quarrying industry with paid-in capital of NT$80 million or less; (2) the enterprise is an enterprise in the industry other than any of those mentioned above and had its sales revenue of NT$100 million or less in the previous year, according to the Standards for Identifying Small and Medium Enterprises.
2. Since 2012, the industries are classified according to the 9th revision of Industry Classification Standard by Directorate-General of Budget, Accounting and Statistics (DGBAS).
3. Representative office of foreign company (82 representative offices in 2014) in the form of organization is excluded from the data since 2014.

Source: Fiscal Information Agency, Ministry of Finance, Value-Added Business Tax (VAT) data (2013-2015).

Table C-2 Total Sales Value by Industry and Enterprise Size, 2013-2015

Unit: Million NT$; %

Industry / year \ Enterprise size		Total	SMEs	Share	Large enterprises	Share
Total	2013	38,460,894	11,321,842	29.44	27,139,052	70.56
	2014	40,240,506	11,839,868	29.42	28,400,638	70.58
	2015	38,875,300	11,803,100	30.36	27,072,200	69.64
Agriculture, Forestry, Fishing and Animal Husbandry	2013	40,262	21,881	54.35	18,381	45.65
	2014	47,134	23,508	49.87	23,627	50.13
	2015	46,573	23,872	51.26	22,702	48.74
Mining and Quarrying	2013	47,718	37,180	77.92	10,538	22.08
	2014	48,033	37,712	78.51	10,321	21.49
	2015	44,997	32,210	71.58	12,787	28.42
Manufacturing	2013	14,368,660	4,074,252	28.36	10,294,408	71.64
	2014	15,054,553	4,323,807	28.72	10,730,746	71.28
	2015	13,962,100	4,140,270	29.65	9,821,840	70.35
Electricity and Gas Supply	2013	944,235	4,281	0.45	939,954	99.55
	2014	1,016,077	4,557	0.45	1,011,519	99.55
	2015	895,508	5,295	0.59	890,214	99.41
Water Supply and Remediation Activities	2013	182,086	54,501	29.93	127,586	70.07
	2014	187,655	55,979	29.83	131,676	70.17
	2015	167,779	55,929	33.33	111,850	66.67
Construction	2013	2,040,944	1,340,692	65.69	700,251	34.31
	2014	2,162,496	1,411,725	65.28	750,770	34.72
	2015	2,230,250	1,459,300	65.43	770,951	34.57
Wholesale and Retail Trade	2013	13,545,522	4,151,590	30.65	9,393,932	69.35
	2014	14,154,603	4,266,050	30.14	9,888,553	69.86
	2015	13,686,600	4,316,500	31.54	9,370,150	68.46
Transportation and Storage	2013	1,077,132	262,169	24.34	814,963	75.66
	2014	1,098,184	269,873	24.57	828,311	75.43
	2015	1,136,500	269,441	23.71	867,056	76.29
Accommodation and Food Service Activities	2013	492,075	342,378	69.58	149,697	30.42
	2014	540,748	371,052	68.62	169,696	31.38
	2015	574,200	400,811	69.80	173,389	30.20

Table C-2 Total Sales Value by Industry and Enterprise Size, 2013-2015 (Continued)

Unit: Million NT$; %

Industry / year \ Enterprise size		Total	SMEs	Share	Large enterprises	Share
Information and Communication	2013	1,016,833	109,473	10.77	907,360	89.23
	2014	957,248	113,244	11.83	844,004	88.17
	2015	1,069,990	117,262	10.96	952,733	89.04
Financial and Insurance Activities	2013	2,179,157	195,397	8.97	1,983,760	91.03
	2014	2,387,871	207,354	8.68	2,180,517	91.32
	2015	2,398,420	202,960	8.46	2,195,460	91.54
Real Estate Activities	2013	1,161,144	225,317	19.40	935,827	80.60
	2014	1,136,063	226,824	19.97	909,239	80.03
	2015	1,116,710	237,569	21.27	879,142	78.73
Professional, Scientific and Technical Activities	2013	653,793	198,268	30.33	455,525	69.67
	2014	674,048	210,774	31.27	463,274	68.73
	2015	681,936	210,016	30.80	471,920	69.20
Support Service Activities	2013	396,116	131,896	33.30	264,220	66.70
	2014	441,608	137,081	31.04	304,526	68.96
	2015	510,865	142,999	27.99	367,866	72.01
Education	2013	10,523	7,822	74.33	2,701	25.67
	2014	12,282	8,708	70.90	3,574	29.10
	2015	14,336	10,099	70.45	4,237	29.55
Human Health and Social Work Activities	2013	6,036	2,179	36.11	3,856	63.89
	2014	8,995	2,184	24.28	6,811	75.72
	2015	12,357	2,579	20.87	9,778	79.13
Arts, Entertainment and Recreation	2013	80,067	48,626	60.73	31,441	39.27
	2014	85,389	50,765	59.45	34,624	40.55
	2015	91,675	54,203	59.12	37,472	40.88
Other Service Activities	2013	218,593	113,942	52.12	104,652	47.88
	2014	227,519	118,670	52.16	108,849	47.84
	2015	234,487	121,797	51.94	112,690	48.06

Note and source: See Table C-1.

Table C-3 Domestic Sales Value by Industry and Enterprise Size, 2013-2015

Unit: Million NT$; %

Industry / year \ Enterprise size		Total	SMEs	Share	Large enterprises	Share
Total	2013	28,624,527	9,897,617	34.58	18,726,910	65.42
	2014	30,019,115	10,345,095	34.46	19,674,021	65.54
	2015	29,158,900	10,325,300	35.41	18,833,600	64.59
Agriculture, Forestry, Fishing and Animal Husbandry	2013	34,984	19,202	54.89	15,782	45.11
	2014	40,699	20,198	49.63	20,500	50.37
	2015	39,479	20,422	51.73	19,057	48.27
Mining and Quarrying	2013	47,193	37,045	78.50	10,148	21.50
	2014	47,525	37,498	78.90	10,026	21.10
	2015	44,483	31,986	71.91	12,497	28.09
Manufacturing	2013	7,725,245	3,100,360	40.13	4,624,886	59.87
	2014	8,051,699	3,285,618	40.81	4,766,081	59.19
	2015	7,339,100	3,120,570	42.52	4,218,540	57.48
Electricity and Gas Supply	2013	929,802	4,235	0.46	925,567	99.54
	2014	997,862	4,425	0.44	993,436	99.56
	2015	878,433	5,239	0.60	873,194	99.40
Water Supply and Remediation Activities	2013	171,929	53,109	30.89	118,819	69.11
	2014	176,909	54,551	30.84	122,358	69.16
	2015	159,808	54,474	34.09	105,334	65.91
Construction	2013	2,014,371	1,330,485	66.05	683,886	33.95
	2014	2,129,604	1,399,939	65.74	729,665	34.26
	2015	2,184,620	1,447,110	66.24	737,506	33.76
Wholesale and Retail Trade	2013	10,971,012	3,741,734	34.11	7,229,278	65.89
	2014	11,594,689	3,852,488	33.23	7,742,201	66.77
	2015	11,294,900	3,902,850	34.55	7,392,010	65.45
Transportation and Storage	2013	783,928	252,503	32.21	531,424	67.79
	2014	778,744	260,866	33.50	517,878	66.50
	2015	795,922	261,112	32.81	534,811	67.19
Accommodation and Food Service Activities	2013	490,928	342,200	69.70	148,728	30.30
	2014	539,368	370,911	68.77	168,457	31.23
	2015	572,650	400,642	69.96	172,008	30.04

Table C-3 Domestic Sales Value by Industry and Enterprise Size, 2013-2015 (Continued)

Unit: Million NT$; %

Industry / year \ Enterprise size		Total	SMEs	Share	Large enterprises	Share
Information and Communication	2013	914,074	103,183	11.29	810,892	88.71
	2014	855,122	106,414	12.44	748,708	87.56
	2015	962,043	109,778	11.41	852,265	88.59
Financial and Insurance Activities	2013	2,174,011	194,720	8.96	1,979,291	91.04
	2014	2,382,067	206,663	8.68	2,175,404	91.32
	2015	2,389,520	202,209	8.46	2,187,310	91.54
Real Estate Activities	2013	1,157,318	224,626	19.41	932,692	80.59
	2014	1,133,146	226,218	19.96	906,927	80.04
	2015	1,113,770	236,764	21.26	877,004	78.74
Professional, Scientific and Technical Activities	2013	514,741	191,581	37.22	323,160	62.78
	2014	536,299	203,699	37.98	332,600	62.02
	2015	539,817	202,360	37.49	337,457	62.51
Support Service Activities	2013	390,026	130,685	33.51	259,342	66.49
	2014	435,345	135,978	31.23	299,367	68.77
	2015	504,251	141,886	28.14	362,365	71.86
Education	2013	10,431	7,803	74.80	2,628	25.20
	2014	12,198	8,673	71.10	3,525	28.90
	2015	14,260	10,071	70.62	4,189	29.38
Human Health and Social Work Activities	2013	5,857	2,126	36.29	3,731	63.71
	2014	6,531	2,118	32.43	4,412	67.57
	2015	9,770	2,469	25.27	7,301	74.73
Arts, Entertainment and Recreation	2013	79,852	48,442	60.66	31,410	39.34
	2014	85,037	50,436	59.31	34,601	40.69
	2015	91,343	53,876	58.98	37,467	41.02
Other Service Activities	2013	208,825	113,578	54.39	95,246	45.61
	2014	216,274	118,402	54.75	97,872	45.25
	2015	224,724	121,441	54.04	103,284	45.96

Note and source: See Table C-1.

Table C-4 Export Sales Value by Industry and Enterprise Size, 2013-2015

Unit: Million NT$; %

Industry / year \ Enterprise size		Total	SMEs	Share	Large enterprises	Share
Total	2013	9,836,367	1,424,225	14.48	8,412,142	85.52
	2014	10,221,390	1,494,773	14.62	8,726,617	85.38
	2015	9,716,490	1,477,860	15.21	8,238,630	84.79
Agriculture, Forestry, Fishing and Animal Husbandry	2013	5,278	2,679	50.76	2,599	49.24
	2014	6,435	3,309	51.42	3,126	48.58
	2015	7,094	3,450	48.63	3,644	51.37
Mining and Quarrying	2013	525	135	25.71	390	74.29
	2014	509	214	42.07	295	57.93
	2015	514	224	43.53	290	56.47
Manufacturing	2013	6,643,414	973,892	14.66	5,669,522	85.34
	2014	7,002,855	1,038,190	14.83	5,964,665	85.17
	2015	6,623,010	1,019,700	15.40	5,603,300	84.60
Electricity and Gas Supply	2013	14,432	45	0.31	14,387	99.69
	2014	18,215	132	0.72	18,083	99.28
	2015	17,075	55	0.32	17,019	99.68
Water Supply and Remediation Activities	2013	10,158	1,391	13.70	8,766	86.30
	2014	10,746	1,428	13.29	9,318	86.71
	2015	7,970	1,455	18.25	6,515	81.75
Construction	2013	26,573	10,207	38.41	16,366	61.59
	2014	32,892	11,787	35.83	21,105	64.17
	2015	45,632	12,187	26.71	33,445	73.29
Wholesale and Retail Trade	2013	2,574,510	409,856	15.92	2,164,655	84.08
	2014	2,559,914	413,562	16.16	2,146,352	83.84
	2015	2,391,790	413,650	17.29	1,978,140	82.71
Transportation and Storage	2013	293,204	9,666	3.30	283,538	96.70
	2014	319,440	9,007	2.82	310,432	97.18
	2015	340,575	8,330	2.45	332,246	97.55
Accommodation and Food Service Activities	2013	1,147	177	15.48	969	84.52
	2014	1,380	140	10.18	1,240	89.82
	2015	1,550	169	10.91	1,381	89.09

Table C-4 Export Sales Value by Industry and Enterprise Size, 2013-2015 (Continued)

Unit: Million NT$; %

Industry / year \ Enterprise size		Total	SMEs	Share	Large enterprises	Share
Information and Communication	2013	102,758	6,290	6.12	96,468	93.88
	2014	102,126	6,829	6.69	95,296	93.31
	2015	107,952	7,484	6.93	100,468	93.07
Financial and Insurance Activities	2013	5,146	677	13.16	4,469	86.84
	2014	5,803	691	11.90	5,113	88.10
	2015	8,900	751	8.44	8,149	91.56
Real Estate Activities	2013	3,826	691	18.05	3,135	81.95
	2014	2,917	606	20.76	2,312	79.24
	2015	2,943	805	27.37	2,138	72.63
Professional, Scientific and Technical Activities	2013	139,052	6,687	4.81	132,365	95.19
	2014	137,749	7,076	5.14	130,674	94.86
	2015	142,119	7,656	5.39	134,463	94.61
Support Service Activities	2013	6,090	1,211	19.89	4,879	80.11
	2014	6,263	1,104	17.63	5,159	82.37
	2015	6,614	1,113	16.82	5,501	83.18
Education	2013	91	19	20.61	73	79.39
	2014	84	35	41.63	49	58.37
	2015	76	28	37.33	47	62.67
Human Health and Social Work Activities	2013	178	54	30.00	125	70.00
	2014	2,464	66	2.66	2,399	97.34
	2015	2,586	110	4.24	2,476	95.76
Arts, Entertainment and Recreation	2013	215	184	85.47	31	14.53
	2014	352	329	93.59	23	6.41
	2015	332	327	98.35	5	1.65
Other Service Activities	2013	9,769	363	3.72	9,405	96.28
	2014	11,246	268	2.39	10,977	97.61
	2015	9,763	356	3.65	9,406	96.35

Note and source: See Table C-1.

Table C-5 Total Employment by Industry and Enterprise Size, 2013-2015

Unit: Thousand persons; %

Industry / year \ Enterprise size		Total	Share	SMEs	Share	Large enterprises	Share	Govern-ment
Total	2013	10,967	100.00	8,588	78.30	1,359	12.39	1,020
	2014	11,079	100.00	8,669	78.25	1,387	12.52	1,023
	2015	11,198	100.00	8,759	78.22	1,415	12.64	1,024
Agriculture, Forestry, Fishing and Animal Husbandry	2013	544	100.00	537	98.78	1	0.25	5
	2014	548	100.00	540	98.52	1	0.27	7
	2015	555	100.00	549	98.98	1	0.26	4
Mining and Quarrying	2013	4	100.00	3	85.30	-	-	1
	2014	4	100.00	3	86.48	0	0.00	1
	2015	4	100.00	3	81.33	0	0.97	1
Manufacturing	2013	2,988	100.00	2,195	73.48	768	25.70	25
	2014	3,007	100.00	2,196	73.01	786	26.14	25
	2015	3,024	100.00	2,192	72.48	812	26.86	20
Electricity and Gas Supply	2013	29	100.00	3	11.77	3	9.69	23
	2014	29	100.00	4	14.05	3	8.64	22
	2015	30	100.00	4	14.12	2	8.13	23
Water Supply and Remediation Activities	2013	84	100.00	37	43.78	2	2.85	45
	2014	82	100.00	38	46.07	2	2.52	42
	2015	82	100.00	34	41.60	2	2.54	46
Construction	2013	861	100.00	843	97.99	10	1.11	8
	2014	881	100.00	865	98.08	9	1.01	8
	2015	895	100.00	878	98.10	8	0.93	9
Wholesale and Retail Trade	2013	1,817	100.00	1,745	96.03	64	3.51	8
	2014	1,825	100.00	1,756	96.19	62	3.39	8
	2015	1,842	100.00	1,771	96.13	65	3.51	7
Transportation and Storage	2013	425	100.00	310	72.88	63	14.84	52
	2014	433	100.00	316	73.16	68	15.62	49
	2015	437	100.00	323	73.94	66	15.02	48
Accommodation and Food Service Activities	2013	775	100.00	756	97.46	19	2.47	1
	2014	792	100.00	768	96.99	23	2.97	1
	2015	813	100.00	790	97.21	22	2.75	0

Table C-5 Total Employment by Industry and Enterprise Size, 2013-2015 (Continued)

Unit: Thousand persons; %

Industry / year \ Enterprise size		Total	Share	SMEs	Share	Large enterprises	Share	Govern-ment
Information and Communication	2013	234	100.00	165	70.67	68	29.08	1
	2014	241	100.00	170	70.49	71	29.26	1
	2015	246	100.00	171	69.53	75	30.32	0
Financial and Insurance Activities	2013	422	100.00	320	75.82	86	20.31	16
	2014	416	100.00	316	75.87	84	20.23	16
	2015	420	100.00	323	76.97	80	18.98	17
Real Estate Activities	2013	92	100.00	88	96.31	2	2.38	1
	2014	98	100.00	94	95.89	3	2.95	1
	2015	100	100.00	96	96.08	3	2.52	1
Professional, Scientific and Technical Activities	2013	347	100.00	278	80.21	44	12.74	24
	2014	354	100.00	287	81.18	44	12.35	23
	2015	362	100.00	292	80.67	44	12.28	26
Support Service Activities	2013	263	100.00	242	91.81	21	7.98	1
	2014	273	100.00	251	91.81	22	8.02	1
	2015	281	100.00	255	90.87	25	9.01	0
Public Administration and Defense; Compulsory Social Security	2013	383	100.00	1	0.23	0	0.02	382
	2014	378	100.00	1	0.16	0	0.00	377
	2015	375	100.00	1	0.16	0	0.00	374
Education	2013	634	100.00	232	36.65	69	10.87	333
	2014	645	100.00	235	36.47	63	9.82	346
	2015	650	100.00	238	36.72	59	9.14	352
Human Health and Social Work Activities	2013	427	100.00	222	52.02	128	29.88	77
	2014	432	100.00	217	50.09	136	31.45	80
	2015	438	100.00	219	50.10	139	31.70	80
Arts, Entertainment and Recreation	2013	96	100.00	75	77.48	6	6.36	16
	2014	95	100.00	76	79.82	6	5.91	14
	2015	99	100.00	80	80.83	5	5.35	14
Other Service Activities	2013	541	100.00	534	98.58	5	0.99	2
	2014	543	100.00	536	98.75	4	0.81	2
	2015	546	100.00	538	98.50	6	1.10	2

Note:

1. Since 2012, the industries are classified according to the 9th revision of Industry Classification Standard by Directorate-General of Budget, Accounting and Statistics (DGBAS).
2. For the purposes of this table, SMEs are defined as firms in the Manufacturing, Construction and Mining and Quarrying industries with less than 200 regular employees and firms in other industries with less than 100 regular employees.
3. Employment indicates employed persons, including employers, own-account workers, paid employees and unpaid family workers.
4. "0" represents zero or less than one unit (1000 persons); "-" represents no data available.

Source: Directorate-General of Budget, Accounting and Statistics (DGBAS), *Manpower Survey* data (2013-2015).

Table C-6 Number of Paid Employees by Industry and Enterprise Size, 2013-2015

Unit: Thousand persons; %

Industry / year \ Enterprise size		Total	Share	SMEs	Share	Large enterprises	Share	Govern-ment
Total	2013	8,615	100.00	6,237	72.40	1,357	15.76	1,020
	2014	8,737	100.00	6,329	72.44	1,385	15.85	1,023
	2015	8,860	100.00	6,424	72.50	1,413	15.94	1,024
Agriculture, Forestry, Fishing and Animal Husbandry	2013	88	100.00	81	92.42	1	1.57	5
	2014	90	100.00	82	90.93	1	1.64	7
	2015	92	100.00	86	93.86	1	1.55	4
Mining and Quarrying	2013	4	100.00	3	84.72	-	-	1
	2014	4	100.00	3	85.76	0	0.00	1
	2015	4	100.00	3	80.74	0	1.00	1
Manufacturing	2013	2,734	100.00	1,942	71.04	767	28.06	25
	2014	2,763	100.00	1,952	70.67	785	28.41	25
	2015	2,787	100.00	1,956	70.20	811	29.09	20
Electricity and Gas Supply	2013	29	100.00	3	11.77	3	9.69	23
	2014	29	100.00	4	13.78	3	8.67	22
	2015	30	100.00	4	13.49	2	8.19	23
Water Supply and Remediation Activities	2013	77	100.00	30	39.29	2	3.07	45
	2014	75	100.00	31	40.79	2	2.77	42
	2015	76	100.00	28	36.60	2	2.76	46
Construction	2013	727	100.00	710	97.62	10	1.31	8
	2014	750	100.00	733	97.74	9	1.19	8
	2015	755	100.00	738	97.75	8	1.11	9
Wholesale and Retail Trade	2013	1,116	100.00	1,044	93.55	64	5.70	8
	2014	1,112	100.00	1,043	93.76	62	5.55	8
	2015	1,136	100.00	1,065	93.76	64	5.66	7
Transportation and Storage	2013	341	100.00	226	66.21	63	18.48	52
	2014	351	100.00	235	66.92	68	19.24	49
	2015	354	100.00	240	67.79	66	18.55	48
Accommodation and Food Service Activities	2013	481	100.00	461	95.99	19	3.90	1
	2014	496	100.00	472	95.20	23	4.72	1
	2015	514	100.00	491	95.58	22	4.35	0

Table C-6 Number of Paid Employees by Industry and Enterprise Size, 2013-2015 (Continued)

Units: Thousand persons; %

Industry / year \ Enterprise size		Total	Share	SMEs	Share	Large enterprises	Share	Govern-ment
Information and Communication	2013	220	100.00	152	68.99	68	30.75	1
	2014	228	100.00	157	68.83	70	30.91	1
	2015	232	100.00	157	67.66	75	32.19	0
Financial and Insurance Activities	2013	418	100.00	316	75.57	86	20.52	16
	2014	412	100.00	312	75.63	84	20.43	16
	2015	416	100.00	319	76.74	80	19.17	17
Real Estate Activities	2013	83	100.00	80	95.94	2	2.62	1
	2014	90	100.00	86	95.54	3	3.20	1
	2015	91	100.00	87	95.73	2	2.72	1
Professional, Scientific and Technical Activities	2013	274	100.00	205	74.90	44	16.16	24
	2014	280	100.00	214	76.29	44	15.55	23
	2015	293	100.00	223	76.13	44	15.14	26
Support Service Activities	2013	241	100.00	220	91.07	21	8.69	1
	2014	252	100.00	230	91.11	22	8.70	1
	2015	260	100.00	234	90.18	25	9.69	0
Public Administration and Defense; Compulsory Social Security	2013	383	100.00	1	0.23	0	0.02	382
	2014	378	100.00	1	0.16	0	0.00	377
	2015	375	100.00	1	0.16	0	0.00	374
Education	2013	600	100.00	198	33.05	69	11.45	333
	2014	613	100.00	203	33.12	63	10.34	346
	2015	619	100.00	208	33.65	59	9.57	352
Human Health and Social Work Activities	2013	396	100.00	191	48.23	128	32.24	77
	2014	403	100.00	188	46.52	136	33.70	80
	2015	410	100.00	192	46.79	139	33.80	80
Arts, Entertainment and Recreation	2013	75	100.00	53	71.07	6	8.10	16
	2014	73	100.00	54	73.71	6	7.70	14
	2015	79	100.00	60	75.97	5	6.70	14
Other Service Activities	2013	328	100.00	320	97.65	5	1.63	2
	2014	338	100.00	331	97.99	4	1.31	2
	2015	340	100.00	332	97.60	6	1.76	2

Note and source: See Table C-5.

Table C-7 Overview of Newly-Established Enterprises by Industry and Enterprise Size, 2015

Unit: Enterprises; million NT$; %

Industry \ Enterprise size	Total	SMEs	Share	Large enterprises	Share
Number of enterprises					
Total	98,507	98,320	100.00	187	100.00
Agriculture, Forestry, Fishing and Animal Husbandry	780	780	0.79	0	-
Mining and Quarrying	59	59	0.06	0	-
Manufacturing	5,337	5,285	5.38	52	27.81
Electricity and Gas Supply	98	97	0.10	1	0.53
Water Supply and Remediation Activities	411	409	0.42	2	1.07
Construction	9,230	9,226	9.38	4	2.14
Wholesale and Retail Trade	41,747	41,657	42.37	90	48.13
Transportation and Storage	1,420	1,415	1.44	5	2.67
Accommodation and Food Service Activities	18,266	18,258	18.57	8	4.28
Information and Communication	1,903	1,897	1.93	6	3.21
Financial and Insurance Activities	1,012	1,009	1.03	3	1.60
Real Estate Activities	3,296	3,286	3.34	10	5.35
Professional, Scientific and Technical Activities	3,988	3,986	4.05	2	1.07
Support Service Activities	2,461	2,460	2.50	1	0.53
Education	310	309	0.31	1	0.53
Human Health and Social Work Activities	97	97	0.10	0	-
Arts, Entertainment and Recreation	2,401	2,401	2.44	0	-
Other Service Activities	5,691	5,689	5.79	2	1.07
Total sales					
Total	229,590	182,608	100.00	46,982	100.00
Agriculture, Forestry, Fishing and Animal Husbandry	665	665	0.36	0	-
Mining and Quarrying	168	168	0.09	0	-
Manufacturing	28,472	25,433	13.93	3,039	6.47
Electricity and Gas Supply	11,897	98	0.05	11,799	25.11
Water Supply and Remediation Activities	1,222	966	0.53	256	0.54
Construction	24,461	24,146	13.22	316	0.67
Wholesale and Retail Trade	109,004	84,464	46.25	24,540	52.23
Transportation and Storage	4,186	3,435	1.88	751	1.60
Accommodation and Food Service Activities	22,890	21,464	11.75	1,426	3.03
Information and Communication	3,280	2,505	1.37	775	1.65
Financial and Insurance Activities	970	639	0.35	331	0.70
Real Estate Activities	7,370	5,060	2.77	2,310	4.92
Professional, Scientific and Technical Activities	5,193	4,802	2.63	391	0.83
Support Service Activities	3,202	3,097	1.70	105	0.22
Education	1,023	479	0.26	544	1.16
Human Health and Social Work Activities	31	31	0.02	0	-
Arts, Entertainment and Recreation	1,970	1,970	1.08	0	-
Other Service Activities	3,586	3,185	1.74	401	0.85

Table C-7 Overview of Newly-Established Enterprises by Industry and Enterprise Size, 2015 (Continued)

Unit: Million NT$; %

Industry \ Enterprise size	Total	SMEs	Share	Large enterprises	Share
Domestic sales					
Total	212,681	169,577	100.00	43,104	100.00
Agriculture, Forestry, Fishing and Animal Husbandry	651	651	0.38	0	-
Mining and Quarrying	168	168	0.10	0	-
Manufacturing	19,460	18,007	10.62	1,453	3.37
Electricity and Gas Supply	11,897	98	0.06	11,799	27.37
Water Supply and Remediation Activities	1,211	955	0.56	256	0.59
Construction	24,419	24,103	14.21	316	0.73
Wholesale and Retail Trade	102,064	79,599	46.94	22,465	52.12
Transportation and Storage	3,922	3,278	1.93	644	1.49
Accommodation and Food Service Activities	22,888	21,463	12.66	1,426	3.31
Information and Communication	2,910	2,244	1.32	665	1.54
Financial and Insurance Activities	943	612	0.36	331	0.77
Real Estate Activities	7,348	5,039	2.97	2,310	5.36
Professional, Scientific and Technical Activities	4,995	4,604	2.72	391	0.91
Support Service Activities	3,198	3,093	1.82	105	0.24
Education	1,023	479	0.28	544	1.26
Human Health and Social Work Activities	31	31	0.02	0	-
Arts, Entertainment and Recreation	1,968	1,968	1.16	0	-
Other Service Activities	3,585	3,185	1.88	400	0.93
Export sales					
Total	16,909	13,030	100.00	3,878	100.00
Agriculture, Forestry, Fishing and Animal Husbandry	14	14	0.23	0	-
Mining and Quarrying	0	0	0.02	0	-
Manufacturing	9,012	7,426	69.00	1,586	40.90
Electricity and Gas Supply	0	0	0.00	0	0.00
Water Supply and Remediation Activities	11	11	0.10	0	0.00
Construction	43	43	0.82	0	0.00
Wholesale and Retail Trade	6,940	4,864	27.99	2,075	53.51
Transportation and Storage	264	157	0.56	107	2.76
Accommodation and Food Service Activities	1	1	0.01	0	0.00
Information and Communication	370	261	0.51	110	2.83
Financial and Insurance Activities	27	27	0.05	0	0.00
Real Estate Activities	21	21	0.05	0	0.00
Professional, Scientific and Technical Activities	198	198	0.52	0	0.00
Support Service Activities	4	4	0.08	0	0.00
Education	0	0	0.00	0	0.00
Human Health and Social Work Activities	1	1	0.01	0	-
Arts, Entertainment and Recreation	2	2	0.02	0	-
Other Service Activities	0.2	0	0.02	0.2	0.00

Note: 1. Since 2012, the industries are classified according to the 9th revision of Industry Classification Standard by Directorate-General of Budget, Accounting and Statistics (DGBAS). 2. "0" represents zero or less than one unit (one enterprise or a million NT$); "-" represents no data available.

Source: Fiscal Information Agency, Ministry of Finance, VAT data (2015).

Table C-8 Overview of Female-Owned Enterprises by Industry and Enterprise Size, 2015

Unit: Enterprises; million NT$; %

Industry \ Enterprise size	Total	Female-owned enterprises				
		Sub-total	SMEs	Share	Large enterprises	Share
Number of enterprises						
Total	1,402,446	508,701	502,470	100.00	6,231	100.00
Agriculture, Forestry, Fishing and Animal Husbandry	11,639	2,764	2,745	0.55	19	0.30
Mining and Quarrying	1,155	270	266	0.05	4	0.06
Manufacturing	147,569	40,616	40,045	7.97	571	9.16
Electricity and Gas Supply	768	164	152	0.03	12	0.19
Water Supply and Remediation Activities	7,509	2,205	2,137	0.43	68	1.09
Construction	117,981	29,652	29,425	5.86	227	3.64
Wholesale and Retail Trade	686,316	260,456	256,680	51.08	3,776	60.60
Transportation and Storage	31,252	8,223	8,051	1.60	172	2.76
Accommodation and Food Service Activities	142,410	67,492	67,359	13.41	133	2.13
Information and Communication	18,997	5,560	5,472	1.09	88	1.41
Financial and Insurance Activities	18,252	5,979	5,401	1.07	578	9.28
Real Estate Activities	35,799	10,852	10,549	2.10	303	4.86
Professional, Scientific and Technical Activities	44,523	16,024	15,882	3.16	142	2.28
Support Service Activities	29,444	11,206	11,108	2.21	98	1.57
Education	2,026	833	832	0.17	1	0.02
Human Health and Social Work Activities	732	202	202	0.04	-	-
Arts, Entertainment and Recreation	25,261	9,240	9,226	1.84	14	0.22
Other Service Activities	80,813	36,963	36,938	7.35	25	0.40
Total sales						
Total	34,495,150	5,409,352	2,889,548	100.00	2,519,804	100.00
Agriculture, Forestry, Fishing and Animal Husbandry	45,960	10,353	5,272	0.18	5,081	0.20
Mining and Quarrying	44,821	4,316	4,055	0.14	262	0.01
Manufacturing	11,995,854	1,061,021	708,179	24.51	352,842	14.00
Electricity and Gas Supply	880,707	5,800	916	0.03	4,884	0.19
Water Supply and Remediation Activities	166,161	39,674	16,077	0.56	23,597	0.94
Construction	2,136,416	443,622	353,275	12.23	90,346	3.59
Wholesale and Retail Trade	11,985,473	2,601,617	1,262,594	43.70	1,339,023	53.14
Transportation and Storage	1,021,221	132,167	75,229	2.60	56,939	2.26
Accommodation and Food Service Activities	532,592	169,787	138,746	4.80	31,041	1.23
Information and Communication	971,682	108,134	28,862	1.00	79,272	3.15
Financial and Insurance Activities	2,284,620	343,678	60,086	2.08	283,593	11.25
Real Estate Activities	1,105,307	179,688	62,687	2.17	117,002	4.64
Professional, Scientific and Technical Activities	606,382	142,193	62,766	2.17	79,427	3.15
Support Service Activities	391,482	76,379	47,860	1.66	28,519	1.13
Education	13,760	3,033	2,372	0.08	661	0.03
Human Health and Social Work Activities	12,132	752	752	0.03	-	-
Arts, Entertainment and Recreation	86,407	19,379	15,533	0.54	3,846	0.15
Other Service Activities	214,172	67,757	44,287	1.53	23,470	0.93

Table C-8 Overview of Female-Owned Enterprises by Industry and Enterprise Size, 2015 (Continued)

Unit: Million NT$; %

Industry \ Enterprise size	Total	Female-owned enterprises				
		Sub-total	SMEs	Share	Large enterprises	Share
Domestic sales						
Total	26,628,370	4,670,992	2,619,246	100.00	2,051,746	100.00
Agriculture, Forestry, Fishing and Animal Husbandry	38,908	9,218	4,604	0.18	4,614	0.22
Mining and Quarrying	44,372	4,282	4,021	0.15	262	0.01
Manufacturing	6,809,681	769,959	575,525	21.97	194,435	9.48
Electricity and Gas Supply	865,285	5,796	913	0.03	4,884	0.24
Water Supply and Remediation Activities	158,569	38,567	15,699	0.60	22,868	1.11
Construction	2,095,922	439,780	351,418	13.42	88,362	4.31
Wholesale and Retail Trade	9,901,994	2,198,021	1,134,125	43.30	1,063,896	51.85
Transportation and Storage	746,928	118,890	73,563	2.81	45,327	2.21
Accommodation and Food Service Activities	531,089	169,575	138,680	5.29	30,895	1.51
Information and Communication	875,253	103,838	26,992	1.03	76,846	3.75
Financial and Insurance Activities	2,277,122	342,971	59,776	2.28	283,195	13.80
Real Estate Activities	1,102,425	179,073	62,497	2.39	116,576	5.68
Professional, Scientific and Technical Activities	473,209	124,941	61,164	2.34	63,777	3.11
Support Service Activities	386,208	75,474	47,532	1.81	27,943	1.36
Education	13,687	3,021	2,359	0.09	661	0.03
Human Health and Social Work Activities	9,578	748	748	0.03	-	-
Arts, Entertainment and Recreation	86,083	19,316	15,470	0.59	3,846	0.19
Other Service Activities	212,059	67,520	44,159	1.69	23,361	1.14
Export sales						
Total	7,866,780	738,360	270,302	100.00	468,058	100.00
Agriculture, Forestry, Fishing and Animal Husbandry	7,052	1,135	668	0.25	467	0.10
Mining and Quarrying	449	34	34	0.01	0	0.00
Manufacturing	5,186,173	291,062	132,654	49.08	158,408	33.84
Electricity and Gas Supply	15,422	3	3	0.00	0	0.00
Water Supply and Remediation Activities	7,592	1,107	378	0.14	729	0.16
Construction	40,495	3,842	1,857	0.69	1,985	0.42
Wholesale and Retail Trade	2,083,479	403,596	128,469	47.53	275,127	58.78
Transportation and Storage	274,293	13,277	1,666	0.62	11,612	2.48
Accommodation and Food Service Activities	1,504	212	66	0.02	146	0.03
Information and Communication	96,429	4,296	1,870	0.69	2,426	0.52
Financial and Insurance Activities	7,498	707	310	0.11	397	0.08
Real Estate Activities	2,882	616	190	0.07	426	0.09
Professional, Scientific and Technical Activities	133,173	17,253	1,602	0.59	15,651	3.34
Support Service Activities	5,274	904	328	0.12	576	0.12
Education	74	12	12	0.00	0	0.00
Human Health and Social Work Activities	2,554	4	4	0.00	-	-
Arts, Entertainment and Recreation	324	63	63	0.02	0	0.00
Other Service Activities	2,114	237	128	0.05	109	0.02

Note: 1.Whether an enterprise should be classified as male-owned or female-owned was determined using the registered identity of the business owner. 2. The totals given in this table do not conform to those given in Table C-1~C-4 because some enterprises are registered as being owned by other enterprises or by foreigners; these enterprises were excluded from the data used in this table; data from male- and female-owned enterprises are included in total. 3. "0" represents zero or less than one unit (a million NT$); "-" represents no data available. Source: Fiscal Information Agency, Ministry of Finance, VAT data (2015).

Table C-9 Export Sales Value of SMEs by Manufacturing Industry, 2012-2015

Unit: Million NT$; %

Industry \ Indicator	Export sales				Share of total			
	2012	2013	2014	2015	2012	2013	2014	2015
Total	1,295,476	973,892	1,038,190	1,019,705	100.0	100.0	100.0	100.0
Food Manufacturing	8,065	8,475	9,728	9,860	0.62	0.87	0.94	0.97
Beverages Manufacturing	690	847	763	656	0.05	0.09	0.07	0.06
Tobacco Manufacturing	0	0	0	0	0.00	0.00	0.00	0.00
Textiles Mills Manufacturing	21,482	23,093	23,468	22,551	1.66	2.37	2.26	2.21
Wearing Apparel and Clothing	18,076	16,828	16,825	12,336	1.40	1.73	1.62	1.21
Leather, Fur and Related Products	14,213	13,805	13,597	12,307	1.10	1.42	1.31	1.21
Wood and Bamboo Products	3,201	3,114	3,421	3,206	0.25	0.32	0.33	0.31
Pulp, Paper and Paper Products	11,786	11,693	11,900	11,237	0.91	1.20	1.15	1.10
Printing and Reproduction of Recorded Media	6,617	4,943	4,614	4,025	0.51	0.51	0.44	0.39
Petroleum and Coal Products Manufacturing	141	114	143	98	0.01	0.01	0.01	0.01
Chemical Material Manufacturing	22,086	22,666	23,272	22,156	1.70	2.33	2.24	2.17
Chemical Products Manufacturing	12,904	12,117	14,576	15,150	1.00	1.24	1.40	1.49
Pharmaceuticals and Medicinal Chemical Products Manufacturing	277	341	708	710	0.02	0.04	0.07	0.07
Rubber Products Manufacturing	10,596	10,974	12,250	11,315	0.82	1.13	1.18	1.11
Plastic Products Manufacturing	49,789	51,925	54,583	51,231	3.84	5.33	5.26	5.02
Non-metallic Mineral Products Manufacturing	40,081	31,966	25,344	19,614	3.09	3.28	2.44	1.92
Basic Metal Manufacturing	47,307	43,453	48,500	42,020	3.65	4.46	4.67	4.12
Fabricated Metal Products Manufacturing	113,839	111,827	122,381	122,349	8.79	11.48	11.79	12.00
Electronic Parts and Components Manufacturing	575,576	287,526	295,299	290,748	44.43	29.52	28.44	28.51
Computers, Electronic and Optical Products Manufacturing	43,802	36,597	47,687	60,158	3.38	3.76	4.59	5.90
Electrical Equipment Manufacturing	53,070	49,753	51,538	48,772	4.10	5.11	4.96	4.78
Machinery and Equipment Manufacturing	133,801	125,846	136,860	132,244	10.33	12.92	13.18	12.97
Motor Vehicles and Parts Manufacturing	17,746	17,773	17,795	17,870	1.37	1.82	1.71	1.75
Other Transport Equipment Manufacturing	38,042	34,193	42,358	49,154	2.94	3.51	4.08	4.82
Furniture Manufacturing	13,994	14,868	16,951	17,455	1.08	1.53	1.63	1.71
Manufacturing Not Elsewhere	32,124	32,813	34,061	32,900	2.48	3.37	3.28	3.23
Repair and Installation of Industrial Machinery and Equipment	6,170	6,343	9,566	9,581	0.48	0.65	0.92	0.94

Note and source: See Table C-1.

INDEX