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 # ITISPO-102-T402

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Preface

Global economy, surviving from the impact of the previous financial crisis, is now presenting a slow-to-moderate growth rate in 2013. Taiwan is now facing the pressure from regional economy expansion, new threats from Asia's newly developing countries and competition from Japan/Korea with their strong industrial vertically integrated power. Moreover, there is a trend for those major western multinational companies to move their overseas manufacturing and technical services back to their mother lands, creating a new face of the global supply chain. More severe industrial competition is being expected. As such, Taiwan needs to aggressively proceed with its own industry structural transformation concentrating on the industries, investment, human resources and industrial efficiency. One of the government efforts could be made to continue building the industrial intelligent information service system through the mechanism of its strategic policy, which can facilitate the process of transformation and upgrading to create a more competitive advantage position for Taiwanese industry.

Department of Industrial Technology (DOIT) under Taiwan's Ministry of Economic Affairs has been using its sponsored Industry & Technology Intelligence Services (ITIS) Program to integrate the island's research resources from the most major non-profit professional institutes of "think-tanks" to conduct a series of industrial research focusing on the technology & market studies, new business opportunity explorations and governmental policy. Facing the rising emerging markets, the research directions of ITIS Program should not only cover the needs of Taiwanese industries, but also enhance the research on the emerging regions such as China and India, even extended to the countries of South East Asia. Applying the intelligent service function through the diversified media channels such as internet, publications and conferences can quickly share the knowledge and provide the industries with the needed information. Only helping the industries to stay in the right track of the industrial trends can make Taiwan's competitive position ready for the next wave of economic cycle.

To the year of 2013, ITIS Program is publishing "2013 Taiwan Industrial Outlook". This publication does not only cover the industrial data/major events of year 2012 and the analysis on the future trends/business strategies, but also include the special overall discussion analyzing the domestic/global economics and major industrial issues. The book has 17 chapters in which each chapter has its own targeted industry addressing its current status, the industrial technology/market outlook, and major events. On the top of 17 basic industries, the special observatory research reports on the six emerging industries, namely LED Lighting, Photovoltaic, Wind Power, Electric Vehicle, Green Building and Cloud Computing, are also added. This book is very helpful to learn Taiwan's current industrial development and its international competitiveness as well as Taiwan's global market position.

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Macroeconomic Overview

- Outlook of Global Economies
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Chapter 1 Outlook of Global Economies

CIER

Meng-Chun Liu

Introduction

Drawing on the European debt crisis, it can be verified that the global economy has been going through a structural imbalance and rebalancing since the global financial crisis in 2008. The advanced economies are endeavoring to overcome the vicious circle of over-consumption, high trade deficits and heavy debts, while the emerging economies are dealing with their own "three highs": high savings rates, high trade surpluses, and high foreign exchange reserves. Therefore, on March 2012, China decided to set a target of 7.5% for the 2012 GDP growth rate, below the usual targeted growth rate of 8%, and representing the lowest level in the last eight years. Since the 18th Party Congress in 2012, the Chinese government has been highlighting the domestic demand for driving economic growth. Meanwhile, the U.S., the EU, Japan and the other advanced countries have been focusing on cutting their deficits and re-establishing fiscal discipline.

In the first quarter of 2012, there seemed to be signs of global recovery due to the following reasons. In January, the U.S. Federal Reserve promised that it would maintain a low-interest-rate policy at least until late 2014; in early February, the Bank of England launched its asset purchase program; in mid-February, the Bank of Japan also declared a series of loose monetary policies, including expanding the asset purchase program. Moreover, in ....

Chapter 2 Outlook of Taiwan's Economy

CIER

Meng-Chun Liu; Su-Ling Peng

An Overview of Economic Growth in Taiwan

Taiwan's economic performance in 2012 was disappointing, mainly due to the impact of the global economic downturn. According to national income statistics published by the Directorate General of Budget, Accounting and Statistics (DGBAS) in November 2012, Taiwan's economic growth rates for the first three quarters of 2012 were 0.59%, -0.12% and 0.98% respectively. When viewed in terms of the seasonally adjusted annualized rate (SAAR), the second quarter was still the only quarter with a negative growth rate (-0.37%), indicating that, irrespective of whether considered in terms of a year-on-year or annualized growth rate, the second quarter of 2012 was the point at which the economy bottomed out. Even so, the recovery in the third quarter was very weak, so this has definitely been a U-shaped recession.

Taiwan's economy is gradually starting to escape from a period of low growth

Judging from the available indicators, the Taiwanese economy has already bottomed out and is now starting to pick up again. In late January 2013, the Council for Economic Planning and Development (CEPD) announced that, after ten consecutive months of "blue lights" and three months of "yellow-blue lights," in December 2012 Taiwan finally posted a "green light"....

Chapter 3 Major Developmental Issues of Taiwan's Manufacturing Sector

CIER

Meng-Chun Liu; Chia-Hsuan Wu

Introduction

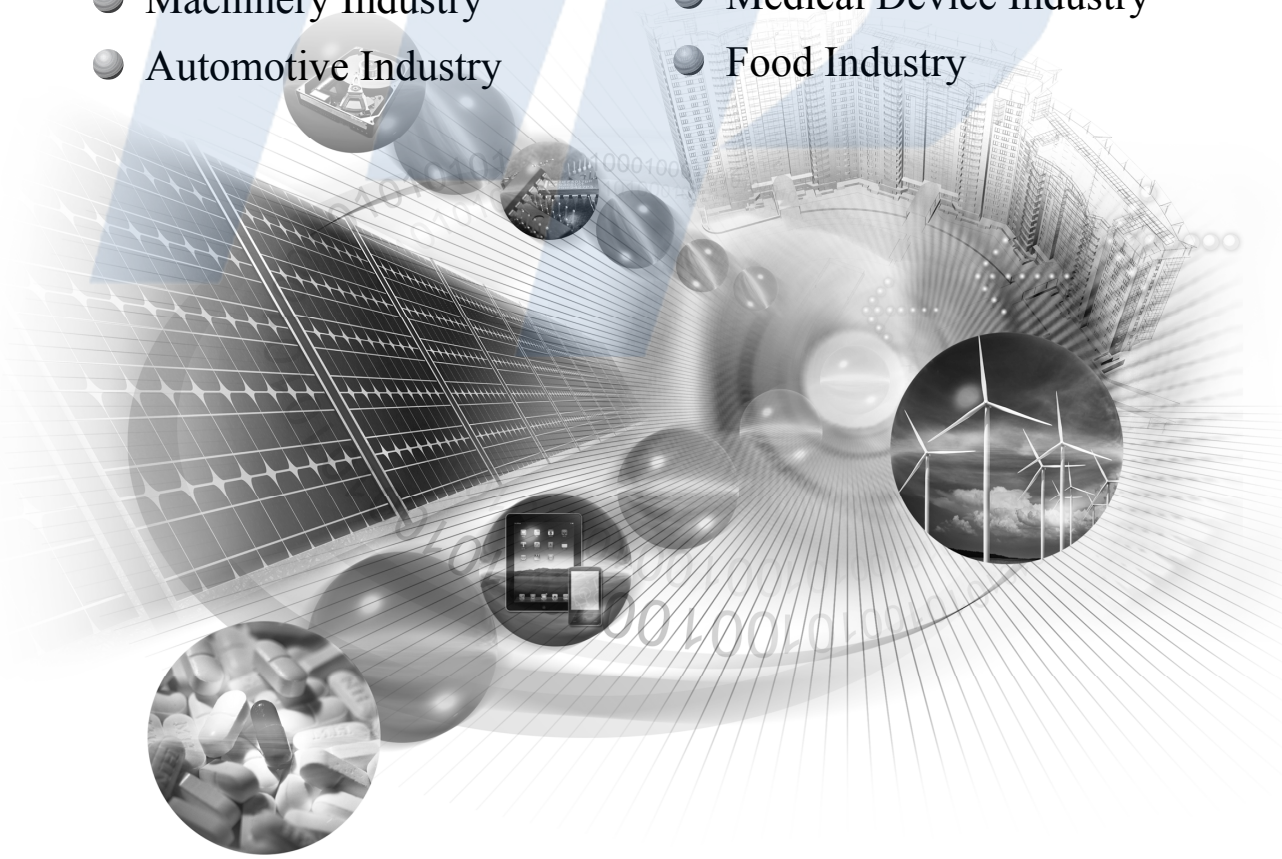
Taiwan's economic development strategies have faced numerous challenges since the financial crisis. Its economic growth driven by foreign trade has also faced difficulties as overseas demand remained stagnant. Figure 1-3-1 shows the domestic demand and foreign trade contributions to Taiwan's GDP from 2002 to 2012 Q3, indicating that Taiwan's economic growth may be over-dependent on foreign trade. Foreign trade contributions to Taiwan's GDP increased from 46% in 2002 to 77.76% in 2007. However, negative domestic demand growth persisted in Taiwan for years after the financial crisis, and economic growth has depended mostly on foreign trade.

Source: Calculations based on Directorate General of Budget, Accounting and Statistics Database (2012/11)

Figure 1-3-1 Taiwan's GDP growth makeup, 2002~2012 Q3

Industry Insights

- IC Industry
- Electronic Components Industry
- Flat Panel Display Industry
- Electronic Materials Industry
- Telecommunications Industry
- IT Industry
- Machinery Industry
- Automotive Industry
- Steel Industry
- Non-Ferrous Metal Industry
- Petrochemical Industry
- Specialty Chemicals Industry
- Textile Industry
- Biotechnology Industry
- Pharmaceutical Industry
- Medical Device Industry
- Food Industry



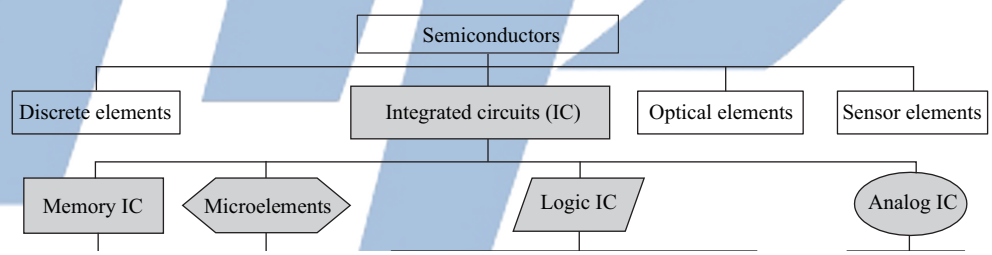
Chapter 1 IC Industry

ITIS Program, IEK of ITRI

Jui-Lin Yang; Mao-Jung Peng; Chin-Kun Tsai; Ling-Chun Chen; Kai-Mu Hsiao

Introduction

Taiwan's semiconductor industry has a vertical-integration structure with up- and downstream sectors. From upstream to downstream, the industry is divided into IC design, IC manufacturing, IC packaging, and IC testing. Of these, IC manufacturing chiefly comprises IC foundries and memory manufacturing. Vertical integration and industry clusters give Taiwan's IC industry the competitive advantages of flexibility, speed and low costs. In 2012, Taiwan's IC design ranked second worldwide in terms of market share, Taiwan IC foundries ranked first worldwide in terms of market share, and Taiwan's packaging and testing industry ranked first worldwide in terms of market share.



Source: ITIS Program, IEK of ITRI (2013/01)

Figure 2-1-1 IC product categories

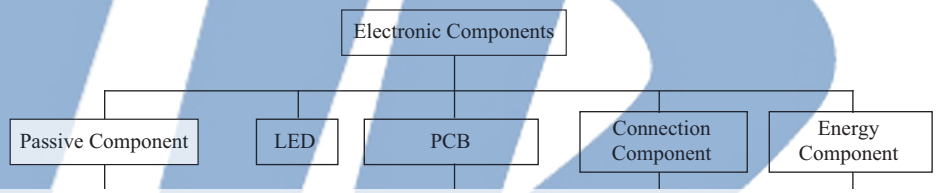
Chapter 2 Electronic Components Industry

ITIS Program, IEK of ITRI

Tsu-Yu Chao; Meng-Hsuan Hsueh

Introduction

Electronic components are the basis for the development of the electronics industry. They can be classified into five major categories according to material or product features; these include passive components, LEDs, printed circuit boards (PCB), connection components and energy components (Figure 2-2-1). This section aims to give a brief introduction of the aforesaid industrial structure.



Passive Components

Passive components, as implied by the name, are incapable of operating anything by themselves. They must be supplemented by or connected to an active component in order to operate. Major products include resistors, inductors, capacitors, wave filters and oscillators. They can also be roughly classified into two major categories: RCL passive components and RF passive components. RCL passive components are the generally known passive

Chapter 3 Flat Panel Display Industry

ITIS Program, IEK of ITRI

Mei-Chun Liu; Cheng-Doul Chuang; Chieh-Po Chen; Chiu-Ling Chen; Yang-Jer Yeh

Introduction

Flat panel displays (FPDs) refer generally to display monitors that are not based on cathode ray tube (CRT) technology. In terms of technologies employed in the products, the FPD category includes PDP panels, large size TFT LCD panels, small/medium size TFT LCD panels, TN/STN panels, OLED panels, micro-display panels and other types of panels, such as vacuum fluorescent displays (VFD) and advanced displays (Table 2-3-1). The above classification is also adopted by the FPD industry.

Table 2-3-1 Scope of flat panel display industry (by technology type)

Industry	Sub-industry	Definition and Description
Flat display panel		

TFT LCD

Key components

Source: ITIS Program, IEK of ITRI (2012/12)

Chapter 4 Electronic Materials Industry

ITIS Program, IEK of ITRI

Yang-Jer Yeh

Introduction

The electronic materials industry is both the upstream and the foundation of the electronics industry. It makes up part of the special chemicals sector of the chemical engineering industry, and although it has a relatively small market value compared to the petrochemical industry, it has a much higher added value. Electronic materials are at the intersection of the chemical engineering and electronic industries.

So-called electronic materials are a very big family and may contain a wide range of items used in semiconductors, LCDs, PCBs, batteries, recording media, passive components, fiber optics and the like. The electronic materials in this article are any substance used in the production of semiconductors, LCDs, IC packaging, solar cells, or lithium ion batteries, or that feature photoelectric functionality, or change the electrical properties of the products containing it.

Source: ITIS Program, IEK of ITRI (2012/12)

Figure 2-4-1 Scope of the electronic materials industry

Chapter 5 Telecommunications Industry

ITIS Program, IEK of ITRI

Mei-Ling Chen

Introduction

The structure of the telecommunications industry in Taiwan can be divided into the chipset, design and manufacturing, branding, and the end customers. Mobile phone, WLAN, and DSL IC designers are the larger players in terms of key chipsets. Design, manufacturing vendors of each sub-industry are all major partners of international brand equipment vendors. Mobile phone, GPS, switch, and WLAN equipment are the branded products with the greatest market success. End customers include telecom operators, enterprises, and retail channels.

Among the telecommunications services in Taiwan in 2012, mobile communications (57.42%) ranked at the top, followed by Internet and value-added services (13.73%), local telephone services (11.63%), circuit leasing services (8.77%), international telephone services (6.1%), long distance telephone services (1.82%), and MOD (0.53%); wherein the ratio of local telephone services improved significantly due to the power of pricing being returned to the fixed-line operators for landline-to-mobile calls.

Within the telecommunications equipment industry in Taiwan in 2012, the main products included mobile phones, GPS, WLAN, Ethernet LAN switch, DSL CPE, Cable CPE, and IP STB, combining to make up 91.3% of the industry. Among them, the mobile phone sector (45.44%) was top....

Chapter 6 IT Industry

ITIS Program, MIC/III

Chun-Hui Hong

External uncertainty factors such as Europe and America's poor economic performance meant that Taiwan's IT industry as a whole did not perform as well in 2012 as it did in 2011. Due to the economic weakness of the West as well as China's weak exports and the ending of domestic stimulus programs, the global IT hardware industry did not grow as strongly as expected either. Market interest in emerging products such as tablets remained strong, however. Cloud computing also stimulated demand for servers and data center construction, and so provided Taiwanese vendors with more OEM opportunities. As a result, Taiwan's IT hardware industry grew by 8.8% in 2012 and had a total value of USD 150.75 billion. As for the IT software industry, the poor economic climate meant businesses became relatively conservative on IT investments. However, with the rise of emerging IT applications such as cloud computing and virtualization as well as the continued interest in IT security issues, Taiwan's IT software industry still grew by 10% in 2012 to reach USD 5.26 billion.

Section One: The IT Hardware Industry

Introduction

Chapter 7 Machinery Industry

ITIS program, IEK of ITRI

Li-Lun Yeh

Introduction

The machinery industry is fundamental to a wide range of applications. The machinery industry this paper refers to is defined as the equipment and auxiliary equipment used directly or indirectly for making products or providing services. It includes metal processing machinery, industrial machinery, general production machinery, power machinery and machinery components. It can be further classified into metal processing machinery, industrial machinery, specialized production machinery, electronics production equipment, general machinery, transportation and automation equipment, metal moulds and other machinery and parts.

The global machine tool industry has a history of a few decades, with Japan, Germany and China accounting for over 50% of the market share. Japan and Germany are almost the exclusive providers of high-precision machine tools. Taiwan has 5~6% market share in the global machine tool market, similar to Korea in terms of market presence, and is mainly competing against Italy and China. The Taiwanese machine tool industry is mainly clustered in Taichung and it has a comprehensive centre-satellite system. It is self-sufficient from the supply of ball screws in the upper stream to the assembly of machine tools in the downstream. In fact, Taiwan is the third largest exporter of ball screws globally. The machining centre segment reported a production value of over USD 2.02 billion, also a major supplier to the global demand....

Chapter 8 Automotive Industry

ITIS Program, IEK of ITRI

Jui-Sheng Hsiao

Introduction

The automotive industry

This chapter examines the 2012 annual performance of the three sectors of Taiwan's automotive industry (i.e., the complete automobile sector, auto parts sector and complete motorcycle sector) in terms of scope, supply chain, current conditions (including production forecasts and sales figures), value-added ratio, major concerns and potential products/technologies. In the final section of this chapter are conclusions about the growth prospects of, and trends in, Taiwan's auto market in 2013.

Connections among Taiwan's automobile industry in the upstream, midstream and downstream of the supply chain

Taiwan's complete automobile manufacturers currently in operation include Kuozui motors, CMC, Yulon, Honda Taiwan, Ford Lio-Ho Motor and Shanyang motor. Of these, Kuozui motors, Honda Taiwan and Ford Lio-Ho Motor are headquartered outside Taiwan. In June 2011, Auto 21 discontinued production of the models it introduced from its China-based partner Chery Automobile. Taiwan Isuzu motors also discontinued their car products one month later. Yulon is known for its multi-brand OEM services and currently manufactures for such brands as Nissan, Luxgen and tobe. Figure 2-8-1 shows the connections in the Taiwan complete automobile supply chain.....

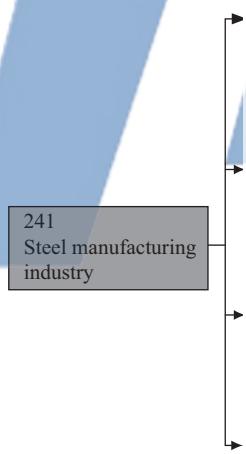
Chapter 9 Steel Industry

ITIS Program, MIRDC

Chien-Jen Chen

Introduction

In terms of steel material processing method, Taiwan's steel industry manufacturers can be divided into blast furnace plants, electric furnace plants and rolling mills; the steel products manufactured can also be classified in terms of material into carbon steel and special steel. According to data from the Industrial Census Report released by the Ministry of Economic Affairs, there are 732 steel manufacturers in Taiwan, with a total of 48,306 employees.



Source: Directorate General of Budget, Accounting and Statistics, Executive Yuan (2010/03)

Figure 2-9-1 Scope of the steel industry

Carbon steel

China Steel Corporation (CSC) Group is the only integrated steel plant in Taiwan that makes steel with blast furnace/oxygen converter. Blast Furnace 1 of Dragon Steel Corporation

Chapter 10 Non-Ferrous Metals Industry

ITIS Program, MII/MIRDC

Kuan-Chih Hou; Sheng-Chieh Chang; Yu-Ruei Syu; Che-Cheng Yeh

Non-ferrous metals applied to structural materials mainly include: aluminum, magnesium, titanium, copper, zinc, nickel, lead, tin, etc. The non-ferrous metals industry is knowledge and technology intensive, with low energy dependence (compared with the steel industry), high added value and industry relevance. It is able to drive the continuous development of related industries as well as assist with the transformation and upgrading of traditional industries. In terms of demand, the top six non-ferrous metals in Taiwan are: copper, aluminum, nickel, zinc, magnesium and titanium.

The gross output of Taiwan's non-ferrous metals smelting and primary processing industry (excluding forging, stamping and machining) for 2012 was estimated at around USD 8,547 million, a decline of 8% compared with 2011. There were approximately 400 manufacturers. The output of copper products was USD 2,215 million, accounting for 26% of the gross output, aluminum casting products and aluminum products made up 17%, magnesium products 0.6% and other non-ferrous metals 41%. The decline in Taiwan's non-ferrous output in 2012 was mainly due to the global economy being impacted by such factors as the European debt crisis, the U.S.A.'s rising unemployment rate and China's....

Chapter 11 Petrochemical Industry

ITIS Program, IEK of ITRI

Chen-Cheng Fan

Introduction

An overview of the petrochemical industry

Using light oil (aka. naphtha) or natural gas as the raw material in the naphtha cracking process, petrochemical firms produce basic raw materials such as ethylene, propylene and benzene, which are then processed into intermediate materials, namely plastics, rubber and fibers. Petrochemical manufacturing is one of the fundamental industries for national development and immensely benefits a country's economic growth. Not only are products from the petrochemical supply chain's lower end applied extensively to everyday necessities, this particular industry is also closely linked to people's everyday life as well as a country's high-tech sector, accounting for 60%-70% of the hardware of precision products (e.g., information technology, electronics and automobile items) including spare parts, outer casings, tires and chemicals. Consequently, how well the petrochemical industry fares is inseparable from people's buying power and also deeply affected by the sales results of construction, automobile and high-tech companies.

The characteristics of the petrochemical industry

Chapter 12 Specialty Chemicals Industry

ITIS Program, IEK of ITRI

Chih-Chung Liu; Yu-Chen Chen

Introduction

The chemical industry is fundamental to various industries, such as plastics, rubbers, automotive, and consumer electronics. Chemicals are classified into two major categories, i.e., bulk chemicals and specialty chemicals, as illustrated in Table 2-12-1. Bulk chemicals are characterized by pure substance, mass-production and low margin. On the other hand, specialty chemicals could be pure substances but are usually a formulation composed of several chemicals. Their function is to enhance specific characteristics of products, but they make up only a small proportion of the downstream users' costs. They are usually manufactured in batches and in small amounts, but their prices are higher than bulk chemicals.

Table 2-12-1 Categories of chemicals and their characteristics

Categories	Characteristics
Bulk chemicals	
Specialty chemicals	

Source: ITIS Program, IEK of ITRI (2012/12)

As indicated by the statistics of "chemical manufacturing industries", collected by the Department of Statistics, Ministry of Economic Affairs (MOEA), the category of specialty chemicals includes six major product areas; these are plastic additives, pigments & dyes,

Chapter 13 Textile Industry

ITIS Program, TTRI

Kai-Fang Cheng; Chieh Min; Hsin-Huang Lee;

Shu-Ting Wang;Yu-Cheng Liu; Chia-Yu Wu

Introduction

The scope of the textile industry

The range of activities covered by the term "textile industry" is extremely broad, whether viewed in terms of the sub-industries that make up the textile industry, or the different types of production processes used. The textile industry as a whole can be considered to encompass six broad categories – the textile materials industry, the yarn industry, the woven fabric industry, the dyeing and finishing industry, and the finished product manufacturing industry – as well as the related electromechanical, chemical engineering and instrument manufacturing industries. As a result of the advances made in science and technology in recent years, the textile industry now produces far more than just clothing and interior furnishings products; there has been rapid development of a wide range of new uses for textiles, including various types of industrial, agricultural, construction, filtering, medical, military, protective, textile structural composites, transportation, sporting and entertainment applications. It is these new applications that will constitute the main focus of the textile industry's future development (Figure 2-13-1).

The diversified textile manufacturing processes indicates the complexity and richness of textile technology applications and human resources. In practice, the structure of the textile industry includes textile production machinery manufacturing, textile industry related IT applications, pollution prevention, analysis and appraisal services, production management, the production of chemicals for use in textile manufacturing, and so on....

Chapter 14 Biotechnology Industry

ITIS Program, DCB

Shu-Hui Luo

Introduction

In the United Nations Convention on Biological Diversity, Biotechnology is defined as: "any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for a specific use". In the context of Taiwan's industry, biotechnology can also be defined as "applications based on life sciences and technologies (e.g. genomics, proteomics, genetic engineering, cell engineering, cell culturing, fermentation engineering, enzyme transformation etc.) for the research, development, manufacture and improvement of products which improve the quality of human life". In Taiwan, biotechnology covers a wide range of applications, with products grouped into eight categories: Biopharmaceuticals (also called: biotech drugs, biological drugs and biotech medicine), Regenerative Medicine, Medical Diagnostics, Specialty Biochemicals, Agricultural Biotech, Food Biotech, Biotech/Pharmaceutical Services and Environmental Biotech (Table 2-14-1).

Table 2-14-1 Taiwan's biotech sub-industries and products/services

Sub-Industry	Biotech Products/Services
Biopharmaceuticals	
Regenerative Medicine	
Medical Diagnostics	
Specialty Biochemicals	
Food Biotech	

Chapter 15 Pharmaceutical Industry

ITIS Program, DCB

Shu-Hui Luo

Introduction

Taiwan's pharmaceutical industry focuses on medicines for human use, which can be divided as: raw materials, western formulated medicines and Chinese medicines. The western formulated medicines can be further divided into small-molecule drugs and biologics. In accordance with the various regulations and requirements for evaluation and registration of clinical trials, Chinese medicines can be further divided into: traditional prescriptions, non-traditional prescriptions, and plant extracts. The main categories of pharmaceutical products in Taiwan are shown in Table 2-15-1.

Table 2-15-1 Main categories of pharmaceutical products in Taiwan

Category	Main Products
Raw materials	
Western formulated medicines	
Chinese medicines	

Source: ITIS Program, DCB (2013/01)

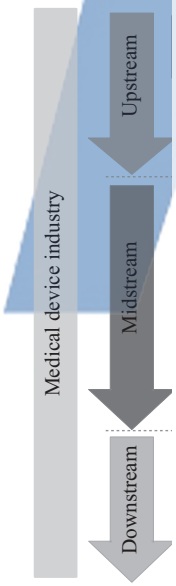
Chapter 16 Medical Device Industry

ITIS Program, IEK of ITRI

Tsz-Yin Chang; Yu-Bin Huang; Yi-Hsin Lin

Introduction

There are many kinds of technologies used for medical device products. This interdisciplinary industry integrates biomedical, electrical and electronics, semiconductors, information, software, optical and precision instruments, chemicals, materials, mechanical devices and so forth. With the coming of an aging society, the demands of many medical care and healthcare fields have increased and this is expected to promote the prompt growth of the global medical device market.



Source: ITIS Program, IEK of ITRI (2012/12)

Figure 2-16-1 The structure of the medical device industry

The medical device industry is a special industry encompassing a wide range of products. There is no common global definition. The definitions of a medical device in Taiwan

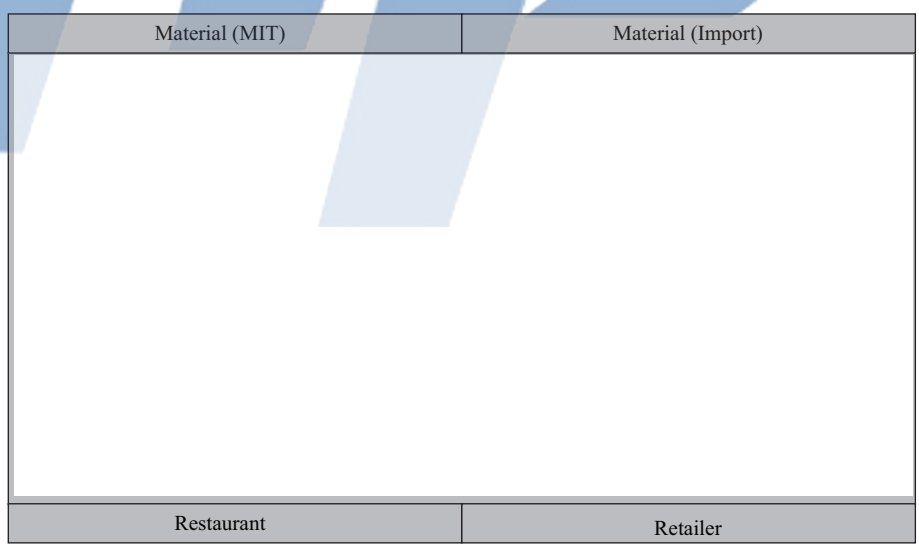
Chapter 17 Food Industry

ITIS Program, FIRDI

Li-Ting Chen

Introduction

Despite the maturity of Taiwan's food market, the solid operating management and technical skills, sharp market observation, effective vertical integration of upstream and downstream, and division of labor model have established good characteristics and value for the long-term development of Taiwan's food industry (Figure 2-17-1). In the last 20 years, Taiwanese food manufacturers have continued expanding their business territory in Mainland China and Southeast Asia, mastering the international market trends and consumer demand. Leveraging their power to strengthen their overseas layout will be another important development opportunity for Taiwan's food industry, as Taiwan's food manufacturers gradually step from Mainland China and Southeast Asia to India and other emerging markets.



Source: ITIS Program, FIRDI (2013/01)

Figure 2-17-1 Taiwan food industry structure

Emerging Industry Insights

- LED Lighting Industry
- Photovoltaic Industry
- Wind Power Industry
- Electric Vehicle Industry
- Green Building Industry
- Cloud Computing Industry

Chapter 1 LED Lighting Industry

ITIS Program, IEK of ITRI

Meng-Chiao Huang

Introduction

The history of LED development dates back to the 1960s. In the early phase, optical communications for aerospace and military applications were the focus for LED development. As LEDs have long been recognized for their low cost and simple production process, it was perceived as the alternative light source of choice for laser diodes. Over time, the LED ecosystem gradually formed with a range of possible applications. Business signage and displays became the main applications for the market.

The luminous efficiency of LED has greatly increased in recent years. The Nichia Corp announced in 2009 that it had developed the white LED bulb with a luminous efficiency of 249 lm/W, and for commercial applications, the level of efficiency can reach 150 lm/W, which is far higher than the current incandescent light bulbs or fluorescent lamps.

LED lighting refers to lighting systems that use LED as their light source. Applications include: residential, office, shop, hospitality, industrial, outdoor and architectural lighting.

Table 3-1-1 Main application realms of LED lighting

Field/Application	Description
Residential	
Office	
Shop	

Chapter 2 Photovoltaic Industry

ITIS Program, IEK of ITRI

Meng-Chieh Wang; Fan Ting

Introduction

The photovoltaic (PV) industry is an industry of diversified and loosely connected technologies with a very large scope. In general, any device that generates electrical power from sunlight can be called a PV product.

There are two types of PV devices: flat panel and concentration type with the former being the most popular one for the time being. The flat panel PV products include silicon, thin film silicon, compound chemical thin film (CdTe and CIGS technology), and the organic type (dye-sensitized cells and organic thin film cells). Among these flat panel products, the silicon product industry is top in both scale and completeness of industry chain. The PV industry is composed of five sectors; these being - from upstream to downstream - polysilicon, silicon ingot/wafer, cell, module, and system, (Figure 3-2-1).

Source: ITIS Program, IEK of ITRI (2012/12)

Figure 3-2-1 Scope of the PV industry

The PV industry took off in 2004 when the German government set up a comprehensive feed-in tariff (FIT) for renewable power which led to explosive global growth in the PV industry, as many of Germany's citizens installed PV systems for power revenue. In recent years, domestic industries have also started growing by combining existing core competencies

Chapter 3 Wind Power Industry

ITIS Program, IEK of ITRI

Chih-Chien Kang

Introduction

Global accumulated wind power nameplate capacity for 2011 was 240.0 GW, amounting to a 20.3% growth from 199.5 GW in 2009; newly installed capacity for 2011 totaled 40.6 GW, amounting to 2.9% growth compared to 39.4 GW in 2010. As of the end of 2011, China, the United States and Germany were the world's three foremost nations in terms of accumulated installed wind power nameplate capacity, generating 62.2 GW, 46.9 GW and 29.4 GW, respectively. When calculating newly installed capacity, China, the United States and India were the three foremost nations in newly installed capacity worldwide for 2011. Of the three, China and the United States saw new increases of 17.4 MW and 6.6 GW respectively. These two countries accounted for 59.3% of total newly installed capacity worldwide, and there is quite a gap between the newly installed capacities of other countries when compared to the top two countries.

Overview of the Wind Power Industry in 2012

Taiwan's wind resources can be found on the west coast and offshore islands such as Penghu with an annual average wind speed reaching 5~6 m/sec and more than 2,500 hours of equivalent full load generation, which is considered plentiful. According to Industrial Technology Research Institute estimates, Taiwan's land based wind power development potential is 1,200 MW and offshore wind power development potential is 6,200 MW, for a total development potential of 7,400 MW....

Chapter 4 Electric Vehicle Industry

ITIS Program, IEK of ITRI

Chih-Yang Chen; Tsu-Yu Chao; Hsueh-Lung Lu

Introduction

In general, vehicles that are powered by electricity can be referred to as electric vehicles. Based on the power system adopted as well as the type of energy supplied, electric vehicles can be further categorized into Hybrid Electric Vehicle (HEV), Plug-in Hybrid Electric Vehicle (PHEV), Battery Electric Vehicle (BEV), and Fuel Cell Electric Vehicle (FCEV) as shown in Figure 3-4-1.

Electric vehicles

Hybrid Electric Vehicle (HEV)

Besides having a conventional internal combustion engine, a Hybrid Electric Vehicle (HEV) is equipped with batteries and an electric motor. Its batteries, however, cannot be charged by an external power source. As for the internal combustion engine, this is fueled by gasoline or diesel much like in conventional cars to power the wheels of the vehicle. Depending on the system design, the batteries and electric motor are capable of providing all or part of the following functions: idle stop, brake regeneration, power assistance, and pure-electric drive. Hybrid Electric Vehicles (HEV) can be further divided into Micro Hybrid, Mild Hybrid, and Strong Hybrid, depending on the degree of electric-power assistance offered.

Plug-in Hybrid Electric Vehicle (PHEV)

Chapter 5 Green Building Industry

ITIS Program, IEK of ITRI

Su-Chin Lin

Introduction

It is inevitable that people spend a great portion of their lifetimes inside buildings, including residences, offices, etc. Therefore the pursuit of buildings that provide living comfort and feature environmental compatibility at the same time has gained more and more attention resulting in the development of green buildings. In Japan, green building is called Environmental-coexistence building; while the term "green building" is used mainly by North American countries. The Architecture and Building Research Institute of the Ministry of the Interior defines green buildings as those featuring ecological, energy saving and waste reduction functionalities. The scope of the green building industry comprises 4 major sectors as shown in Figure 3-5-1.

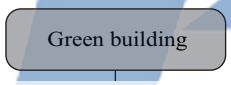


Figure 3-5-1 Scope of the green building industry

Green building evaluation indexes

The green building evaluation criteria of different countries vary due to deviations in geographic nature, climate and environmental conditions. However, major items of evaluation systems are quite similar in most countries. Taiwan also has its own evaluation system and indices that can be divided into 4 groups and 9 indices, known as the EEWH System, detailed as follows:

Chapter 6 Cloud Computing Industry

ITIS Program, MIC/III

Wei-Hsiu Weng

Introduction

The concept of cloud services has gained in popularity with the development of innovative web services on the Internet. Businesses have gradually migrated their computing resources from their own server rooms to service providers. Internet users are now actively creating and sharing content instead of just passively browsing, and thanks to the popularity of mobile devices, it is now easier than ever to share and access information. Users have therefore been encouraged to move their data from personal computers to the data centers of cloud service providers. To provide a more reliable and responsive service, service providers must upgrade their computing capacity and storage space as well as develop all new service architecture in order to meet user requirements.

Cloud computing is an innovative technology that is continuing to be developed due to this trend. Cloud technology not only offers ordinary users greater convenience and flexibility, but also allows businesses to integrate their basic IT infrastructure, introduce different types of services and increase their computing capacity. By 2016, more than half of the global top 1000 enterprises are expected to store sensitive customer data in public clouds. Innovative cloud computing technologies will also play an increasingly important role.

The cloud computing industry is very broad in scope as it includes the IT hardware and IT software service industries. The industry can be divided into two parts if the data centers that provide cloud services are used as a reference. One part is the “Cloud Technology”....

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2013 TAIWAN INDUSTRIAL OUTLOOK

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