

Part 2

Policy

## **Suggestions and Major Items for Industrial Policies in Cambodia**

### **Background**

Cambodia's economy has developed dramatically under the framework of the Rectangular Strategy for Growth, Employment, Equity and Efficiency and the National Strategic Development Plan 2009–2013. Its economy has also recovered to some extent from the severe global financial crisis in 2008, leading to increased confidence for the next development stage.

The economy is facing a turning point : It must take the next step of preparing for the Association of Southeast Asian Nations (ASEAN) integration and the Greater Mekong Sub-region (GMS) development by building up its foundations to compete with other emerging economies in the region, and by increasing its resilience to the global macroeconomic situation. The challenge for Cambodia is to catch up with its neighboring ASEAN countries' level of economic development, and to increase its presence in the global economy.

As global attention on Cambodia's potential has been growing in recent years, foreign direct investment (FDI) has started expanding. It is vital for Cambodia to strengthen its industrial sector with the manufacturing sector as the core and to diversify the industrial structure. Cambodia must now properly prepare to receive the capital inflow and to take full advantage of it to further strengthen its economy. An industrial development policy must be developed to provide direction for Cambodia's further economic development through industrialization.

## **CHAPTER 1 Overview of Major Characteristics of Cambodia's Current Industrial Situation**

For sustainable economic growth, Cambodia must allocate necessary resources optimally and improve efficiency of its economy. The experiences of East Asian countries of economic growth shows that this kind of economic growth is not achievable without strengthening the industrial basis which generates technological innovation.

From these aspects, the problems and issues Cambodia's manufacturing sector is facing are identified: Based on the analysis, the further analysis should identify the problems of Cambodia's investment climate as the premises of FDI promotion.

### **1.1 Highlights of Key Issues in the Current Manufacturing Sector**

The manufacturing sector in Cambodia still has a relatively limited share in GDP, accounting for 14.9%, while it had a higher share in neighboring countries, ranging from 20% in Vietnam, 25% in Malaysia and Indonesia, to 30% in Thailand<sup>1</sup>. Reliance on the importation of manufactured products is also high, reflecting the limited scale of the domestic manufacturing sector. The trade imbalance accounts for USD 1.6 billion, which is 12.4% of GDP.

Leading sectors in the manufacturing sector are garments and footwear, the production value of which accounts for 64.5% of the entire manufacturing sector. Their major activities at present are labor-intensive and simple cut, make, and trim (CMT) assembly which are vulnerable to the international market situations. Moreover, with the limited level of localization of the sector, there is concern that they could move out and/or be shut down relatively easily by a change in economic conditions, including an increase in labor costs.

Foreign capital-related companies are the major driving force in the manufacturing sector. More than 90% of major garment and footwear companies are owned by these foreign companies. The amount of inflow of FDI is further increasing. The share of the value of foreign investors' projects on Qualified Investment Project (QIP) increased from 70% in 2007 to 90% in 2011. However, it is still difficult to identify successful business linkages between foreign invested enterprises (FIE)<sup>2</sup> and domestic manufacturers.

Another characteristic of Cambodia's industrial structure is predominance in the number of small and medium-sized enterprises (SMEs), with 95.6% of business establishments being SMEs in the industry sector.<sup>3</sup> Sectors in the area of MSMEs are often not clearly recognized as forms of "industries". Majority (over 80%) is regarded as being engaged in food processing. However, the business and technical levels of operation may not be high enough to be regarded as "manufacturing" due to their inadequate technical and managerial capacity. Further, most of these industries remain fragmented as individual small businesses,

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<sup>1</sup> As shown in Petty-Clark's Law, figures for Malaysia and Thailand were considered to have already reached the peak. Peak figures: Malaysia 32.7% (2000), Taiwan 39.4% (1986), Korea 31.9% (1988), Japan 36% (1970)

<sup>2</sup> In this report, "FIE" refers not only to foreign assemblers but also other foreign manufacturers.

<sup>3</sup> 99.8% in total establishments according to the Economic Census 2011.

and are left out instead of being integrated into the broader value chains (VC), which may eventually be connected to global supply chains (SC).

## **1.2 Highlights of Key Issues on the Investment Climate**

Competition in acquiring FDI and establishing a position as a major industrial agglomeration is further fueled by the emergence of several new economies within and outside the ASEAN region. While China has established production centers and a market of manufactured goods, ASEAN is emerging as an enlarged production center and market through greater economic integration. As a means of connecting major economies such as Japan, China, and now emerging India, ASEAN's role is becoming increasingly significant.

The location of recent FDIs, including some expansion of currently existing production capacity, shows two distinctive trends, namely: one flow of FDI may be concentrated in the already established industrial areas; and another looks for the opportunities in rather new destinations. The cycle of investment and re-investment may be created through the momentum of agglomeration. It should be noted that one foundation established in one location may induce the investment in the vicinity rather than in remote areas. Through tremendous efforts, FIEs accumulate knowledge about the invested countries with human resources and confidence fostered. This knowledge based on the experience regarding the understanding of the nature of the markets, labors and the institutional structure of the country for improvement of quality, cost, and delivery generates further investment. For the relatively new investment locations such as Cambodia, the role played by FDI for establishing a nucleus of industrial agglomeration is significant. Hence, confidence of the investors in the business operation is required in order to accelerate the flow of investment from these establishing or more established industrial agglomerations.

### **Addendum:**

The trend of Japanese FDI's location in Thailand and Vietnam as well as the examples of investment outside of the core industrial agglomeration areas in both countries indicates the momentum of agglomeration in both countries. Though such examples of the investment outside of center of industrial agglomeration are still limited, it indicates the possible expansion of the variety of products to be produced in Cambodia. The importance of soft and hard infrastructure should be underlined to take the full advantage of this opportunity<sup>4</sup>.

In order to promote FDI to form an industrial agglomeration, it is necessary for Cambodia to strengthen the competitiveness as an industrial location. In comparison of the cost factors of investment with the major industrial agglomerations and the surrounding areas in neighboring countries, the major advantage of Cambodia is relatively inexpensive labor<sup>5</sup>. The major bottlenecks, however, have been identified in such areas as the prohibitive cost of electricity as well as the instability of its supply. While attracting the kind of industries which requires cheap and abundant

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<sup>4</sup> Please see the detail in ANNEX 1

<sup>5</sup> "Discussion Base" attached to this paper provides comparison of cost factors among neighboring countries.

labor or not sensitive to the price and quality of electricity, this may hinder the investment in more sophisticated industries which utilize industrial machinery. Despite multiple modes of transportation, logistics costs remain relatively high in comparison with neighboring countries. As demand is increasing for a quality labor force, many FIEs are facing problems with supplying the required number of workers. To secure a sufficient and quality labor force, the factories are forced to undertake extensive recruitment activities in addition to in-house training. The availability of quality engineers and middle management personnel has been a chronic problem.

With regards to investment-related laws and regulations, namely the Law on Investment of the Kingdom of Cambodia, Sub-decree nos. 111, 147, and 148, the current legal framework has provided an organized foundation for FDI, and is at the stage to ensure their steady implementation<sup>6</sup>. Further strengthening is required in the area of services responding to the issues arising after certifications. For example, the quality of operation and/or management in some SEZs is inadequate. Through improving these situations, the satisfaction and confidence of already-existing investors can be ensured. It is crucial for Cambodia to encourage and accelerate the expansion (re-investment) and sophistication of existing investors and to attract a wider range of new investors<sup>7</sup>.

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<sup>6</sup> Though the legal systems for investments are basically developed, there still are arguments of amendment of investment laws and those of SEZ legislation as discussed in 4.1.3 and 4.1.1.

<sup>7</sup> Section 3.4 of Chapter 3 in Part 1 emphasizes the importance of keeping “good reputation” in response to existing investors’ requests.

## **CHAPTER 2 Vision**

The ultimate goal of Cambodia's industrialization is to bring better life and prosperity to all people, through achieving full employment and improved productivity. Industrialization should be realized through effective integration into the regional and global economies. In the year 2020, Cambodia's industries will be part of the global value chain (GVC), with the Eastern Asian and ASEAN region remaining as one of the cores. The position of Cambodia in GVC should be solid with an increased ability to produce goods with increased value-adding. Whereas, wealth may be effectively created through expanded goods exports partially along the network of GVC, people should enjoy an improved quality of life with stable employment and access to quality goods and services. In pursuit of this goal, this report sets forth the following vision.

Double per capita real GDP of USD 1700 (USD 830 in 2010) in 2020<sup>8</sup> through industrialization is the primary goal of the next development plan. It is estimated that the manufacturing sector's share in GDP should reach 25% (from 14.9% in 2011) in order to achieve the goal. . Furthermore, the size of manufacturing value-added in the targeted year is estimated to reach USD 66.3 billion (at constant 2010 prices) from USD 1.65 billion in 2010.

In 2020, the goal is to be achieved on the solid basis of self-sustainable economic development. For Cambodia's self-sustainable economic development, the manufacturing sector plays a major role, strengthening industrial capacity through FDI, raising the domestic manufacturing sector to a level of global competitiveness, and diversifying the sector to contribute to sustainable economic development. This foundation, together with the initial goal, will be the basis of further policy formulation into the year 2030, when it is expected that the manufacturing sector's share will reach 32% of GDP.<sup>9</sup>

### **Addendum:**

This report consists of the industrial strategy and a set of industrial policies to be implemented by the Royal Government of Cambodia (RGC) in 2020. The RGC aims to double its per capita GDP in 2020, an aim that can be regarded as the country's economic vision. To double its per capita GDP in 2020, it is necessary to continue its economic growth at 7.5% per annum until then. This real growth rate corresponds fully to Cambodia's potential growth rate.

The vision of "double per capita GDP in 2020" is feasible if the Cambodian economy is growing sustainably, with a well-balanced demand and supply. The quality of the Cambodian people's lives will be enhanced and the national capability of Cambodians will increase in line with this vision.

There is a strong need to attract FDI in Cambodia because its savings and investment capacity is not very high. The FDI's contribution shall be considered as the driving force of industrialization in: i) improvement in the balance of payments by increase in exports; ii) improvement in savings and consumption through

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<sup>8</sup> The framework of the double per capita GDP in 2020 is set by SNEC in the "Outline of Industrial Development Policy. The significance of "double per capita GDP in 2020" is its policy direction to take a leading position among late comers to ASEAN membership in 2020.

<sup>9</sup> For the detail of the methodology for estimation, please see Appendix 1.

increase in employment and income; and, above all, iii) bringing up domestic industries through technology transfer. Through these processes, Cambodia's investment capacity in the domestic market will be enhanced and the foundation for sustainable development of the manufacturing sector will be strengthened.

The year 2020 is just a waypoint between 2010 and 2030. It is crucial to place the 2010s (2011–2020) within the long-term time frame and to recognize the trend of industrial development until 2030.

Cambodia is expected to maintain its high potential growth rate in the 2020s. This is because the dependency ratio of Cambodia will be on the decline during the decade, unlike those of other East Asian countries. The real economic growth rate of the 2020s is forecasted to be as high as those of the 2010s, and per capita GDP of 2030 will double from that of 2020.

The manufacturing sector ratio of Cambodia in GDP is expected to be approximately 32% as of 2030. The ratio for Cambodia is getting closer to that of previous peaks for East Asian industrial countries. In the process of industrialization, the increasing rate of the manufacturing sector ratio tends to slow down, because technological progress brings about an increase in service expenditure of industrial production as well as a relative reduction in the prices of industrial products.

In the process of economic development, the structure of the manufacturing sector is diversified from the simple labor-intensive sector-dominated to technology- and labor-intensive sector-centered and further to knowledge-intensive sector-centered.

The direction of manufacturing development in Cambodia towards 2030 can be described as follows:

- 1) Leading industries in the 2010s: simple labor-intensive manufacturing:
  - In addition to the garment and footwear industry, the initial base for the supporting industry is provided by the machinery assembly and processing sectors (assembly of motorcycles and processing parts for motorcycles and cars, electrical and electronic parts, assembly of precision machinery, and manufacturing of plastic products);
  - The base for agro-industry will be formed.
- 2) Leading industries in the 2020s: technology and labor-intensive manufacturing.
  - Develop and upgrade the production process of the above machinery assembly and processing sectors.
  - Gradually expand information- and knowledge-intensive production.
  - Development of agro-industries - sixth industrialization (primary industry x secondary industry x tertiary industry)

## **CHAPTER 3 Strategy**

### **3.1 Overview of Strategies**

This report focuses mainly on FDI and SME as major and urgent policy issues in industrial development policy. It will discuss the strategy and policy measures in light of the points raised below. Furthermore, cross-cutting issues related to the both areas will be discussed in the Chapter 5.

- FDI is the leverage and core driving force for Cambodia's industrial development through achieving structural change and diversification;
- It is recognized that domestic industries is the foundation for industrialization. Regarding the predominance of SMEs in the number of manufacturing enterprises in Cambodia, building the capacity of SMEs and their promotion is an essential and significant factor of the industrial policy in the medium- to long-term while certain immediate actions should be taken in the short run as preparation to the medium- to long-term strategies.

#### **(1) FDI**

With the embryonic state of industrialization in Cambodia, FDI has a crucial role in introducing new technology and managerial expertise as well as channels for the global market to enter Cambodia. FDI should therefore be recognized as the initial and major ignition to launch industrial development and, at the same time, the major channels of outside demand, technology, and knowledge. Newly emerging competitor economies in the region such as Myanmar are still at the initial stage of economic reform. It is essential for Cambodia not to miss the opportunity of recent dramatic increase of FDI inflow, and to take full advantage of it by facilitating the necessary policy framework for FDI promotion. As the investment climate will be changed after the ASEAN market integration in 2015, it is also critical to strengthen the concrete foundation for accommodating FDI before the targeted schedule. Therefore, it is an urgent issue to undertake necessary policy measures regarding FDI in the context of industrial policy at present.

Cambodia needs not only to maintain FDI inflow in general, but also to promote the flow of "quality FDI" which will serve as the impetus for Cambodia's industry to broaden and diversify its base. As far as FDI is concerned, quality is the first priority regardless of the sector/subsector. The domestic manufacturing sector, therefore, must be flexible and versatile to respond to the needs of FDI in a variety of sector. The competition among possible industrial locations within the ASEAN region is intensifying with strengthening economic integration. Therefore, the rapid and proactive improvements to an enabling environment for business operation should be further explored to encourage FDI to select Cambodia as an industrial location.

Although still severely limited, the potential of domestic manufacturers in possible sectors becoming part of the supporting industries for FDI-launched supply chains has been observed. Enterprises in sectors in the line of forward and backward linkages<sup>10</sup>, and/or with possibility of being suppliers to FIEs, should,

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<sup>10</sup> Section 2.2.3 of Chapter 2 in Part 1 defines the supporting industries in the context of this study and emphasizes the importance of forward/backward linkages.



thus, extensively build their capacity to establish linkages and localize a part of their value chains.

(2) **SME**

Majority of Cambodia's manufacturing enterprises consists of SMEs. SME is the basic foundation for economic activities, including generation of employment. Thus, SME promotion is essential to ensure that SMEs play the roles of forming seedbed for industrialization and eventually serve efficient supporting functions to the larger scale industries. It is, and has been, the medium- to long-term task to promote SMEs; however, the recent increase of FDI in Cambodia, as well as the rapid change in global economic situation requires acceleration of SME promotion. It requires some time until SMEs become the viable economic foundation for industrialization. Therefore, SME promotion is another urgent industrial policy that should be initiated and tackled.

There are at least two significant factors to be focused on in the SME promotion policy. One is the size of enterprises, and the other is the viability of sectoral linkages with FIE. The SME promotion policy in general includes various aspects in order to bottom up the overall industrial base targeting the smallness of management and operation of enterprises rather than sectors. However, in the context of industrial development policy, the SME policy area has to be focused more specifically on sectors to be promoted in order to ensure efficient linkage with the larger-scale industries, including FDI/FIE.

SME promotion is often discussed in the context of social and/or rural development policies. However, since SME promotion is the basic foundation for the development of the manufacturing sector, this report outlines a policy direction for SME promotion primarily informed by an industrial policy perspective.

While SMEs as a whole are promoted and strengthened, certain potential and emerging sectors, such as the possible future supporting industries to FIEs, are to be focused on. The strategies encompassing this principle should be designed in the context of SME promotion integrated into the industrial development policy.

(3) **Supporting Policies**

With regards to the cross-cutting issues referred to as "Supporting Policy" in Chapter 5 of this report, various existing policies and policy measures should be properly reviewed in light of consistency and/or complementarities with the industrial development policy throughout the formulation process. It is important to manage this issue not only in the context of individual objectives and provision of policies but also in the coordination and consistency with the objectives of attracting and/or managing FDI. Some elements of policies related to a business-enabling environment may contradict the interests of privately operating FDI<sup>11</sup>. Therefore, it is important to review supporting policies from the aspect of the ultimate policy objective of promoting quality FDI<sup>12</sup>.

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<sup>11</sup> For example, FIEs have commented that the "introduction of a policy on transfer pricing without having a concrete foundation of tax treaty provisions may have adverse effects on their operation and/or their ability to attract FDI" and, further, that "a sudden transformation in fiscal policy may cause confusion to FDI, the interests of which are rather to enjoy low risk on the stable exchange rate under current system in Cambodia".

<sup>12</sup> For example, FDI companies provided opinions such as "introduction of transfer prices without specific tax convention

(4) **Role of the Government**

The principle of the government's role in public policies should be strongly recognized in the industrial development policy in particular. In brief, its role is "to set the enabling environment limiting the intervention to correct market failure". In terms of the objective of setting the enabling environment, the government's role is to set the basis of economic and industrial development through the implementation of policy measures in such areas as human resource development, promotion of science and technology, facilitating physical infrastructure, and reforming its economic institution. These measures should function to provide clear future prospects to business communities and to support them to explore the frontier of industrial development utilizing their knowledge and creativity.

### **3.2 Strengthening Industrial Capacity by Promoting the Inflow of Quality FDI**

First, the investment climate is to be improved and upgraded to meet the quality requirements of FDI in order to continuously attract them. The provision of the most suitable condition for reducing the costs of all aspects of business operation is necessary. Priority should be given to a combination of the improvement of operations and logistical cost reduction through the improvement of hard and soft infrastructure.

- i) Instead of deploying nationwide attempts simultaneously at this stage, implementation concentrating on specific areas should be considered. In this regard, effectively designed industrial estates (I/E) with good quality physical infrastructure, management and services should be provided in sufficient capacity in locations that are most efficient for the intended production activities. Considering that governmental surveillance is legitimate for SEZs (Special Economic Zone), policy focus should guide SEZs as opposed to I/E in general to become leading models of quality I/E. Characteristics of SEZs should be determined based on tenants' objectives, and the facilities are to be designed accordingly.
- ii) A proactive area development policy should be pursued to support efficient operation of SEZs by laying out the necessary urban and regional infrastructure, including preferential electricity transmission, water supply system, transportation network, and solid and liquid waste management infrastructure. Housing development with basic public facilities and proper living environment for workers in the SEZs' surrounding areas is an integral part of the proactive area development policy.
- iii) One of the major factors which may affect FDI decisions regarding investment destinations is the perception of investors formed through the investment experiences of prior investors already operating in a certain new location<sup>13</sup>. Establishing a good reputation for Cambodia as a favorable investment destination is crucial in attracting further FDIs. Therefore, it is necessary to understand the operational conditions of FDIs already located in Cambodia and to improve the policy measures regarding the operational environment. Interviews and hearings to get the views of investors can be targeted to FIEs located in SEZs to start with, and extended to all QIP-approved FIEs in the medium- to long-term.

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make negative impacts on FDI companies' operation and it cannot be an investment incentive" and "sudden change of finance make FDI companies confused. The system which keeps stable exchange rates with relatively low risks in current financial market in Cambodia enables FDI companies to make more profits".

<sup>13</sup> Section 3.4 of Chapter 3 in Part 1 also emphasizes the importance of "good reputation" among existing investors.

Second, investment management has to be improved and upgraded. FDI has to be managed in such a manner as to attract more of those with the potential of promoting localization of the industry, generating employment continuously, technology transfer, and facilitating linkages with Cambodia's industries with GVCs, as well as contributing to social development. An investment with the potential of playing the above-mentioned roles can be defined as "quality investment". In order to upgrade investment management, it is necessary to strengthen the mechanisms to flexibly and promptly manage FDI to match with the policy objectives of domestic industrial development. Proactive marketing in this area is necessary. Thus, strengthening managing mechanisms and/or the investment promotion authority (IPA) is essential. As to specifying the priority targets for investment management, it is also important to promote a sector-based industrial unity where the initial and viable leading companies show interests. The task requires coordination among relevant ministries and organizations.

Third, facilitation and enhancement of technology transfer (T/T) is to be outlined. Technology transfer from established FIEs to domestic industries is the most effective means of taking advantage of FDI to ignite the development of domestic industrial activities. At the initial stage, a basic production and its management skills/expertise can be targeted for the objectives of T/T, such as T/T in an efficient assembly and production process, production management, and initial mechanization management. Further T/T of manufacturing techniques and technologies may be expected from FIEs supplying parts which may come accompanying or following the FIEs dealing with assembly. The T/T at this initial stage is often realized through training of employees.

Fourth, human resource development (HRD) targeting both workforce development and fostering middle managers should be further promoted. At the worker level, immediately adoptable practical skills and basic disciplines are expected to meet the requirements of FIE in the short-term. In terms of immediate requirements, the focus of HRD promotion should be on specific practical areas, such as accurate assembly skills and basic discipline for working in the factory, according to the actual needs of FIE. As FIE in-house training is often found to be a tailor-made training meeting specific skill needs of individual firms, HRD for industrial development should be discussed in the context of strengthening institutional and administrative capacity of the government. The policy should be balanced from both perspectives of employment and labor policy and investment promotion policy taking a balance between workers' welfare, benefits of investors, and employment promotion into the consideration.

### **3.3 SME Promotion Integrated Strategy**

First, it is essential that at least major viable sectors have to form industrial unities in order to operate more efficiently and effectively, enjoying economies of scale. It is also vital that different sectors are recognized within the scope of industrial policy. The current structure of the manufacturing sector has a somewhat scattered nature, with the exception of the garment, footwear, and rice-milling sectors. As for the initial approach, it is essential to promote and build sectoral scales of economic capacity in viable sectors. Facilitation in creating linkages between the sectors and GVC to expand "unities" should be the next task to be pursued. As explained in Section 3.1, it is important to facilitate and strengthen the linkage between

SMEs and GVC.

Second, in order to promote competitiveness in the manufacturing sector, strengthening basic productivity (efficiency and price competitiveness) and upgrading capacity should be tackled within clusters. Upgrading capacity aims at reaching the level that SMEs will generate original brands. An incremental approach is to be taken and regarded as the most essential element in SME promotion. Benchmarking of productivity to shift from efficiency to quality should be set initially at the basic level.

Third, access to technology should be the core element for all the strategic objectives described above. The aim is not to pursue high-end technology from the initial stage. Sharing information about basic skills and knowledge for efficient production, training opportunities, and/or even sharing manufacturing machinery can be regarded as access to technology. The governmental measures can be considered as catalysts for sharing information and opportunities which fit the level of development of SMEs.

Fourth, it has been recognized that “access to finance” is essential to promote SMEs as well as industrial development as a whole<sup>14</sup>. Together with the strategy already stated, a more focused approach with more solid linkage with industrial development policy should be considered to be applied to policy measures. Instead of tackling the improvement of the entire financial system, the policy in this context should rather focus on the financing scheme for SMEs in order to achieve the objectives of the industrial policy efficiently.

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<sup>14</sup> Access to finance will be discussed in Sections 4.2.4 and 5.3.

## CHAPTER 4 Policy Elements and Recommendations

### 4.1 Strengthening Industrial Potentials through FDI

#### 4.1.1 SEZ Upgrading

- i) In order to realize the efficient development of SEZs, a development plan should be laid out based on careful examination of plans in partnership with national and provincial authorities. The locations where SEZs are to be established require adequate zoning and the infrastructure to manage both the industrial activities and urban development of the area. This includes the living environment for workers such as housing, water supply, and waste management, as well as public facilities such as hospitals, schools, and public transportation, particularly for workers who are commuting. Special attention should be paid to electricity supply. Preferential distribution of electricity to SEZs with the installation of adequate generating capacity is given consideration. Encouraging private investments in power generation for the area surrounding SEZs is another option when industrial agglomeration with the development of the surrounding zoning is realized and where appropriate.
- ii) As a part of good reputation building:
  - a) The terms and conditions for the establishment of SEZs such as capacity, conditions, and the requirements for management of facilities should be reviewed according to the actual needs of existing tenants. If necessary, additional and/or improved terms and conditions should be prepared.
  - b) The function of the SEZ Trouble Shooting Committee (TSC) should be strengthened to be more user-friendly in order to respond flexibly and promptly to the issues raised by tenants<sup>15</sup>.
  - c) A monitoring scheme should be introduced and strengthened for the operation and management of certified SEZs as back up after-certification services.

#### **Addendum:**

Some SEZs are observed to be operated inadequately in terms of the maintenance of the infrastructure and provision of services. It is important to have effective surveillance mechanisms under the IPA for the appropriate conduct of operation of SEZs.

- iii) In order to serve particular needs of specific industries, specialized SEZs with tailored infrastructure and incentives should be considered for establishment<sup>16</sup>. The authorities could encourage SEZ operators to specialize in their zones through consultation, introduction of preferential measures in infrastructure, and promotion of FDI in the targeted sectors. The specialized SEZ may be designed

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<sup>15</sup> Infrastructure (electricity and water supply), conditions and maintenance of facilities, and other services (arranging workers, etc.) can be considered as issues of SEZs.

<sup>16</sup> For example, 2- to 4-hectare compartment areas of SEZs are suitable for the establishment of labor-intensive plants such as for the garment sector. On the other hand, more than 10 hectares are required for plants for the apparatus industry such as vehicle manufacturers. Certain sectors, such as optical lens manufacturers and weaving sectors, require large volumes of water.

according to the characteristics of the site and the type of business operation. For example, for the latter, labor-intensive SEZ, technology/IT-oriented SEZ, potential supporting industries agglomeration (including product supplying sectors such as plastic products, packaging, structured/fabricated metals) and others. Agro-SEZ may well be considered at the early stage utilizing agriculture products and the food processing industry as Cambodia's major resources with broad production base<sup>17</sup>. In future, such SEZs as high-tech SEZs may be further considered for development.

- iv) A special zone should be designed for potential supporting industries including SMEs in SEZs or the areas attached to or close to SEZs in order to facilitate linkages between FIE and domestic industries. The benefits of infrastructure development may also be effectively enjoyed by the special zone.
- v) In order for the development and operation of SEZs not to cause environmental pollution in neighboring areas, it is essential to comply with the standards of both technical and environmental development. Of the various types of pollution, it is particularly important to preserve water quality and prevent air pollution. To this end, implementation of the laws and regulations related to Environmental Impact Assessment (EIA), which is required for the establishment of SEZ, should be strengthened.

**Addendum<sup>18</sup>:**

The preliminary and rough estimate of the size of the necessary investment is attempted, of which results are as indicated in the Bases of Discussion. There are 22 SEZs approved. The total area planned for development is about 9000 hectares. Only seven out of the 22 approved SEZs started operating with tenants.

- vi) It is required to re-start and expedite the process of formulating the SEZ law regarding actual situations and currently observed problems of SEZs by taking into account the issues raised above.

**4.1.2 Upgrading Institutional and Administrative Capabilities Related to Trade Facilitation and Streamlining the Administrative Procedures**

- i) Under the current situation, shipment to and from Cambodia goes through transit and transshipment as Cambodia's location is off from major international shipping routes. Therefore, the time and cost required for trade-related transactions should be continuously reduced in order to minimize the burden on manufactures dealing with import and export. Special attention should be paid to streamlining trade-related administration and increasing their transparency. Any duplication and lack of transparency in administrative procedures of relevant authorities such as the custom and Cambodia Import-Export Inspection and Fraud Repression Director-General (CAMCONTROL) may easily accommodate cumbersome procedures, which consequently induce arbitrariness and unnecessary interactions with officers in charge. All the relevant authorities should make any possible efforts to eliminate cost factors to the private sectors. Such efforts should include simplifying the relevant procedures and improving transparency and accountability of the procedures through consistent and

<sup>17</sup> See Appendix 3.

<sup>18</sup> Figures are tentative estimations based on the *Cambodia Investment Guidebook 2012* and interviews.

continuous information dissemination and dialogues with the private sector. As the diversification of the manufacturing sector progresses, various new items will be traded. Continuous enhancement of institutional capacity and efficiency is required to cope with the increased number of traded items in terms of quantity and variety.

- ii) For easier custom procedures, Automated System for Customs Data (ASYCUDA) should be more user-friendly. In terms of the duty-free importation of products by QIP-approved enterprises, procedures for application and the revise of the master list as well as the management of the lists should be streamlined with the cooperation with the Council for the Development of Cambodia (CDC) and the General Department of Customs and Excise (GDCE).
- iii) Regional efforts such as GMS-wide efforts on enacting the Cross Border Transportation Agreement (CBTA) and facilitation of ASEAN Single Window (ASW) have been made for enhancing efficiency of the region's international logistic network. Cambodia is also required to establish necessary institutional framework to be integrated into this logistic network with collaboration and adjustment among various authorities of Custom, Immigration and Quarantine (CIQ) relevant to the cross-border movement of people and goods.
- iv) Although not limited to the benefit of FDI, the basic and functioning institutional frameworks and administrative capacity regarding standards, metrology and quality certification should be quickly laid out. Accelerating the currently on-going efforts, basic legal frameworks with adequate status and international accreditation for national key institutions are the basis for any industrial activities. In addition, effective administrative capacity of key national laboratories with adequate infrastructure is essential.

**Addendum:**

There are some claims from FIEs operating in SEZs that the fees for many of the import/export transactions and operation in the SEZ are not clear. These fees and the means of their collection by relevant authorities are often undermining and/or nullifying the benefits provided through incentives for QIPs such as the exemption of import duty.

**4.1.3 Upgrading/Improvement of the Investment Promotion Agency (IPA) Function**

- i) The recommendation of the JICA study<sup>19</sup> raises the establishment of functional linkages between the industrial policy and investment promotion as an issue with the greatest priority directly connected with industrial development. In addition, such issues as pro-active promotion<sup>20</sup>, service upgrading including one-stop services (OSS) and aftercare services for QIP-certified investors are also listed as significant measures. There is a further consideration regarding "investment management" in connection with the linkage with the industrial policy. IPA should strengthen legitimate flexibility and take appropriate measures promptly to respond to the changes in the environment for industrialization.

<sup>19</sup> See "The Study on the Institutional Strengthening of Investment Promotion in the Kingdom of Cambodia" (JICA 2010)

<sup>20</sup> As a part of the pro-active investment promotion, establishing a window of IPA in Japan may be considered.

The measures to be applied should not be limited to introducing incentives but also appropriate adjustments and modifications of the conditions for QIP, including an explicit provision for the cancellation of approvals for SEZ status according to the industrialization policy.

- ii) With regards to building a good reputation<sup>21</sup>, IPA (CDC) has to introduce the scheme to conduct periodic monitoring and exchange of views (interviews) with potential and existing investors as part of pre- and post-investment (after-certification) services in order to meet the needs of investors more flexibly and promptly. It is also important that the investment approval tracking should be maintained for the result to be carefully analyzed to reflect on the measures for further investment promotion and eventually, on the industrial development policy. The government–FIE dialogues should also be promoted parallel to the monitoring and “exchange of views scheme”, utilizing existing frameworks such as the government-private sector forum and/or establishing a new forum. The continuation of the task is an essential way not only to build concrete trust in IPA but also to reinforce good reputation among established FIEs. Consequently, these efforts will create a solid foundation for FDI promotion, which is documented from the experiences of successful IPAs in other countries such as Thailand. These activities could also be effectively utilized for linkage promotion with FIEs and the domestic industry.
- iii) The investment management scheme should be strengthened. “Quality investment” has to be carefully examined and managed as it is important for achieving the objectives of the industrial policy. Quality investment has to have positive effects on industrial development in the forms of technology transfer as well as employment generation and exports development. Among other issues in the recommendation, investment management has to be tackled as a first priority. Certain functional entities, such as an inter-ministerial task force and/or a committee, should be established within or outside of IPA as the focal point for a variety of policies and information relevant to investment. The focal point should perform such functions as examining the consistency of policies, proposing and coordinating to define the criteria for selecting “quality investment” as well as the actual target investment, and evaluating efficiency and effectiveness of these targeted investment vis-à-vis the objectives of the industrial development policy. The institutional framework for these tasks should be bolstered by adequate legal and regulatory background to implement appropriate measures and actions. Regarding the fact that the law has been in place for 20 years since its enactment, the Law of Investment may be reviewed based on the current situation considering the necessary factors of the industrial development policy.
- iv) The proactive promotion of FDI should be designed for promotion of the following sectors, namely: the upstream and downstream sectors of already-operating FIEs (domino-style proactive FDI promotion); and the sectors matching with the strategic objectives and competitiveness of specialized SEZs. For example, in the case that the parent FDI is a manufacturer of digital devices for cameras, then the downstream FDI to be proactively promoted can be manufacturers of digital cameras.

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<sup>21</sup> See Section 3.4 of Chapter 3 in Part 1.



**Addendum:**

In the JICA study, “The Institutional Strengthening of Investment Promotion in the Kingdom of Cambodia 2010”, the recommendation covers the following scopes, namely: i) investment information services; ii) public relations (PR) activities; iii) investment and consultation and aftercare services; iv) policy advocacy; and v) organization and management mainly for CDC. The recommended action plan has also been suggested. JICA has been provided various assistances to the Royal Government of Cambodia including a technical assistance project to improve the investment-related services of IPA (CDC) in line with the recommendation.

**4.1.4 Technology Transfer and Human Resource Development**

- i) FIE’s technology transfer should be the key element to realize sustainable development of domestic industries<sup>22</sup>. In the short-term, T/T from FIEs can be facilitated when the cooperation of FIEs can be secured. Facilitation for FIE’s training programs on assembly skills, expertise and/or discipline for workers, and on simple knowledge and experience in manufacturing process management for staff employees may be possible target areas for this kind of T/T.
- ii) In addition to other measures for human resource development such as vocational training programs and upgrading education levels on basic skills and business management, the above-mentioned trainings by FIE is also to be recognized as part of human resource development through T/T. The objective, criteria, and qualification system can be considered to be introduced for the employees to scale and prove their trained level.
- iii) In the medium term, together with the facilitation of linkages with domestic supporting sectors<sup>23</sup>, an incentive scheme can be introduced within the World Trade Organization (WTO) and bi- and plurilateral treaty compliances. The scheme can include facilitation of FIE activities to provide technical assistance to supporting sectors to upgrade the quality of their products to meet FIE’s requirements. The facilitation for entrepreneurs to start businesses is also to be prepared: assistance schemes may be introduced for trained employees of FIEs to establish their own businesses to supply products for their original FIEs (“spilled over entrepreneurs”). The support may include such services as starting up consultation in collaboration with private business development service (BDS) providers, and government credit guarantee for access to finance.
- iv) Another dimension is to promote a more concrete intellectual property rights (IPR)-enabling environment to ensure T/T of FIEs. It is to be tackled both to meet FIE’s requirement in the protection of their rights and to promote IPR as a strategic instrument for the domestic manufacturing sector. Design and utility models are initial strategic instruments for the domestic manufacturing sector to be globally competitive. Trademarks are also important as a branding strategy. Capacity building of

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<sup>22</sup> Regardless of nationality of capital share, the domestically operated and developing enterprises should be recognized as “domestic industries”.

<sup>23</sup> Supporting sector: the term used in this paper includes potential sectors of “supporting industry” in conventional concept and the sectors supplying other versatile products to FIEs such as packaging materials.

examiners and institutional strengthening is essential. Promotional programs should be formulated in the strengthened authority, along with coordination with academia, public research institutes, and business communities; for example, the introduction of good design awards and qualification programs, technology licensing information exchange programs, etc. As for the capacity building side, the introduction of recruitment and training programs for examiners is also essential to support the promotion of an IPR-enabling environment.

## **4.2 SME Promotion Integrated Strategy (Diversifying SME Manufacturing Sector)**

### **4.2.1 Association Formulation, Facilitation, and Clustering**

In order to form sectoral unities and the manufacturing sector as one “industry”, the initial task should be to facilitate the establishment of industry associations in sectors where the considerable volume of economic activities is recognized (i.e., relatively large share in GDP as a subsector)<sup>24</sup>. The authorities should provide established associations with incentives and benefits such as the following: swift provision of information on the new policies, regulation, and procedures, invitations to public hearings and public/private dialogues, and technical assistance (e.g., dealing with the accounting systems, IPR registration, testing, and quality certification). The policy objectives through association formation should include improvement of an asymmetry of information, efficient value chain management, and dialogues between private and public sectors. As the association promotion policies for trade development and other areas have been implemented, this facilitation task should include and/or complementarily coordinate with existing regimes and outcomes. The coordination with academia and private sector BDS and the demarcation of private/public roles should be considered, where necessary. Governmental assistance should be ensured in the area of facilitation, and the exit strategy needs to be prepared where emerging private businesses such as BDS are observed.

In the areas where constructing the foundations for sectoral scales of economic capacity is the initial task, cluster development should be one of the major approaches to be employed. This is regarded as preparation for the association formation mentioned above, thus, needs to be dealt with in the context of industrial development and to draw a line from the social and rural development issues. International development partner-led pilot approaches for cluster development It may be more realistic to promote cluster development with assistance of international development partners. It will be effective if the cluster development schemes are designed in combination and/or coordination with policies mentioned later, and when these provide the framework for the mechanism to feedback the outcomes through their implementation to the policy side for further improvement. As a result, the concrete schemes for effective cluster development should be specified through sharing the good practices learned from the pilot tasks.

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<sup>24</sup> For instance, priority sectors can be chosen based on the criteria including sales volume and the number of establishments as explained in Table A3-2 of Appendix 3 in Part 2.

#### **4.2.2 Improvement of Production Process and Certification**

- i) Parallel with the current undertakings, the standardization policy should address the area of upgrading productivities (process upgrading). The Institute of Standards of Cambodia (ISC) has adopted from the International Organization for Standardization (ISO) for quality management, more basic standards and/or guidelines are to be introduced for the process of upgrading assembly for SME. The 5S/*Kaizen* and GMP (Good Manufacturing Practices)/ GHP (Good Hygiene Practices) are some of the major management systems to be referred to for the formulation of standardized benchmarks. For example, domestic manufacturing sectors are encouraged to follow the benchmarks to be certified for the standardized manufacturing process.
- ii) Information on the certified manufacturers should be accumulated and provided according to the requests from industrial development needs (from both FDI/FIE and domestic industries). Effective information dissemination measures should also be put into action such as the introduction of a website and an award scheme for good practice.
- iii) A training and/or company management assistance scheme should be considered through public assistance measures and/or the facilitation of private BDS sectors.

#### **Addendum:**

The FIEs expect efficiency and precision as well as lower labor costs in the manufacturing process from having business relationships with domestic firms. Such factors as defect rate and parts per million (PPM) is often FDI's criteria for evaluating investing candidates. Production upgrading and certification by the authority is an effective way to meet this requirement.

#### **4.2.3 Access to Technology Scheme**

In the short-term, any information related to technology/expertise/techniques shall be gathered and organized at one window for SMEs. Subsequently, exchange of the information should be further facilitated through such media as the internet and forums. The major focus should include the enhancement of productivity (production management), mechanization, quality control, linking to GVC, and business incubation. Coordination of the public and private sectors, and academia is vital. The introduction of a facilitating body (institute) should be considered in the medium- to long-term to link technology with business by means of licensing management, marketing technology, and actual product commercialization.

#### **4.2.4 Access to Finance<sup>25</sup>**

The introduction of a policy credit guarantee scheme to complement and/or supplement the collateral scheme along with other policies (incentives) should be designed. The scheme requires sufficient coordination with private financial institutions. In the medium- to long-run, the establishment of financial institutions especially targeted for SME development should be considered.

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<sup>25</sup> Regarding the SME's access to finance, see Section 5.3.

## CHAPTER 5 Supporting Policies

The impacts of the direct industrial policy, explained in Chapter 4, can be entailed with the support of indirect cross-cutting basic policy. This chapter presents supporting policies on soft and hard infrastructure which are especially important for industrialization in Cambodia.

### 5.1 Skills and Human Resource Development for Industry (Soft Infrastructure Development)

In order for Cambodia to bring about a full-scale transition to an industrialized society, it is necessary to formulate and implement the policies for fostering and allocating a broad spectrum of human resources serving for industrial development. It is not limited to the supply of skilled labor for companies in SEZs. According to the analysis by JICA (2012)<sup>26</sup>, however, Cambodia has not taken any measures towards securing an adequate number of engineering specialists able to support future industrial development<sup>27</sup>. Therefore, it is essential to take the following measures:

- i) Develop human resources to enable the future upgrading of industrial structures. Currently, the government lacks a concrete vision of demand for human resources in the coming decade for industry. Such a vision can be described as follows.<sup>28</sup>
  - Firstly, training of candidates as future leaders<sup>29</sup> should be promoted. The localization of the positions currently occupied by foreign expatriate personnel from other East Asian countries could be achieved over the next three years.
  - The aim could then be to improve technology levels of workers and to localize quality management as demand grows for skilled workers (technicians, assemblers, and welders) in five years.
  - In seven years, there will be a growing need for middle management personnel such as production line managers.
  - Finally, in ten years, it can be expected that design and development departments/divisions will be localized and the supporting industries developed as a result of the increase in the need for high-level human resources for industry such as engineers.
- ii) Develop human resources with basic skills for industrial production activities. As part of the process, strengthen science and mathematics education and introduce career education at the primary and secondary level education.
- iii) Train middle-class engineers based on the above-stated visions. In order to bridge the gap between workers and managers, it is necessary to improve the technical and vocational education and training (TVET) institutions. It is also suggested to establish model schools for industrial and agricultural high schools.

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<sup>26</sup> JICA (2012) “The Preparatory Study on Program for Human Resource Development for Industry in the Kingdom of Cambodia”

<sup>27</sup> Human resource development in managerial areas such as accounting is also important.

<sup>28</sup> JICA (2012) “The Preparatory Study on Program for Human Resource Development for Industry in the Kingdom of Cambodia”

<sup>29</sup> Leaders of units and task teams on the shop-floor.

- iv) Develop high-level human resources for industry. The JICA study (2012) mentioned above estimates that there will be a demand for 35,000 engineers and 46,000 technicians in 2018. In order to meet these demands, it is necessary to enhance higher education institutions such as the Institute of Technology of Cambodia (ITC), as well as to improve a supporting and supervising system for TVET institutions under the Ministry of Labor and Vocational Training (MLVT)<sup>30</sup>.
- v) Strengthen cooperation between the business community and educational institutions. To do so, it is essential: (a) to reform education and training which currently overemphasizes academic degrees; (b) to improve the quality of science, mathematics, and engineering education and to upgrade equipment used for these subjects, and (c) through employment support, to increase the number of students who wish to undertake technical training in engineering and technology.
- vi) Create a matching scheme in the labor market. The largest supply source of employment for the manufacturing industry is farming villages. It is fundamental to devise a modern intermediate system, where the private sector and government organizations such as the National Employment Agency (NEA) can cooperate with each other to create links between the increased demand for employment and the abundant labor in farming villages.
- vii) Establish a qualification system. The rationalization of wage and employment systems in companies and the efficiency of the labor market will be promoted through the development of various qualification systems related to technologies and skills or techniques.

## **5.2 Physical Infrastructure**

The most important issue of this industrialization strategy is to expand manufacturing production by attracting FDIs to SEZs. The significance of upgrading physical infrastructure in relation to SEZs has been emphasized repeatedly in this study. Meanwhile, many FIEs as well as local firms operate businesses outside the SEZs. Therefore, it is essential to upgrade physical infrastructure, as a “container” to support industrial activities such as the manufacturing sector with focus on industrial development across Cambodia as a whole.

There are various kinds of physical infrastructure, of which electricity supply and transport infrastructure (e.g., road network and inland water transportation) are the most important considering the current situation in Cambodia.

### **5.2.1 Electricity**

Electricity is a major obstacle to Cambodia’s industrial development. The capacity of electricity supply is inadequate and the power grid is not integrated. Furthermore, electricity prices are much higher than in neighboring countries. Together with the supply and insufficient quality of transmission, these factors cause

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<sup>30</sup> According to JICA (2012), among the total students going on to higher education in 2008/09, the percentage of students in engineering, basic science such as physics and chemicals, and computer science was only 3.4 %, 2.2 %, and 6.9 %, respectively.

unstable factory operation, which makes investors hesitate to invest in the country. As stated before, it is necessary to consider special measures to manage electricity supply for SEZs. At the same time, the following measures should be considered to overcome the general constraints regarding electricity:

- Following existing development plans, six hydropower plants will commence their operations between 2011 and 2014. Ensure these on-going and planned projects are completed, in order to eliminate power shortages in 2015.
- Perform a gradual and steady upgrade of capacity and quality of transmission with the support of international donor agencies and integrate power grids as soon as possible.
- In accordance with the electricity cooperation agreement with neighboring countries, promote the expansion and construction of transmission lines connecting Cambodia to neighboring countries and utilize imported electricity.
- Review the long-term electricity demand estimates and the electric power development plan vis-à-vis the new visions for economic and industrial development. Review the options for construction of large-capacity power plants, if necessary.
- Development of electric power depending on electricity imports and IPPs may entail slight reduction of the electricity price. If the government maintains the current electricity development policy as is, however, it will be difficult to provide electricity services that are competitive with those of Thailand and Vietnam. The RGC, in collaboration with EDC, needs to take necessary measures to secure financial resources for the improvement of the electricity sector.

## **5.2.2 Roads**

### **(1) Upgrading the Southern Economic Corridor**

The Southern Economic Corridor (SEC) is the principal axis of Cambodia and improving its connectivity requires urgent upgrading. Giving consideration to the convenience of logistics in the area of SEZs, the Phnom Penh Metropolitan Area, and ports (reducing the time taken and the issue of maintaining freight quality), the corridor should be upgraded step by step, as follows:

- Expand the sections of national roads 1 and 5 paved with asphalt in view of completing the Neak Loeung Bridge in 2015. Also, proceed with a similar upgrade for National Road 6 (Phnom Penh – Siem Reap).
- Promote the expansion of the SEC into a four-lane road as a long-term policy to keep up with the progress of road upgrading from the Thai and Vietnamese sides. Expand the Phnom Penh–Sihanoukville Corridor (national roads 3 and 4) into a four-lane road following SEC. Furthermore, the RGC should construct highways for major national routes as a long-term project to strengthen logistical capacity between Cambodia and other countries such as Thailand and Vietnam.

### **(2) Upgrading of Roads in the Phnom Penh Metropolitan Area**

The Phnom Penh Metropolitan Area is the largest manufacturing agglomeration area in Cambodia. It is assumed that industries develop dynamically utilizing the externalities of urban settings. However, this development may cause severe traffic congestion in the metropolitan area, and an increase in the cost of logistics is inevitable. It is therefore essential to upgrade an outer ring road in 2020 in order to secure smooth traffic along SEC, and construct new ports in Phnom Penh and Sihanoukville. From an industrial policy point of view, it is necessary to promote a modal shift by formulating a new transport plan in the metropolitan area.

**(3) Inland Transportation by Water**

Inland transportation by water has the potential to reduce logistics costs (e.g., construction of a small-scale berthing facility which enables barge carriers to reach the wharf of the Mekong River). Therefore, the development and expansion of transportation modes other than roads should be considered.

**5.2.3 Regional and Urban Development of Industrial Agglomeration Areas**

**(1) Regional and Urban Development of Industrial Agglomeration in Provinces**

For the time being, the necessary measures mentioned above will be taken for densely SEZ-located areas. In the long-term, it is important to formulate a system to foster comprehensive development of industrial agglomeration; in other words, to establish a single coordinating organization, and promote: (1) land zoning based on a land use plan, (2) eco-friendly environmental management, (3) housing development, and (4) infrastructure development including electricity, roads, ports, water supply, sewerage and waste disposal systems, and allocation of other facilities as educational and public health facilities, based on a long-term development plan. It is vital to prevent disorderly development and to foster healthy industrial agglomeration development with coordination between investment management and such policies.

The target areas will be Svay Rieng, Sihanoukville, Koh Kong, and Poipet.

**(2) Upgrading Industrial Areas in the Phnom Penh Metropolitan Area**

In order to deal with further growth of industrial agglomeration in the Phnom Penh Metropolitan Area, proper land use planning should be introduced, perhaps utilizing zoning: the areas could, for example, be delineated as the zone for promoting industries and other zones for the use of other urban functions. Coordination for transportation infrastructure (roads, airports, and ports) development mentioned above and industrial area development is important.

**5.2.4 Comprehensive National Development and Industrial Agglomeration**

**(1) Concept (Plan) for Comprehensive National Development**

Industrial agglomeration development including SEZ development is closely connected with the development of basic transportation system and urban development. Therefore, the area development surrounding industrial agglomerations explained above should be aligned properly in a concept (plan) for comprehensive national development

Cambodia is located at the center of the Mekong Region. It is formed with a rectangular-shaped relatively flat and fertile land with on side delineated by a coastline. The basic factors structuring the land are the following: i) SEC as the major axis; ii) the sub-axis formed by the route from the border with Lao PDR to Thailand via Sihanoukville and SEC; iii) Phnom Penh Metropolitan Area where two axes intersect; iv) and the vast majority of rural agro- and fishing village areas. By connecting these four factors (two national axes and urban and rural areas) organically, the structure of the land can function actively (so-called "Cross Axis Initiative"). From this aspect, it is important to formulate the long-term concept

(plan) for comprehensive national development which leads the industrial locations effectively.

## (2) **Concentration and Dispersion in the National Land**

Overconcentration in the Phnom Penh Metropolitan Area has been progressing. In order to cope with the competition among cities in GMS, it is necessary to strengthen the competitiveness of the metropolitan area through formulation of an orderly economic and industrial agglomeration. At the same time, provincial development requires strategies for development of transportation networks and promotion of urban areas and industrial agglomerations in the provinces. Core urban centers and rural agricultural areas surrounding the centers will form the regional economic zones from these networks and industrial agglomeration development.

## **5.3 Financial Sector**

In order to develop the private sector in accordance with its industrialization strategy, it is necessary to establish the mechanism that provides financial resources efficiently to meet the demands of capital investment in the industry.

SMEs' access to finance is limited because of the lack of assets for collateral. The limitation is an obstacle to improving managerial capabilities and production technologies.

It is therefore necessary to implement the following policy measures:

- 1) As a result of the analysis of financial conditions, it is concluded that the ten largest commercial banks in Cambodia have sufficient managerial capability in terms of financial soundness and corporate governance<sup>31</sup>. Therefore, it is important to shape direction to keep these commercial banks' financial situation healthy and improve the availability of providing medium- and long-term funds by checking the deposition ratio, capital adequacy ratio, and liquidity.
- 2) The establishment of a community-based indirect financial system should be considered, in which people save money to provide the financial resources needed to meet financial requirements of the industries.
- 3) Policy financial institutions and the scheme shall be established to provide capital for industrial development as Cambodia does not currently have any policy financial institutions. Through introduction of soft loans (long-term, at low interest rates), SMEs' capital development is to be promoted.
- 4) It appears that many FIEs operating in Cambodia undertake mainly dollar-based business transactions. Therefore, thorough evaluation of the impacts on FDI should be conducted before the government considers introducing capital regulations and de-dollarization policies.

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<sup>31</sup> See "The Preparatory Survey on the SME Two-Step Loan Project in the Kingdom of Cambodia" JICA (2010).



## **CHAPTER 6 Conclusion**

With the embryonic state of industrialization in Cambodia, FDIs play a significant role in introducing new technology and managerial expertise as well as in connecting Cambodia to the global market. Although some countries in Asia are emerging as the new investment destinations, other countries are still at the initial stage of economic reform. Cambodia with the gradually establishing economic basis may be in the advantageous position comparing with these countries. . The investment climate will be changed after the ASEAN economic integration in 2015. At the same time, SMEs, which are dominant in establishments in Cambodia's industrial sector, have to be focused as the foundation for the development of the manufacturing sector. SME promotion has to be addressed in the industrial development policy and should be integrated.

This report, thus, has been aimed at providing issues to be focused as proposed elements for further discussion upon formulation of Cambodia's industrial development policy. Two main focuses, the leverage of FDI and SME promotion, are set for the discussion. The policy recommendations were provided for these two pillars. Setting the initial policy target as "double per capita real GDP in 2020 through industrialization", this report reviews the prospect of the manufacturing sector and projected the volume of FDI inflow. Based on the analysis, it discussed further that the achieving the target is possible through establishing foundation of industrial development by leveraging FDI and satisfying necessary conditions.

In conclusion, the following elements are overall summary points of the proposed elements.

### **Strengthening Industrial Potentials through FDI**

- **SEZ Upgrading:** (i) Comprehensive SEZ development encompassing such issues as facilitating relevant functions, location, and urban development of surrounding areas; (ii) Good reputation-building through strengthening the function of the SEZ TSC; and (iii) Establishing specialized SEZs (i.e. Agro-SEZ, High-tech/IT-SEZ).
- **Upgrading and Streamlining Institutional and Administrative Capabilities Related to Trade Facilitation:** (i) Streamlining and improving transparency and accountability of trade related administration; (ii) Enhancing user-friendliness of currently operating custom related procedures and prepare related for establishment of the National Single Window with the coordination with CIQ-related agencies; and (iii) Establishing functioning institutional frameworks and administrative capacity for the area of standards, metrology, and quality accreditation and certification.
- **Upgrading of IPA Function:** (i) Periodic monitoring and exchange of views with potential and existing investors; and (ii) Investment management to attract "quality investment." (including the establishment of the window of IPA in Japan)
- **Technology Transfer and Human Resource Development:** (i) Promotion and facilitation of FIE's technology transfer; (ii) Promotion and facilitation of FIE's in-house training; and (iii) Strengthening an IPR-enabling environment.

## **SME Promotion Integrated Strategy (Diversifying SME Manufacturing Sector)**

- **Facilitation of the Formation of Associations and Cluster Development:** Promotion of the formation of industry associations at a subsector level, and facilitation of cluster development to reinforce the foundation of the associations.
- **Production Process Improvement and Certification:** (i) Upgrading productivity (through promoting 5S, *KAIZEN*, GMP/GHP); (ii) Enhancing information exchange on viable SMEs; and (iii) Trainings for company management (with the private BDS sectors' participation).
- **Access to Technology Scheme:** Establishing a mechanism of platforms of information related to technology, expertise, and techniques for SMEs. The introduction of a facilitating body in the mid- to long-run.
- **Access to Finance:** Introduction of a scheme of policy credit guarantee to complement and/or supplement the existing financing mechanism along with other promotional policies (such as introducing incentives).

## **Supporting Policies**

- **Skills and HRD for Industry:** (i) Concrete vision on the future demand for human resource for industry, (ii) HRD policies for nurturing of skilled labor and middle-class management and technical human resources, and (iii) Strengthening of higher education (e.g. ITC).
- **Physical Infrastructure:** (i) Completion of currently on-going or planned upgrading in generation capacity and transmission of electricity through review of the required electricity supply for targeted industrial development, (ii) Improvement of road infrastructure for upgrading of the function of Phnom Penh and enhancement of connectivity with the SEC, and (iii) Area development for forming industrial agglomerations in provinces as well as in the Phnom Penh Metropolitan Area.
- **Financial Sector:** Establishment of the mechanisms to finance the manufacturing sector and institutions and schemes for policy finance.

## Bases for Discussion<sup>32</sup>

### Target Benchmarks for Development of the Manufacturing Sector

The national development goal set by SNEC for formulating industrial development policy is as shown in the table below<sup>33</sup>.

<b>National Development Goal</b>	2010	2020
GDP (constant 2010 billion USD)*1*2	11.3	25.2
Average Growth Rate of Real GDP 2011-2020 (%)*2	7.5	

\*1: 2010 data is based on the IMF (2012) Staff Report for the 2011 Article IV Consultation–Debt Sustainability Analysis.

\*2: 2020 projection calculated by the JICA Study Team based on the IMF projected growth rate.

In order to achieve the above-mentioned national development goal, industrial sector development is required to realize the degree of growth as seen in the table below. The employees in the manufacturing sector are also estimated based on the growth estimation.

<b>Growth Target of Manufacturing Sector</b>	2010	2020
Manufacturing Value-Added (constant 2010 billion USD)*1, *2	1.65	6.63
Share of Manufacturing Value- Added in GDP (%)*1, *2	14.69	25
Average Growth Rate of Manufacturing Value Added 2011-2020 (%)*2	14.9	
Employees in Manufacturing Sector (1000 person)*3	539*4	1,400

\*1: 2010 from the World Bank, World Development Indicator.

\*2: Growth rate and 2020 target calculated by JST.

\*3: For details of the calculation, see Appendix 1.

\*4: The figure is for 2011 based on the data from the Economic Census of Cambodia 2011.

### Target Benchmarks of FDI to the Manufacturing Sector

The estimated amount of FDI inflow to the manufacturing sectors during the period 2011–2020 in order to achieve the above stated manufacturing sector growth are as shown in the table below:

<b>Target FDI Inflow</b>	2001~2010	2011~2020	
		2011~16	2017~20
FDI percentage to GDP*7	4.4	8.2	6.5
Accumulated FDI 2011-2020 (million USD)*1	4,277	14,410	
FDI Average Annual Inflow (million USD)*1	428	1,441	
FDI Average Annual Inflow to Manufacturing Sector*2 (million USD)	Low Case	430	
	Medium Case	580	
	High Case	720	
Accumulated Amount of FDI to Manufacturing Sector *2 (million USD)	Low Case	4,320	
	Medium Case	5,760	
	High Case	7,210	

\*1: JICA Study Team based on IMF (2012) "Staff Report for the 2011 Article IV Consultation-Debt Sustainability Analysis"

\*2: Average and accumulated FDI inflow to the manufacturing sectors are estimated using the three case scenarios; namely, the lowest case with an FDI to manufacturing sector ratio of 30%, medium with 40%, and the highest case with 50%<sup>34</sup>.

<sup>32</sup> The analysis of target numbers used both constant and real prices depending on the suitability of the use of data. The base year for the analysis varies depending on the availability of data.

<sup>33</sup> The number is based on the tentative goal set by the SNEC Outline of Cambodia's Industrial Development Policy. For details of the calculation of the projection, please see Appendix 2.

<sup>34</sup> For details of the methodology of the projection, see Appendix 1 and 2.

### **Infrastructure Development and SEZ<sup>35</sup>**

The electricity demand may be roughly calculated as shown in the table below. The size of the gap between the demand and the current official estimation should be noted.

<b>Electricity Demand Estimation</b>	MIME	JST
Electricity Capacity Required in 2020 (MW)	2,770	3,930

\*8: MIME: CDC (2012) "Cambodia Investment Seminar". JST calculation using the elasticity to GDP (2.1) and to manufacturing production (1.5) based on actual GDP growth projection (also, see Appendix 1 of this report).

This is an indicative estimation of the necessary volume of investment for infrastructure development accommodating FDI to generate targeted manufacturing value-added. This experimental calculation estimated the figures covering the period between 2011 and 2020. The items estimated are the following: (i) necessary additional industrial area to be developed (per annum and the average throughout the period); (ii) necessary volume of work force (employment generated); (iii) necessary additional power generation capacity for electricity (per annum and the average throughout the period); and (iv) increase in demand for water supply and the capacity of sewage and water disposal (per annum and the average throughout the period).

The results are as summarized in the table below. In this analysis, the targeted manufacturing value-added generated from manufacturing FDI are hypothetically set at 80% of total domestic manufacturing value-added as the higher case, 70% as the medium case, and 60% as the lower case. The data presented in this section should be regarded as experimental data based on preliminary estimation using various assumptions and hypotheses in order to complement the difficulty in obtaining data. Therefore, it should be considered that the result may contain some deviation from reality. It should also be noted that the data presented in the previous section may differ from the data in this section due to different methods utilized for each case.

The estimation was done based on the following three premises:

- i) The estimation of industrial areas includes the areas of industrial use in general including industrial estates/zones/parks in addition to SEZs.
- ii) This estimation included only the zones where production activities are undertaken (in other words, where factories are actually located) into the calculation. This zone may have other facilities than factory buildings such as canteens for workers and administrative sections attached to factories. On the other hand, various facilities may be located in the areas designated specifically for industrial use or in the industrial estates/zones/parks. In many cases, there are residential and commercial areas in addition to supporting facilities such as roads, warehouses, and logistical facilities, power plants and water treatment facilities. Therefore, the actual size of an area designated as an industrial site is usually larger, although the type of other facilities may differ depending on various reasons. The difference in the strategy and characteristics of the site

<sup>35</sup> For details of the estimation, see Appendix 2.

development, geographic location, and shape of the sites, value of the land, and financial and technical capacity of the developers, and other reasons may affect the design of the sites.

- iii) The volume of demand for utilities and infrastructure may be influenced by the number of external factors. For example, the productivity and usage of specific inputs per unit production may change due to technical development or price fluctuation due to the conditions of domestic and global economies.<sup>36</sup>

<b>EXPERIMENTAL ESTIMATE:</b> <b>Infrastructure Demand Accommodating Targeted FDI Volume</b>	Higher Case	Medium Case	Lower Case
Ratio of Manufacturing Value-Added by FIE in 2020 (%)	80	70	60
Manufacturing Value-Added by FIE in 2020 (Constant 2010 Billion US\$)	5.30	4.64	3.98
Necessary Labor working for Manufacturing FIE in 2020 (1000 persons)*	985	862	739
Average Additional Industrial Area to be Developed per Year in 2011-2020 (ha)	351	278	238
Average Increase of Electricity Demand per Year in 2011-2020 (MW)	192	168	142
Average Increase of Water Demand per Year in 2011-2020 (t/day)	14,067	11,112	9,525

\* NOT FOR CITATION OR FURTHER UTILIZATION OF DATA

### Comparison of Costs and Factors Affecting Costs of Operation in Core and Other Areas in Thailand and Vietnam

	Phnom Penh	Bangkok	Ho Chi Minh City	Nakhon Ratchasima (Northeast Region, Thailand)	Khon Kaen (Northeast Region, Thailand)	Da Nang	Can Tho	Qui Nhon (Binh Dinh Province, Vietnam)
Population (1000 persons)	1,328	8,200	7,397	2,522	1,735	926	1,197	1,490
Wage (USD/month)								
Worker	82	286	130	-	-	200	-	-
Engineer	204	641	286	-	-	250	-	-
Middle-Management	663	1555	704	-	-	400	-	-
Minimal Wage*1	61	193	95.05	165	150	85	85	66
Rent/lease of the land in industrial estates (USD/sq.M/month)	0.091/month	0.95/month	0.25/month	-	-	0.188/month	50	22 (lease until 2048)
Price of the land (USD/sq.M)	-	-	-	29	-	-	-	-
Utilities								
Electricity (Corporate, per kWh, USD)	0.216	0.14	0.11	0.09	0.09	0.11	0.11	0.11
Water (Corporate, per cu.M., USD)	0.359	0.51	0.73	0.59	-	0.47	-	0.4
Logistics cost								
Container transportation (from the nearest port to Yokohama, per 40ft, USD)	1350	1120	500	-	-	1000	-	-
Distance from the nearest major ports (km)	Sihanoukville: 250 Caimep: 390	-	-	Laem Chabang: 275 Khlong Toei: 245	Laem Chabang: 500 Khlong Toei: 400	-	Saigon: 170	Caimep: 630 (by road) Qui Nhon Port: in the vicinity
The nearest international airports (km)	Phnom Penh International Airport	Suvarnabhumi International Airport	Tan Son Nhat International Airport	Suvarnabhumi International Airport: 270km, Nakhon Ratchasima Airport in the vicinity	Kohn Kaen Airport in the vicinity	Da Nang	Tan Son Nhat International Airport: 175	Tan Son Nhat or Da Nang, Phu Cat Airport in the vicinity
Other remarks on transportation	-	-	-	150min to Bangkok by road (via highway)	-	-	-	Qui Nhon is one of the 10 largest ports in Vietnam.
Taxation								
Corporate Tax (%)	20	23	25	23	23	25	25	25

<sup>36</sup> Please refer to APPENDIX 2 for the details of the methodology for estimation.

\* The data are based on the various sources. The wage in cities is based on the information of JETRO survey. Although the changes of minimum wages in Cambodia and Bangkok are reflected, the real wages after the change were not captured. The minimum wage of other areas in Thailand will also increase in 2013.

\*The population of Nakhon Ratchasima, Kohn Kaen, and Qui Nhon (Binh Dinh Province) is the total of provincial populations.

\*Thailand will reduce the corporate income tax rate to 20% in 2013.

## Timeframe

### Strengthening Industrial Potentials through FDI

Policy Elements		Immediate/Short-term <sup>37</sup> (2012-2014)	Medium-term (2015-2017)	Long-term (2018-2020)	Related Entities
<b>SEZ upgrading</b>	SEZ development	<ul style="list-style-type: none"> <li>- Immediate necessary improvement (such as public transportation for commuting workers, etc.).</li> <li>- Formulation of the master plan on SEZ locations and zoning which includes land use plans of SEZs with specialized zones for SEZ to form linkages and incentives such as preferential submission of electricity.</li> </ul>	<ul style="list-style-type: none"> <li>- Housing and public facilities upgrading.</li> <li>- Pilot implementation of preferential measures on infrastructure and development and facility upgrading</li> <li>- Improvement of SEZ-surrounding areas.</li> </ul>	<ul style="list-style-type: none"> <li>- Industrial agglomeration promotion.</li> </ul>	CDC, MIME, MOC, MAFF, MOI, MOP, MPWT, MLVT, MEF
	Good reputation-building	<ul style="list-style-type: none"> <li>- Review and upgrading of conditions and management of facility according to actual requirements of existing tenants.</li> <li>- Strengthening the function of SEZ TSC.</li> <li>- Strengthening monitoring scheme to back up after-certification services.</li> </ul>			

<sup>37</sup> All the policy elements in this column are recommended for immediate launch and implementation.

	Specialized SEZ	- Formulation of master plans.	- Development and/or upgrading of specialized SEZ. - Pro-active FDI promotion to specific industries	- Further promotion of linkage between FIE and domestic industries.
	Formulation of special zones for establishing linkages between FIEs and domestic industries	- Formulation of plans for special industrial areas for domestic industries including SME.	- Plan and design pilot zones with pilot incentive schemes.	- Promotion of linkage. - Introduction of incentives for facilitating linkages.
	Strengthened EIA	- Review of the current implementation situation and introduce measures for improvement.		
<b>Upgrading institutional and administrative capabilities and streamlining administrative procedures related to trade facilitation</b>	Streamlining trade-related administration and improving the transparency and accountability	- Simplify trade-related administrative procedures to reduce the lead time at the border points. - Promote prompt information dissemination regarding the changes in rules and procedures and the implementation. - Continuous dialogue with the private sector - Simplify custom procedures and improve their user-friendliness	- Review and upgrading of implementation. - Establish the national single window	



		<ul style="list-style-type: none"> <li>- Improve user-friendliness of duty-free importation incentive scheme using the master lists.</li> <li>- Prepare the establishment of the national single window</li> </ul>			
	Establishing institutions and administrative capacity relevant to standard, metrology and quality certification	<ul style="list-style-type: none"> <li>- Review of current situation relevant to trade facilitation.</li> <li>- Capacity building of implementing authorities including laboratories.</li> </ul>	<ul style="list-style-type: none"> <li>- Improvement of legal framework where necessary.</li> <li>- Laboratories and related infrastructure upgrading.</li> </ul>	<ul style="list-style-type: none"> <li>- Review and upgrading of implementation</li> </ul>	
<b>Upgrading/improvement of the Investment Promotion Agency (IPA) function</b>	Improvement of function on “linkage with industrialization policy”	<ul style="list-style-type: none"> <li>- Review of conditions of QIP for the linkage objectives.</li> <li>- Review of provisions on the related legal framework.</li> </ul>	<ul style="list-style-type: none"> <li>- Introduction of further conditions and legal provisions where relevant.</li> </ul>		CDC, MEF
	Periodic monitoring and exchange of views (interviews) with potential and existing investors	<ul style="list-style-type: none"> <li>- Scheme design and introduction of record tracking and dialogues.</li> <li>- Review of IPA upgrading.</li> </ul>	<ul style="list-style-type: none"> <li>- Further upgrading of IPA function.</li> <li>- Introducing new measures where relevant.</li> </ul>	<ul style="list-style-type: none"> <li>- Linkage promotion with domestic industries.</li> </ul>	
	Strengthening Investment management for promoting “Quality investment”	<ul style="list-style-type: none"> <li>- Strategy formulation for “quality investment” promotion including setting up the focal point within RGC.</li> </ul>	<ul style="list-style-type: none"> <li>- Review and further upgrading of investment management function.</li> </ul>		

		- Implementing investment management based on the approval criteria and conditions for QIP.			
	Proactive FDI promotion	- Strategy formulation on “Domino-style proactive promotion”. - Implementation of measures based on the strategy.	- Review and upgrade implementation.		
<b>Technology transfer (T/T) and human resource development</b>	T/T from FIEs	- Promotion of FIE’s in-house training programs.	- Review and upgrade implementation.		CDC, MEF, MIME, MOC, MOEYS
	Strengthening vocational training programs and improvement of basic level of education system	- Introduction of qualification system with objective criteria.			
	T/T for potential supporting sectors for linkage formulation.	- Introduction of facilitation scheme for FIE’s technical transfer through training.	- Introduction of facilitation scheme for FIE’s technical assistance to supporting sectors. - Designing and introduction of support scheme for entrepreneurs in supporting sectors.	- Reviews and further implementation.	
	Facilitation of	- Strengthening IPR related	- Continuous	- Continuous	

*Suggestions and Major Items for Industrial Policies in Cambodia*

	effective IPR enabling environment	legal system. - Capacity development of related authorities. - IPR promotion on IPR.	strengthening and promotion.	strengthening and promotion.	
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**SME Promotion Integrated Strategy**

Policy Elements		Immediate/Short-term (2012-2014)	Medium-term (2015-2017)	Long-term (2018-2020)	Related Entities
<b>Association formation facilitation and clustering</b>	Association formation	- Promotion of forming associations (information exchange, trade promotion).	- Dissemination of information on good practices at pilot activities. - Strengthening linkages with FIE and to GVC.	- Further development of linkages with FIE and supply chain development through association networks.	MIME, MOC, MAFF, MEF, MOEYS, Provincial government
	Cluster development	- Launch SME cluster development in the context of industrial policy (pilot).	- Dissemination of information on good practices obtained through pilot activities. - Strengthening promising clusters to industrial association formation.	- Domestic value chain development through cluster networks.	
<b>Improvement of production process and certification</b>	Introduction of methodology for production process upgrading	- Introduction of benchmarks on quality management, basic guidelines mainly for process upgrading in the production process including 5S/KAIZEN, GMP/GHP.	- Introduction of certification for the benchmarks.		MIME, MOC, CDC

	Information exchange	- Preparation and introduction of information exchange platform.	- Introduction of information exchange system for certification.		
	Training	- Introduction and facilitation of training schemes including FIE's in-house training in collaboration with private BDS.			
<b>Access to technology scheme</b>		- Establishing portal of technology/know-how related information on the "information platform"	Establishment of facilitating bodies (institutes) to link technology with business by means of licensing management and marketing of technology.		
<b>Access to finance</b>		Introduction of policy credit guarantee scheme in coordination with private financial institutions.	Establishment of financial institutions specialized on SME development.		

# Appendices

# Appendix 1

## Outlook on Economy and Industry

## **【Appendix 1】 Outlook on the Economy and Industry**

### **1.1 Outlook on the Economy**

#### **1.1.1 Outlook on the Economy in 2020**

##### **(1) GDP per Capita and Economic Growth Rate**

The “Outline of Cambodia’s Industrial Development Policy” by SNEC aims to double Cambodia’s per capita GDP in 2020. This goal can be interpreted as a vision of economic growth of the Royal Government of Cambodia (RGC). As Cambodia’s per capita GDP is estimated to be USD 830 in 2010 (USD 909 in 2011<sup>1</sup>), the government further aims to reach approximately USD 1700 in 2020.

This section attempts to estimate what percentage of economic growth is necessary in order to realize the vision. The assumptions for 2011-2020 are as follows:

Population growth rate (annual average): 1.1%<sup>2</sup>

Fluctuation rate of foreign exchange rate (2000-2010 average: KHR per USD): 0.8%<sup>3</sup>

Under these conditions, GDP in 2020 in USD is estimated to be 2.1 times as much as that in 2011, and average annual growth rate is approximately 7.5%.

However, a number of destabilizing factors have been occurred in the global economy, for instance, the debt crisis in Europe, the weak recovery of the US economy, and the slowdown of China’s economy. It should be noted therefore that there are many risks to the global economy, which may slow down the growth of Cambodian economy.

##### **(2) Verification of the Potential Growth Rate**

In April 2012, the IMF Working Paper (WP/12/96)<sup>4</sup> was published, in which the potential growth rate of Cambodia was estimated. This section attempts to ascertain the validity of the aforementioned potential growth rate.

In the IMF estimate, a Cobb-Douglas aggregation production function is used for the supply side and a simply econometric model is used for the equalization from the demand side. According to the result of estimate, after Cambodia’s potential growth rate reached its peak in 2004-2005 as shown in Figure 1-1, it begins to decrease slowly and remains stable at an annual rate of 7.5% from 2012 onward, under the condition that there will be no financial shocks (such as GFC), and the investment rate of 20% continues. If the rate of productivity increases while that of investment decreases by

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<sup>1</sup> SNEC & MEF (Presentation by H. E. Sok Chenda Sophea “Investment Environment and Opportunities in Cambodia” at Cambodia Investment Seminar (July 2012) in Osaka and Tokyo)

<sup>2</sup> UN “World Population Prospects: The 2010, Vol.II

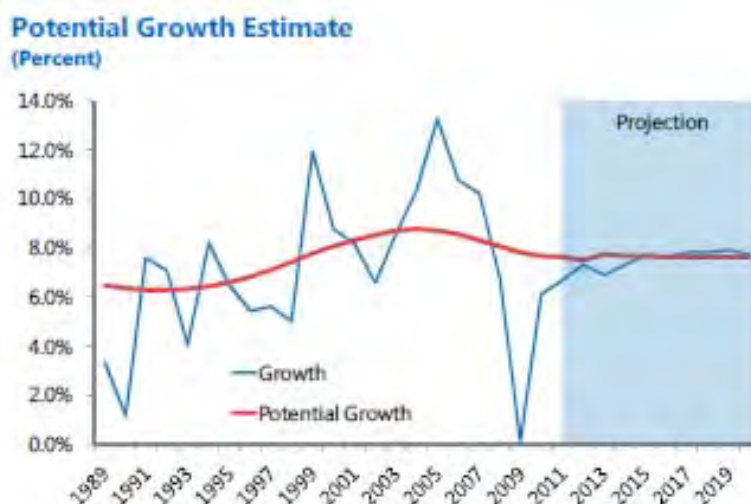
<sup>3</sup> ADB “Key Indicators for Asia and the Pacific 2011”

<sup>4</sup> IMF Working Paper “Modeling with Limited Data: Estimating Potential Growth in Cambodia Prepared by Phurichai Rungcharoenkitkull”(WP12/96) April 2012.



50%, the potential growth rate decreases by 1.7%. Conversely, if the rate of investment goes up to 25%, the potential growth rate increases by 1.2%.

The result of IMF’s estimate is close to that of this section’s prospective estimate. IMF’s estimate points out that there is a strong need for reduction in electricity costs, improvement of infrastructure, and investment in human resource development.

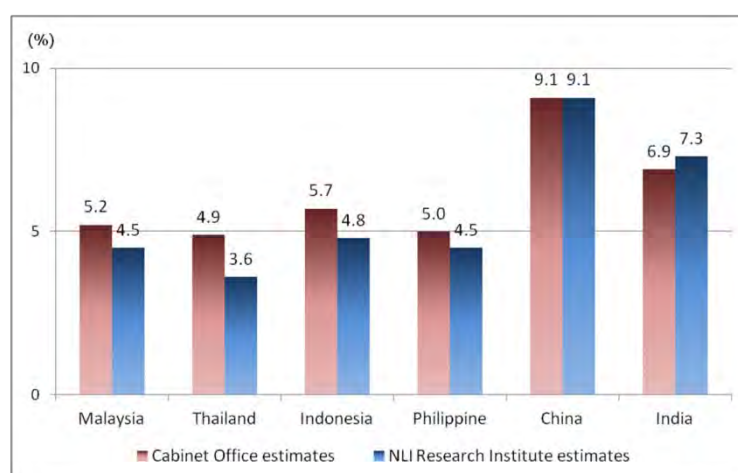


Source: IMF (2012) “Modeling with Limited Data: Estimating Potential Growth in Cambodia” (WP/12/96)

Figure A1-1 Cambodia’s Potential Growth Rate

(3) Comparison with Potential Growth Rate of Other East Asian Countries

This section also attempts to compare Cambodia’s economic growth rate with East Asian countries’ potential growth rate as of 2010.



Source: Compiled by JICA Study Team based on Cabinet Office (GOJ) (2010) “Trends of World Economy 2010 I” and NLI Research Institute (Takeshi Takayama) (2011) “Potential Growth Rate in the Emerging Asian Countries”

Figure A1-2 Asian Countries’ Potential Growth Rate

Figure A1-2 is compiled by the JICA Study Team on the basis of Japan's Cabinet Office (2010) and of NLI Research Institute (2011). The potential growth rate of ASEAN 4 (i.e., Malaysia, Thailand, Indonesia, and the Philippines) is 4% to 5% in said period. During this period, labor supply in these countries, was expected to contribute less to economic growth than the preceding decades because of the decrease in population of productive age. The same can be applied to capital because there has been an increase in capital formation, although the Philippines is an exception. On the other hand, China and India kept their potential growth rate at around 9% and 7%, respectively.

Implications of the result of this estimate are as follows: (i) Cambodia has greater potentials for economic growth than the ASEAN 4 because it enjoys the advantage of backwardness; (ii) it also has a potential comparative advantage, in particular, of labor supply; and (iii) it is vital for the country to make good use of not only economic opportunities of ASEAN's growth but also those of China and India.

### 1.1.2 Outlook on the Cambodian Economy in 2030

#### (1) Continuous Contribution of Labor Input to the Economic Growth

Labor and capital stock are the basic factors of production. It is said that these two factors and total factor productivity (TFP) are the determinants of potential growth rate. Labor supply has contributed largely to rapid economic growth in East Asia. In this Report, nevertheless, does not conduct the own estimation of potential growth rates of Cambodia and other East Asian countries using the production functions. In this section, the long-term trend of labor supply is analyzed as one of major determinants of potential growth rate.

**Table A1-1 Bottom Period of Dependency Ratio in Asia**

Group	Country	Bottom Period
I	Japan	1995-2000
II	Korea, China, Thailand, Singapore	2015-2025
III	Vietnam, Malaysia, Indonesia	2025-2040
IV	India, Philippines, <b>Cambodia</b>	2040-2050

Note: 1) UN "World Population Prospects".

2) Dependency Population Ratio=(child population + aged population) divided by production age population (15~64)

Source: Compiled by JICA Study Team based on Cabinet Office (2010) "World Economic Trends 2010 I"

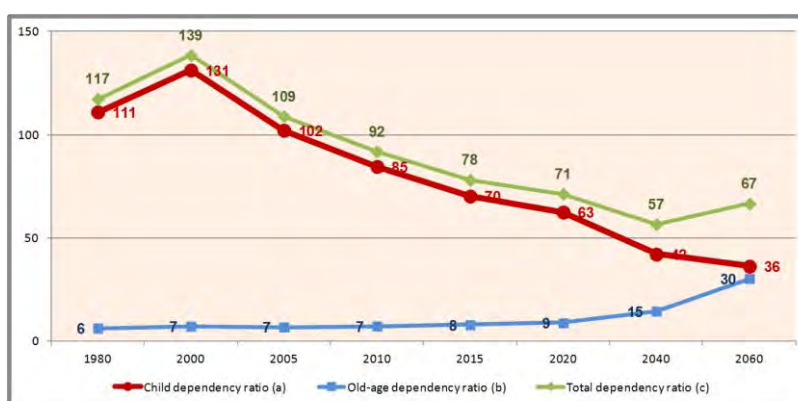
The period is called a "population bonus period" when dependency ratio decreases<sup>5</sup>. In this period, economic growth is accelerated because labor supply increases, and the burden of supporting the dependent population is eased. In East Asian countries, however, the "population bonus period" shall be over for the coming decades with the decrease in population and progress of aging population. Japan

<sup>5</sup> In general, child population refers to ages 0-14 and old-age population refers to over 65. Working age population refers to ages 15 to 64.

entered a “population bonus period” at the turn of the 20<sup>th</sup> century. Likewise, the second group (e.g., South Korea, China, and Thailand) followed by the third group (e.g., Vietnam, Malaysia, and Indonesia) will enter such period in the near future. In Cambodia’s case, however, the period will begin between 2040 and 2050 (Table A1-1).

In Cambodia, the dependency ratio of children reached its peak in 2000 and will gradually decrease toward the 2040s. On the other hand, the aged dependency ratio increases gradually toward the 2040s. As shown in Figure A1-3, the total dependency ratio in Cambodia continues to decrease for the coming decades, and its population bonus period is the longest in the region. The country has a crucial advantage over other East Asian countries where aging of their population progresses.

It is estimated that many East Asian economies will experience negative growth of labor input in the 2020s, which will lead to their economic slowdown<sup>6</sup>. On the other hand, labor input is expected to continue increasing in Cambodia in the 2020s. This is the reason why the Cambodian economy can maintain the same potential growth rate in the decade as in the 2010s, while other East Asian economies are likely to stagnate.



Note: a The child dependency ratio is the ratio of the population aged 0-19 to the population aged 20-64.  
 b The old-age dependency ratio is the ratio of the population aged 65 years or over to the population aged 20-64.  
 c The total dependency ratio is the ratio of the population aged 0-19 and that aged 65+ to the population aged 20-64.  
 Source: Compiled by JICA Study Team based on UN “World Population Prospects: The 2010, Vol. II: Demographic Profiles”

**Figure A1-3 Cambodia’s Dependency Ratio (1980-2060)**

(2) **Economic Growth Rate and GDP per Capita**

The IMF and World Bank published the report entitled IMF (2012) “Cambodia: 2011 Article VI Consultation-Debt Sustainability Analysis”, which contains the country’s long-term economic forecast (up to 2031).

According to the forecast, the annual average rate of real economic growth in Cambodia between 2017 and 2031 is 7.7%. It is argued that the Cambodian economy could maintain almost the same

<sup>6</sup> Cabinet Office (2010) “World Economic Trend 2010 I”, Japan Center for Economic Research (2007) “Long-term Forecast of Global Economy and Population 2006-2050 Demographic Change and the Asian Economy”

growth rate in the 2020s as that in the 2010s. The size of the Cambodian economy could grow 2.1 times larger in 2030 than in 2020. By a simple calculation therefore, the country's per capita GDP of 2030 is approximately USD 3400, which means that Cambodia will become one of the middle-income countries in approximately 20 years.

The above-stated IMF report (2012) also estimates nominal growth rate and nominal GDP (2021 and 2031). According to the estimates, nominal values in 2020 and 2030 can be calculated as shown in the following table.

Cambodia's economy has potentials to enjoy long-run high growth for a long period of time from the viewpoint of labor supply. Cambodia can spend the coming two to three decades in preparing for industrialization. By taking this advantage, it is necessary for Cambodia to promote industrialization and prepare for the advent of the aging society in the middle of the 21<sup>st</sup> century.

**Table A1-2 Nominal GDP and Nominal per Capita GDP in 2020 and 2030**

(Billion USD, USD)

	Nominal GDP	Nominal GDP per Capita
2020	310	1,950
2030	830	4,850

Resource : JICA Study Team based on IMF Report (2012) "Cambodia: 2011 Article VI Consultation-Debt Sustainability Analysis"

## 1.2 Outlook on Industry

### 1.2.1 Outlook on Industry in 2020

This section attempts to envisage what Cambodia's industrial structure is going to be like if its economy grows annually at 7.5% continuously in the 2010s. In this section, the same trend as that of the Thai economy is assumed, in which the manufacturing sector ratio in GDP increases (refer to Curve A explained in Section 2.1.1 of Chapter 2 of Part 1).

There is no precise econometric estimate because a long-term multi-sector econometric model is not prepared in this Study. This section attempts to apply the growth trend of the increase in the manufacturing sector ratio in GDP to Cambodia, which the East Asian economies experienced in the past decades. The ratio increased by less than 1% per annum in East Asia during the period of rapid economic growth. If the ratio continues to increase by 1% every year in Cambodia (although such assumption is bold), it will reach approximately 25% in 2020. This percentage is almost the same as Malaysia's and Indonesia's. The gross value added of manufacturing increased 2.8 times larger from 2000 up to 2010 (in real terms). Likewise, the gross value added of the manufacturing sector of 2020 is approximately 3.5 times larger than that of 2011 (in USD). In this case, the annual rate would become 14.9%.

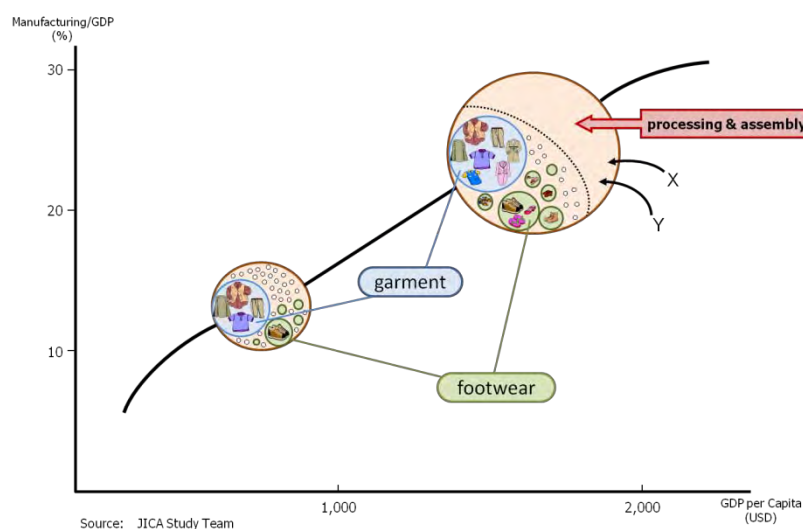
The IMF Working Paper (WP/12/96) mentioned earlier attempts at increasing the productivity rate until 2020 of agriculture, manufacturing, and other industries to 3%, 15%, and 3%, respectively. It attempts at increasing the productivity in the manufacturing sector to much more than that of other sectors, and considers that such increase will contribute to the rise of manufacturing share in GDP. At the same time however, such increase in both productivity and share of manufacturing cannot be realized without infrastructure investments to reduce electricity costs, investments in education and working capacity, productivity increase in existing sectors, and diversification of the manufacturing sector.

The ratio of the manufacturing sector to GDP became 18.6% in 2006 (20.8% in 2000 base). After that, the ratio decreased due to the stagnation of the garment and footwear sectors, and slow diversification of manufacturing sector (e.g. assembly and processing sector). If the VC of the garment sector had been shifted and manufacturing sector had started its diversification, the ratio of manufacturing to GDP would have been more than 20%.

Moreover, gross value added of manufacturing in Cambodia (price in 2000) would have increased at 14.9% in annual average during 1998 and 2008, which means that above estimates is same as the actual growth of manufacturing until the occurrence of global financial crisis.

There is question as to what the industrial structure would be like if the production volume of the manufacturing sector becomes 3.5 times larger in nine years than the current volume. As mentioned in Chapter 3 of Part 1, the garment and footwear sectors are the leading industries in Cambodia as these sectors account for 85% of total export. When it comes to the garment sector, for instance, its structure is expected to be upgraded from CMT-dominated to FOB-centered production and distribution. However, the development of existing industries only is not sufficient, and industrial diversification is essential in order to reach the estimated production level of the manufacturing sector.

In order to reach the target level of 2020, the current leading sectors (e.g. garment and footwear) or other sectors are expected to emerge. In other East Asian countries, the assembly and processing sub-sectors have played a major role in diversifying the industrial structure, which may also be the case in Cambodia. For the coming decade, the following labor-intensive assembly and processing sectors are expected to have great growth potentials, namely: electrical and electronics (E&E) products and equipment, motorcycles, motor vehicles, and precision equipment. It is necessary to attract FDIs of foreign manufacturers to become part of GVC in the region, and to develop/strengthen industrial agglomerations in the country. Attracting FDIs of the foreign manufacturers, which are technologically advanced and experienced in foreign operations, enables Cambodia to nurture the supporting industries as well as interlink with foreigners and local firms. As a result, the industrial structure will be diversified over time.



**Figure A1-4 Structural Change of the Manufacturing Sector**

### 1.2.2 Outlook on Industry in 2030

As mentioned, there is a possibility for Cambodia to keep its economic growth in the 2020s at the same rate as that in the 2010s (IMF estimates: 7.7%). Even though the Cambodian economy can grow at the same rate in the 2020s as in the 2010s, the manufacturing sector ratio does not necessarily grow in the 2020s at the same pace as in the previous decade. East Asian economies experienced slowdown of the increase in manufacturing ratio once it exceeds 25%.

In this section, it is assumed based on the experiences of East Asian economies that the increase in the manufacturing ratio in the 2020s slows down to 0.7% annually. As a result, the ratio becomes approximately 32% in 2030, which is the same level as during the peak of South Korea (31.9% in 1999) and Malaysia (32.7% in 2000).

The growth of the manufacturing sector's share in GDP slows down gradually contrary to the progress of industrialization. This is because technological progress brings an increase in service expenditure of industrial production as well as the relative reduction in prices of industrial products. This does not necessarily mean the slowdown of industrial development. For example, the share of manufacturing sector in 2009 is 23.7% in Taiwan, 25.0% in South Korea, and 25.5% in Malaysia.

In the process of industrialization, the structure of the manufacturing sector will transform from simple labor-intensive work such as garment and shoemaking to technology- and labor-intensive production (processing parts and machinery assembly), then will finally diversify to knowledge-intensive production.

The direction of Cambodia's manufacturing sector development toward 2030 is as follows:

- 1) First stage: Simple labor intensive manufacturing [I] – Leading sectors in the 2000s
  - Garment
  - Footwear
  
- 2) Second stage: Simple labor intensive manufacturing [II] – Leading industry in the 2010s
  - a) On top of the garment and footwear sectors in the first stage, production sites (i.e., factories) of the assembly and processing industry is established in the SEZ and elsewhere. The supporting sectors (or the supporting and related industries) are also developed in the surrounding areas.
    - Assembly of E&E parts/components
    - Assembly of motorcycle and motor vehicles and manufacture of their parts/components
    - Assembly of precision machines
    - Manufacture of plastic products
  - b) On the other hand, industrial base for agro-industry will be formed with the advantage of organic farming, etc.
    - Food processing
    - Fish processing
  
- 3) Third stage: Technology- and Labor-intensive manufacturing – Leading industry in the 2020s
  - a) Improve industrial information infrastructure, develop capacity of human resources, and upgrade to high value-added process in the assembly and processing industry.
  - b) Receive increased reputation on agro-products in Cambodia and upgrade to sixth industrialization (primary + secondary + tertiary industries).
  - c) Oil production in full swing and develop related industries.
  - d) Develop the supporting industry of the software industry, consequently developing knowledge-intensive industry in Cambodia.

### **1.3 Estimate of Electricity Demand and Electric Power Development**

Based on the above outlook of economy and industry, this section discusses electricity demand and electric power development, which are essential infrastructure to support the outlook.

#### **1.3.1 Estimate of Electricity Demand**

##### **(1) Current Electricity Demand Assumption and Electric Power Development Plan**

According to the Electric Power Development Plan formulated in 2007 in Cambodia, electricity demand is assumed to increase from 1062 MW in 2012 to 2770 MW in 2020, which is about 2.6 times more than that in 2012 (See Table A1-3).

**Table A1-3 Estimation of Electricity Demand (MW)**

2012	2015	2018	2020
1,062	1,643	2,283	2,770

Source : MIME (CDC (2012) "Cambodia Investment Guidebook ")

Cambodia formulated a development plan for electricity supply in order to meet the increasing demand for electricity. According to the plan, eight hydropower plants and three thermal power plants will be completed in 2020. The total electricity generated in the power plants and imported electricity from neighboring countries based on the electricity cooperation agreement will be 3576 MW at maximum. As a result, the maximum capacity of electricity supply will become about 3.4 times more than that in 2012.

### (2) Simplified Estimate of Electricity Demand

This section attempts to estimate electricity demand using real economic growth rate (7.5%) and annual rate of increase in manufacturing (14.9%) until 2020, which are assumed in this study.

Following the actual performance between 2000 and 2007, this section sets elasticity of electricity demand as follows:

GDP elasticity of electricity demand	2.1
Manufacturing production elasticity of electricity demand	1.5

Using the above stated elasticity, electricity demand in 2020 is calculated as 3930 MW, which is about 3.7 times more than that in 2012. Also, the electricity demand for manufacturing in 2020 will become about 4.6 times higher than that in 2012.

### (3) Gap in Electricity Demand

Existing electricity demand assumption estimates 1160 MW lower than the above simplified estimation (gap rate: ▲29.5%). Also, the assumption is 354 MW lower than the maximum electricity supply capacity including electricity import (gap rate: ▲9.0%). It is expected that electricity demand for industry will rapidly increase in addition to the gradual increase in electricity penetration rate for households (22.7% of total households). Therefore, there is concern that the gap rate may widen without steady implementation of current electricity development plan. It is therefore urgent to promote electricity development, which fills in such demand gaps.

## 1.3.2 Critical Issues Concerning Electricity Supply

Current electricity development plan in Cambodia has the following three issues to be tackled immediately:



(1) **Overreliance on Hydro Power**

The first issue is over-reliance on hydro power. There are eight hydropower plants and three thermal power plants scheduled for completion in 2020<sup>7</sup>. The advantage of hydro power is eco-friendliness, while its disadvantage is the large seasonal variations between rainy and dry seasons, which undermine the stability of electricity supply for the day-to-day manufacturing operations. Therefore, it is necessary to diversify the power sources, while taking advantage of hydro power.

(2) **Instability of Dependency on Electricity Import**

The second issue is the instability of reliance on electricity import. According to the contract of electricity purchase with Vietnam, 200 MW is supposed to be transmitted from Vietnam to Phnom Penh, which needs 300 MW per day. However, more than 120 MW of electricity have not yet been sent to Cambodia because of electricity shortage in Vietnam<sup>8</sup>. In addition to the electricity import from Vietnam, import of electricity from Thailand through two power cables (22 KV and 115 KV) has started. Also, a 115 KV power cable connecting Laos to Cambodia is scheduled to be completed in 2016<sup>9</sup>.

However, it is expected that rapid economic growth in neighboring countries such as Vietnam (except for Laos) will cause electricity shortage. It is critically important to improve electricity grid network on a regional scale, but the risks of over-reliance on electricity import also needs to be carefully considered.

(3) **Vulnerability of Electricity Sector**

The Electricity Law was enacted in 2001, leading to the establishment of the Electricity Authority of Cambodia (EAC), which supervises and coordinates the supply of electricity. Besides EAC, there are private companies including Independent Power Producers (IPP) in provincial capitals, certified small-scale power providers in other cities in provinces, and rural electricity enterprises (REE) in rural areas. The electricity sector in Cambodia is vulnerable partly because the various actors stated above supply electricity through different channels, and partly because power sources are IPP and import from neighboring countries.

In Cambodia, the improvement and upgrading of a nationwide network of electricity grid has been underway. Currently, some provinces are covered by the transmission and distribution system, while others are out of coverage. Combined with low fee collection rates, the current situation, in which electricity transmission and distribution is limited at local level and the grid is not integrated,

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<sup>7</sup> MIME (CDC(2012) “Cambodia Investment Guidebook” )

<sup>8</sup> Same as above

<sup>9</sup> Same as above

increases the vulnerability of the electricity sector in Cambodia.

A stable and low-cost supply of electricity is essential in order for manufacturing companies, which consume relatively large amount of electricity, to expand their business in Cambodia. It is noted however, that it is difficult to provide electricity services, which are competitive to Thailand and Vietnam, if the current power development system remains as it is.

The above issues have to be overcome in order to promote FDI in manufacturing for diversification and upgrading of industry. For improving the electricity sector, it is required for RGC, together with the EDC (Electricité due Cambodge), to review the policies related to the electricity sector, and to take necessary measures to secure financial resources.

## Appendix 2

# Quantitative Base for a Formulation of a FDI/SEZ Policy

## **【Appendix 2】 Quantitative Base for the Formulation of FDI/SEZ Policy**

### **2.1 Set an FDI Target Figure**

The size of FDI in Cambodia is the most important factor to determine its future industrial development. This section estimates the total amount of FDI up to 2020, and shows the amount of FDI invested in manufacturing and in SEZ.

#### **(1) Estimation of the Total Amount of FDI in the 2010s (2011-2020)**

##### **1) Basic information**

The IMF document entitled, “Cambodia: Staff Report for the 2011 Article IV Consultation” estimates the total amount of FDI up to 2016 as a part of estimation process of the international balance of payments. Also, IMF document entitled, “Cambodia: Staff Report for the 2011 Article IV Consultation –Debt Sustainability Analysis” estimates the ratio of net FDI to GDP in 2021 and 2031<sup>1</sup>.

These estimates and the IMF Working Paper<sup>2</sup>, published around the same time as the above-mentioned reports and referred to in **【Appendix 1】** of this report, are in the same process at IMF. Therefore, the consistency of these three estimates is basically considered secure. In other words, the estimates of FDI shall reflect the potential growth rate of 7.5% after 2012. Because of that, the FDI target in this study depends on these estimates, and its validity need not be checked here.

##### **2) Estimation results**

Among the IMF documents mentioned above, the appendix table in the “Consultation” shows the amount of annual FDI up to 2016. On the other hand, “Debt Sustainability Analysis” shows average ratio of FDI to GDP in 2021, 2031, and from 2017 to 2031.

Table A2-1 below shows the amount of accumulated investments and the annual average amount of investments by dividing 2011-2020 into two periods. The annual average amount of FDI will be USD 1,316 million in the first period, and become USD 1,629 million in the next period.

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<sup>1</sup> IMF, February 2012.

<sup>2</sup> IMF “Modeling with Limited Data: Estimating Potential Growth in Cambodia” April 2012.

**Table A2-1 Breakdown of Target Amount of FDI by Period**

(Unit : USD million)

Periods	Accumulated Amount	Annual Average Amount
2011-2016 (6 years)	7,895	1,316
2017-2020 (4 years)	6,515	1,629
2011-2020	14,410	1,441

Source: JICA Study Team based on IMF document, "2011 Article IV Report-Debt Sustainability Analysis Cambodia"

Compared to the accumulated amount of FDI between the periods (2001-2010 and 2011-2020), the amount will increase from USD 4,277 million in the 2000s to USD 14,410 million in the 2010s, which is 3.37 times more than that in the 2000s. As for the annual average amount, it will be USD 428 million and USD 1,441 million in the 2000s and 2010s, respectively (Table A2-2).

**Table A2-2 Comparison of the Amount of FDI in the 2000s and 2010s**

(Unit : USD million, ratio)

Periods	Accumulated Amount	Annual Average Amount
2001-2010 (a)	4,277	428
2011-2020 (b)	14,410	1,441
b/a	3.37	3.37

Source: JICA Study Team based on IMF "2011 Article IV Report-Debt Sustainability Analysis Cambodia"

Therefore, the amount of FDI in 2020 is estimated as USD 1,809 million, which is 2.61 times higher than the average amount from 2008 to 2010 (Table A2-3).

**Table A2-3 Average Amount from 2008 to 2010 and Estimated Amount in 2020**

(Unit : USD million, ratio )

Annual Average (2008-2010)(a)	2020 (b)	(b)/(a)
694	1,809	2.61

Source: JICA Study Team based on IMF document "2011 Article IV Report-Debt Sustainability Analysis Cambodia"

Also, Table 4 shows the estimated ratios of FDI to GDP. The ratios, especially those in the first half of the 2010s, will significantly increase compared to the one in the last ten years.

**Table A2-4 Ratios of FDI to GDP**

(%)

2001-2010	2011-2016	2017-2020
4.4	8.2	6.5

Source: JICA Study Team based on IMF "2011 Article IV Report-Debt Sustainability Analysis Cambodia"

**(2) Estimation of the Amount of FDI in Manufacturing Sector in the 2010s (2011-2020)**

## 1) Total amount of FDI in the manufacturing sector

## a) Investment trends by sector

There are no statistical documents calculating FDI by sector in Cambodia. Therefore, this section uses the amount of investments by sector calculated by CDC. It should be noted that the data is based on the approved amount by QIP, and there is a huge gap between this amount and the actual amount of investments.

Table A2-5 shows the approved amount of investments for foreign companies from 2001 to 2011. By dividing the 2000s into two periods (2001-2005 and 2006-2010), the share of the approved amount invested in a manufacturing sector in the first period is 42.7%, which significantly decreases to 5.5% in the next period. On the other hand, the share of approved amount invested in the tourism sector increases to 56.1%. However, the one invested in the manufacturing sector again increases to 40.5% in 2011.

**Table A2-5 Approved Amount of FDI for Foreign Companies by Sector**

(Unit : %, USD million)

	2001~05	2006~10	2011
Agriculture	3.3	8.0	10.3
Industries	59.7	14.9	40.9
Energy	7.9	8.9	0.0
Mining	9.2	0.6	0.4
Manufacturing	42.7	5.5	40.5
Services	15.2	21.0	9.4
Tourism	21.8	56.1	39.4
Total	100.0	100.0	100.0
Amount	1,986	26,535	7,012

Note: Investments equal to or less than USD 200 million were excluded.

Source: JICA Study Team based on documents from CIB (CDC)

It is worth noting that USD 201 million for oil refinery plants is included in the amount in 2005, which raised the share of the manufacturing sector in the total investments. If the share without that amount is recalculated, the share in the first period (2001-2005) decreases from 42.7% to 36.8% (42.8% for 2003-2005).

For information purposes, the share of FDI in the manufacturing sector in Vietnam (approval base) was 53.0% in the 2010s. Though it decreased to 29.7% during the global financial crisis (2007-2010), the share was 68.4% during 2001-2006 (Table A2-6). Based on these results, it can be

interpreted that production transformation to manufacturing sector in Vietnam developed significantly while its investments in tourism sector was not significant.

**Table A2-6 Share of FDI in Manufacturing Sector in Vietnam (Approval Base) –Period Average-**

(%)

2001-2010	2001-2006	2007-2010	2007-2010 (without 2009)
53.0	68.4	29.7	35.0

Source: JICA Study Team based on Ministry of Planning and Investment, Vietnam

b) FDI in the manufacturing sector

In terms of the percentage of FDI invested in manufacturing in Cambodia in the 2010s, this section sets three cases, namely, a lower case (30%), a medium case (40%), and a higher case (50%). These cases are set considering that (1) the share of manufacturing in 2003-2005 average in Cambodia (excluding the oil refinery plants) is 42.8%(approval base), (2) share of approved investments in 2011 is 40.5%, (3) Cambodia recently became an attractive alternative production location for manufacturing companies, (4) FDI from Japanese companies started to flow into the country, and (5) Cambodia is following Vietnam, which is one step ahead.

As a result, the amount of FDI invested in manufacturing in Cambodia in the 2010s can be calculated as shown in Table A2-7. The annual amount of FDI is USD 430 million, 580 million, and 720 million for lower, medium, and higher case, respectively.

**Table A2-7 Target Amount of FDI to be Invested in Manufacturing**

(Unit : USD million)

	Annual Average			Accumulated		
	Lower	Medium	Higher	Lower	Medium	Higher
2011-2016	400	530	660	2,370	3,160	3,950
2017-2020	490	650	810	1,960	2,610	3,260
2011-2020	430	580	720	4,320	5,760	7,210

Note: The share of FDI for manufacturing is 30%, 40%, and 50% in low, medium, and high case, respectively.

Source : JICA Study Team

2) FDI in SEZs

This section estimates the share of FDI invested in located in SEZs in the total amount of FDI in the manufacturing sector.

- ① Using the data from CDC, the actual amount of investments poured in SEZ was estimated. The amount of FDI invested in manufacturing is calculated using the accumulated amount of investments from 2008 to 2012, with deduction of investments in electricity and the one invested by the Cambodian government.

Investment in SEZ: USD 694.6 million - {249.1 million (investment in electricity) + 0.6 million (investment by Cambodia)} = USD 445 million

- ② Using the data from CDC and the “Economic Census of Cambodia 2011”, the share of workers in SEZ divided by the total number of workers employed by FDI companies is as follows:

$$\text{Share of workers in SEZ: } \frac{80,000 \text{ people (workers in SEZs)}}{23,900 \text{ people (workers at FIEs)}} = 33.3\%$$

From the results, it can be said that the amount of investments in SEZ is USD 445 million, which is about USD 100 million per year, and the workers in SEZ account for a third of the total number of workers employed by FDI companies. Considering expected concentration of investments in SEZ from now, it is envisaged that the share of investments in SEZ in terms of total amount of FDI will increase.

Here, investment share in SEZ in terms of total amount of FDI invested in manufacturing were set in three cases, which are 40%, 50%, and 60%. Combined with data from Table A2-7, Table A2-8 shows the amount of FDI invested in SEZ according to each target of FDI in manufacturing. The annual average amount is between USD 170 million and 430 million with the standard of about USD 290 million.

**Table A2-8 Target Amount of FDI in Manufacturing Invested in SEZ**

(Unit : USD million)

		FDI in Manufacturing		
		Lower	Medium	Higher
SEZ	40%	170	230	290
Ratio	50%	220	290	360
	60%	260	350	430

Source: JICA Study Team

### 3) ICOR of the manufacturing sector

Based on the above amount of FDI invested in manufacturing, this section estimates the incremental-capital output ratio (ICOR) of manufacturing. As the amount of investments by sector is not available in Cambodia’s GDP statistics, the gross amount of value-added in manufacturing related to FDI cannot be calculated. Therefore, below estimate is only intended to roughly calculate ICOR.

The target period of ICOR estimation is from 2011 to 2016. The increase in gross value-added amount was calculated by increasing the ratio of value added in manufacturing (14.9%). Also, the



above amount of FDI invested in manufacturing is used as increase in investments in manufacturing, while the ratio of garment and textile sector is used as the ratio of investments in manufacturing to total FDI (increase in share is taken into account in the “higher” case).

As shown in Table A2-10, the estimated amount in the “medium” and “higher” cases is 1.4 and 2.0, respectively.

**Table A2-9 Gross Amount of Value-added and Increased Amount in Investments (2011-16)**

		(USD million)
Estimated increased amount of gross value added of manufacturing (annual average)	(a)	362
Estimated amount of increased investments in manufacturing (annual average)	Lower case (b)	307
	Medium case (c)	507
	Higher case (d)	707

Source JICA Study Team

**Table A2-10 ICOR of the Manufacturing Sector**

Lower Case (b/a)	Medium Case (c/a)	Higher Case (d/a)
0.9	1.4	2.0

Source: JICA Study Team

It is not easy to identify what the approximate level of ICOR of manufacturing in Cambodia in the 2010s is, and some similar cases are listed as below. Also, ICOR based on GDP is referred because the examples of measurement of manufacturing are quite limited:

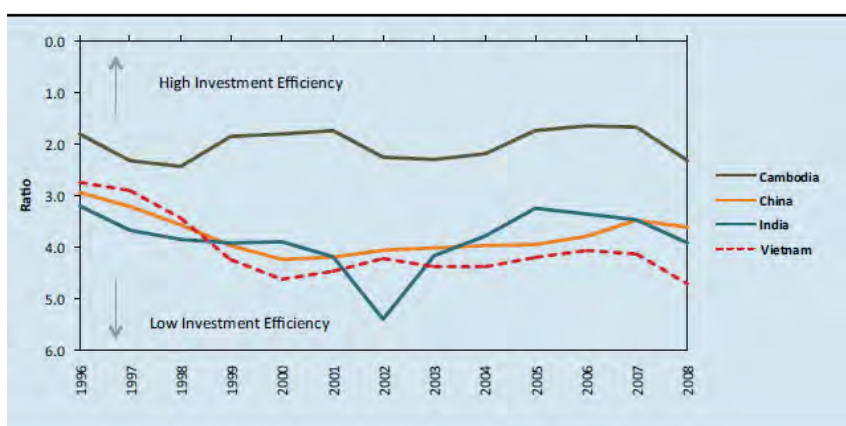
- According to the empirical analysis of ICOR conducted by the Ministry of International Trade and Industry (MITI) of Japan (1978)<sup>3</sup> with private capital investment function, optimum capital coefficient during 1962-1971 and during 1973-1977 is 2.59 and 1.53, respectively.
  - The ICOR of manufacturing seems to vary according to sectors and company size. In the case of manufacturing in Japan in 1932, for example, the average capital coefficient varies from 2.3 to 6.1<sup>4</sup>. Also, the average capital-output ratio by sectors of manufacturing varies from 0.17 for other manufacturing, to 1.03 for chemicals<sup>5</sup>.
1. The optimum capital coefficient of non-primary industry in Japan varies from 1.68 to 4.05 between 1985 and 1949, which greatly fluctuates in the face of growth and economic

<sup>3</sup> MITI (1978) “Long-term vision of industrial structure”. MITI has changed its name as the Ministry of Economy, Trade and Industry (METI) in 2001.

<sup>4</sup> Takahide Nakamura (1978) “Japanese Economy – its growth and structure” University of Tokyo Press

<sup>5</sup> MITI (1978)

- conditions<sup>6</sup>.
- The ICOR in East Asian countries varies from 1.9 to 22.4 between 1965 and 1995, and tends to increase with the increase in income per capita<sup>7</sup>.
  - While the ICOR of Cambodia fluctuates by around 1.0, that of Vietnam shows higher figures, which are 4.8 as annual average in 2000 and 2008, and 5.4 as annual average in 2006 and 2008. In case of Vietnam, the share of national companies is large despite the huge FDI inflow, making the ICOR of Vietnam high<sup>8</sup>. In case of Cambodia on the other hand, it can be estimated that the optimum capital coefficient is relatively low while capital efficiency of investments is high because private capital stock is in the initial stage, and the weight of FDI is huge (see Figure A2-1).
  - When one looks at the trends of optimum capital coefficient in Japan, it reached 3.19 in 1990 after large annual fluctuation since 0.67 in 1960<sup>9</sup>. Also, the periodical average of 1957-1961, 1961-1964, 1964-1969, and 1969-1973 was 0.95, 1.17, 1.23, and 1.86, respectively<sup>10</sup>.



Source: Ketels, Nguyen Dinh Cung, Nguyen Thi Tue Anh, Do Hong Hanh (2010), Vietnam Competitiveness Report”

Figure A2-1 ICOR in Vietnam, Cambodia, China, and India

## 2.2 Estimation of Labor Supply and Number of Workers (FDI/SEZ) in the Manufacturing Sector

First, this section briefly estimates labor supply in 2020. Then, it shows a brief estimation of the number of workers in the overall manufacturing sector and FDI/SEZ, in relation with Appendix 1 and 2.1 above. After that, the possibility of securing the balance of labor force demand in 2020 will be verified.

<sup>6</sup> Takahide Nakamura (1978)

<sup>7</sup> Shinichi Ichimura (1998) “Political Economy of Japanese and Asian Development”

<sup>8</sup> H.E.Hoang Trung Hai, Michael E. porter (2010) “Vietnam Competitiveness Report 2010”

<sup>9</sup> Takafusa Nakamura (1995) “The Post-war Japanese Economy- Its Development and Structure, 1937-1994” University of Tokyo Press”

<sup>10</sup> Takahide Nakamura (1978)

(1) **Labor Supply in 2020**

1) Working age population

According to the “General Population Census of Cambodia 2008” (hereinafter referred to as “2008 population census”), economic activity rates of ages between 10 and 14, and the age over 65 in Cambodia were 5.4% and 54.5%, respectively. However, the ratio of the two age groups to total workers is low. Also, this section focuses on the estimation of workers in the manufacturing sector related with FDI and SEZ. Therefore, the estimate will be based on the working age population (age between 15 and 64).

The working age population is 8.31 million in 2008. To facilitate estimation below is hypothesized:

- ① Fertility rate of the target population is 0.0%
- ② Social mobilization rate (international as well as urban-rural movement) of the target population is 0.0%

Under these hypotheses, the estimation of entry-in and exit-from the working age population by urban/rural is presented below. As a result, the working age population in 2020 will become 10.46 million (2.15 million or 25.9% increase since 2008).

**Table A2-11 Entry-in and Exit-from the Population between the Age of 15 and 64 (Change between 2008 and 2020)**

(unit : 1,000 people)

	Entry	Exit	Net Increase
Urban	430	170	260
Rural	2,570	680	1,890
Total	3,000	850	2,150

Source: JICA Study Team based on National Institute of Statistics, Ministry of Planning “General Population Census of Cambodia 2008” August 2009

2) Labor force population

In order to estimate labor force population, it is necessary to hypothesize the rate of labor force (labor force population divided by working age population). Usually, the rate of labor force is different among sex, age, and urban/rural employment. Although these differences must be taken care of for the detailed labor force population estimation, this section employs the rate of labor force in the age bracket of 15-64 in 2008 by urban/rural group to facilitate estimation.

**Table A2-12 Rate of Labor Force in the Age of 15-64**

(Unit : %)

	Urban	Rural	Total
1998	65.9	82.4	79.0
2008	67.7	83.5	80.0

Source: National Institute of Statistics, Ministry of Planning "General Population Census of Cambodia 2008" August 2009.

According to the estimate, the labor force population in the working age in 2020 will be 8.37 million, which is an increase from 6.64 million in 2008. (1.73 million or 26.1% increase)

**Table A2-13 Working Age and Labor Force Population in 2020**

(Unit : 1000 people, ratio)

	2008 (a)	2020 (b)	Increase (b-a)	Ratio (b/a)
Population in the age of 15-64	8,310	10,460	2,150	1.259
Labor force population	6,640	8,370	1,730	1.261

Source: JICA Study Team based on National Institute of Statistics, Ministry of Planning "General Population Census of Cambodia 2008" August 2009

## (2) **Workers in the Manufacturing Sector (FDI/SEZ) in 2020**

### 1) Workers in the manufacturing sector

As discussed in Appendix 1, this study hypothesizes that the gross value added in the manufacturing sector in 2020 (in USD, 2011) would be 3.5 times higher than that in 2011 (annual rate 14.9%). This section estimates the size of manufacturing workers in 2020 in response to this production expansion.

The gross value added from the manufacturing sector in Cambodia (2000 base) increased more than 3.9 times (annual rate: 14.9%) over ten years (from 1998 to 2008). Because of the lack of data on workers in the secondary industry (manufacturing), 0.785 was estimated as the elasticity of the gross value added from the manufacturing sector, using the increase in workers in the secondary industry (annual ratio is 11.3%).

Subsequently, the number of workers in the manufacturing sector in 2020 was estimated by simply using said elasticity. According to "Economic Census of Cambodia 2011" (hereinafter referred to as "2011 Economic Census"), the number of workers in the manufacturing sector is 539,000. Therefore, assuming the above growth rate in the manufacturing sector and the elasticity of employment, the number of workers in the manufacturing sector in 2020 is calculated to be 1.4 million. This means that the number will increase by 861,000 over nine years from 2011, and the annual average increase will be 96,000, which will become 960,000 in ten years.

**Table A2-14 Workers in the Manufacturing Sector in 2020**

(Unit : 1,000 people, ratio)

2011 (a)	2020 (b)	Increase (b-a)	Ratio (b/a)
539	1,400	861	2.597

Source: JICA Study Team based on National Institute of Statistics, Ministry of Planning  
“Economic Census of Cambodia 2011” March 2012

## 2) Workers in FDI companies

This section assumes manufacturing companies operated by foreign owners in “2011 Economic Census”, as FDI companies. Based on this assumption, the number of workers working in FDI companies is 239,000, which consists of 173,000 from China, 124,000 from Korea, 45,000 from ASEAN countries other than Cambodia, and 7000 from USA or Europe.

**Table A2-15 Number of Workers in the Manufacturing Sector by Type of Owner (2011)**

(Unit : 1,000 people, %)

Cambodian Owner	Foreign Owner	Total
300	239	539
(55.7)	(44.3)	(100.0)

Source: National Institute of Statistics, Ministry of Planning “Economic Census of Cambodia 2011” March 2012.

This section replaced the figures in the Economic Census 2011 with figures in 2010 as reference date for Economic Census in 2011 is March 1, 2011. Using SEZ data as the basic unit for estimating the number of employees in FDI companies in manufacturing sector, the number of employees in SEZ is 80,000 and the accumulated amount of investments is USD 711 million (see Section 3.2 of Chapter 3 in Part 1). Therefore, the amount of FDI investments per employee becomes USD 112.5 million/employee. Using these results, the number of employees in FDI companies in manufacturing sector will be as follows:

**Table A2-16 Number of Employees in Manufacturing Companies Invested by FDI**

(1000 people, ratio)

	2010 (a)	2020 (b)	(b/a)
Lower case	239	725	3.0
Medium case		887	3.7
Higher case		1050	4.4

Source: JICA Study Team

Using the same methodology, the number of employees in SEZ by the amount of FDI invested in manufacturing and the ratio of SEZ can be calculated as follows:

**Table A2-17 Number of employees working in manufacturing FIEs in SEZs in 2020**

(1000 people, ratio)

FDI Invested and SEZ Ratio		FDI Invested in Manufacturing		
		Lower Case	Medium Case	Higher Case
SEZ Ratio	40%	190	260	330
	50%	250	330	410
	60%	290	390	480

Source JICA Study Team

**(3) Verification of Labor Force Demand in 2020**

## 1) Verification from the macroeconomic point of view

The number of workers in the manufacturing sector will increase by 861,000 between 2011 and 2020 (annual average: 96,000). On the other hand, the increase in working age population and labor force population will be 1.612 million (annual average: 179,000) and 1.279 million (annual average: 144,000), respectively. Furthermore, the number of people engaged in agriculture increased by 1.275 million between 1998 and 2008, which means that the comparative productivity in agriculture decreased and that the overcrowded situation in agriculture is getting worse (see Chapter 2 of Part 1). In consideration of such situation in agriculture, the estimated increase in the demand for workers in the manufacturing sector can be satisfied from the viewpoint of macroeconomics. Rather, the expansion of employment opportunities in the manufacturing sector will improve the overcrowded situation in agriculture, and will become a key factor in modernizing agriculture.

## 2) Mismatch of labor force supply and demand

The issue is a mismatch of labor force supply and demand among sectors and regions. Farming villages are the dominant source of labor force for the manufacturing sector in regard to both old and new workers. Therefore, the largest issue is how to smoothly lead labor force in farming villages to be absorbed by labor demand in the manufacturing sector. It is necessary to establish a modern system where industry and the labor force in farming villages are interrelated, and to eliminate a mismatch between divisions and regions.

### **2.3 Background Notes on the Indicative Estimate of the Size of Required Infrastructure Capacity**

The objective of this analysis is to perform experimental and indicative calculation on the size of investment necessary to achieve the economic growth target and manufacturing sector growth target set in Appendix 1, based on the overall policy objective described in “Outline of Cambodia’s Industrial Policy” by SNEC. Regarding the FDI-lead manufacturing sector growth as the main pillar

of the policy recommendation discussed in the main text of this report, this analysis is composed of three parts as listed below: First, it estimates the manufacturing value-added to be generated from the industrial area where FIEs are to be located. Subsequently, the capacity of infrastructure to meet the target is estimated.

- 1) Estimation of the manufacturing value-added using additional FDI required to achieve the growth target
- 2) Necessary area for industrial site to accommodate FDI is sufficient enough to generate the value-added estimated in 1)
- 3) Demand estimates for power generation and water supply for the estimated area of industrial sites in 2)

The results of the demand estimation for infrastructure development (e.g., industrial areas) and the number of employees are as follows:

### **2.3.2 Estimation of the Target Manufacturing Value-added Generated by FDI**

The vision of the proposed policy in the main text set the target as doubled GDP per capita by 2020, with the share of manufacturing sector to GDP as 25%. In order to achieve such target, it was estimated that the annual growth rate of manufacturing value-added until 2020 should be maintained at 14.9% (constant base).

In this analysis, the share of manufacturing value-added generated by FDI to the entire manufacturing sector is hypothetically set in three levels, namely, 80% (higher case), 70% (medium case), and 60% (lower case). In 2010, the value-added generated from the textile, wearing apparel and footwear industries were 63% of the manufacturing sector value-added in total. Assuming that majority of the manufacturers in these sectors are FIEs, at least 60% or more manufacturing value-added are generated from FIEs. The hypothetical ratio is set based on the understanding and strategy toward Cambodia's industrial growth to be led by FDI as explained in the main text.

The result of the estimation is shown below.

**Table A2-18 Estimation of Manufacturing Value-Added by FDI**

	2010	2020
Manufacturing Value-Added (Constant Price, Billion USD)	1.65	6.63
Manufacturing Value-Added by FDI sector (High Case, 80%)(Constant Price, Billion USD)	1.32	5.30
Manufacturing Value-Added by FDI sector (Medium Case, 70%)(Constant Price, Billion USD)	1.16	4.64
Manufacturing Value-Added by FDI sector (Low Case, 60%)(Constant Price, Billion USD)	0.99	3.98

Source: JICA Study Team based on 2010: Statistical Yearbook of Cambodia, 2011-2020:

### 2.3.3 Demand Estimation for Infrastructure Development

The necessary capacity of infrastructure to generate the abovementioned share of manufacturing value-added by FDI is estimated as explained below.

#### (1) The Method for Estimating Necessary Area of Industrial Site

Using the formula shown below, the necessary area of industrial sites to accommodate manufacturing FDI is estimated. It should be noted that the area of the site purely used for the purpose of industrial activities is not necessarily equal to the area of industrial estates/zones/parks, which are specifically designated for industrial use. For example, roads, administration buildings, and other facilities are located within the industrial estates/zones/parks. Some may include residential areas for workers and managers. Therefore, the total area for SEZ or similar industrial sites should be estimated taking into the account these additional areas<sup>11</sup>. The 2010 data are tentative figures calculated by the formula<sup>12</sup> below.

$$W_j = \frac{MVA_{FDI_j}}{MVA_e \times EA}$$

$W_j$ : Necessary area of industrial site for manufacturing FDI in year j (Unit: ha)

$MVA_{FDI_j}$ : Manufacturing value-added generated by manufacturing FDI in year j (Unit: USD)

$MVA_e$ : Manufacturing value-added per worker (Unit : USD)

$EA$ : Workers per unit area (Unit: person/ha)

<sup>11</sup> For example, out of 70 ha, 45 to 50 ha are allocated for the lots for factories. Phnom Penh SEZ with 360 ha of planned areas for development includes 57 ha of residential area.

<sup>12</sup> Only categorized data on the size of establishments is available in “Economic Census of Cambodia 2011” and actual size is not available.



1) Labor productivity (Manufacturing value-added per worker: MVA<sub>e</sub>)

Manufacturing value-added per worker in 2010 was calculated using the manufacturing value-added in 2010, divided by the population engaged in manufacturing based on the population census of 2008. The value in the following years were calculated based on the assumed 5% increase per annum from 2010 to 2015 and 5.5% from 2016 to 2020<sup>13</sup>. The result of 2010 as the base year and that of 2020 are as indicated below.

**Table A2-19 Manufacturing Value-added per Worker**

	2010	2020
Manufacturing Value-Added Per Worker (2010 Constant USD)	3,304	5,381

Source: JICA Study Team

The data of labor productivity in Vietnam indicates the better performance of FIEs than that of manufacturing sector in total. In case of Cambodia however, the major part of manufacturing value-added is generated by FIEs as explained earlier. Therefore, this analysis substitutes the data of manufacturing sector in total.

## 2) Workers per unit area (Workers per hectare : EA)

The estimation employed the data of necessary electricity capacity per unit area constructed for the feasibility study of the Sihanoukville Port SEZ as the figure of the base year, 2010. In general, the number of workers per unit area decreases as the labor productivity increases. Therefore, the number of each year is hypothetically reduced: the number is reduced 2% per annum from 2011 to 2015; and 5% per annum from 2016 to 2020. As a result, the number of workers per hectare is estimated at 218. Due to the price of electricity, the manufacturing sector tends to utilize labor-intensive production methods. As the condition may change in the future with possible increase in electricity supply and consequently lowered electricity price, the number of workers per unit area may change in a different degree.

## 3) Manufacturing value-added per unit area (MVA × EA)

Manufacturing value-added per unit area is obtained by multiplying the valuables computed

<sup>13</sup> In Vietnam, the growth rate of labor productivity have changed over time from 5.9% between 1990 and 1995, to 4.3% between 1995 and 2000, and to 5.1% between 2000 and 2006 (Diep Phan(2009), "Vietnam's Labor Market-Wage Growth and Wage Inequality (Presentation Material, CIEM-DANIDA Project July 22, 2009). The result of a research revealed that the productivity of FDI sector dropped sharply since the beginning of 2000 although it maintains at a higher level than the domestic and state-owned enterprise sectors. The reason may be due to FDI sector's transition to more labor-intensive production. On the other hand, the productivity of the manufacturing sector in total has been increasing. In this analysis, Vietnam's experience after 2000 is used as reference assuming labor-intensive industries will remain predominant in Cambodia in the near future. (Ketels, Nguyen Dinh Cung, Nguyen Thi Tue Anh, Do Hong Hanh (2010), "Vietnam Competitiveness Report")

through 1) and 2) (manufacturing value-added per worker) by the number of workers per unit area, computed under 3). The result of 2010 and 2020 are shown in the table below.

**Table A2-20 Estimation of Manufacturing Value-added per Unit Area**

	2010	2020
Manufacturing Value-Added per area (2010 Constant USD/ha)	991,074	1,175,598

Source: JICA Study Team based on the data of NIS(2012), "Economic Census of Cambodia 2011", NIS(2011), and Statistical Yearbook of Cambodia 2011"

4) Estimation of the demand of newly developed industrial sites for manufacturing FDI

Utilizing the variables computed from the abovementioned estimation, the demand for newly developed industrial sites for manufacturing FDI is further estimated. The result is indicated in the table below. It should be noted that the data of 2010 is based on the calculation in this analysis due to the difficulty in obtaining actual land use data<sup>14</sup>.

**Table A2-21 Estimation of Demand for Industrial Site Development for Manufacturing FDI**

	1	Higher Case	Medium Case	Lower Case
Necessary Industrial Area for Manufacturing FIE in 2020 (ha)	4508	3945	3381	
Average Additional Industrial Area to be Developed per Year in 2011-2020 (ha)	351	278	238	

Source: JICA Study Team

The sum of the area of currently approved SEZs in Cambodia is about 8800 ha. However, the SEZs, which have already started actual development, are limited<sup>15</sup>. On the other hand, as explained earlier, SEZs and industrial estates/zones/parks typically comprise the part used for other purposes than purely production. The design may vary depending on the nature of certain industrial sites. However, the area claimed in the currently approved SEZs may not be insufficient to accommodate necessary FDI in future. The problem is rather the status of approved SEZ projects without actual development or in severe delay in development, which leave the land unutilized. This may not only cause insufficiency in supply of industrial sites, but also incur possible negative impacts in the surrounding areas such as unnecessary rise of the land price.

<sup>14</sup> "Economic Census of Cambodia 2011" includes the data on the area occupied by the business using the nine categories, but not the actual number of the area.

<sup>15</sup> Based on the data in JICA(2012), Cambodia Investment Guidebook, JICA/Nippon Koei/KRI/VPI (2010) "The Study on National Integrated Strategy of Coastal Area and Master Plan of Sihanoukville for Sustainable Development, Final Report (Book II)

(2) **Estimation of the Demands of Labor, Electricity and Water Supply**

1) Estimation of employment generated by manufacturing FDI

The number of employment generated by manufacturing FDI is estimated by the number of workers per unit area (the data in Section 2) above) multiplied by the total area to be developed for manufacturing FDI (the data in Section 4) above).

2) Estimation of electricity demand

The demand analysis on electricity is done in Appendix 1.3 based on macro data. In this analysis, the demand is estimated using the data of necessary industrial sites for manufacturing FDI obtained through the calculation explained in the previous section. The electricity demand incurred by manufacturing FDI necessary to reach the overall targeted manufacturing value-added is estimated by using the estimated demand per unit area multiplied by the total area of industrial sites necessary for manufacturing FDI (in Section 4) above).

The electricity demand per unit area differs widely depending on the type of products or processes of production even in the same sector. Therefore, the analysis sets the hypothetical demand per unit area for selected industries based on the projected electricity demand per hectare from the feasibility study of the Sihanoukville Port SEZ, and an index constructed using the data of electricity consumption per area, obtained from the survey on the unit demand and outputs of Japanese manufacturing sector. The industries selected are i) garment sector, representing relatively low consumption of electricity, ii) food processing, representing sectors with consumption of electricity with medium degree, and iii) plastic molding and metal plating, representing sectors with high demand of electricity.

The demand of electricity per hectare is projected to be 400 kW per hectare based on the feasibility study of the Sihanoukville Port SEZ. Due to the current electricity price and the quality of supply in Cambodia, the projection is made based on the assumption that the industrial composition is mostly labor-intensive industries. Therefore, it is assumed in this analysis that the electricity supply will increase gradually over time, and that the composition of the manufacturing FDI is also changed slightly by more sectors with higher electricity demand.

First, the demand of electricity per hectare for four sectors is calculated. Using the Japanese data of unit electricity demand at industrial sites per sector, an index is constructed where the amount of electricity demand per unit area by putting garment sector is 1. Multiplying the data of the projected demand estimate of garment sector by the value from the feasibility study of Sihanoukville Port SEZ (300 MW/ha), and by the number obtained in the index, the demand per hectare per sector is obtained (please refer to Index I and Electricity Demand per Area in the table below). As mentioned earlier, the estimation for Sihanoukville Port SEZ is 400 kW per hectare. The ratio in the total

electricity consumption in 2010 is hypothetical composition to match the projection of 400 kW in total. For 2020, it is further assumed that the ratio of garment sectors (i.e., the less electricity-consuming sectors) will decrease with the increase in higher electricity-consuming sector. The result is shown in the table below.

**Table A2-22 Composition of Sectors and Electricity Demand per Unit Area**

	Electricity Consumption per Area (1000 yen/m <sup>2</sup> )	Index1 (Garment =1)	Electricity Demand per Area (kW/ha)	Ratio in Total Electricity Consumption 2010	2010 Electricity Demand Per Area (kW/ha)	Ratio in Total Electricity Consumption 2020	Electricity Demand per Area (kW/ha) 2020
Textile	1.75	1.46	437.5	0.1	44	0.15	66
Garment	1.2	1.00	300.0	0.8	240	0.6	180
Food	2.37	1.98	592.5	0.05	30	0.1	59
Plastic moulding	6	5.00	1500.0	0	0	0.1	150
Metal Plating	6.33	5.28	1582.5	0.05	79	0.05	79
Total				1	393	1	534

Source: JICA Study Team based on the data of Japan Industrial Location Center (1995) "Kogyo Richi Gentani Chousa Houkokusho" (Report of the Survey on Industrial Sites Specific Consumption Rate" and data from the interview with the Sihanoukville Port SEZ construction office.

On the other hand, assuming that the demand of electricity increases by 3.5% per annum, the unit electricity demand per hectare in 2020 will be 540 kW, which is almost at the same level as the projection above. Therefore, in this analysis, electricity demand per unit area for projected years is calculated assuming that the demand increases by 3.5% per annum from the base year (400 kW in 2010 per hectare). By multiplying the industrial site to be developed (data in Section 4) above), the total demand of electricity for manufacturing FDI will become 546 kW/ha.

### 3) Demand estimate of water supply for the production activities by manufacturing FDI

The water consumption of unit production varies depending on the type of sector and products. In addition, manufacturing companies located in other Asian countries started recycling major parts of used water reducing volumes, both of intake and discharge. Therefore, similar to other data in this analysis, this data is also considered as a preliminary indicative estimate.

The demand for water is calculated by multiplying the unit amount of water consumption (40 t/day) by the area of industrial sites required by manufacturing FDI (data of Section 4) above). The unit amount of water consumption is obtained again from the feasibility study of Sihanoukville Port SEZ.

### 4) Estimation of necessary sewage disposal capacity

The amount of water to be discharged after utilization is normally proportional to the amount of intake. It is assumed that 90% of the water intake (demand) should be discharged.

### 2.3.4 The Results of Estimation

The table below shows the summary of the estimation explained above.

**Table A2-23 FDI and Demand for Infrastructure Development**

<b>EXPERIMENTAL ESTIMATE: Infrastructure Demand Accommodating Targeted FDI Volume</b>	Higher Case	Medium Case	Lower Case
Ratio of Manufacturing Value-Added by FIE in 2020 (%)	80	70	60
Manufacturing Value-Added by FIE in 2020 (Constant 2010 Billion USD)	5.30	4.64	3.98
Necessary Labor working for Manufacturing FIE in 2020 (1000 persons)*	985	862	739
Necessary Industrial Area for Manufacturing FIE in 2020 (ha)	4508	3945	3381
Average Additional Industrial Area to be Developed per Year in 2011-2020 (ha)	351	278	238
Electricity Demand of Manufacturing FIE in 2020 (MW)	2,422	2,119	1,817
Average Increase of Electricity Capacity per Year in 2011-2020 (MW)	192	168	142
Necessary Water Supply to Manufacturing FIE in 2020 (t/day)	180,335	157,793	135,251
Average Increase of Water Demand per Year in 2011-2020 (t/day)	14,067	11,112	9,525
Necessary Sewage Disposal Capacity for Manufacturing FIE in 2020 (t/day)	162,302	142,014	121,726

Source: JICA Study Team

## Appendix 3

### References for Industrial Policy Formulation by Sector

## **【Appendix 3】 References for Industrial Policy Formulation by Sector**

### **3.1 Approach for Nomination of Candidate Sectors and Background Data Analyses**

#### **3.1.1 Significance of the Priority Sectors**

The significance of the “priority sectors” is that the specific sectors are given priority in resource allocation according to the market mechanisms. These sectors are expected to gain a comparative advantage in the international network of production (or international division of labor) and to play the lead role in a country’s economic development.

In Japan, there were heated discussions over favorable industrial structures and selection methodologies in the 1950s and 1960s among academics and policy makers. They took the issues from the viewpoint of capital and labor, international trade, and interdependence between industries.<sup>1</sup>

Such indices as revealed comparative advantage (RCA) or comparative cost of production may be the tools often used to measure international competitiveness. These indices represent export competitiveness. However, the sectors exhibiting “competitiveness” may not maintain the same competitiveness in the long term. While a country in the period with excessive labor supply may have competitiveness for right industries such as garment and sundries, it may be likely to lose the competitiveness for the same industries when it enters to the period with labor shortage. Therefore, it is necessary not only to analyze the current status of industrial competitiveness but also to review the possible sectors which may be the leading sectors for export.

In the debate for the policy formulation of industrial structural adjustment in 1950s in Japan, Shinohara (1959) raised doubts about the view that the labor-intensive sectors, such as textile and sundry supplies, would continue to grow, and proposed the two following approaches in view of the next decade’s structure of comparative costs.<sup>2</sup> The Ministry of Industry and International Trade developed the policy to foster the future leading sectors for export based on these two criteria.

It should be, however, noted that the analysis requires estimation of the growth rate of demand or technology advancement rate. Therefore, the conditions of availability of data should be fulfilled. Other scrutinizing work is necessary such as setting the assumption on targeted level of the economic development and selecting the target countries with the necessary attribution of hypothetically targeted economic level.

#### **(1) Income Elasticity Criterion**

The income elasticity of a certain industrial sector is analyzed from the viewpoint of the demand side. Foreign market’s income elasticity of the following decade is compared between the textile and sector A. If income

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<sup>1</sup> Shionoya, Y. (1959) proposed 19 criteria from the standpoint of economics (Shionoya, Y. (1959) *Sangyokozo no sakuteikijun* (Formulation criteria of industrial structure) in Shinohara, M. *Sangyokozo* (Industrial structure) Tokyo: Shunjusha).

<sup>2</sup> Shionoya, Y. (1957) *Sangyokozo to toshihaibun* (Industrial structure and investment allocation) in “*Keizaikenkyu* (economic research)” and Shinohara, M. (2006) *Seicho to juncan de yomitoku nihon to ajia* (Economic Growth and Cycle of Japan and Asia), Tokyo: Nippon Keizai Shinbunsha)

elasticity of sector A is higher, it is selected as one of the strategic sectors in order to increase export. This approach aims to manufacture a product of higher income elasticity to be exported to foreign markets.

**(2) Comparative Technical Progress Rate Criterion**

When it comes to the supply side, selection standards are the rate of technical progress as well as structure of comparative costs. If technical progress rate of sector A is higher than that of the textile sector, sector A is selected as one of the priority sectors. It is important to take a dynamic point of view, instead of a static viewpoint.

With the aim of addressing Cambodia’s over-occupation, the following approach should be added to the two above-stated ones.

**(3) Employment Generation Impact Criterion**

Priority should be given to a sector that has a broad range of support and related industries (sectors), and provides wider employment opportunities for SMEs.<sup>3</sup>

**3.1.2 Classifications of the Priority Sectors**

As for the priority sectors, the following three classifications are assumed: (1) indigenous and existing sectors; (2) assembly and processing sectors; and (3) supporting industries. (1) and (2) are basic classifications, whereas (3) is complementary to (2).

The two following approaches are taken for the classification of priority sectors. One is an economic base approach.<sup>4</sup> In this approach, the basic function is the economic activity, which aims to meet the market demand of outside the region/province and which serves as the economic foundation for the region/province. In the meantime, the activity, which is based on intra-region (province) demand, is regarded as a non-basic function. In other words, it is an intra-region (province) industry (sector). The other approach is to categorize a sector into a foot-tight or footloose type according to the standard of dependence on regional resources and of transferability to other regions. In this section, exportability is emphasized (Table A3-1).

**Table A3-1 Industrial Classification**

	Basic Function	Non-Basic Function
Foot-tight Type	agro-industry	agro-industry
Foot-loose type	garment footwear processing & assembly industry	-

Source: JICA Study Team

<sup>3</sup> Shinich Ichimura (1998) “Political Economy of Japanese and Asian Development” Springer-Verlag.

<sup>4</sup> Sasada, Y. (1964) *Chiiki nokagaku* (Regional Science ), Tokyo: Kinokuniyashoten; Masahisa Fujita, M., Krugman, P. and Venables, A. J. (1999) “The Spatial Economy: Cities, Regions, and International Trade” MIT Press.



**(1) Indigenous and Existing Sectors**

The indigenous sectors are dependent on domestic resources, and process domestic products of agriculture, fishery, forestry, and mining as inputs. The existing sectors (e.g. garment and footwear) are also considered for selection.

Most indigenous sectors are categorized into foot-tight. The basic sectors, the domestic market of which is brisk, are to be selected from among them.

**(2) Assembly and Processing Sectors**

As mentioned in Chapter 2 of this Report's Part 1, the assembly and processing sector (e.g. electronics and machinery) play the lead in the production network throughout East Asia. They are footloose type manufacturers that attempt to select locations for optimal procurement and production. Although some of them select Cambodia as location for domestic market, most of them aim to export because the scale of domestic market is small. In other words, they are characterized as basic industries.

The assembly and processing sector is a "foot-loose" type of industry. It is difficult to specify the sectors as priority sectors because industrial agglomerations are at their initial stage and are not yet well established. In practice, it is advisable to decide the strategic priority of the sector when the core firm/sector (i.e. assembler or 1<sup>st</sup> tier supplier) establishes a factory in Cambodia.

**(3) Supporting Industries**

One of the largest automotive industrial agglomerations where there are 1st to 5th tier suppliers has been formed in Thailand. It is often pointed out, however, that the supporting industries are not very competitive in GMS countries (see Chapter 2 of this Report's Part 1).

The supporting industries are manufacturers of parts/components (e.g. screws, gears, die and mold), basic metal processing (e.g. press and gilding) which form the foundation of the assembly manufacturing industry. In case of Cambodia, however, it may be acceptable to include other related materials (e.g. packaging) based on the results of the industrial sector survey under the Study. It was confirmed that FIEs are actually procuring packaging materials locally as one of the very limited locally sourced items. Although the supporting industries play a critical role in the assembly and processing sectors, it is difficult to develop the supporting industries before assembly and processing sectors' investment. This is partly because transportation costs will be high if the supporting industries are far from the assembly and processing sectors, and partly because the two parties need to share the information on the products and part/components, etc. In many cases observed in ASEAN countries, 1st tier suppliers invest in the recipient countries, then establish factories and begin productive operations in the country. Subsequently, the local supporting industries emerge and begin to set up a new firm.

In short, once the formation of agglomeration of the assembly and processing sector begins, local supporting industries will develop. Since the supporting industries play a crucial role in developing Cambodia's industrial sectors, there is a need to prepare various conditions and prerequisites.

### **3.1.3 Narrowing Down of Sectors to Priority Sectors**

Priority sectors for industrial development have been discussed in a variety of policy documents such as Rectangular Strategy, and Diversifying the Cambodian Economy (SNEC). In order to clearly focus on the target and scope of the industrial policy, it is necessary to narrow them down to sectors. The following discussion aims to provide a direction to one of the approaches to achieve this purpose. The priority sectors to be nominated in this approach will be based on the characteristic aspects, which are; 1) sectors that are actually the present driving force of Cambodia's economy, 2) that are closely related to major FDI projects, 3) that are (or could be) taking significant positions in the global value chains, and 4) that are required to be lead by certain policy intentions.

#### **(1) Approach for Nomination**

- 1) Sectors that are actually the present driving force of Cambodia's economy

Based on the 4-digit ISIC code, 122 subject manufacturing sectors will be narrowed down according to their ranks on value of production (sales scale), value of value-added (sales–expenses), and number of establishments.

The filtering factors are also considered and applied for verification if these are in consistent categories as sectors nominated for priority in the major policy documents namely, NSDP, Diversifying the Cambodian Economy (SNEC), DTIS (Trade SWAP/MOC), and GDI Strategy (MIME). The export and import data with 3-digit SITC code is also referred to as the trading strength of the sectors nominated.

- 2) Sectors that are closely related to major FDI projects

The focus will be put on the trends of QIP (approved base). The major sectoral development in the trend will be considered as a selection factor for the priority sectors. At current stage, this filtering approach is mainly based on statistical data.

- 3) Sectors that are (or could be) taking significant positions in the global value chains

Based on the situation and competitiveness identified above, the sectors will be prioritized as the participation in GVC will be important in Cambodia in the near future.

- 4) Sectors that are required to be lead by certain policy intentions

Even if a sector is still newly established and its production weight is low, it will be included if it should be prioritized from the view of industrial strategy in Cambodia.

(2) **Nomination of Candidate Sectors**<sup>5</sup>

1) Narrowing down by ISIC Code

The detailed statistics used in this section are presented in Table 2-11 (top 27 sectors by sales volume based on ISIC code) and Table 2-12 (breakdown of 37 sectors) in Section 2.3 of Chapter 2 in Part 1. Also, priority grouped sectors by category is shown in Table A3-2. Other basic data is compiled at the end of this section.

Based on the Economic Census of Cambodia 2011, the following table shows the reordering of sector ranking on sales volume, plotted by breakdowns of manufacturing sector to 4-digit ISIC code. There are 27 sectors with sales value of over USD 10 million/annum of which six sectors are with USD 100 million/annum. These six sectors (apparel, footwear, plastic products, food products, grain mill products, and animal feeds) should be nominated as candidates for prioritization.

As the top 27 sectors fall into either top 30 or bottom 10 if they are categorized according to value-added, the number of candidate sectors, which are either with sales value of over USD 10 million/annum or with value-added of over USD 1 million/annum (about top 30), becomes 37 out of 112 sectors. This is rather an automatic selection, but it is important to select sectors by size under the assumption that they will be focused in industrial policies. If there are small sectors with potential to grow, or sectors with policy intention, some of them may need to be included as candidates.

The 37 candidate sectors are further prioritized by indexes as follows: (i) top six sectors indicated in the previous section, (ii) four sectors with value-added of over USD 1 million/annum (structural metal products, malt liquor, manufacture of bicycle, and corrugated paper), (iii) three sectors with over 1000 establishments other than those in group (i) and (ii) (textile, sugar, and alcoholic beverage (spirit)).

For future analyses, nominated sectors are categorized into six groups by sales volume, value-added, and number of establishments. The following Table A33-2 shows the categorized grouping of nominated sectors referring to the consistency of coverage of priority sectors in related policy documents (e.g. Rectangular strategy), which will be considered as next prioritized sectors to group (iii) as long as they are not included in (i), (ii), and (iii).

2) Sectors that are closely related to major FDI projects minestrone

Based on QIP approval, constant or more volume of some USD 100 million/annum is recognized for garment sector. Volume in “other industry”, which presumably was established through Japanese’ large scaled investment project for electronics parts manufacturing sector by Minebea, is recently increasing. The comparison between the recent investment trends and identified sectors in Table A3-2, however, reveals that the sectors directly related to FDI is not reflected on the nominated sectors, except for the garment sector.

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<sup>5</sup> Although some group of industries referred to in this Report may be called as “sub-sector”, the Report uses word “sector” in order to avoid the ambiguity and confusion. For example, the electrical and electronics machinery sector supply electrical parts to the automobile sectors. In this case, the group of industries producing electrical parts may be also referred to as “sub-sector”.

➤ Packaging related products

As explained in Chapter 2 in the Part I of this Report, the interviews with the Japanese FEIs reveals that FDI companies are not so much interested in the procurement of parts and/or raw materials domestically, and such companies keep importing products from neighboring countries. The only industries that are interested in possible domestic procurement, so far, are those whose products are related to packaging materials and/or daily factory operations, such as palettes of assembly lines, consumable supply for production equipment. Though the quality is still low and not competitive to those from abroad, there is a possibility for technology progress to develop them with a higher value-added as these products are necessary not only for a certain sector but for others as well.

➤ Plastic products

Also, FDI companies started to consider procuring simple plastic products domestically. In Vietnam and Thailand, the same development was observed at an early stage of FDI boom. Some suppliers and distributors entered in these countries from abroad, but it was confirmed that issue on technology transfer emerged even in such a case. Although Cambodia still have issues on technology transfer, production and quality management, and standardization, it is vital to consider the possibility of the development of such sectors. It is also noted that this sector, as well as packaging, has the characteristic to produce versatile parts for a variety of sectors.

Manufacturing of corrugated paper (ISIC1702) and Manufacturing of plastic products (ISIC 2220) are also included in the candidates list of 37 sectors, and need to be reviewed from the above point of view.

**Table A3-2 Overview of Manufacturing Sector (Categorized Nominated Candidate Sectors)**

Value of Sales (Production)	Value of Sales - Expenses (Value-added)	Number of Establishment	Category	ISIC Code	Class of ISIC rev.4.1	NSDP 2009-2013 related Correspondence	Diversifying the Cambodian Economy (SNEC)	DTIS related Correspondence (with SITC Code)	GDI Strategy 2010-15 (MIME)	Value of Sales (Production) 1000 USD	Value of Sales (per establishment) 1000USD	Value of Sales - Expenses (Value-added) 1000 USD	Number of Establishment	Export (th. Riel/4300) (approx. th USD)
large (Over 10 mil.)	large (Over 1 mil.)	large (Over 1,000)	S1	G-1 1061	Manufacture of grain mill products	Agriculture related	Agriculture related	Rice (042)	Rice	138,866	7.1	39,605	19,554	4,581
				G-2 2511	Manufacture of structural metal products	Construction related	Construction materials			38,195	12.7	11,182	3,015	
				G-3 1312	Weaving of textiles	Garment related	Textile	Garment related (651)	Garment related	73,093	8.6	5,206	8,471	
				G-3 1101	Distilling, rectifying and blending of spirits					14,113	3.9	3,514	3,657	
				3211	Manufacture of jewellery and related articles					24,078	13.1	5,202	1,844	
				2395	Manufacture of articles of concrete, cement and plaster	Construction				15,113	9.8	4,518	1,546	
				1071	Manufacture of bakery products					16,969	11.2	4,359	1,515	
				2392	Manufacture of clay building materials	Construction related	Construction materials			26,609	28.2	6,424	945	
large	large	small (Less 1,000)	S2	G-1 1520	Manufacture of footwear		Footwear	Footwear (851)		3,973,826	36,457.1	3,746,686	109	83,037
				G-1 2220	Manufacture of plastics products					1,311,502	31,226.2	1,307,125	42	
				G-1 1080	Manufacture of prepared animal feeds					117,956	8,425.4	11,057	14	
				G-2 3092	Manufacture of bicycles and invalid carriages			Service 3: Light mnfrg. assembly		45,153	7,525.5	17,790	6	46,503
				G-2 1103	Manufacture of malt liquors and malt			Beer (112)		97,135	3,736.0	14,424	26	
				G-2 1702	Manufacture of corrugated paper and paperboard and of containers of paper and paperboard		Paper			23,555	1,570.3	10,973	15	
				2592	Treatment and coating of metals; machining					11,752	16.2	3,004	727	
				1010	Processing and preserving of meat	Agriculture related	Agriculture related			19,921	59.5	3,342	335	
				1104	Manufacture of soft drinks; production of mineral waters and other bottled waters			Food & Beverage		48,982	331.0	1,579	148	
				2599	Manufacture of other fabricated metal products n.e.c.					17,137	129.8	1,251	132	
large	minus (-)	large	S3	G-1 1410	Manufacture of wearing apparel, except fur apparel	Garment	Garment	Garment (841-844)	Garment	50,842,689	3,218.3	-1,646,348	15,798	2,845,757
				G-3 1072	Manufacture of sugar	Agriculture related	Agriculture related			37,309	6.1	-6,669	6,152	
				3100	Manufacture of furniture		Furniture	Service 2: Wood products		14,430	13.6	-1,471	1,063	5,033
large	minus (-)	small	S4	G-1 1079	Manufacture of other food products n.e.c.	Food processing			Food & Beverage	259,756	3,206.9	-27,192	81	
				1430	Manufacture of knitted and crocheted apparel	Garment	Garment	Garment (845, 848)	Garment	86,457	298.1	-21,470	290	2,699
				2013	Manufacture of plastics and synthetic rubber in primary forms				Rubber	71,619	1,746.8	-54,518	41	31,734
				1062	Manufacture of starches and starch products	Food processing				11,366	44.6	-1,735	255	
				1811	Printing					10,595	50.9	-3,940	208	852,207
over 1 mil.	large	large	S5	1030	Processing and preserving of fruit and vegetables	Agriculture related	Agriculture related	Cashew (057), Cassava (054,056) Corn (044) + Service1	Food & Beverage	8,797	5.6	1,952	1,583	
over 1 mil.	large	small	S6	1074	Manufacture of macaroni, noodles, couscous and similar farinaceous products	Food processing			Food & Beverage	8,463	9.1	2,397	926	
				3312	Repair of machinery					8,384	10.5	2,792	799	
				1621	Manufacture of veneer sheets and wood-based panels					7,930	38.7	1,680	205	
				1610	Sawmilling and planing of wood					6,268	27.6	2,610	227	
				3313	Repair of electronic and optical equipment					6,249	135.8	1,891	46	
				1622	Manufacture of builders' carpentry and joinery					4,903	7.5	1,193	656	
				2029	Manufacture of other chemical products n.e.c.					4,102	47.1	1,342	87	
				1512	Manufacture of luggage, handbags and the like, saddlery and harness					3,934	24.6	1,788	160	
2593	Manufacture of cutlery, hand tools and general hardware					3,777	5.8	1,301	646					

Source: ISIC data from breakdowns of "Economic Census of Cambodia 2011", National Institute of Statistics of Cambodia

Tourism	Tourism	Fishery (034 - 037)	Silk	over 100,000	less 100	over 10,000	over 3,000	over aprx.52mil
Exploitation of Oil, Natural Gas and other minerals	Oil and gas and other minerals	Livestock (001)	Creative industry	10,000 - 100,000	over 10.0	1,000 - 10,000	1,000 - 3,000	
	Cutting edge technology	Silk, including silk handicraft	Handicraft					
	Heavy industry	Soybeans (222, 223)						
	Creative industry	Service: Tourism						
		Service: Labor services						
		Service: Transport						
		Service: Business services						

**(3) Rationales for Governmental Intervention and/or Related Measures**

It is often recognized the statement in policy documents, including “Diversifying the Cambodian Economy” by SNEC, put stress on that the intervention by government to economic activities, or more specifically the market of private business activities, should be limited to the minimum possible and the governmental intervention can be relevant only for the case where market has failed.

Supposing that the major philosophy of the industrial policy could also follow this principle, sectors which the industrial policy should address need to be carefully examined for the possible interventional measures.

The following Figure A3-1 (showing L.1.-L.4.), presents the possible oligopolistic characteristics and possible structural irregularity over the 37 sectors nominated in the list. They are plotted in the chart on the sales value per establishment for y-axis and value-added (sales–expenses) of the sector for x-axis. Higher level on y-axis presumes possible oligopolistic situation, and minus area on x-axis may suggest possible certain irregularity in the sectoral structure, as negative value-added in business indicates that business activities will not be sustained. This figure does not only show the existence of market failure, but is also sufficient enough to raise the possibility.

In the figure showing L1, the standing out nature of three sectors, garment, footwear, and plastic is presented. As for the footwear sector, further analysis on industrial situation need to be done as sales volume per establishment is significantly large compared to that of the garment sector. With regard to garment, the negative value-added is recognized in fairly large scale. It could imply the possibility of structural problems, which may require government interventions at some level in that sector.

Comparing sectors by taking steps from L.1. to L.4. enable the analysis of issues on oligopolistic situation and industrial structure. Also, the sector positioning can be more conducive for the target of SME policies as L.4. becomes closer. Sectors such as fruits and vegetable processing and fabric have many establishments, and thus improvement of productivity has to be promoted in these sectors.

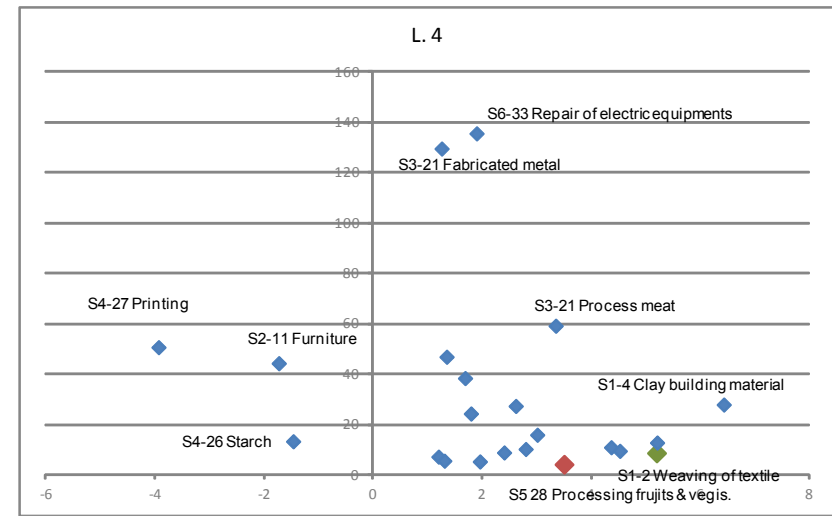
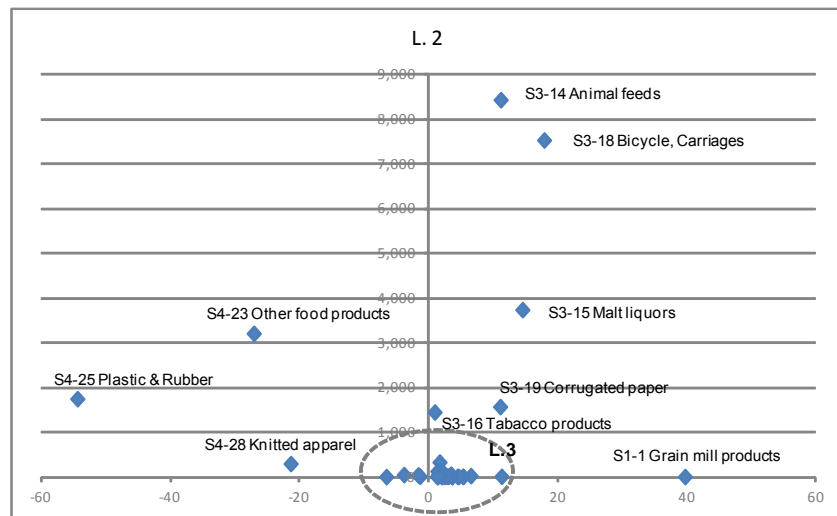
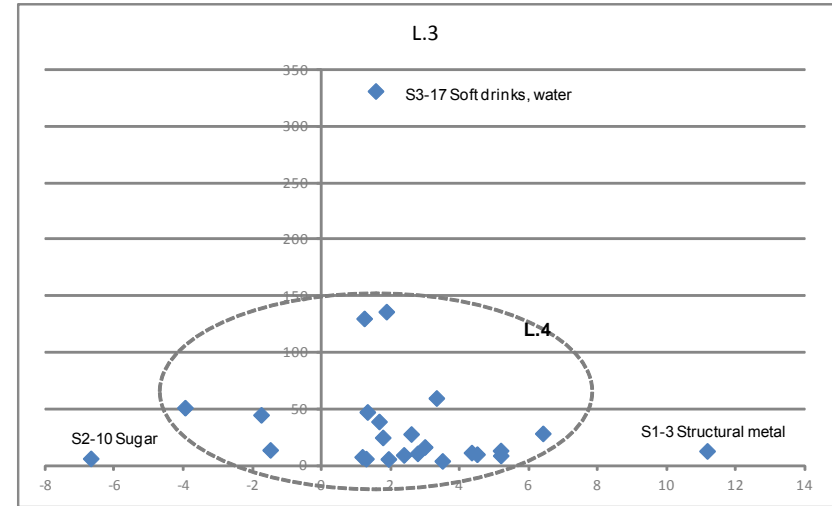
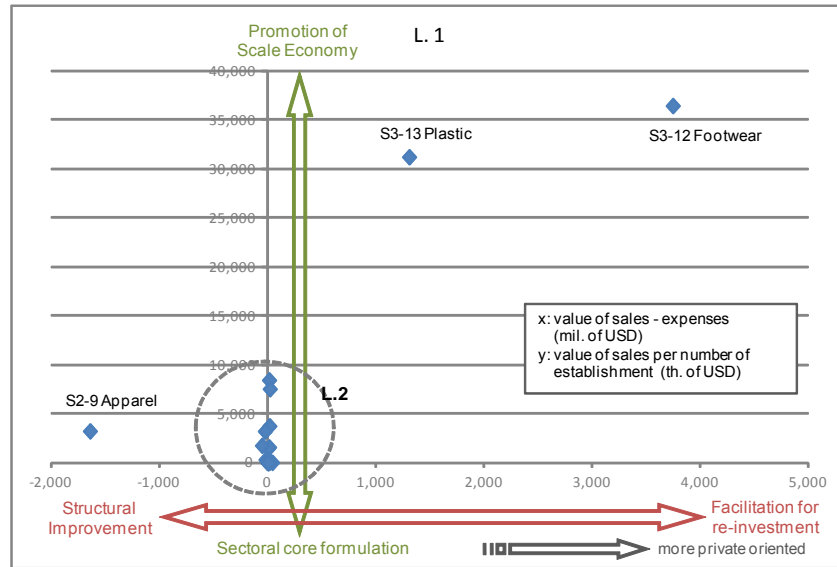


Figure A3-1 Relation between Sales Scale and Profitability in Major Sectors

Table A3-3 Overview of Manufacturing Sector by Sales Volume

ISIC Code	Class of ISIC rev.4.1	Value of Sales (Production) 1000 USD	Value of Sales (per establishment) 1000USD	Value of Sales - Expenses (Value-added) 1000 USD	Number of Establishment
9	1410 Manufacture of wearing apparel, except fur apparel	50,842,689	3,218.3	-1,646,348	15,798
12	1520 Manufacture of footwear	3,973,826	36,457.1	3,746,686	109
13	2220 Manufacture of plastics products	1,311,502	31,226.2	1,307,125	42
23	1079 Manufacture of other food products n.e.c.	259,756	3,206.9	-27,192	81
1	1061 Manufacture of grain mill products	138,866	7.1	39,605	19,554
14	1080 Manufacture of prepared animal feeds	117,956	8,425.4	11,057	14
15	1103 Manufacture of malt liquors and malt	97,135	3,736.0	14,424	26
24	1430 Manufacture of knitted and crocheted apparel	86,457	298.1	-21,470	290
2	1312 Weaving of textiles	73,093	8.6	5,206	8,471
25	2013 Manufacture of plastics and synthetic rubber in primary forms	71,619	1,746.8	-54,518	41
16	1200 Manufacture of tobacco products	50,714	1,449.0	827	35
17	1104 Manufacture of soft drinks; production of mineral waters and other bottled waters	48,982	331.0	1,579	148
18	3092 Manufacture of bicycles and invalid carriages	45,153	7,525.5	17,790	6
3	2511 Manufacture of structural metal products	38,195	12.7	11,182	3,015
10	1072 Manufacture of sugar	37,309	6.1	-6,669	6,152
4	2392 Manufacture of clay building materials	26,609	28.2	6,424	945
5	3211 Manufacture of jewellery and related articles	24,078	13.1	5,202	1,844
19	1702 Manufacture of corrugated paper and paperboard and of containers of paper and paperboard	23,555	1,570.3	10,973	15
20	1010 Processing and preserving of meat	19,921	59.5	3,342	335
21	2599 Manufacture of other fabricated metal products n.e.c.	17,137	129.8	1,251	132
6	1071 Manufacture of bakery products	16,969	11.2	4,359	1,515
7	2395 Manufacture of articles of concrete, cement and plaster	15,113	9.8	4,518	1,546
11	3100 Manufacture of furniture	14,430	13.6	-1,471	1,063
8	1101 Distilling, rectifying and blending of spirits	14,113	3.9	3,514	3,657
22	2592 Treatment and coating of metals; machining	11,752	16.2	3,004	727
26	1062 Manufacture of starches and starch products	11,366	44.6	-1,735	255
27	1811 Printing	10,595	50.9	-3,940	208
28	1030 Processing and preserving of fruit and vegetables	8,797	5.6	1,952	1,583
29	1074 Manufacture of macaroni, noodles, couscous and similar farinaceous products	8,463	9.1	2,397	926
30	3312 Repair of machinery	8,384	10.5	2,792	799
31	1621 Manufacture of veneer sheets and wood-based panels	7,930	38.7	1,680	205
32	1610 Sawmilling and planing of wood	6,268	27.6	2,610	227
33	3313 Repair of electronic and optical equipment	6,249	135.8	1,891	46
34	1622 Manufacture of builders' carpentry and joinery	4,903	7.5	1,193	656
35	2029 Manufacture of other chemical products n.e.c.	4,102	47.1	1,342	87
36	1512 Manufacture of luggage, handbags and the like, saddlery and harness	3,934	24.6	1,788	160
37	2593 Manufacture of cutlery, hand tools and general hardware	3,777	5.8	1,301	646



Table A3-4 Implication of Strategy and Types of 37 Sectors

Category	#	ISIC Code	Class of ISIC rev.4.1	Value of Sales (Production) 1000 USD	Value of Sales (per establishment) 1000USD	Value of Sales - Expenses (Value-added) 1000 USD	Number of Establishment	Directions of Strategies
Group 1	1	1061	Manufacture of grain mill products	138,866	7.1	39,605	19,554	Sectoral core formulation + Promotion of scale economy
	2	1312	Weaving of textiles	73,093	8.6	5,206	8,471	
	3	2511	Manufacture of structural metal products	38,195	12.7	11,182	3,015	
	4	2392	Manufacture of clay building materials	26,609	28.2	6,424	945	
	5	3211	Manufacture of jewellery and related articles	24,078	13.1	5,202	1,844	
	6	1071	Manufacture of bakery products	16,969	11.2	4,359	1,515	
	7	2395	Manufacture of articles of concrete, cement and plaster	15,113	9.8	4,518	1,546	
	8	1101	Distilling, rectifying and blending of spirits	14,113	3.9	3,514	3,657	
Group 2	9	1520	Manufacture of footwear	3,973,826	36,457.1	3,746,686	109	Promotion of scale economy
	10	2220	Manufacture of plastics products	1,311,502	31,226.2	1,307,125	42	
	11	1080	Manufacture of prepared animal feeds	117,956	8,425.4	11,057	14	
	12	1103	Manufacture of malt liquors and malt	97,135	3,736.0	14,424	26	
	13	1200	Manufacture of tobacco products	50,714	1,449.0	827	35	
	14	1104	Manufacture of soft drinks; production of mineral waters and other bottled waters	48,982	331.0	1,579	148	
	15	3092	Manufacture of bicycles and invalid carriages	45,153	7,525.5	17,790	6	
	16	1702	Manufacture of corrugated paper and paperboard and of containers of paper and paperboard	23,555	1,570.3	10,973	15	
	17	1010	Processing and preserving of meat	19,921	59.5	3,342	335	
	18	2599	Manufacture of other fabricated metal products n.e.c.	17,137	129.8	1,251	132	
Group 3	19	2592	Treatment and coating of metals; machining	11,752	16.2	3,004	727	Structural improvement + Sectoral core
	20	1410	Manufacture of wearing apparel, except fur apparel	50,842,689	3,218.3	-1,646,348	15,798	
	21	1072	Manufacture of sugar	37,309	6.1	-6,669	6,152	
Group 4	22	3100	Manufacture of furniture	14,430	13.6	-1,471	1,063	Structural improvement + Promotion of scale economy *2
	23	1079	Manufacture of other food products n.e.c.	259,756	3,206.9	-27,192	81	
	24	1430	Manufacture of knitted and crocheted apparel	86,457	298.1	-21,470	290	
	25	2013	Manufacture of plastics and synthetic rubber in primary forms	71,619	1,746.8	-54,518	41	
	26	1062	Manufacture of starches and starch products	11,366	44.6	-1,735	255	
Group 5	27	1811	Printing	10,595	50.9	-3,940	208	Sectoral core formulation
	28	1030	Processing and preserving of fruit and vegetables	8,797	5.6	1,952	1,583	
Group 6	29	1074	Manufacture of macaroni, noodles, couscous and similar farinaceous products	8,463	9.1	2,397	926	Sectoral core formulation
	30	3312	Repair of machinery	8,384	10.5	2,792	799	
	31	1621	Manufacture of veneer sheets and wood-based panels	7,930	38.7	1,680	205	
	32	1610	Sawmilling and planing of wood	6,268	27.6	2,610	227	
	33	3313	Repair of electronic and optical equipment	6,249	135.8	1,891	46	
	34	1622	Manufacture of builders' carpentry and joinery	4,903	7.5	1,193	656	
	35	2029	Manufacture of other chemical products n.e.c.	4,102	47.1	1,342	87	
	36	1512	Manufacture of luggage, handbags and the like, saddlery and harness	3,934	24.6	1,788	160	
	37	2593	Manufacture of cutlery, hand tools and general hardware	3,777	5.8	1,301	646	

Table A3-5 Overview of Manufacturing Sector (Value-added)

ISIC Code	Class of ISIC Rev.4 1)	Number of Establishment	Value of Production (USD)	Value of Expenses (USD)	Value Added (USD)
1520	Manufacture of footwear	109	3,973,826,464	227,140,389	3,746,686,075
2220	Manufacture of plastics products	42	1,311,502,032	4,377,415	1,307,124,617
1061	Manufacture of grain mill products	19,554	138,866,061	99,260,765	39,605,296
3092	Manufacture of bicycles and invalid carriages	6	45,153,196	27,363,396	17,789,800
1103	Manufacture of malt liquors and malt	26	97,134,881	82,711,321	14,423,560
2511	Manufacture of structural metal products	3,015	38,195,407	27,013,789	11,181,618
1080	Manufacture of prepared animal feeds	14	117,956,211	106,899,170	11,057,041
1702	Manufacture of corrugated paper and paperboard and of containers of paper and paperboard	15	23,554,536	12,581,797	10,972,739
2392	Manufacture of clay building materials	945	26,609,272	20,184,985	6,424,287
1312	Weaving of textiles	8,471	73,092,652	67,886,507	5,206,145
3211	Manufacture of jewellery and related articles	1,844	24,077,505	18,875,613	5,201,892
2395	Manufacture of articles of concrete, cement and plaster	1,546	15,113,477	10,595,912	4,517,565
1071	Manufacture of bakery products	1,515	16,969,186	12,610,584	4,358,602
1101	Distilling, rectifying and blending of spirits	3,657	14,113,079	10,599,274	3,513,805
1010	Processing and preserving of meat	335	19,921,285	16,579,425	3,341,860
2592	Treatment and coating of metals; machining	727	11,751,544	8,747,610	3,003,934
3312	Repair of machinery	799	8,384,281	5,592,064	2,792,217
1610	Sawmilling and planing of wood	227	6,267,599	3,657,721	2,609,878
1074	Manufacture of macaroni, noodles, couscous and similar farinaceous products	926	8,463,172	6,066,525	2,396,647
1030	Processing and preserving of fruit and vegetables	1,583	8,797,145	6,844,915	1,952,230
3313	Repair of electronic and optical equipment	46	6,248,818	4,357,532	1,891,286
1512	Manufacture of luggage, handbags and the like, saddlery and harness	160	3,934,207	2,146,270	1,787,937
1621	Manufacture of veneer sheets and wood-based panels	205	7,929,873	6,249,388	1,680,485
1104	Manufacture of soft drinks; production of mineral waters and other bottled waters	148	48,982,029	47,402,536	1,579,493
2029	Manufacture of other chemical products n.e.c.	87	4,101,540	2,759,832	1,341,708
2593	Manufacture of cutlery, hand tools and general hardware	646	3,777,178	2,475,965	1,301,213
2599	Manufacture of other fabricated metal products n.e.c.	132	17,136,559	15,885,431	1,251,128
1622	Manufacture of builders' carpentry and joinery	656	4,903,392	3,710,435	1,192,957
2512	Manufacture of tanks, reservoirs and containers of metal	368	2,769,961	1,917,590	852,371
1200	Manufacture of tobacco products	35	50,714,497	49,887,788	826,709
1102	Manufacture of wines	667	3,010,530	2,343,468	667,062
2431	Casting of iron and steel	12	5,122,483	4,482,141	640,342
1629	Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials	1,047	1,651,956	1,029,401	622,555
2310	Manufacture of glass and glass products	128	1,769,399	1,164,371	605,028
1812	Service activities related to printing	98	1,808,631	1,217,955	590,676
2100	Manufacture of pharmaceuticals, medicinal chemical and botanical products	12	1,554,489	1,027,684	526,805
2022	Manufacture of paints, varnishes and similar coatings, printing ink and mastics	3	2,631,268	2,146,686	484,582
3314	Repair of electrical equipment	179	1,233,900	860,165	373,735
2710	Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus	29	1,728,063	1,355,193	372,870
2825	Manufacture of machinery for food, beverage and tobacco processing	1	360,000	18,000	342,000
2396	Cutting, shaping and finishing of stone	14	994,020	730,786	263,234
1075	Manufacture of prepared meals and dishes	14	781,040	573,685	207,355
1511	Tanning and dressing of leather; dressing and dyeing of fur	12	338,784	146,312	192,472
1701	Manufacture of pulp, paper and paperboard	12	2,781,656	2,603,344	178,312
2219	Manufacture of other rubber products	8	210,960	48,540	162,420
3011	Building of ships and floating structures	28	668,047	510,673	157,374
2591	Forging, pressing stamping and roll-forming of metal; powder metallurgy	25	555,276	412,005	143,271
2393	Manufacture of other porcelain and ceramic products	24	340,708	209,845	130,863
1920	Manufacture of refined petroleum products	2	198,000	78,000	120,000
1392	Manufacture of made-up textile articles, except apparel	322	242,024	129,791	112,233
1393	Manufacture of carpets and rugs	11	358,810	251,160	107,650
2420	Manufacture of basic precious and other non-ferrous metals	28	226,003	120,174	105,829
2815	Manufacture of ovens, furnaces and furnaceburners	3	474,300	376,872	97,428

(Continued)

ISIC Code	Class of ISIC Rev.4 1)	Number of Establishment	Value of Production (USD)	Value of Expenses (USD)	Value Added (USD)
1623	Manufacture of wooden containers	11	121,638	30,518	91,120
1050	Manufacture of dairy products	47	469,915	379,581	90,334
2023	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations	19	568,092	481,524	86,568
3099	Manufacture of other transport equipment n.e.c.	32	555,149	474,600	80,549
3319	Repair of other equipment	10	114,168	43,560	70,608
2790	Manufacture of other electrical equipment	1	270,000	201,372	68,628
2821	Manufacture of agricultural and forestry machinery	15	204,389	142,039	62,350
3250	Manufacture of medical and dental instruments and supplies	10	132,960	72,430	60,530
2394	Manufacture of cement, lime and plaster	33	1,403,091	1,344,101	58,990
2011	Manufacture of basic chemicals	3	189,720	130,800	58,920
1394	Manufacture of cordage, rope, twine and netting	27	120,112	71,973	48,139
2021	Manufacture of pesticides and other agrochemical products	1	120,000	72,000	48,000
3240	Manufacture of games and toys	4	119,100	79,720	39,380
1040	Manufacture of vegetable and animal oils and fats	6	179,005	144,890	34,115
1313	Finishing of textiles	12	661,025	629,835	31,190
2811	Manufacture of engines and turbines, except aircraft, vehicle and cycle engines	3	232,500	201,624	30,876
2513	Manufacture of steam generators, except central heating hot water boilers	5	166,154	142,825	23,329
3315	Repair of transport equipment, except motor vehicles	25	173,746	151,020	22,726
2610	Manufacture of electronic components and boards	5	36,500	14,773	21,727
3230	Manufacture of sports goods	3	322,528	302,677	19,851
2750	Manufacture of domestic appliances	4	84,538	64,950	19,588
3320	Installation of industrial machinery and equipment	8	64,635	46,295	18,340
2211	Manufacture of rubber tyres and tubes; retreading and rebuilding of rubber tyres	3	44,595	26,690	17,905
3212	Manufacture of imitation jewellery and related articles	10	112,713	96,261	16,452
2920	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	3	85,440	70,560	14,880
2391	Manufacture of refractory products	11	26,995	13,221	13,774
3311	Repair of fabricated metal products	10	50,925	37,174	13,751
1311	Preparation and spinning of textile fibres	18	31,076	19,008	12,068
1420	Manufacture of articles of fur	3	13,140	3,833	9,307
2680	Manufacture of magnetic and optical media	2	19,450	10,320	9,130
2670	Manufacture of optical instruments and photographic equipment	1	18,250	9,125	9,125
1073	Manufacture of cocoa, chocolate and sugar confectionery	7	49,183	41,134	8,049
2410	Manufacture of basic iron and steel	3	27,600	20,520	7,080
3091	Manufacture of motorcycles	1	24,000	18,000	6,000
1709	Manufacture of other articles of paper and paperboard	7	30,635	24,863	5,772
3220	Manufacture of musical instruments	5	17,744	12,490	5,254
1820	Reproduction of recorded media	1	12,000	7,200	4,800
2399	Manufacture of other non-metallic mineral products	3	72,420	68,640	3,780
2630	Manufacture of communication equipment	2	10,065	7,348	2,717
2740	Manufacture of electric lighting equipment	1	2,738	730	2,008
2620	Manufacture of computers and peripheral equipment	1	12,000	10,200	1,800
1910	Manufacture of coke oven products	1	6,000	4,200	1,800
2813	Manufacture of other pumps, compressors, taps and valves	1	3,360	1,680	1,680
2822	Manufacture of metal-forming machinery and machine tools	1	18,000	16,800	1,200
3012	Building of pleasure and sporting boats	1	3,600	2,400	1,200
2930	Manufacture of parts and accessories for motor vehicles	1	0	0	0
1399	Manufacture of other textiles n.e.c.	9	100,846	157,016	-56,170
2432	Casting of non-ferrous metals	2	9,631,038	10,199,978	-568,940
1020	Processing and preserving of fish, crustaceans and molluscs	107	3,911,345	4,504,291	-592,946
3100	Manufacture of furniture	1,063	14,429,664	15,901,027	-1,471,363
1062	Manufacture of starches and starch products	255	11,366,086	13,101,426	-1,735,340
1391	Manufacture of knitted and crocheted fabrics	63	8,094,211	10,528,702	-2,434,491
1811	Printing	208	10,595,408	14,535,891	-3,940,483
1072	Manufacture of sugar	6,152	37,309,078	43,978,080	-6,669,002
1430	Manufacture of knitted and crocheted apparel	290	86,457,288	107,927,325	-21,470,037
1079	Manufacture of other food products n.e.c.	81	259,756,424	286,947,938	-27,191,514
2013	Manufacture of plastics and synthetic rubber in primary forms	41	71,619,381	126,137,031	-54,517,650
3290	Other manufacturing n.e.c.	63	2,847,551	147,595,343	-144,747,792
1410	Manufacture of wearing apparel, except fur apparel	15,798	50,842,688,867	52,489,036,410	-1,646,347,543
Total		75,031	57,525,095,467	54,210,514,157	3,314,581,310

Table A3-6 Overview of Manufacturing Sector (Candidates of Priority Sectors)

	No	ISIC Code	Class of ISIC (Rev.4 1)	Number of Establishment	Value of Production (USD)	Value Added (USD)
Group 1	1	1410	Manufacture of wearing apparel, except fur apparel	15,798	50,842,688,867	-1,646,347,543
	2	1520	Manufacture of footwear	109	3,973,826,464	3,746,686,075
	3	2220	Manufacture of plastics products	42	1,311,502,032	1,307,124,617
	4	1079	Manufacture of other food products n.e.c.	81	259,756,424	-27,191,514
	5	1061	Manufacture of grain mill products	19,554	138,866,061	39,605,296
	6	1080	Manufacture of prepared animal feeds	14	117,956,211	11,057,041
Group 2	7	3092	Manufacture of bicycles and invalid carriages	6	45,153,196	17,789,800
	8	1103	Manufacture of malt liquors and malt	26	97,134,881	14,423,560
	9	2511	Manufacture of structural metal products	3,015	38,195,407	11,181,618
	10	1702	Manufacture of corrugated paper and paperboard and of containers of paper and paperboard	15	23,554,536	10,972,739
Group 3	11	1312	Weaving of textiles	8,471	73,092,652	5,206,145
	12	1072	Manufacture of sugar	6,152	37,309,078	-6,669,002
	13	1101	Distilling, rectifying and blending of spirits	3,657	14,113,079	3,513,805
	14	3211	Manufacture of jewellery and related articles	1,844	24,077,505	5,201,892
	15	1430	Manufacture of knitted and crocheted apparel	290	86,457,288	-21,470,037
	16	2013	Manufacture of plastics and synthetic rubber in primary forms	41	71,619,381	-54,517,650
	17	1200	Manufacture of tobacco products	35	50,714,497	826,709
	18	1104	Manufacture of soft drinks; production of mineral waters and other bottled waters	148	48,982,029	1,579,493
	19	2392	Manufacture of clay building materials	945	26,609,272	6,424,287
	20	1010	Processing and preserving of meat	335	19,921,285	3,341,860
	21	2599	Manufacture of other fabricated metal products n.e.c.	132	17,136,559	1,251,128
	22	1071	Manufacture of bakery products	1,515	16,969,186	4,358,602
	23	2395	Manufacture of articles of concrete, cement and plaster	1,546	15,113,477	4,517,565
	24	3100	Manufacture of furniture	1,063	14,429,664	-1,471,363
	25	2592	Treatment and coating of metals; machining	727	11,751,544	3,003,934
	26	1062	Manufacture of starches and starch products	255	11,366,086	-1,735,340
	27	1811	Printing	208	10,595,408	-3,940,483
	28	3312	Repair of machinery	799	8,384,281	2,792,217
	29	1610	Sawmilling and planing of wood	227	6,267,599	2,609,878
	30	1074	Manufacture of macaroni, noodles, couscous and similar farinaceous products	926	8,463,172	2,396,647
	31	1030	Processing and preserving of fruit and vegetables	1,583	8,797,145	1,952,230
	32	3313	Repair of electronic and optical equipment	46	6,248,818	1,891,286
	33	1512	Manufacture of luggage, handbags and the like, saddlery and harness	160	3,934,207	1,787,937
	34	1621	Manufacture of veneer sheets and wood-based panels	205	7,929,873	1,680,485
	35	2029	Manufacture of other chemical products n.e.c.	87	4,101,540	1,341,708
	36	2593	Manufacture of cutlery, hand tools and general hardware	646	3,777,178	1,301,213
	37	1622	Manufacture of builders' carpentry and joinery	656	4,903,392	1,192,957
	38	2512	Manufacture of tanks, reservoirs and containers of metal	368	2,769,961	852,371
	39	1102	Manufacture of wines	667	3,010,530	667,062
	40	2431	Casting of iron and steel	12	5,122,483	640,342
	41	1629	Manufacture of other products of wood; manufacture of articles of cork, straw and plait	1,047	1,651,956	622,555
	42	2310	Manufacture of glass and glass products	128	1,769,399	605,028
	43	1812	Service activities related to printing	98	1,808,631	590,676
44	2100	Manufacture of pharmaceuticals, medicinal chemical and botanical products	12	1,554,489	526,805	
45	2022	Manufacture of paints, varnishes and similar coatings, printing ink and mastics	3	2,631,268	484,582	
46	3314	Repair of electrical equipment	179	1,233,900	373,735	
47	2710	Manufacture of electric motors, generators, transformers and electricity distribution and	29	1,728,063	372,870	
48	2825	Manufacture of machinery for food, beverage and tobacco processing	1	360,000	342,000	
49	2396	Cutting, shaping and finishing of stone	14	994,020	263,234	
50	1075	Manufacture of prepared meals and dishes	14	781,040	207,355	
51	1511	Tanning and dressing of leather; dressing and dyeing of fur	12	338,784	192,472	
52	1701	Manufacture of pulp, paper and paperboard	12	2,781,656	178,312	
53	2219	Manufacture of other rubber products	8	210,960	162,420	

(Continued)

No	ISIC Code	Class of ISIC (Rev.4 1)	Number of Establishment	Value of Production (USD)	Value Added (USD)
54	3011	Building of ships and floating structures	28	668,047	157,374
55	2591	Forging, pressing stamping and roll-forming of metal; powder metallurgy	25	555,276	143,271
56	2393	Manufacture of other porcelain and ceramic products	24	340,708	130,863
57	1920	Manufacture of refined petroleum products	2	198,000	120,000
58	1392	Manufacture of made-up textile articles, except apparel	322	242,024	112,233
59	1393	Manufacture of carpets and rugs	11	358,810	107,650
60	2420	Manufacture of basic precious and other non-ferrous metals	28	226,003	105,829
61	2815	Manufacture of ovens, furnaces and furnaceburners	3	474,300	97,428
62	1623	Manufacture of wooden containers	11	121,638	91,120
63	1050	Manufacture of dairy products	47	469,915	90,334
64	2023	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and t	19	568,092	86,568
65	3099	Manufacture of other transport equipment n.e.c.	32	555,149	80,549
66	3319	Repair of other equipment	10	114,168	70,608
67	2790	Manufacture of other electrical equipment	1	270,000	68,628
68	2821	Manufacture of agricultural and forestry machinery	15	204,389	62,350
69	3250	Manufacture of medical and dental instruments and supplies	10	132,960	60,530
70	2394	Manufacture of cement, lime and plaster	33	1,403,091	58,990
71	2011	Manufacture of basic chemicals	3	189,720	58,920
72	1394	Manufacture of cordage, rope, twine and netting	27	120,112	48,139
73	2021	Manufacture of pesticides and other agrochemical products	1	120,000	48,000
74	3240	Manufacture of games and toys	4	119,100	39,380
75	1040	Manufacture of vegetable and animal oils and fats	6	179,005	34,115
76	1313	Finishing of textiles	12	661,025	31,190
77	2811	Manufacture of engines and turbines, except aircraft, vehicle and cycle engines	3	232,500	30,876
78	2513	Manufacture of steam generators, except central heating hot water boilers	5	166,154	23,329
79	3315	Repair of transport equipment, except motor vehicles	25	173,746	22,726
80	2610	Manufacture of electronic components and boards	5	36,500	21,727
81	3230	Manufacture of sports goods	3	322,528	19,851
82	2750	Manufacture of domestic appliances	4	84,538	19,588
83	3320	Installation of industrial machinery and equipment	8	64,635	18,340
84	2211	Manufacture of rubber tyres and tubes; retreading and rebuilding of rubber tyres	3	44,595	17,905
85	3212	Manufacture of imitation jewellery and related articles	10	112,713	16,452
86	2920	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and sem	3	85,440	14,880
87	2391	Manufacture of refractory products	11	26,995	13,774
88	3311	Repair of fabricated metal products	10	50,925	13,751
89	1311	Preparation and spinning of textiles fibres	18	31,076	12,068
90	1420	Manufacture of articles of fur	3	13,140	9,307
91	2680	Manufacture of magnetic and optical media	2	19,450	9,130
92	2670	Manufacture of optical instruments and photographic equipment	1	18,250	9,125
93	1073	Manufacture of cocoa, chocolate and sugar confectionery	7	49,183	8,049
94	2410	Manufacture of basic iron and steel	3	27,600	7,080
95	3091	Manufacture of motorcycles	1	24,000	6,000
96	1709	Manufacture of other articles of paper and paperboard	7	30,635	5,772
97	3220	Manufacture of musical instruments	5	17,744	5,254
98	1820	Reproduction of recorded media	1	12,000	4,800
99	2399	Manufacture of other non-metallic mineral products	3	72,420	3,780
100	2630	Manufacture of communication equipment	2	10,065	2,717
101	2740	Manufacture of electric lighting equipment	1	2,738	2,008
102	2620	Manufacture of computers and peripheral equipment	1	12,000	1,800
103	1910	Manufacture of coke oven products	1	6,000	1,800
104	2813	Manufacture of other pumps, compressors, taps and valves	1	3,360	1,680
105	2822	Manufacture of metal-forming machinery and machine tools	1	18,000	1,200
106	3012	Building of pleasure and sporting boats	1	3,600	1,200
107	2930	Manufacture of parts and accessories for motor vehicles	1	0	0
108	1399	Manufacture of other textiles n.e.c.	9	100,846	-56,170
109	2432	Casting of non-ferrous metals	2	9,631,038	-568,940
110	1020	Processing and preserving of fish, crustaceans and molluscs	107	3,911,345	-592,946
111	1391	Manufacture of knitted and crocheted fabrics	63	8,094,211	-2,434,491
112	3290	Other manufacturing n.e.c.	63	2,847,551	-144,747,792
		Total	75,031	57,525,095,467	3,314,581,310

Table A3-7 Overview of Manufacturing Sector (Value of Production)

ISIC Code	Class of ISIC Rev.4 1)	Value of Production (USD)
1410	Manufacture of wearing apparel, except fur apparel	50,842,688,867
1520	Manufacture of footwear	3,973,826,464
2220	Manufacture of plastics products	1,311,502,032
1079	Manufacture of other food products n.e.c.	259,756,424
1061	Manufacture of grain mill products	138,866,061
1080	Manufacture of prepared animal feeds	117,956,211
1103	Manufacture of malt liquors and malt	97,134,881
1430	Manufacture of knitted and crocheted apparel	86,457,288
1312	Weaving of textiles	73,092,652
2013	Manufacture of plastics and synthetic rubber in primary forms	71,619,381
1200	Manufacture of tobacco products	50,714,497
1104	Manufacture of soft drinks; production of mineral waters and other bottled waters	48,982,029
3092	Manufacture of bicycles and invalid carriages	45,153,196
2511	Manufacture of structural metal products	38,195,407
1072	Manufacture of sugar	37,309,078
2392	Manufacture of clay building materials	26,609,272
3211	Manufacture of jewellery and related articles	24,077,505
1702	Manufacture of corrugated paper and paperboard and of containers of paper and paperboard	23,554,536
1010	Processing and preserving of meat	19,921,285
2599	Manufacture of other fabricated metal products n.e.c.	17,136,559
1071	Manufacture of bakery products	16,969,186
2395	Manufacture of articles of concrete, cement and plaster	15,113,477
3100	Manufacture of furniture	14,429,664
1101	Distilling, rectifying and blending of spirits	14,113,079
2592	Treatment and coating of metals; machining	11,751,544
1062	Manufacture of starches and starch products	11,366,086
1811	Printing	10,595,408
2432	Casting of non-ferrous metals	9,631,038
1030	Processing and preserving of fruit and vegetables	8,797,145
1074	Manufacture of macaroni, noodles, couscous and similar farinaceous products	8,463,172
3312	Repair of machinery	8,384,281
1391	Manufacture of knitted and crocheted fabrics	8,094,211
1621	Manufacture of veneer sheets and wood-based panels	7,929,873
1610	Sawmilling and planing of wood	6,267,599
3313	Repair of electronic and optical equipment	6,248,818
2431	Casting of iron and steel	5,122,483
1622	Manufacture of builders' carpentry and joinery	4,903,392
2029	Manufacture of other chemical products n.e.c.	4,101,540
1512	Manufacture of luggage, handbags and the like, saddlery and harness	3,934,207
1020	Processing and preserving of fish, crustaceans and molluscs	3,911,345
2593	Manufacture of cutlery, hand tools and general hardware	3,777,178
1102	Manufacture of wines	3,010,530
3290	Other manufacturing n.e.c.	2,847,551
1701	Manufacture of pulp, paper and paperboard	2,781,656
2512	Manufacture of tanks, reservoirs and containers of metal	2,769,961
2022	Manufacture of paints, vernishes and similar coatings, printing ink and mastics	2,631,268
1812	Service activities related to printing	1,808,631
2310	Manufacture of glass and glass products	1,769,399
2710	Manufacture of electric motors, generators, transformers and electricity distribution and control equipment	1,728,063
1629	Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials	1,651,956
2100	Manufacture of pharmaceuticals, medicinal chemical and botanical products	1,554,489
2394	Manufacture of cement, lime and plaster	1,403,091
3314	Repair of electrical equipment	1,233,900

(Continued)

ISIC Code	Class of ISIC Rev.4 1)	Value of Production (USD)
2396	Cutting, shaping and finishing of stone	994,020
1075	Manufacture of prepared meals and dishes	781,040
3011	Building of ships and floating structures	668,047
1313	Finishing of textiles	661,025
2023	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toile	568,092
2591	Forging, pressing stamping and roll-forming of metal; powder metallurgy	555,276
3099	Manufacture of other transport equipment n.e.c.	555,149
2815	Manufacture of ovens, furnaces and furnaceburners	474,300
1050	Manufacture of dairy products	469,915
2825	Manufacture of machinery for food, beverage and tobacco processing	360,000
1393	Manufacture of carpets and rugs	358,810
2393	Manufacture of other porcelain and ceramic products	340,708
1511	Tanning and dressing of leather; dressing and dyeing of fur	338,784
3230	Manufacture of sports goods	322,528
2790	Manufacture of other electrical equipment	270,000
1392	Manufacture of made-up textile articles, except apparel	242,024
2811	Manufacture of engines and turbines, except aircraft, vehicle and cycle engines	232,500
2420	Manufacture of basic precious and other non-ferrous metals	226,003
2219	Manufacture of other rubber products	210,960
2821	Manufacture of agricultural and forestry machinery	204,389
1920	Manufacture of refined petroleum products	198,000
2011	Manufacture of basic chemicals	189,720
1040	Manufacture of vegetable and animal oils and fats	179,005
3315	Repair of transport equipment, except motor vehicles	173,746
2513	Manufacture of steam generators, except central heating hot water boilers	166,154
3250	Manufacture of medical and dental instruments and supplies	132,960
1623	Manufacture of wooden containers	121,638
1394	Manufacture of cordage, rope, twine and netting	120,112
2021	Manufacture of pesticides and other agrochemical products	120,000
3240	Manufacture of games and toys	119,100
3319	Repair of other equipment	114,168
3212	Manufacture of imitation jewellery and related articles	112,713
1399	Manufacture of other textiles n.e.c.	100,846
2920	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-tra	85,440
2750	Manufacture of domestic appliances	84,538
2399	Manufacture of other non-metallic mineral products	72,420
3320	Installation of industrial machinery and equipment	64,635
3311	Repair of fabricated metal products	50,925
1073	Manufacture of cocoa, chocolate and sugar confectionery	49,183
2211	Manufacture of rubber tyres and tubes; retreading and rebuilding of rubber tyres	44,595
2610	Manufacture of electronic components and boards	36,500
1311	Preparation and spinning of textiles fibres	31,076
1709	Manufacture of other articles of paper and paperboard	30,635
2410	Manufacture of basic iron and steel	27,600
2391	Manufacture of refractory products	26,995
3091	Manufacture of motorcycles	24,000
2680	Manufacture of magnetic and optical media	19,450
2670	Manufacture of optical instruments and photographic equipment	18,250
2822	Manufacture of metal-forming machinery and machine tools	18,000
3220	Manufacture of musical instruments	17,744
1420	Manufacture of articles of fur	13,140
1820	Reproduction of recorded media	12,000
2620	Manufacture of computers and peripheral equipment	12,000
2630	Manufacture of communication equipment	10,065
1910	Manufacture of coke oven products	6,000
3012	Building of pleasure and sporting boats	3,600
2813	Manufacture of other pumps, compressors, taps and valves	3,360
2740	Manufacture of electric lighting equipment	2,738
2930	Manufacture of parts and accessories for motor vehicles	0
	Total	57,525,095,467

### 3.2 Technology Transfer of Japanese Production System (JPS) in Latecomer Economies<sup>6</sup> and Key Issues for Cambodia

#### (1) Three Types of Industrial Technology

Industrial technology is applied in manufacturing of products and is categorized into the three types in the following table:<sup>7</sup>(i) product technology, (ii) production technology, and (iii) production management know-how.

**Table A3-8 Three Types of Industrial Technology**

Type of Production Technology	Contents
Product Technology	Design and research and development (R&D) for product performance (capacity, heat consumption, and efficiency) and product function (structure and intensity)
Production Technology	Processing and assembly technology (the electrical and electronics [E&E], automotive, and motorcycle sectors) or operation technology (the apparatus sector) to make products as directed in blueprints and manufacturing instructions
Production Management Know-how	Production management technology to make products by efficiently organizing various factors (production equipments, raw materials, components, production workers, and information) at manufacturing sites.

Source: JICA Study Team based on Suehiro (2000)

#### (2) Three Types of Technology Formation

Industrial technology can be further categorized into three types according to differences of technology formation necessary in each sector<sup>8</sup>: (i) operation technology in apparatus industry (e.g., steel and chemical), (ii) assembly technology in mass production industry (e.g. home electronics, automobiles, and electronics components), and (iii) processing technology (including casting, forging, heat treatment, and surface treatment) in metal processing industry (machine tool and mold making), which is usually “made-to-order” and non-mass production kind of products.

In order to stabilize the foundation of advantage of backwardness, it is important for latecomer economies to import technologies and master them, by acquiring specific technologies and skills for each type described in the following table.<sup>9</sup> As an example of type (ii), production management systems and composition of production group are the deciding factors for competitiveness of automobile and motorcycle sectors, as well as of the efficiency of assembly production. It is therefore crucial to devise a layout of production lines in response to common troubles and failures

<sup>6</sup> In this section, the terms “latecomer economy” and less developed country (economy) are used interchangeably.

<sup>7</sup> See Suehiro, Akira (2000), “Catching-up Industrialization The Trajectory and Prospects of East Asian Economies Chapter 10”, The University of Nagoya Press

<sup>8</sup> See Chapter 3 of Suehiro (2000)

<sup>9</sup> Advantage of backwardness is the situation where latecomers can quickly and inexpensively obtain techniques developed by first-movers. See Chapter 2 of Suehiro (2000).



of production lines, and to shorten length of workers' lead time.<sup>10</sup>

In the case of type (iii), metal molding<sup>11</sup> as an example, it is necessary to improve technologies of (a) making a detailed design according to an order, (b) processing a mold in accordance with a blueprint, (c) stable manufacturing of exact same molds with conformance to specifications<sup>12</sup>, (d) casting and forging to create a mold, and (e) surface fabrication to grinding and polishing molds. As for processing technology, there is a need not only for knowledge about technologies and products, but also for techniques and a certain sense of experienced and skilled workers (i.e. tacit knowledge). The technologies and techniques that Japanese small and medium enterprises developed in the field of molding and machine tool fabrication are characterized as mentioned above.<sup>13</sup> In other words, such technologies and techniques can be acquired through the "learning by making" process.<sup>14</sup>

**Table A3-9 Three Types of Technology Formation of Production Technology**

Type of Production Technology	Contents	Required Characteristics
<p><b>Operation Technology</b> e.g., apparatus industry (steel and chemical)</p>	<ul style="list-style-type: none"> <li>- Technologies related to machine operation</li> <li>- Technologies related to operate instruments and panels operation</li> <li>- Continuous process type of production</li> </ul>	<ul style="list-style-type: none"> <li>- Ability to prevent or adapt to accidents and unexpected situations</li> <li>- Accumulated acquisition and experiences to gain scientific and technological knowledge on structure of machines and apparatus</li> </ul>
<p><b>Assembly Technology</b> e.g., final assemble lines (home electronics, automobiles, and electronic components)</p>	<ul style="list-style-type: none"> <li>- Assemble components according to specifications and manufacturing instructions</li> <li>- Plastic model technology</li> <li>- Mass production</li> </ul>	<ul style="list-style-type: none"> <li>- Quick response to common small accidents and troubles in production lines</li> <li>- Devise where to put components, operation setup, and molding exchange</li> <li>- depth and breadth of each worker's activity area</li> </ul>

<sup>10</sup> Lead time is the time required to assemble components.

<sup>11</sup> Details of molding, using the case in Japan as an example, is explained in Chapter 4-7 of "Agglomeration of Machine Industry in Modern Japan: Spatial Dynamics in ME Technological Innovation and Globalization Period" written by Hironobu Oda (2005)

<sup>12</sup> Moldings are manufactured one at a time, but need to be produced repeatedly because it is a consumable good.

<sup>13</sup> See Chapter 4 of ODA (2005) for technological basis from the view of division and link structure of molding manufacturing.

<sup>14</sup> See Tetsuro, Nakaoka (1990), "International Comparison of Technology Transfer: Social Capacity of Industrialization", Chikuma Shobo Ltd.

<p style="text-align: center;"><b>Processing Technology</b></p> <p>e.g., metal fabrication (molding and machine tool fabrication)</p>	<ul style="list-style-type: none"> <li>- Technologies of casting, forging, and precision machining</li> <li>- Technologies of heat and surface treatment</li> <li>- Non-mass production and made-to-order production</li> </ul>	<ul style="list-style-type: none"> <li>- In addition to knowledge of technologies and products, accumulated techniques and intuitions based on experiences (tacit knowledge)</li> </ul>
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Source: Suehiro (2000)

### (3) Five Development Steps of Technology Transfer

In general, it is considered that there are four channels to transfer technologies from early comers (developed countries) to latecomers (less developed countries or LDCs). These are (a) technical assistance through governments and public organizations (ODA including sending experts), (b) grants of technical licenses based on a technical contract, (c) FDI directly related to management of local companies, and (d) export of plants in a full-turnkey system. This Appendix focuses on (c), which is related to FDI.

Channel (c) above is technology transfer through FDI, especially in-house technology transfer system, in which the head office of a multinational corporation (MNC) provides technology to its subsidiary or factory in a foreign country.<sup>15</sup> When it comes to discussion about technology transfer, the focus has been on either the analysis from the viewpoint of corporate strategy or the latecomer side's bottlenecks. As for the industrialization of latecomers, however, it is important to look at a series of processes: the introduced technology has become established among workers; it comes into common use among them; and it is improved. Figure A3-2 below shows the transfer process of production technology. The process is divided into five different steps, namely, (i) acquisition of operation technologies, (ii) maintenance of introduced machinery equipments, (iii) repairs and minor improvements, (iv) designing and planning, and (v) domestically designing and producing. According to Suehiro (2000), developing countries face the first obstacle in the process of upgrading from (i) to (ii). According to interviews with Japanese firms conducted by the JICA Study Team in July and August 2012,<sup>16</sup> the motorcycle sector in Cambodia is in this transition period from (i) to (ii) as shown in Figure 1.

For instance, company "A" imports completely-knocked-down (CKD) parts from its affiliated company in Thailand and also conducts assembly production in Cambodia. The company introduced equipment for welding and painting works, and shifted the import of CKD parts to in-house

<sup>15</sup> See Komoda, Fumio (1987), "Theory of International Technology Transfer", Publishing Co., Ltd. and Itagaki, Hiroshi (1997), "Japanese Production System : Hybrid Factories in East Asia: Hybrid Factories in Taiwan, China, and Korea", Minerva Shobo.

<sup>16</sup> The interview was conducted in July and August of 2012.

production in 2011. The company's production is currently at the stage of (i) in Figure 1 (first stage in Figure 2), and will face the first obstacle shown in Figure 1 when it transfers from (i) to (ii) in the near future. It takes several years to overcome the first obstacle when Cambodian workers and engineers manage to maintain the machines and equipment by themselves. This is because the accumulation of such human resources requires a certain level of technical knowledge and experiences. Suehiro (2000) indicated that it took more than ten years for Thai workers to upgrade from simple operation of plants up to the maintenance of equipment and machines by themselves at a Japanese synthetic fiber factory in Thailand in the late 1970s.

Once workers manage to maintain the equipment and machines, they also become capable of repairing or are slightly improved to a certain level. At stage (ii), (iii), and (iv), they are able to imitate and produce imported equipment and machines. It is at such stages that latecomers can benefit from the "advantage of backwardness."

The second challenge occurs at the transition stage from (iv) to (v) in Figure A3-2, which is called "middle-income trap" in Figure A3-3. On top of the accumulation of production and manufacturing technologies, in order to localize production, it is necessary to solve a wide variety of issues, for instance, the development of the supporting industry, enhancement of quality of raw materials and parts (level of industrial agglomerations), cooperation between design and manufacturing divisions in a company (organization capability of technology formation), and accumulation of human resources for technology development (national educational system).

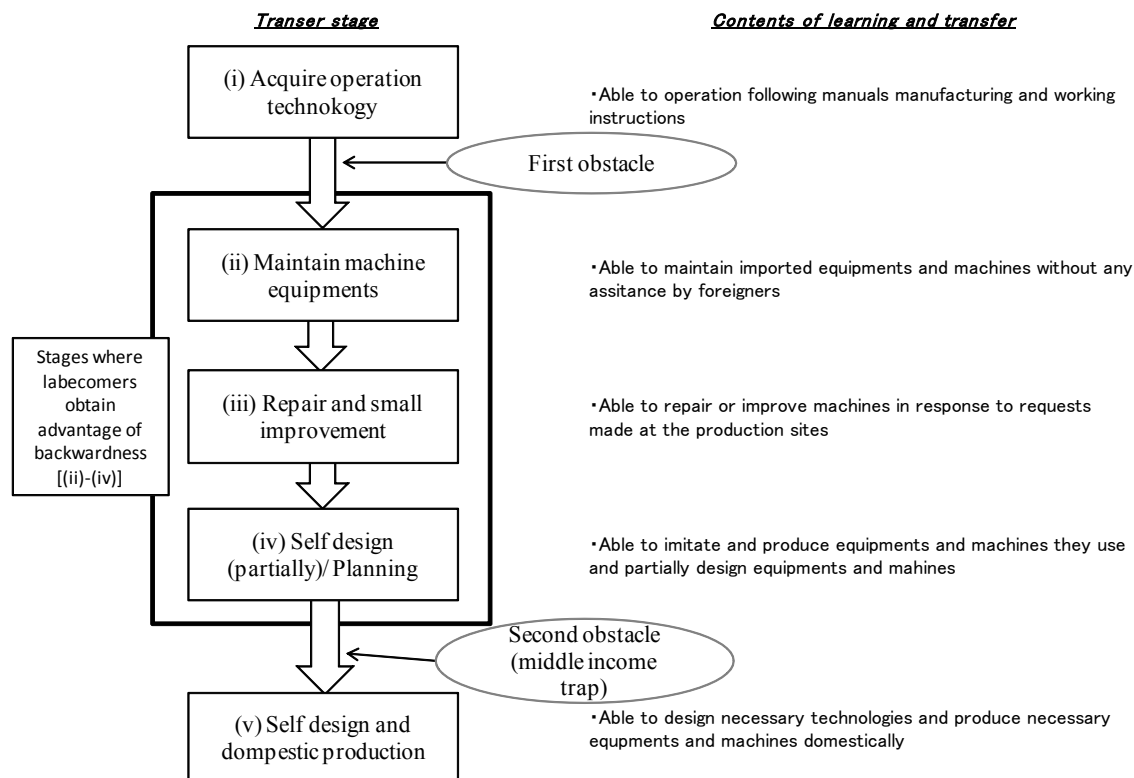
Regarding "middle-income trap," Ohno (2009) points out that latecomer economy can reach the level of localization of components (middle-income level). However, improvement of policy formation and private sector initiatives are necessary to aim at a higher level, and that there is a high possibility that without these improvements<sup>17</sup>, such level will not be reached. From Figure A3-2, it can be interpreted that policy shift (or introduction) for the improvement of technological skills is necessary to overcome a technological obstacle<sup>18</sup>. Higashi (2006) indicates that the starting point of the motorcycle sector in Thailand was in the 1960s when BOI formulated and enforced industrial policy related to the sector. Consequently, three Japanese manufacturers entered into the Thai market during the said decade. However, it was in 2002 when Tiger Motor Sales Co., Ltd. introduced motorcycles with its own domestic brand. This means that it took more than 35 years to finally overcome "middle-income trap" shown in Figure A3-3 (the second obstacle in Figure A3-2) by strengthening the supporting industry, upgrading industrial agglomeration, raising capacity to deal

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<sup>17</sup> See Ohno, Kennichi (2009) "The East Asian Growth Regime and Political Development," in *Diversity and Complementarity in Development Aid: East Asian Lessons for African Growth*: Chapter 2. Tokyo: GRIPS Development Forum

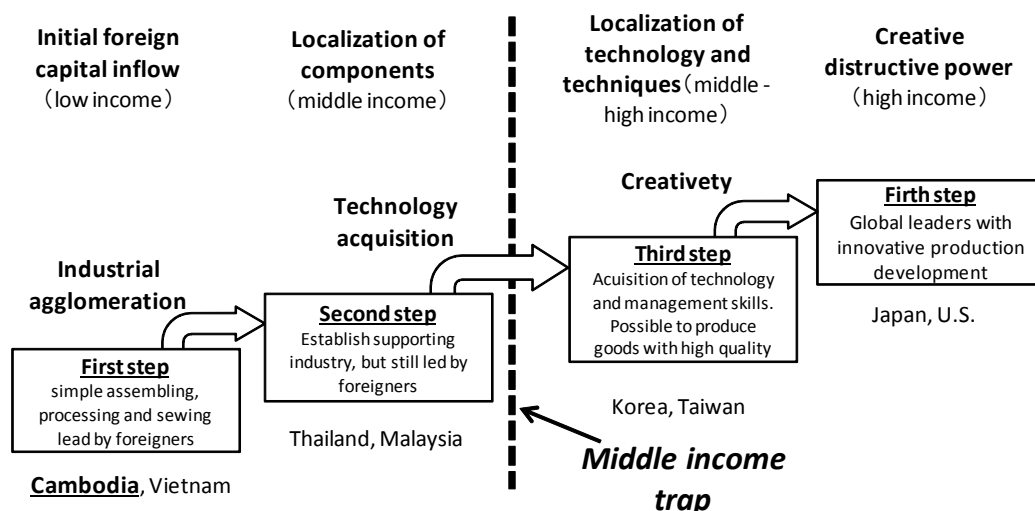
<sup>18</sup> See Shigeki, Higashi (2006), "Motorcycle industry in Thailand", in *Motorcycle Industry in Asia*, edited by Yuri, Sato and Moriki, Ohara, Institutes of Developing Economies Japan External Trade Organization.

with technology formation as an organization at the company level, and developing human resources for industry.



Source: JICA Study Team based on Hirose (2000)

Figure A3-2 Process of Production Technology Transfer



Source: JICA Study Team based on Karikomi (2011)

Figure A3-3 Development Steps for Technologies (Ohno Model)<sup>19</sup>

<sup>19</sup> See Shunji, Karikomi (2011), “Identified Issues related to ‘Middle-income Trap’”, vol 17, The Waseda Journal of

**(4) Organizational Capacity for Technology Formation**

The capability of technology formation in LDCs can be categorized into three levels: (i) individual, (ii) company (organizational)<sup>20</sup>, and (iii) society. Regarding level (i), it is essential for individuals to be capable of learning and understanding imported technology and production systems by studying abroad and training in other countries. At the same time, it is crucial for them to show interest in entrepreneurship to connect such imported technologies to domestic production factors and resources, and to find a niche and new market. Regarding level (ii), it is more important for developing countries to apply obtained technical knowledge and capacity to the operation sites, and learn and improve a production system. In other words, how to organize in-house production group composed of engineers, skilled and unskilled labor and how to make commitment in production management make significant impacts on technology formation at company level<sup>21</sup>. As for level (iii), the three important points are educational system and its expansion, accumulation of traditional technologies and its potential for conversion, and a system to promote technological spillover by encouraging entrepreneurship. The system to promote technological spillover can be accelerated by dividing a large company into specialized company (e.g., designing and manufacturing specific components) and supporting establishment of new manufacturers.

**Table A3-10 Three Levels of Organizational Skills for Technology Formation**

Level of Technology Formation	Contents
(i) Individual Level	<ul style="list-style-type: none"> <li>- Individuals acquire technologies by studying abroad, educational training, and training at headquarters of foreign manufacturers (Japan)</li> <li>- In Japanese companies, experiences from above trainings can be offset as conditions for promotion to a group leader or pay increase.</li> <li>- It is important for individuals to show interest in entrepreneurship on connecting imported technologies to domestic production factors and resources and of finding a niche and new market.</li> </ul>
(ii) Company (organizational) Level	<ul style="list-style-type: none"> <li>- Capacity to deal with technology formation as an organization is an important issue. That is, how to transfer and spread technologies obtained by individuals into companies in developing countries including Cambodia is an essential point.</li> </ul>

Social Sciences

<sup>20</sup> Takahiro, Fujimoto (2003) "Competition of Capacity Development", Chuo-Korin Inc. show detailed discussion of building organizational capacity, using automobile industry in Japan as an example.

<sup>21</sup> See Kohei, Mishima (2010), "The Motorcycle Industry in Southeast Asia : Japanese Firms and Industrial Formulation in Developing Countries", Minerva Shobo. For instance, Chapter 8 describes details of the process of building organizational capacity for Japanese automobile companies to improve QCD (Quality, Cost, and Delivery) in motorcycle industry in Vietnam through QC activities and VA/VE proposals.

(iii) Society Level	- (a) Educational system and its expansion, (b) accumulation of traditional technologies and its potential for conversion, and (c) a system to promote technological spillover by encouraging entrepreneurship are the three important points.
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Source: JICA Study Team based on Suehiro (2000)

## (5) Spillover of Japanese Production System into Latecomer Economies

### 1) Japanese Production System (JPS)

From a company's point of view, technology formation in latecomer economies mainly occurred after Japanese manufacturers' FDI in Asian countries. In other words, the technology formation was realized from spillover of JPS from the headquarters to their overseas affiliated companies through FDIs, and the channel of "in-house technology transfer." JPS is a system, which deals flexibly with continual changes in markets and operating environments. It is also a high-volume flexible production system,<sup>22</sup> which incorporates high-mix low-volume production (or manufacturing of a wide variety of products in small quantities) and is supported by multi-skilled workers, in-house small production groups, etc.

The catching-up processes of industrialization and the spillover of dynamism of industrialization are mentioned (i.e. wild-geese flying theory)<sup>23</sup>. From the viewpoint of technology formation, these processes can be viewed as the spillover of JPS into latecomer economies. If JPS was not introduced and spread in ASEAN countries, considerable increase in production and export of automobiles, motorcycles and electrical and electronic (E&E) products<sup>24</sup> could not have been realized in the region.

### 2) Application and Adaptation of JPS

JPS is normally transferred not only through machines and equipment but also through "human relations" (i.e. from one engineer or technician to another) and "systems or mechanisms of technology transfer." Suehiro (2000) points to the two following constraints to the spillover effects of JPS through in-house technology transfer. One is that many firms tend to attach greater

<sup>22</sup> Based on Abo, Tetsuo (1995; 35), "Economic Theory of Productive Power and Industry", in *Capitalism in the 20th Century I: Technological Innovation and Production System*, edited by Hasimoto, Juro University of Tokyo Press.

<sup>23</sup> For example, please refer to Akamatsu, Kaname (1962) "A Historical Pattern of Economic Growth in Developing Countries," *The Developing Economies (IAEA)*, Preliminary Issue No. 1, March-August: 3-25

<sup>24</sup> Hyundai Motor Company in Korea and PROTON Holdings Berhad in Malaysia were able to operate after frequent technical guidance by Mitsubishi Motors Corp. in both field and Japan. See Amsden, Alice (1989) *Asia's Next Giant: South Korea and Late Industrialization*, NY: Oxford University Press Regarding the case of Hyundai and Anazawa, Makoto (1998), "Malaysian National Car Project and Development of the Supporting Industries--Vendor Development by Proton", in *Asian Economies* 39(5), 92-114, May 1998. Also, see Naoki, Taguchi (2010), "A Case Study on How to Procure Dies and Mold for Japanese Auto Manufactures in China", in *Supply System of Automobile Industry in China and Japan*, edited Shuji, Yamazaki, Horitsu Bunka Sha regarding the case in China.

importance to corporate governance (i.e. financial management and voices of minority shareholders) than to production management know-how. The other is the limitation on the social-level capability of technology formation in latecomer economies: for example, the lack of engineers and technicians, very low spending on R&D, etc.

With the advancement of ICT and the acceleration of technological innovation of a product, by making full use of “advantage of backwardness,” there is an increasing need to enhance individual and firm level technology formation, as well as to strengthen the country’s education system and social foundations of technology development. This is a necessary condition to upgrade not only from assembly to processing technology but also from production to product technology. Unless this condition is satisfied, it may be difficult to realize the spinoffs from larger firms and establishment of manufacturers, as well as to encourage the spillover of Japanese firms’ “in-house technology transfer.”

#### (6) **Key Issues and Challenges of Cambodia**

As explained in Figure A3-2, using the transfer process of production technology, the level of technology transfer in Cambodia is somewhere between (i), and transfer period from (i) to (ii) in Figure A3-2. This indicates that many companies are dealing with the first obstacle. With consideration of these situations, the table below summarizes the issues and countermeasures for each individual, organizational (company), and society level. It is expected that some Japanese manufactures will shift to in-house production in the near future<sup>25</sup>. Therefore, it is especially necessary to take countermeasures in consideration of such trend,

As mentioned in the previous section, it took about 10 years for Thailand to remove the first obstacle, which clearly indicates that it will not be easy for Cambodia to overcome the obstacle. Furthermore, the country will encounter the second obstacle (middle-income trap) in a few decades. Therefore, it is vital not only to cooperate among the related entities including SNEC, CDC, MIME, and MLVT but also to promote joint efforts of the public and private sectors

**Table A3-11 Issues Related to Technology Transfer in Cambodia**

Level of Technology Formation	Issues	Example of Countermeasures
Individual Level	(i) Lack of human resources with foreign language skills (sufficient to work at foreign companies) and advanced technologies used abroad.	(i) Encourage students in universities and graduate schools to study abroad especially those studying in the field of science
	(ii) Lack of people who are willing to establish a new manufacturing	(ii) Organize a lecture on entrepreneurship (including speeches by current active

<sup>25</sup> Based on the interviews conducted by JICA Study Team in July and August 2012

	company or start a business	entrepreneurs) and internship at companies, and encourage entrepreneurs, students, etc. to participate in them.
Company (organizational) Level	(i) Lack of knowledge and experience on “5S and Kaizen”, which are the first principle on manufacturing, among unskilled workers, especially new ones	(i) Encourage in-house training and OJT by providing incentives (tax exemption). Meanwhile, request CJCC and universities to organize similar lectures for workers in companies, which are unable to do such trainings.
	(ii) Significantly insufficient number of skilled workers with process technology, especially those in the field of welding, painting, and press molding.	(ii) Assess specific needs accurately by interviewing companies.
	(iii) lack of knowledge and experiences on production management and quality management among staff	(iii) Provide basic knowledge in universities and/or vocational trainings. Also, encourage in-house training and OJT by providing incentives.
	(iii) lack of human resources who can maintain introduced equipment and machines	(iv) same as above
Society Level	(i) Low literacy rate compared with neighboring countries. Specially, lack of knowledge in science and mathematics.	(i) Strengthen primary education, especially in science and mathematics.
	(ii) The prejudice against foreign companies goes deep especially in the country, which often becomes an obstacle to recruitment, especially in rural areas <sup>26</sup> .	(ii) Raise social awareness on the importance of manufacturing, and economic and social role of manufacturers. Then encourage working in such companies (e.g. media advertisement in TV and/or radio)
	(iii) Social trend of respective entrepreneurs in manufacturing is not necessarily strong.	(iii) Inform that there are people who contribute to society by establishing manufacturers and creating many job

<sup>26</sup> According to the interview conducted in July, 2012, Japanese company “B” requested awareness campaign such as “working at foreign companies help development of Cambodia” through public advertisement because there are signboard written “Watch out foreign companies” in Khmer, which prevents them from recruit new workers.



		opportunities. (e.g. governmental recognition)
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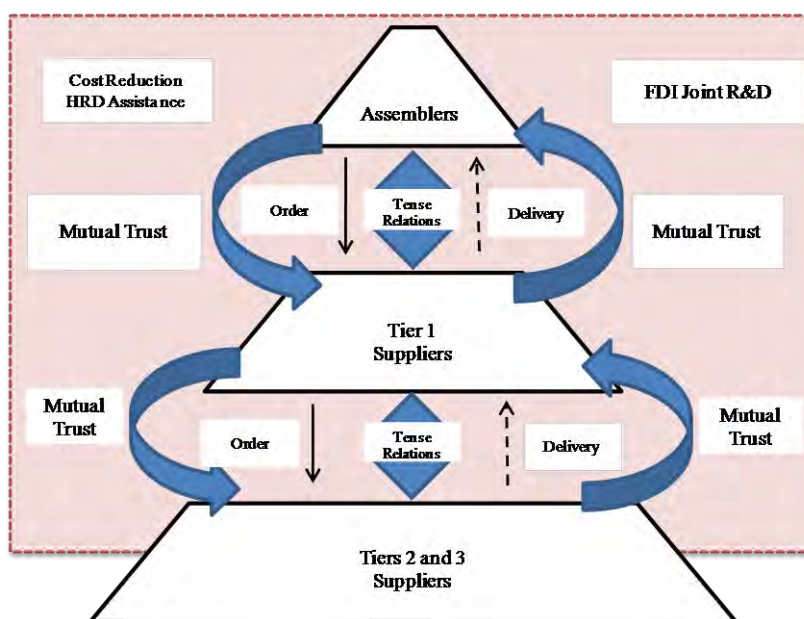
Source: JICA Study Team

### 3.3 Developmental Scenario of Machinery Sectors (Assembly and Processing)

#### (1) Motorcycle Sector

In Thailand, as shown in the figure below, there is a pyramid-shaped production system which represents 16 vehicle manufacturers and five assemblers of motorcycles, more than 700 Tier-1 suppliers, and more than 1,200 Tiers-2 and -3 suppliers.<sup>27</sup>

It is expected that a similar and smaller scale pyramid will be formed in Cambodia in five or ten years, and that part of Thailand’s pyramid will be extended to Cambodia. In other words, Tier 1 and 2 suppliers of Thailand may come to Cambodia. As mentioned in Chapter 2, Part 1, of this study, when the construction of Neak Loeng Bridge is completed, there is a possibility that motorcycle assemblers will begin importing complete knock-down (CKD) parts from Vietnam, and foreign suppliers (e.g. Taiwan) will make an FDI in Cambodia in order to extend their production to the country.<sup>28</sup>



Source: JICA Study Team

Figure A3-4 Pyramid of Automotive and Motorcycle Sectors in Thailand

On the other hand, Section 2.5 of Chapter 2 of this Report’s Part 1 emphasized the two following

<sup>27</sup> Please refer to Chapter 9 of JICA (2007) “Final Report on DS on Economic Policy Support in Cambodia.”

<sup>28</sup> As of August 2012, CKD parts for motorcycle assembly are imported from Thailand and Indonesia. For details, please refer to Chapter 2 of this Report’s Part 1.

points: one is the prohibition of importing completed motorcycles in the late 1990s. This prohibitive measure resulted in an increase in foreign assemblers' FDI in Vietnam and in the production volume of motorcycles. The other is the tariff, introduced in 2001, linked with local contents to facilitate the localization of part production and of production process.

In the period between 1986 and 1999, *kaizen* activities were carried out and a wide variety of training courses for workers were provided. Import substitution was also promoted in the form of phased local procurement; namely, foreign manufacturers shifted the import of CKD parts to in-house production. In the first half of the 2000s, as indicated in the following table, through Japanese firms' shift of import of CKD parts to in-house production and foreign suppliers' entry into the Vietnamese market, Japanese firms realized the localization of part production and production process in Vietnam.

Provision of incentive for foreign invested enterprises (FIEs) according to local contents ratio may be effective. It is important to encourage FIEs' in-house production as well as to increase the variety of parts and production volume by carrying out *kaizen* activities and providing workers with a variety of related training courses, in order to diversify the industrial structure of Cambodia.

**Table A3-12 Japanese Firms' Localization of Production Process and Part Production (in Vietnam)**

	Honda Vietnam	Machino Auto Parts (MAP)
1999 and before	Assembly of completed motor vehicle Press molding, welding, and painting Plastic injection and metal processing	Plastic case of meters Clutch parts Aluminum processing (cushion)
2000 and 2001	Metal casting (engine cover) Metal casting (engine case) Metal casting (cylinder) Metal casting (cylinder head)	Metal casting (cushion and clutch) Aluminum processing (clutch) Assembly of lamp code Damper processing of rear cushion
After 2002 inclusive	Metal casting (cylinder) Strengthening of plastic injection Strengthening of metal processing	Processing (pipe and steering system) Plating Oil pump, fuel unit parts Spring

Source: Chapter 8 of Mishima (2010)<sup>29</sup>

<sup>29</sup> Mishima, Kohei, (2010) "*Tonan Ajia no outbai sangyo*" (Motorcycle Industry in Southeast Asia), Tokyo: Minerva Shobo

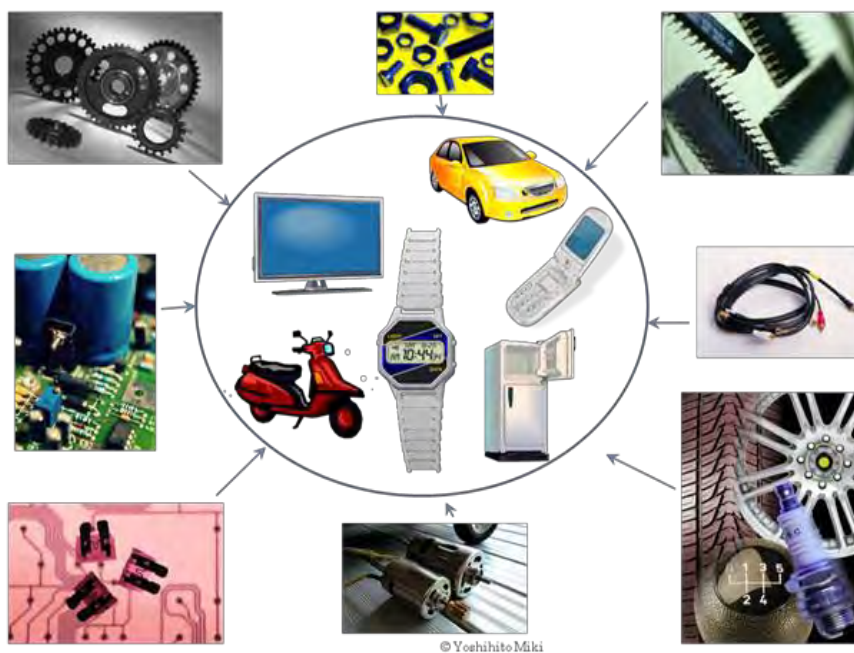
**Table A3-13 Japanese Assemblers' Classification (in-house Production and Outsourcing) in Vietnam (2003)**

			Honda Wave	Yamaha
Category	Engine parts	Cylinder block	◎	◎
		Cylinder head	◎	◎
		Piston	-	△
		Piston ring	△	△
		Oil pump	△	●
		Carburetor	-	△
		Automobile muffler	●	●
	Drive train parts	Clutch	●	△
		Transmission	●	△
	Electric parts	Lights	●○	●
		Meters	●	●
		Generator	-	◎
	Auto body parts	Auto body	◎	◎
		Suspension	●	●
		Gasoline tank	-	◎
		Wheel	●	●
		Tire	●	●

Remarks: ◎ In-house production, ● Outsourcing (special order), ○ Outsourcing (general), △ Import  
Source: Chapter 8 of Mishima (2010)

(2) **Other Machinery Sectors (Precision Instruments, Electrical/Electronic Parts, etc.)**

On top of the above-stated motorcycle assemblers, several manufacturers of precision equipment/parts (e.g. a variety of motors), and electrical/electronic parts (e.g. wire harness) have entered into the Cambodian market for the past few years. These products and parts are used for motor vehicles, motorcycles, personal computers, mobile phones, refrigerators, watches etc., as shown in the following figure.



Source: JICA Study Team

**Figure A3-5 Examples of Precision Equipment (Parts), Electronic Parts and Final Products in which Equipment and Parts Are Used**

Examples of potential electrical/electronic parts and products to be manufactured in Cambodia are shown in the following table.<sup>30</sup>

**Table A3-14 Examples of Electrical/Electronic Parts and Products to be Manufactured in Cambodia**

Potential Products and Parts	Potential Investors	Potential Source of Procurement	Export Destinations	Characteristics of Production Process
Watch, digital camera (module), BLU, etc.	Japan, Taiwan	Japan, ASEAN, China	Japan, ASEAN, and China	Introduction of advanced assembly equipment
Information and communication equipment (printer, mobile phone, etc.)	Japan, Korea	Japan, ASEAN, China	Europe and U.S.	Introduction of advanced assembly equipment and in-house production of metal and resin parts
Wire harness	Japan, Korea	ASEAN, China	Thailand and U.S.	Labor-intensive work
Coil and trans	Japan, Korea, Taiwan	Japan, ASEAN, China	ASEAN and China	Labor-intensive work with automation
Other electric parts	Japan, Taiwan, ASEAN	Japan, ASEAN, China	Japan and Europe	In-house production of metal and resin parts

Source: JICA Study Team based on Chapter 8 of JICA (2007)

On the other hand, in Koh Kong, assembly of motor vehicles is conducted by a Korean auto-maker and, therefore, the production of the following parts is expected in Cambodia.

<sup>30</sup> Chapter 8 of JICA (2007) “Final Report of Economic Policy Support in the Kingdom of Cambodia”

**Table A3-15 Category of Main Automotive Parts**

Category	Main Parts
Engine component	Piston, piston ring, intake and exhaust valves, gasket, fuel pump equipment, radiator, etc.
Driving power, transmission, equipment components	Automatic transmission, clutch, universal joint, propeller shaft, universal joint, steering, etc.
Parts of braking system and automotive suspension	Shock absorber, brakes, etc.
Electrical equipment for internal combustion engines	Dynamo, distributor, starter, ignition coil, spark plug, etc.
Chassis and auto body parts	Fuel tank, window frame, silencer, sheet, airbag, etc.
Electrical components and others	Switch, meter, wiper, horn, air conditioning system, heater, etc.

Source: JICA Study Team based on Chapter 9 of JICA (2007)

In line with the above-stated analysis, short-, medium- and long-term prospects of development of other machinery sectors (precision instruments, electrical/electronic parts, etc.) are as follows.<sup>31</sup>

1) Short-term (2012-15)

In Chapter 2 of this Report's Part 2, it is pointed out that many foreign manufacturers have a production base in Thailand, which plays a central role in their GVC across ASEAN region. The manufacturers place the labor-intensive portion of the GVC in Cambodia.

Among the machinery sectors, the labor-intensive processes of the transportation equipment sectors (e.g. motor vehicle and motorcycle) are appropriate.

Since few local manufacturers have potentials to become suppliers of foreign assemblers in the near future, assemblers import most of the raw materials and semi-complete knock-down (SKD) parts by taking advantage of low labor costs in Cambodia.<sup>32</sup>

2) Medium-term (2015-20)

With an increase in production volume, local production of raw materials and parts begins. The manufacture of many FIEs is based on CKD production by combining in-house production parts and imported ones. With the progress of in-house technological accumulation and production of parts is upgraded to higher value-added.

3) Long-term (2021-)

With the development of industrial agglomerations, variety of products and parts produced has increased in Cambodia (e.g. key functional parts). These manufacturers grew into export industries within the framework of ASEAN Economic Community (AEC). Through the implementation of measures for attracting foreign manufacturers and developing supporting industries, some local as well as foreign manufacturers are expected to emerge. Simultaneously, elemental technologies are in

<sup>31</sup> On the basis of the experiences of the machinery sectors of early-comer economies of ASEAN (e.g. Malaysia, Thailand and Indonesia), this scenario shows the directions of those sectors of Cambodia to be followed.

<sup>32</sup> For instance, please refer to Sato and Ohara (2006).

demand, and related technicians and skilled workers are nurtured.

**Table A3-16 Prospects of Development of Cambodia's Machinery Sectors**

Period	Potential Areas	Investor Country	Procurement of Parts and Raw Materials	Main Markets/ Export Destinations	Mode of Production
Short-term (2012-2015)	Precision machines (final products) and transportation equipment (simple products)	Japan and Korea	Import (Japan, Korea, ASEAN, etc.)	Domestic market and export (Japan, Thailand, Vietnam, etc.)	SKD and simple assembly
Medium-term (2016-2020)	Precision machines (final products) and transportation equipment (key products)	Japan, Korea and Thailand	Domestic market and import (Japan, Korea, ASEAN, China, etc.)	Domestic market and export (Japan, ASEAN, China, etc.)	CKD (increase in value added)
Long-term (2021-)	Increase in the variety of precision machines (watch); and production of agriculture equipment	Japan, Korea and Thailand	Domestic market and import (Japan, Korea, ASEAN, China, India, etc.)	Domestic market and export (Japan, ASEAN, China, etc.)	CKD (development of elementary technology)

Source: JICA Study Team based on Chapter 9 of JICA (2007)

### 3.4 Direction for the Promotion of Agro-SEZ and Food Processing Sector

It is needless to say that SEZ development is one of the most important vehicles to attract FDI through provision of infrastructures with both soft and hard facilities. It is also important to promote strategically specialized SEZs to meet the requirement from the aspect of investment management. One of the options for the specialized SEZs should be that which can make best use of Cambodia's advantageous resources, especially agriculture products. The potentials of the Agro-SEZ should be, therefore, reviewed as measures to promote agglomeration of agro-industry and food-processing industry.

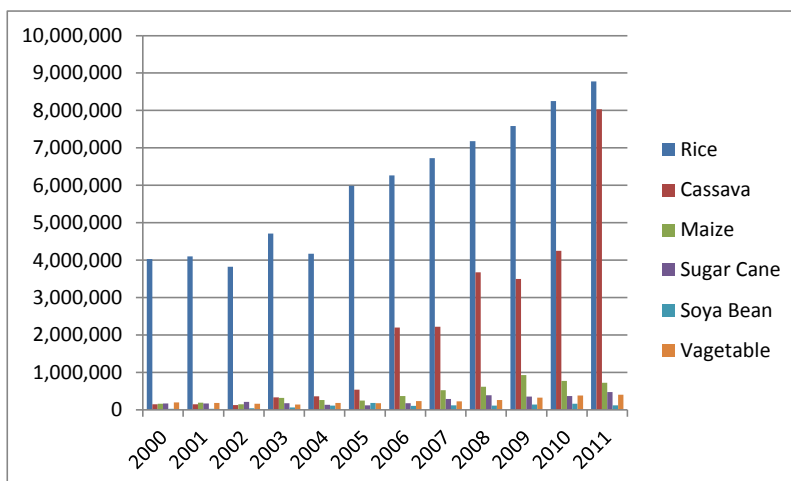
#### 3.4.1 Potentials of Food Processing Sector Promotion in Cambodia

##### (1) Recent Production Trends of Agricultural Products

As already clearly identified in the "Rice Policy<sup>33</sup>", rice and paddy products are the most significant resources of Cambodia. Among agricultural production, which comprises over 30% of

<sup>33</sup> "Policy Paper on the Promotion of Paddy Production and Rice Export" (July 2010), RGC

GDP, rice production's share is over half of the agriculture products in total. The area under cultivation of rice covers over 70% of total crop cultivated area. The production of rice has been increasing steadily since 2005, and has reached as much as about 1.5 times larger in volume in 2011.

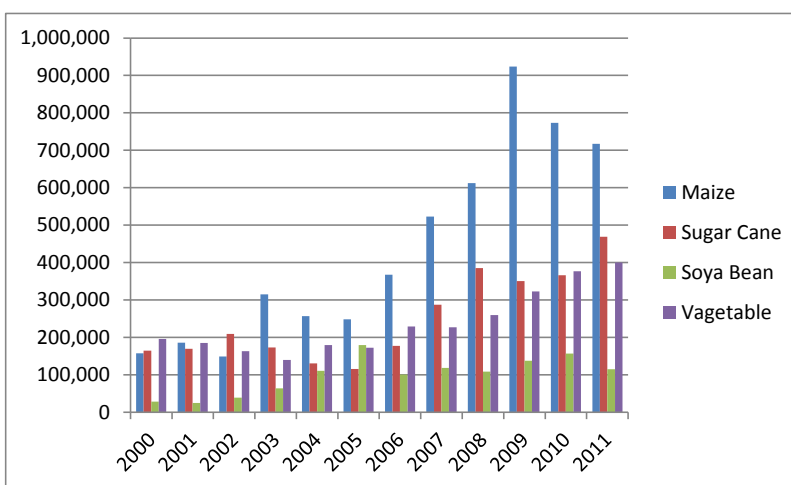


Source: Ministry of Agriculture, Forestry and Fisheries

**Figure A3-6 Major Crops Production Trends (Unit: ton)**

Cambodia's major subsidiary crops are maize, cassava, mung bean, sweet potato, and vegetable in the category of cash crops, while peanut, soya bean, sugar cane, sesame, tobacco, and jute in the category of industrial crops. Cassava is the second major crop next to rice, showing rapid increase since 2006 with doubled production in 2011 from the previous year.

Among those crops, MAFF has designated maize, cassava, mung bean, and soya bean as the priority cash crops. With regard to fruit and perennial crops, mango, dragon fruit, cashew nut, and rubber are recognized as important resources. The following figure indicates that the production of sugar cane and vegetable is increasing steadily, while maize has peaked in 2009.



Source: Ministry of Agriculture, Forestry and Fisheries (unit: ton)

**Figure A3-7 Major Crops Production Trends (Other than Rice and Cassava)**

According to the JICA survey in 2012<sup>34</sup>, “Rice, cassava, maize and soybeans are potential crops as ingredients or low materials for strategic processed foods. Above all, rice has the largest potential. Starting with rice could accumulate technologies, capital and knowhow, which could pave way for other crops. The crop with the greatest potential after rice could be cassava.”

## (2) **Current Situation of the Food Processing Sector**

When considering the FDI attraction in the food-processing industry, it is essential to have a clear idea on the current status of domestic food-processing industry, and its potentials to serve as supporting industry to FDI, as well as the impact of the industrial agglomeration.

Cambodia’s food-processing industry consists of micro, small and medium sized companies, and is labor-intensive. It still stays in the relatively low productivity with delay in mechanization. Despite the resources in Cambodia, due to lack of sophistication of distribution network, the food-processing industry often, and for most cases, relies on import for raw materials from Thailand, Vietnam, or China. Their target market is mainly the domestic market. The FDI from Thailand, Vietnam and Malaysia is recognized but mostly limited in small scale.

According to the statistics by MIME, there are a total of 56 (27 FIEs and 29 domestic capital companies) large-scale food-processing companies<sup>35</sup> in Cambodia. The number of employees of FIEs and domestic capital companies is 7355 and 4313 respectively, and is 11,668 in total<sup>36</sup>. As for the small and medium sized food-processing companies, there are 31,479 companies and 93,704 employees<sup>37</sup>. Based on the statistical data in the Economic Census 2012, the total number of establishments in the manufacturing sector is 75,031 and 539,134 for the total number of employees. The share of food-processing companies and employees in the manufacturing sector are approximately 47% and 17%, respectively. The food processing sector is 1.4 times larger than the garment and footwear sector in terms of number of companies, while the number of employees is one fourth of that of the garment and footwear sectors. This makes the food processing sector the second most important sector after the garment and footwear sectors.

## (3) **Issues to Be Addressed by the Food Processing Sector**

Among others, following issues are often pointed out in the area of production, distribution, and quality standard.

High cost of electricity is a serious issue for most sectors and is not only limited to food

<sup>34</sup> Data Collection Survey on Selecting the Processed Foods to be Focused On and Promoting Foreign Direct Investment in the Food Business in The Kingdom of Cambodia (January 2012), JICA

<sup>35</sup> Large-scale: number of employees over 100/total asset over US\$500,000, Medium-scale: 51~100 人 /US\$250,000~500,000, Small & micro-scale: less than 50/less than US\$250,000 (based on the SME Development Framework)

<sup>36</sup> “Factories registered under Ministry of Industry, Mines, and Energy, from the year 1994 to 2010”, MIME

<sup>37</sup> “2010 SMEs Sector and Sector”, MIME



processing sector. It affects manufacturing sector as it faced difficulties in shifting its labor-intensive structure to an efficient mode such as mechanized manufacturing where electricity is crucial. For the food processing sector, besides the issues in electricity, the following difficulties are found in low productivity especially in micro/small sized companies; i) under the low quality of production management, ii) low quality of workers, iii) unstable condition of employment (i.e. seasonal employment). The production cost is another issue. As most raw materials are imported rather than procured from domestic market due to lack of efficient distribution network and/or constant supplies, production cost remains relatively high because of import duties and transportation cost. In the distribution stage, the undeveloped cold chain and relatively high cost of land transportation is preventing the food-processing sector from upgrading and diversifying their products.

In the area of quality standard, criteria and/or guidelines are still lacking for relevant equipment for hygiene control, food products and food processing. There are also negative attitudes in the company side such as the lack of awareness and effort to improve and upgrade quality of products through internal control measures with target or criteria to achieve acceptable quality. The framework of standards, quality control measures for food safety and quality has been developed to some extent; however, the system requires more effort to become effective. It is also necessary to promote more advocacy and awareness building for the private sector to adopt such quality standard. It is pointed out that the lack of relevant facilities, such as research and testing institutes, and insufficient human resources to back them up is also an issue to be improved especially in the public sector.

From the aspect of procurement of raw materials from the domestic market, it is pointed out that stable and constant supply of agricultural products is not often ensured, and that the proper product pricing is difficult since there is no relevant market price. These are mainly issues dealt in the agricultural policy caused by reasons such as low agricultural production technology, insufficient development of commercialization and marketing system, and undeveloped infrastructure for collection system and consolidating stations. It often allows unfair trading including the backdoor trading undermining the bargaining balance at the agricultural production areas, and the farmers. In the current commercial practice, there are traders in-between the farmers and food-processing companies. They are individuals called “Chhmourn Kandal”, playing the role of mediators, who often take advantage in pricing the agricultural products. They sometimes lend money to farmers for their fertilizers and/or seeds, and receive agricultural products as payments. This keeps them in the advantageous position in pricing. This is also another bottleneck to undermine the transparency in the market price.

### **3.4.2 Discussions on Agro-SEZ**

As discussed in the previous section, there are agricultural products which are advantageous and

are potential resources in Cambodia. Although further promotion and development is essential, this leads to the potential development of the food processing industry. It is important to link the potentials of food processing industry to FDI. The domestic industry could well serve as the supporting industry and FDI/FIE for new roles as suppliers of raw materials.

Considering the significance of agricultural products as the resource of Cambodia, specialized SEZ can be designed as Agro-SEZ to promote agglomeration of food processing industry, which could be beneficial to both FDI and domestic industry. This should be utilized as leverage for industrialization and improvement, and upgrading of agro-industry.

In the initial design of Agro-SEZ, which does not include facilitating stable supply of electricity at a reasonable cost, the consolidating points and market function should be built in the SEZ. This is intended so that efficient distribution system linked with producers (from farmgate) and the SEZ could be realized. The areas for domestic food processing SMEs with accessibility to testing and research functions and services such as consulting for production management and hygiene control, should also be attached. Through this facility, it is expected that domestic industries may be encouraged to adopt quality standard in the international level. Further services for FDI such as linkage programs with domestic suppliers/partners should also be considered important, through which FDI may be able to establish a hub for their supply chains comprising not only manufacturers but also producers of agricultural products.

According to the JICA survey mentioned in the previous section, it is suggested to establish a “SEZ specialized for Food Processing Industry” starting with targeting unprocessed rice and other grains, and aiming at promoting export of related processed products by strategically establishing in the neighboring port areas such as the new Phnom Penh Port.

**Table A3-17 Concept of SEZ Specialized in Food Processing Industry**

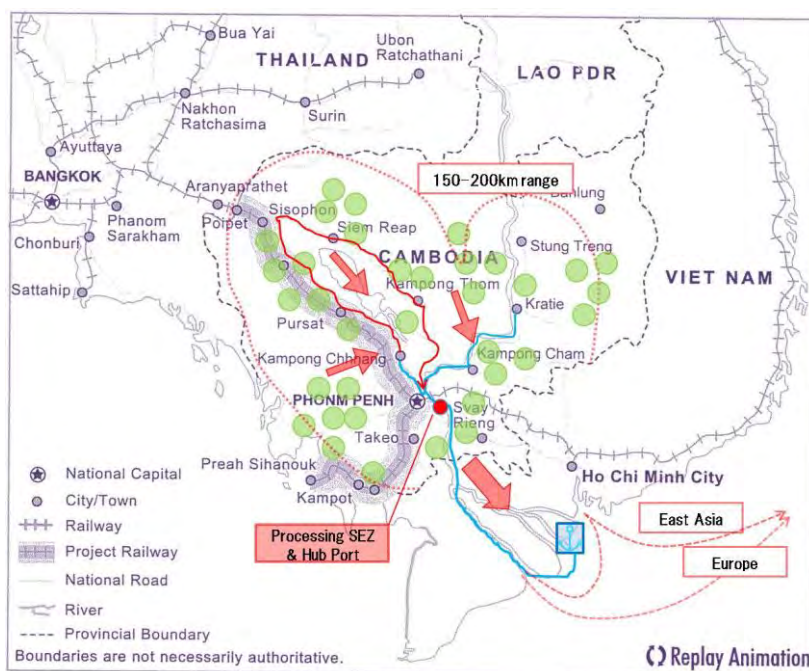
Support Sector	Food Processing: Installation of Current Technology Trade and Marketing: Food Processing SEZ Development
Project Name	Development of SEZ specialized as Food Processing Industry
Target Commodity and Target Area	<u>Target Commodities</u> Paddy and the other grains <u>Target Areas</u> Phnom Penh Municipality and surrounding area
Background /Objective	The grain, e.g., mainly paddy, cassava, maize, corn, etc., in the rough exports to the neighboring countries irregularly. The main causes are the shortage of food processing technology and facilities, of marketing know-how and a less-developed distribution network of grain and processed food products. Hence, this project will contribute mainly to creation of food processing industry and increase/stabilization of

	farmer's incomes, and to the national priority policy, e.g., Rice Policy, Rectangular Plan, etc. by effectively developing export location (e.g. surroundings of international ports/important ports, road connectivity).
Benefit to Cambodia	<p><u>Beneficiaries</u></p> <p>(Direct beneficiaries)</p> <ul style="list-style-type: none"> <li>- Growers' groups, processors and traders (collectors, wholesalers, etc.) for target areas and commodities</li> </ul> <p>(Indirect / medium- and long-term beneficiaries)</p> <ul style="list-style-type: none"> <li>- Individual consumers, large-scale consumers, distributors, exporters, etc.</li> <li>- All relevant players for other areas and commodities</li> </ul> <p><u>Benefits</u></p> <ul style="list-style-type: none"> <li>- Prevents irregular grain and paddy leakage to other neighboring countries</li> <li>- Realizes actual potential of grain productivity</li> <li>- Expands processed food exports</li> <li>- Increases and stabilizes farmers' incomes</li> <li>- Enhances FDI into the field of food processing industry</li> <li>- Creates job opportunities</li> <li>- Install the latest technology of food processing</li> <li>- Stabilizes the structure of the macro economy by industrial diversification</li> </ul>

Source: "Data Collection Survey on Selecting the Processed Foods to be Focused On and Promoting Foreign Direct Investment in the Food Business in The Kingdom of Cambodia" (2012), JICA

Japan Development Institute (JDI) is also proposing Agro-SEZ encompassing cash crops as well as rice and grains. Quoting JDI, it suggests "to develop infrastructure which connects 1) an Agro-Forestry Processing SEZ and 2) an Agro-Forestry Products Collection Hub Port along the Mekong River Basin. Agro-forestry products are collected at the hub ports and processed (primary-processing) at the SEZ. The finished products are transported to Cai Mep, a Vietnamese deep sea port by barge transportation along the Mekong River, and directly exported to the international market."<sup>38</sup>

<sup>38</sup> Quoted from JDI homepage; <http://www.jditokyo.com/en/projects-2.html>



Source: Japan Development Institute (JDI)

**Figure A3-8 Conceptual Image of Agro-SEZ**

In 2010, one of the major Japanese food distribution companies withdrew their USD 5 million investment from Cambodia. The project aimed at developing their own plantation to grow their products and processing site in Cambodia, for export purposes. The plan was to build a major supply chain within Cambodia linked with the distribution channel in Japan. According to reports, however, serious delay in fulfillment of contractual terms gave them no choice but to withdraw their plan. Hence, the construction and facilitation of infrastructure was not realized as contracted by Cambodia side.

The project was damaged by this situation. Moreover, it was quite a loss of opportunity for Cambodia's economy, more specifically for its industrialization. In order to avoid this type of situation in the future, development of an Agro-SEZ and related infrastructure is essential. The action should be undertaken as expeditiously as possible as new developments are observed in the food processing related areas such as establishment of Japanese large scale distribution shopping mall business in 2012 and a major Korean trading company producing crops aiming to reach 140,000 ton in 2013 by developing 26,000 hectare plantation. Such high attention is now being brought to this area and the Agro-SEZ shall be one of the effective measures to be tackled.

### 3.5 Garment Sector in the Investment Management –Investment Management by Upgrading CMT of the Current Cambodia’s Garment Sector

#### 3.5.1 Current Situation of Cut, Make, Trim (CMT)-oriented Garment Sector in Cambodia

##### (1) Vulnerability in Driving Force of Manufacturing Sector

Industry contributes about 22% to the GDP of Cambodia. Once figures of energy sector and construction sector are excluded, pure manufacturing accounts for about 15% of GDP (2011). Garment industry, including footwear, shares almost 65% of the total manufacturing outputs (in terms of value), and accounts for about 70% of the total export (for USD 3 billion in 2008), making it the current driving force of manufacturing sector in Cambodia. As there are few alternative exporting industries developed in Cambodia, reliance on garment industry in the country’s export business is very high. While strong presence of garment sector is observed, overall industrial structure is fragile consisting of severely limited variety of sectors.

Table A3-19 below shows breakdown of sales (turnover), expenditure, value added (sales minus expenditure), number of establishments, and sales per establishment in 2011. Both wearing apparel and knitted product apparel sectors recorded negative value-added, implying possible structural problems. With regard to weaving, all figures are low while the number of establishments is more than half of wearing apparel sector, which means that weaving sector is dominated by small- or medium-scale establishments. On the other hand, footwear sector, despite a fewer number of establishments, recorded turnover exceeding USD 3.8 billion or USD 36 million per establishment. This average sales value per establishment is more than 40 times than that of the manufacturing sector in total. However, there is a concern about possible oligopoly situation.

**Table A3-18 Comparison of Sales in Garment/Footwear Establishments (2011)**

ISIC code	Sector	Sales (Mil. USD)	Expenses (Mil. USD)	Value-added (Mil. USD)	Number of Est.	Sales/Est. (th. USD)
1410	Wearing Apparel	50,843	52,489	-1,646	15,798	3,218
1430	Knitted & crocheted apparel	37	44	-7	290	129
1312	Weaving of textile	73	68	5	8,471	9
1520	Footwear	3,874	227	3,647	109	35,539
	Total	57,525	54,211	3,315	75,031	767

Source: JICA Study Team based on “National Economic Census 2011”, National Institute of Statistics

The following table summarizes the actual situation of import and export of garment industry in 2008. This shows the significance in its structure of heavy reliance on imports of raw materials for

exports of finished products.

**Table A3-19 Export/Import of Garment Sector (2008)**

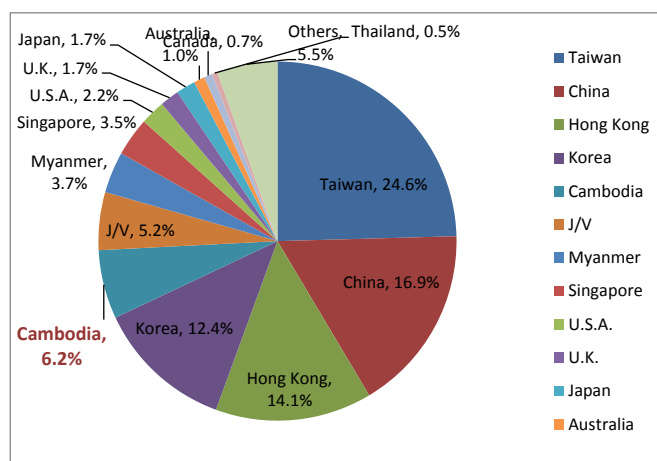
No	Code Items	Description	2008		
			Export Values (Million Riels)	Import Values (Million Riels)	Trade Balance (Million Riels)
57	269	Worn clothing and other worn textile articles; rags	7,142	206,735	-199,593
125	651	Textile yarn	2,653	425,405	-422,753
126	652	Cotton fabrics, woven (not including narrow or special fabrics)	346	189,288	-188,942
127	653	Fabrics, woven, of man-made textile materials	5,665	1,354,080	-1,348,416
128	654	Other textile fabrics, woven	47	27,993	-27,946
129	655	Knitted or crocheted fabrics (including tubular knit fabrics)	11,606	3,617,819	-3,606,213
130	656	Tulles, lace, embroidery, ribbons, trimmings and other smallwares	835	222,002	-221,166
131	657	Special yarns, special textile fabrics and related products	244	125,255	-125,011
132	658	Made-up articles, wholly or chiefly of textile material, n.e.s.	39,634	13,297	26,337
220	841	Men's or boy's coats, capes, jackets, suits, blazers, trousers, shorts, shirts, underwear, nightwear and similar articles of textile fabrics, not knitted or crocheted (other than those of subgroup 845.2)	98,902	203	98,700
221	842	Women's or girls' coats, capes, jackets, suits, trousers, shorts, nightwear and similar articles of textile fabrics, not knitted or crocheted (other than those of subgroup 845.2)	128,587	482	128,104
222	843	Men's or boy's coats, capes, jackets, suits, blazers, trousers, shorts, shirts, underwear, nightwear and similar articles of textile fabrics, not knitted or crocheted (other than those of subgroup 845.2)	2,843,498	140	2,843,359
223	844	Women's or girls' coats, capes, jackets, suits, trousers, shorts, nightwear and similar articles of textile fabrics, not knitted or crocheted (other than those of subgroup 845.2)	4,632,595	103	4,632,492
224	845	Articles of apparel, of textile fabrics, whether or not knitted or crocheted, n.e.s.	4,457,100	5,183	4,451,918
225	846	Clothing accessories, of textile fabrics, whether or not knitted or babies)	50,768	143,877	-93,109
226	848	Articles of apparel and clothing accessories of other than textile fabrics; headgear of all materials	25,304	104,106	-78,802
		Total	<b>12,304,951</b>	<b>6,448,874</b>	<b>5,856,077</b>

Note: Due to the limitation of the space, only the items with more than CR 10,000 million in trade balance are indicated in the list. The total amounts at the bottom refer to the sum of all the items including the ones not listed on the table above.

Source: JICA Study Team based on "Trade Statistics 2009", National Institute of Statistics

## (2) Structure of the Sector Dominated by Foreign Enterprises

As shown in Figure A3-9, garment industry in Cambodia is led by foreign enterprises, and localization has been delayed. Currently, more than half of the members (55% or 224 establishments) of the Garment Manufacturers Association of Cambodia (GMAC) are from Taiwan, China and Hong Kong, while Cambodian owned establishments account for only 6.2% (25 establishments).



Source: JICA Study Team based on Member list of GMAC, GMAC

**Figure A3-9 Composition of GMAC Membership by Nationality**

Footwear manufacturing establishments register their membership at GMAC and account for about 10% of the total GMAC membership (37 establishments). Among these establishments, the share of both Taiwanese and Chinese is about two thirds.

**Table A3-20 Membership of GMAC by Nationality (Garment and Footwear)**

	Number of Garment Company	%	Number of Footwear Company	%	Total	%
Taiwan	79	21.6%	20	54.1%	99	24.6%
China	64	17.5%	4	10.8%	68	16.9%
Hong Kong	57	15.6%			57	14.1%
Korea	49	13.4%	1	2.7%	50	12.4%
Cambodia	21	5.7%	4	10.8%	25	6.2%
J/V	19	5.2%	2	5.4%	21	5.2%
Myanmar	15	4.1%			15	3.7%
Singapore	14	3.8%			14	3.5%
U.S.A.	9	2.5%			9	2.2%
U.K.	7	1.9%			7	1.7%
Japan	4	1.1%	3	8.1%	7	1.7%
Australia	3	0.8%	1	2.7%	4	1.0%
Canada	3	0.8%			3	0.7%
Thailand	2	0.5%			2	0.5%
Others	20	5.5%	2	5.4%	22	5.5%
Total	366		37		403	

Source: JICA Study Team based on Member list of GMAC, GMAC

### (3) Simple Contract Assembly Process (CMT)

In general, business operation of garment industry in Cambodia is basically under simple CMT contract. Most of the products are exported, particularly to the United States (approximately 70%) reflecting the previous Trade Agreement on Textile and Apparel (TATA) signed between Cambodia and the United States. About 70% of the exported items comprise knitting products such as T-shirts, sweat

shirts and polo-shirts, which are not highly value added compared to apparel products using woven textile observed in Vietnam. Furthermore, counterparts of CMT contracts are mostly investors from Taiwan, China and Hong Kong whose share is about 55% in the garment sector. These Chinese investors usually pursue the economy of scale and tend to place higher priority on efficiency in CMT assembly process comparing with investors of other nationalities. From these facts, it can be said that CMT contract is a simple process with low value added and there is limited technology to be transferred to local establishments (employees).

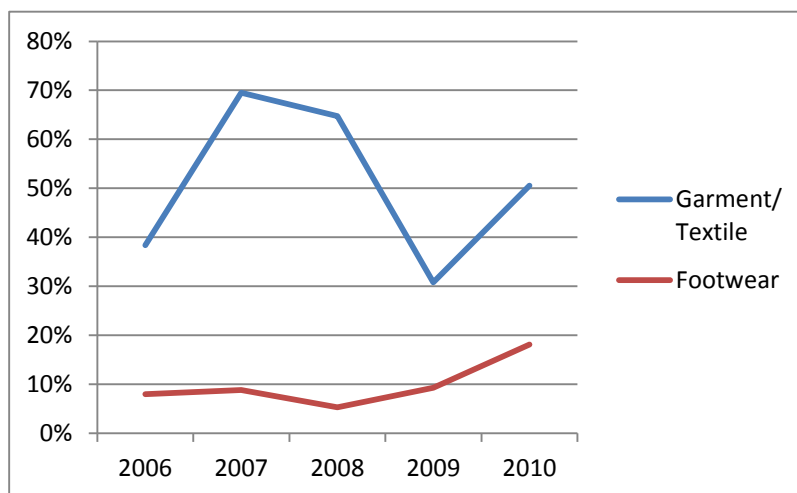
According to the survey implemented by USAID in 2007, the share of CMT, FOB and consignment contract is approximately 60%, 25% and 15%, respectively. However, even in the category of FOB, authorities involved in decision making for design and/or procurement routes usually remain at parent companies abroad. Thus, the actual operation is no more than CMT in nature. The actual share of CMT can be a bit larger than the figures indicated in the survey.

**(4) External Factors of the Current Garment Sector**

The following three points are recently pointed out as external factors that will impact the Cambodian garment sector: i) increase in labor cost in Thailand, China, and Vietnam, ii) anti-dumping measures taken on the exports of footwear from China and Vietnam to the EU since 2007, (imposed import duties of 16.5%), iii) safeguard measures taken on garment products from China to the EU and the United States since 2006. It is pointed out that increase in FDI to this sector in Cambodia is the detouring countermeasures. Figure A3-10 shows the trends of share of QIP approved value in garment and footwear sectors. It may be possible that increase in share of the garment sector is due to the safeguard measures in 2006, and that of the footwear sector is due to the anti-dumping measures in 2007.

It should be noted that above trends can be temporary and may not be for actual industrialization. In addition to the vulnerability of the industrial structure, one must carefully consider how an industrial policy deals with these sectors (e.g. whether the policy promotes advanced industrial structure of these sectors or it is included in the context of FDI promotion).





Source: JICA Study Team based on “Investment Guidebook 2012”

**Figure A3-10 Trends of Share of QIP Approved Value in Garment/Footwear Sectors**

### 3.5.2 Significance of Cambodia’s Garment Sector in the Context of Industrial Development Policy

As stated in the previous section, CMT assembly companies are dominated by FIE and the garment sector in Cambodia remains in the low value-added manufacturing, making it less comparative in the global market. Upgrading the sector through technology transfer is also limited in CMT. Having accepted the fact, the garment sector is still important considering its large share of GDP in the manufacturing sector (65%) and 70% of total export in value.

#### (1) Upgrading the CMT

The recent development in the garment sector in Cambodia is the provision of wider opportunities for training and educating workers. Although it is still on the developing stage, some of the advanced companies make efforts to train workers to upgrade the quality of their products through minimization of defect rate and standardization of assembly process. The training for the production management is also provided to staff in some companies. This development can be regarded as a good move for the garment sector, which is considered a footloose industry. It may also be regarded that some FIE may now position Cambodia as a stable manufacturing base within their global supply chain. They may recognize the comparative advantage in the quality of workers other than cheap labor cost after all of the trainings. FIEs are the ones to provide this type of training opportunities for workers, meaning, it is a part of technology transfer and the specific FDI should be regarded as the “Quality Investment”. It should also be subject to the target of the “investment management” by the government authorities. The initial focus of “investment management” should be put on such ripple effect of FDI rather than the sectoral priority and/or general incentive policies.

Under the WTO regime, the performance requirement is prohibited while it leaves generous room for technology transfer and training in developing countries. Under the bilateral regimes, such as the Cambodia-Japan Economic Partnership Agreement, some provisions are more restrictive for requirements of investment arrangements including technology transfer. Therefore, when certain encouragement conditions of investment are considered for technology transfer, thorough examination is essential on compliances to those international schemes.

Another effective direction shall be the introduction of appropriate process evaluation system for upgrading and standardization of CMT assembly process through technology transfer. The introduction of the production management system, such as 5S/KAIZEN, GMP, GHP, will provide objective criteria to evaluate the quality of FIE as well as the quality of their CMT assembly process. This can be supported by an award system, the subsidy arrangement for further in-house training programs, and tax exemption arrangement which can serve as incentives to FIE.

**(2) Shift to FOB**

As stated in the previous section, even at present, the share of FOB accounts for 25% of the total number of garment companies. It has to be carefully examined if they are substantial FOB or not. If there is power to decide the actual design, and/or procuring routes is given to FOB, the FOB is still substantially closer to CMT.

The support started with programs and facilities for pattern-making training, which is regarded as an effective way to shift CMT to actual FOB. However, more promotion and facilitation is necessary to raise awareness of the importance of the original design and the decision-making authority for design and procurement routes. There are still a certain number of garment companies which regard pattern-making as just part of CAD/CAM operations. In order to accommodate and/or develop the function of decision-making in Cambodia, training programs and facilities have to be designed to meet this goal. This kind of promotion will become more and more important, especially in terms of facilitation of information sharing with domestic suppliers, and data compiling/data-base<sup>39</sup> provided by ASEAN, Thai BOI and other distinguished IPAs.

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<sup>39</sup> i.e. ASEAN provides ASIC (ASEAN Supporting Industry Database), Thai BOI provides BUILD (The BOI Unit for Industrial Linkage Development)