

## Lessons from Asian Experiences of Industrial Agglomeration and Trade

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### Summary:

This paper proposes that growth strategy in Africa may take an industrial cluster policy of establishing an export processing zone to become an industrial cluster in future. The strategy in the 21<sup>st</sup> century is an unbalanced growth by A.O. Hirschman (1958) under the liberalization of international trade and investment. The flowchart approach to industrial cluster policy is effective in taking the strategy and suggests us to find actors in Africa.

### 1. Introduction

While there are many large industrial agglomerations or clusters in East Asia, there are nearly none in Sub-Saharan Africa. It may be difficult to narrow the gaps in the world without any industrial clusters in Africa.

In his development theory, Nurkse (1953) explained that there exist vicious cycles of poverty in developing countries. Nelson (1956) also proved that there exists a low-level equilibrium trap. Yokoyama (1997) derived the policy implications as follows: To get out of the trap and take off, developing countries must attain critical minimum effort via the big push concept. Rostow (1960), Rosenstein-Rodan (1943), and Leibenstein (1957) advanced these concepts of take-off, big push, critical minimum effort, respectively. Lewis (1954), Ranis and Fei (1961), Jorgenson (1967), and others discussed a dual economy that consists of traditional customary economy and modern market economy. A modern economy is needed to give employment opportunities to

redundant labor in the traditional economy. Hirschman (1958) recommended fostering industries with high values of backward linkage effects at growing points or poles.

A closed economy, protectionism and centralization dominated the economies before the 1980s. However, the economic conditions saw a marked change after the 1980s. President Ronald Reagan introduced a new economic policy called Reaganomics, the Chinese government adopted an Open-Door Policy, and the World Bank implemented its Structural Adjustment Policy. All these policies promoted the shift from the planned economy to the market economy. The principles of the open economy, free market, and decentralization started to dominate. Global trade and investment were liberalized.

Economies moved away from the import substitution policy, which dominated the era before the 1980s, and toward the export-led policy that the World Bank called the “export push strategy” adopted in Asia. The most important change in the development strategy, however, happened when Asian economies introduced the foreign direct investment (FDI) by liberalizing trade and the inflow of foreign investment.

In sum, foreign investors in the modern economy were instrumental to the big push that paved the way for Asian countries to liberalize themselves from their low-level equilibrium trap after the 1980s. The idea of industrial clusters was tapped to make foreign investors agglomerate in industrial zones in the Asian economies.

This paper proposes that growth strategy in Africa may take an industrial cluster policy of establishing an export processing zone to become an industrial cluster in future. The strategy is an unbalanced growth and needs leadership to implement it. Our flowchart approach to industrial cluster policy is effective in taking the growth strategy and suggests us to find actors to implement policy measures in Africa.

The policies recommended by the flowchart approach are as follows: First, an export processing zone is needed to invite anchor firms since domestic markets of countries in Africa are small; Second, on capacity building, primary education should be strengthened; Third, incentives for anchor firms, such as cheap land prices, the construction of roads and railways for the firm, and the establishment of international hospitals and schools, are effective in inviting them to the export processing zone; Fourth, the flowchart approach makes clear who are actors at each step of the flowchart in forming an industrial cluster.

Section 2 reexamines development theories including Hirschman (1958) in the past. Section 3 reclassifies industrial clusters by Markusen (1996) and Iammarino and McCann (2006). Section 4 defines our flowchart approach to industrial cluster policy. Section 5 explains the development of the electronics industry cluster policy in northern Vietnam using the flowchart approach and introducing an interview method to find the bottlenecks of its industrial cluster policy. Section 6 applies the flowchart approach to cities in Africa and concludes the paper.

## 2. Reexamination of development strategy

There is a critical minimum level of per capita income which must be reached in order for sustained growth to take place. To escape the low-level equilibrium trap, per capita income must rise to the critical minimum level. Leibenstein (1957) explained that, on the big push, the depressing forces operating below the critical minimum rate of growth include (a) population growth and the reduction in available capital per worker, (b) a rise in the incremental capital-output ratio, (c) insufficient stimulus to entrepreneurial activity, and (d) resistance to new ideas, technical progress, and

non-productive conspicuous consumption (pp. 189-90).

Lewis (1954), Ranis and Fei (1961), Jorgenson (1967), and others discussed a dual economy. The Lewis model consists of the traditional agricultural sector with low or zero marginal products and the modern industrial sector with high rising marginal products. The Lewis model argues economic growth requires structural change in the economy whereby surplus labor in traditional agricultural sector migrates to the modern industrial sector. A modern economy is needed to give employment opportunities to redundant labor in the traditional economy. Hirschman (1958) proposed fostering industries with high values of backward linkage effects at growing points or poles. In Hirschman's concept of unbalanced growth leading sectors induce growth in other sectors. Individual firms create backward linkages through the purchase of inputs in the local market or they create forward linkages through selling output as intermediate input to other local firms. A theory of protecting infant industries supported the import substitution policy of fostering domestic industries that Hirschman recommended by the protection policy. That is, the government should foster domestic industries by intervening in the dynamic market failure and protecting the industries of import substitution.

Though a closed economy, protectionism and centralization dominated the economies before the 1980s, the economic conditions saw a marked change after the 1980s. Reaganomics, Open-Door Policy, and the Structural Adjustment Policy by the World Bank promoted the shift from the planned economy to the market economy and international trade and investment have been liberalized.

Economies moved away from the import substitution policy, which dominated the era before the 1980s, and toward the export-led policy that the World Bank called the

“export push strategy adopted in Asia” in a book titled ‘East Asian Miracle’ published in 1993. The most important change in the development strategy, however, was that Asian economies introduced foreign direct investment (FDI) to export processing zones, special economic zones or free trade zones by liberalizing the inflow of foreign investment. Development strategy changed from import substitution policy to export-oriented policy in the 1980s and 1990s. Most of Asian economies positively introduced foreign direct investment one by one and their development pattern was called patterns of flying geese.

Then industrial policy lost its support in 1997 since Asian economies including South Korea and Japan faced economic crises originated from Asian Currency Crisis. The growth strategy of Asian countries used export processing zones, free trade zones or special economic zones and experienced its bottlenecks. So they made efforts to solve the bottlenecks.

They made an emphasis especially on institutional reforms after Mr. Wolfensohn became the president of the World Bank. In growth theory, the Harrod (1939) – Domar (1946) model emphasized the importance of physical investment, that is, social overhead capital, the Solow (1956) model made clear that technological progress contributes to economic growth, and Romer (1986) explained that human capital is the origin of economic growth. We could understand that economic growth needs physical investment, technological progress and human resource development. Investment divides into domestic investment and foreign investment. We explained that domestic investment played central roles in economic growth before the 1980s, and that foreign investment substituted it after the 1980s. Official development assistance focused on supplying social overhead capital as physical infrastructure before the 1980s, while it emphasized the importance of (1) human capital, (2) institutions, and (3) social capital

after the 1980s.

Economics lost its weight in development strategy while sociology and politics increased their weight. Poverty reduction strategy papers have been written since 1998 as institutional reforms became more and more important. ODA contributed to introduce market economies into developing economies and instituted laws and regulations for good governance and transparency. The papers promoted to build capacity for development strategy and made clear that institutional reforms are unavoidable for economic growth. Governance became the first priority of institutional reforms in developing countries. In particular, control on corruption was one of the most serious issues in the reforms.

Development theory before the 1980s told us that the big push of the manufacturing sector is needed for poor countries to get out of the vicious cycle of poverty. The manufacturing industries with high values of backward linkage are suitable for the industries. Some countries took industrial policy of import substitution before the 1980s.

But international trade and investment have been liberalized and many countries in Asia formed industrial agglomerations by inviting foreign investors to export processing zones since the 1980s. Then Asian Currency Crisis happened in 1997. After the crisis, it became common that, since it presupposed protectionism, industrial policy taken in Asia is not applicable to all countries except such countries as South Korea and Japan that bureaucrats are excellent. The investment environment in Asia, particularly in the coastal area in China, was prepared to promote industrial agglomerations by introducing foreign direct investment. For that purpose institutional reforms were emphasized to be important. One of the most critical issues of institutional reforms for development is to

reduce corruption.

The summary of this section is as follows: first, industrial policy as import substitution is not desirable; second, roles of markets of international trade and investment should be played; third, institutional reforms in governance are necessary.

In summary, unbalanced growth is needed to get away from the vicious cycle of poverty. The growing industry may belong to an industry with high backward linkages. International trade and investment has been liberalized since the 1980s. While Hirschman (1958) recommended us to foster the domestic industry by protecting domestic firms before the 1980s, we should introduce his unbalanced growth strategy under the liberalization of international trade and investment after the 1980s. One of the strategies is industrial cluster policy.

### 3. New classification of industrial clusters

Markusen (1996) classified industrial districts into the five of Marshallian industrial district, Italian variant, Hub-spoke districts, Satellite industrial platforms, State-anchored industrial districts. The paper explains the five districts as follows. Marshallian industrial district is a traditional industrial agglomeration whose business structure is dominated by small locally owned firms. It has its recent Italian variety. Hub-and-spoke districts are dominated by one or several large, vertically integrated firms in one or more sectors, surrounded by smaller and less powerful suppliers. The smaller firms are quite dependent upon the anchor firm. Satellite platforms are a congregation of branch facilities of externally based multi-plant firms. State-anchored districts have their business structure dominated by one or several large, government institutions such as military bases, state or national capitals, large public universities,

surrounded by suppliers and customers.

Iammarino and McCann (2006) classified industrial agglomerations into (1) pure agglomeration, (2) industrial complex, and (3) social network (pp.1022-23). (1) In the model of pure agglomeration, inter-firm relations are inherently transient. Firms are essentially atomistic in the sense of having no market power. (2) The industrial complex is characterized primarily by long-term stable and predictable relations between the firms in the cluster. Component firms within the spatial cluster each undertake significant long-term investments in order to become part of the grouping. The rationale is that proximity is required in order to minimize inter-firm transport transactions costs. (3) The social network model argues that mutual trust relations between key decision-making agents in different organizations may be as important as decision-making hierarchies within individual organizations. These trust relations will be manifested by a variety of features such as joint lobbying, informal alliances, and so on. Trust relations are assumed to reduce inter-firm transactions costs. The paper argues how an observed industrial cluster may evolve over time and used some examples to illustrate the different directions of shifts in cluster types in order to identify typical evolutionary paths and transitions.

The evolutionary process of the automobile industry is from pure agglomeration to industrial complex. The evolutionary process of the high-fashion garment industry clusters is from old social network to new social network, or to pure network. The evolutionary transition of the Silicon Valley cluster is from old social network to new social network to pure agglomeration. On the other hand, no real evolutionary path is discernible in the case of the Scottish Electronics Industry.

Hershberg, Nabeshima and Yusuf (2007) overviewed papers on



University-Industry Linkages (UILs) and National Innovation Systems (NISs) in Asia. Their paper pointed out the following conclusions related to our paper: first, the leading universities in Korea and Singapore have only recently begun giving more attention to research and its commercialization; second, the economies in East Asia, especially Japan, Korea, and Taiwan, are slowly changing the way in which their universities and research institutes interact with firms; third, the leading university and research institutions are unlikely to be satisfied with their traditional roles of educating and imparting science and technology skills; lastly, contracting out research to universities, entering into alliances with research institutes and collaborating with university researchers can confer substantial advantages.

Kuchiki&Tsuji (2008) proposed a flowchart approach as industrial cluster policy. We think that the re-classification of industrial clusters by Markusen (1996) is effective in implementing industrial cluster policy successfully based on the Asian experiences of growth.

This section tries to reclassify the classifications of Markusen (1996) and Iammarino and McCann(2006) and position University-Industry Linkages (UILs) and National Innovation Systems (NISs) overviewed by Hershberg, Nabeshima and Yusuf (2007) at the third step of our flowchart approach by Kuchiki&Tsuji (2008) that is composed of two steps of agglomeration and innovation. Kuchiki&Tsuji (2008) needs to take into account the third step of activating innovation in order to understand the dynamics of industrial clusters by Iammarino and McCann (2006).

Figure 1 shows our new classification consisting of the following four dimensions: the first dimension is whether there are industrial zones or industrial parks; the second dimension is which type of ownership of anchor firms is, public, private or

semi-public; the third dimension is which linkage is, backward linkage, forward linkage or little linkage; the fourth dimension is which step an agglomeration locates, the first step of agglomeration, the second step of innovation, or the third step of innovation with University-Industry Linkages (UILs) and National Innovation Systems (NISs).

Four dimensions of the classification on industrial clusters in detail are as follows. The first dimension is whether industrial zones or science parks exist or not. Markusen (1996) illustrated Manaus Export Processing Zone in Brazil and Research Triangle Park in U.S.A. as Satellite Platforms. Satellite Platforms are cases where industrial zones or science parks exist. Industrial agglomerations without industrial zones are possible to exist.

The second dimension is which type of ownership it is, (i) public, (ii) private, or (iii) semi-public. The hub in the case of the hub-spoke in Markusen (1996) is an anchor firm and its ownership can be in the case of the public sector or the private sector. In general, hub firms are considered to be multinational corporations, particularly in the automobile industry and electronics industry. Markusen (1996) illustrated Toyota of a Japanese automobile firm in Toyota City in Japan as its case. But the ownership of Proton of Malaysia, Maruti Suzuki of India, and First Automobile Works Group of China are owned by the public sector. Many governments in Asia established automobile firms by adopting industrial policy and tried to form the automobile industry cluster. In sum, the ownership of hub firms can be either state-anchored or multinational corporation-anchored.

The third dimension is which linkage an anchor firm has, (i) backward linkage, (ii) forward linkage, or (iii) little linkage. There are three types of industrial linkages. Close industrial linkage will strengthen the relationship between a hub firm, or anchor

firm, and spokes. The automobile assembly industry has high value of industrial linkage since an automobile is composed of more than twenty thousands of parts and components. An ink jet printer in the electronics industry is composed of eight hundred of parts and components. The size of industrial agglomeration, or the number of spokes, depends on the strength of industrial linkage between a hub firm and its spoke firms. Though the steel industry has not backward linkage but strong forward linkage, its industrial agglomeration of the steel industry in Kitakyushu was formed since Nippon Steel in Kitakyushu in Japan was large at the cost of about 100 billion U.S. dollar.

The fourth dimension is which step an agglomeration locates, (i) the first step of agglomeration, (ii) the second step of innovation, or (iii) the third step of innovation with University-Industry Linkages (UILs) and National Innovation Systems (NISs). The dynamic evolution of industrial clusters will depend on the change in transaction costs according to Iammarino and McCann (2006). We apply their theory to the Asian experiences in the following. Pure agglomeration of Iammarino and McCann (2006) corresponds to the first step of our flowchart approach. This is a case where firms agglomerate without innovation. This case will evolve to the second step when innovation in the agglomeration will start. The third step is a step when innovation is positively active due to University-Industry Linkages (UILs) and National Innovation Systems (NISs).

We analyze the Asian experiences of growth since the 1980s using our new classification with the four dimensions. Figure 1 is a result of the application of the new classification to the flowchart approach to Kuchiki & Tsuji (2008). An Asian growth model is to construct an industrial zone at the first dimension, to invite a foreign

investor as an anchor firm to the industrial zone at the second dimension, to make its related firms agglomerate at the third dimension, resulting in the first step of industrial clustering of the flowchart approach. Figure 2 is a prototype model of the third step of innovation under University-Industry Linkages (UILs) and National Innovation Systems (NISs).

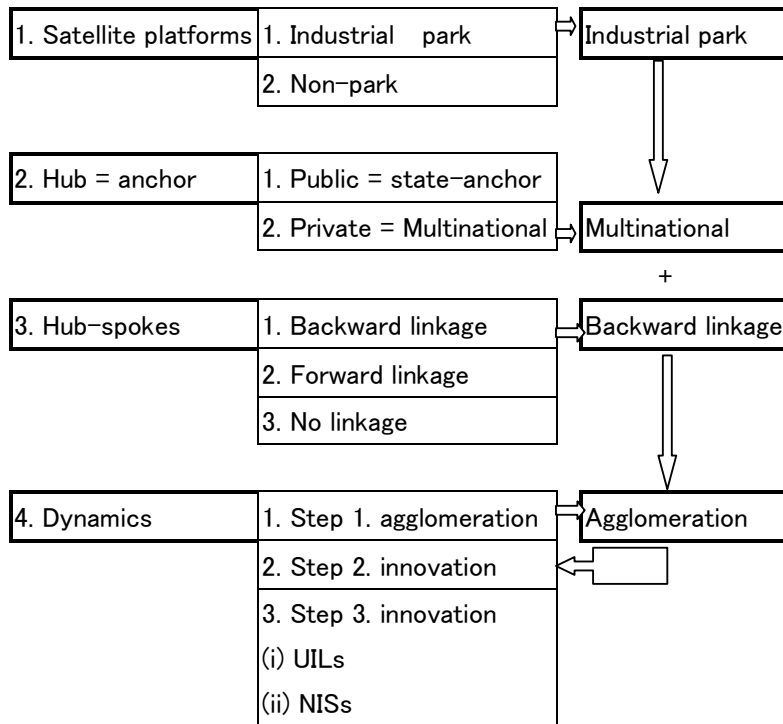
We compiled the flowchart of Figure 3 using the analysis of Wong (2009). The flowchart illustrates its application to a park of the biotechnology industry in Singapore. It is desirable for Singapore to make alliance with foreign universities and employ foreign researchers since the country is small in land and population. The central government established a biopolis as a science park and plays an important role in implementing industrial cluster policy. The committee of the biotechnology industry established ~~the~~ **International Advisory Council** (IAC) and ~~the~~ **Bioethics Advisory Committee** (BAC). The government organized the innovation system that is supported by ~~the~~ **Economic Development Board** (EDB) and BOC.

Singapore outsources (1) multinational corporations, (2) anchor persons, and (3) famous universities from foreign countries. Worldwide famous medical firms such as ~~GlaxoSmithKline~~ (GSK) and Merlion are the examples of (1) multinational corporations. Famous scholars such as Yoshiaki Ito and Nobel prize scholar Didney Brenner and are the examples of (2) anchor persons. Johns Hopkins University and MIT of U.S.A. are the examples of (3) famous universities from foreign countries. The Singapore government makes use of domestic resources while its main policy is to outsource them from foreign countries as mentioned above. S\*Bio and Cordlife are the cases of domestic spin-offs of Singapore partly due to its national innovation system.

Figure 1. An Asian growth model:

## Flowchart Approach to Industrial Cluster Policy

### Classification



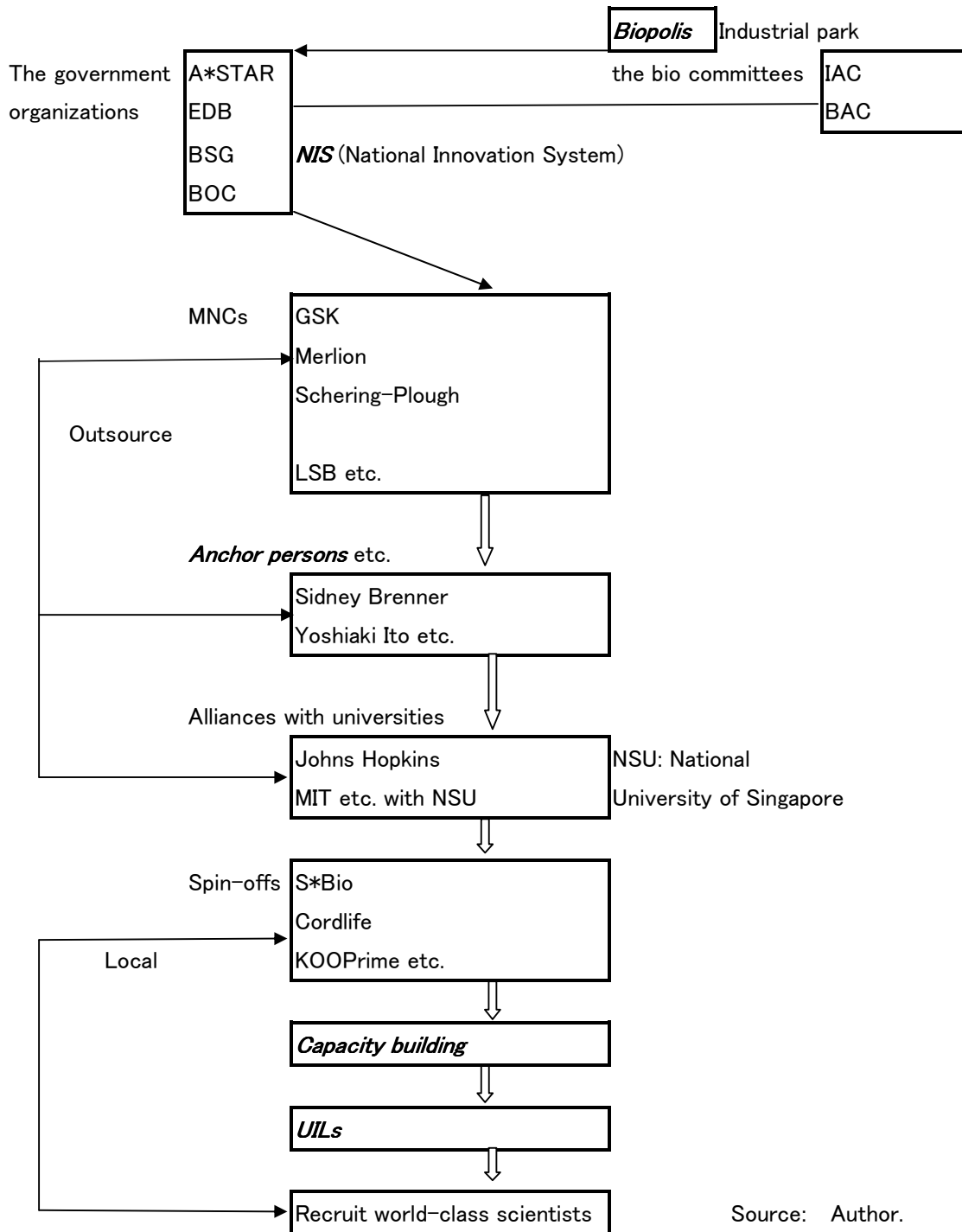
Source: Author.

UIL: university-industry linkage

NIS: national innovation system

Figure 2. Flowchart of Innovation by University, Industry and Cluster





**S\*Bio was established as a joint venture between Chiron and the EDB using Chiron's technology**

**PLATFORM TO DEVELOP PRODUCTS FOR CANCER AND INFECTIOUS DISEASES, ESPECIALLY THOSE IN ASIA. MERLION**  
**ORIGINATED AS A JOINT VENTURE BETWEEN GSK AND THE EDB TO PERFORM MORE TRADITIONAL DRUG.** The government strengthens University-Industry Linkages (UILs) by building capacity.

#### 4. Patterns of the flowchart approach

This section aims to propose a flowchart that shows sufficient conditions that can lead to the successful formation of an industrial cluster.

##### 4.1 A general model of the flowchart approach: From the diamond model in the form of a plane to the flowchart model in the form of a line

Our flowchart approach is not an empty theory but a practical hypothesis applicable to the industrial cluster policy. We can form a cluster if we follow the following steps: Find ingredients or factors such as establishing industrial zones, build capacity, and invite an anchor firm. Figure 4.1 shows ‘industrial zone’, ‘capacity building’, and ‘anchor firm’,

- (i) From the flowchart above, select the minimum number of ingredients.

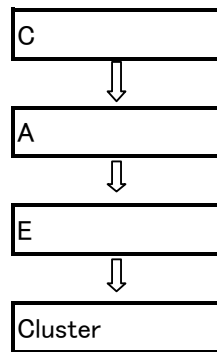
Figure 4.2 shows C, A and E.

- (ii) Order the ingredients along a flowchart (Figure 4.3). The number of ways we prioritize them is a mathematical ‘permutation’ and  $3! = 3*2*1$ . In general,  $n! = n*(n-1)*(n-2)*...*3*2*1$ . We can, however, implement only one policy. Therefore, we must prioritize the policy measures.

Figure 4.1

A Model of Flowchart Approach

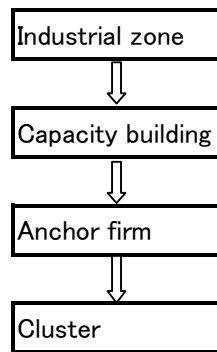




Source: Author.

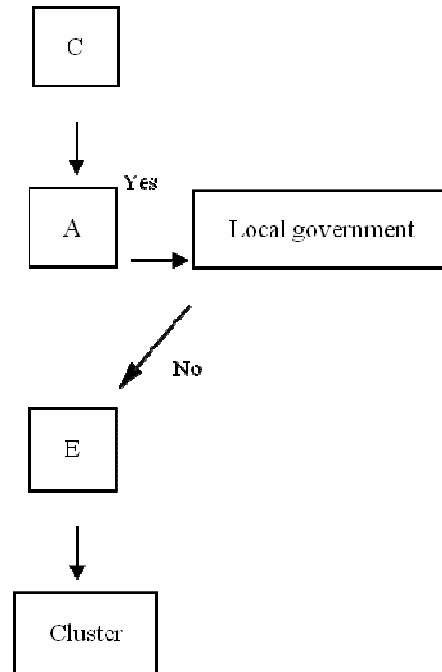
Figure 4.2

An Example of Flowchart Approach



Source: Author.

Figure 4.3 Roles of Actors of Flowchart Approach



- (iii) Specify actors such as central government, local government, non-governmental organizations, or private firms and move forward one step in the flowchart if the answer is "No".

The flowchart approach has three functions: It prioritizes policy measures, specifies players and gives prescriptions regarding the industrial cluster policy.

#### 4.2 A prototype flowchart model for the cluster policy of the manufacturing sector

Our flowchart of the manufacturing industry cluster policy proceeds as follows: First, a local government establishes an industrial zone to attract foreign investors. Second, the government builds capacity for improving the business and living

conditions of foreign investors. Elements of capacity building include: (i) constructing physical infrastructure; (ii) building institutions; (iii) developing human resources; and (iv) creating living conditions amenable to foreign investors. Physical infrastructure refers to roads, ports, communications, etc. Institutional building, which is also crucial in attracting foreign investors, includes streamlining investment procedures through one-stop services, deregulation, and introduction of preferential tax systems. Human resources, which are usually an initial condition for foreign investors, include unskilled labor, skilled labor, managers, researchers, and professionals. The living environment, on the other hand, includes the provision of hospitals and international schools.

An anchor firm will be ready to invest after this capacity building has been carried out. The anchor firm is defined as one with a high value of the backward linkage in manufacturing. Along this line, the Rasmussen method is based on the column sums of the Leontief inverse to measure intersectoral linkages. The backward linkage based on the Leontief inverse matrix is defined as the column sums of the inverse matrix.

$$BLR_j = \sum_{i=1}^n l_{ij},$$

where  $l_{ij}$  is the  $ij$ 'th element of Leontief inverse matrix that is denoted by  $L = (I - A)^{-1}$ .

$BLR_j$  is backward linkage for sector  $j$  which reflects the effects of an increase in final demand. It represents the power of an industry to generate derived demand from other industries. Core competencies of a region should be established to attract the anchor firm.

#### 4.3 Step I. Agglomeration

Our flowchart approach is illustrated in Figure 5. First, we ask whether

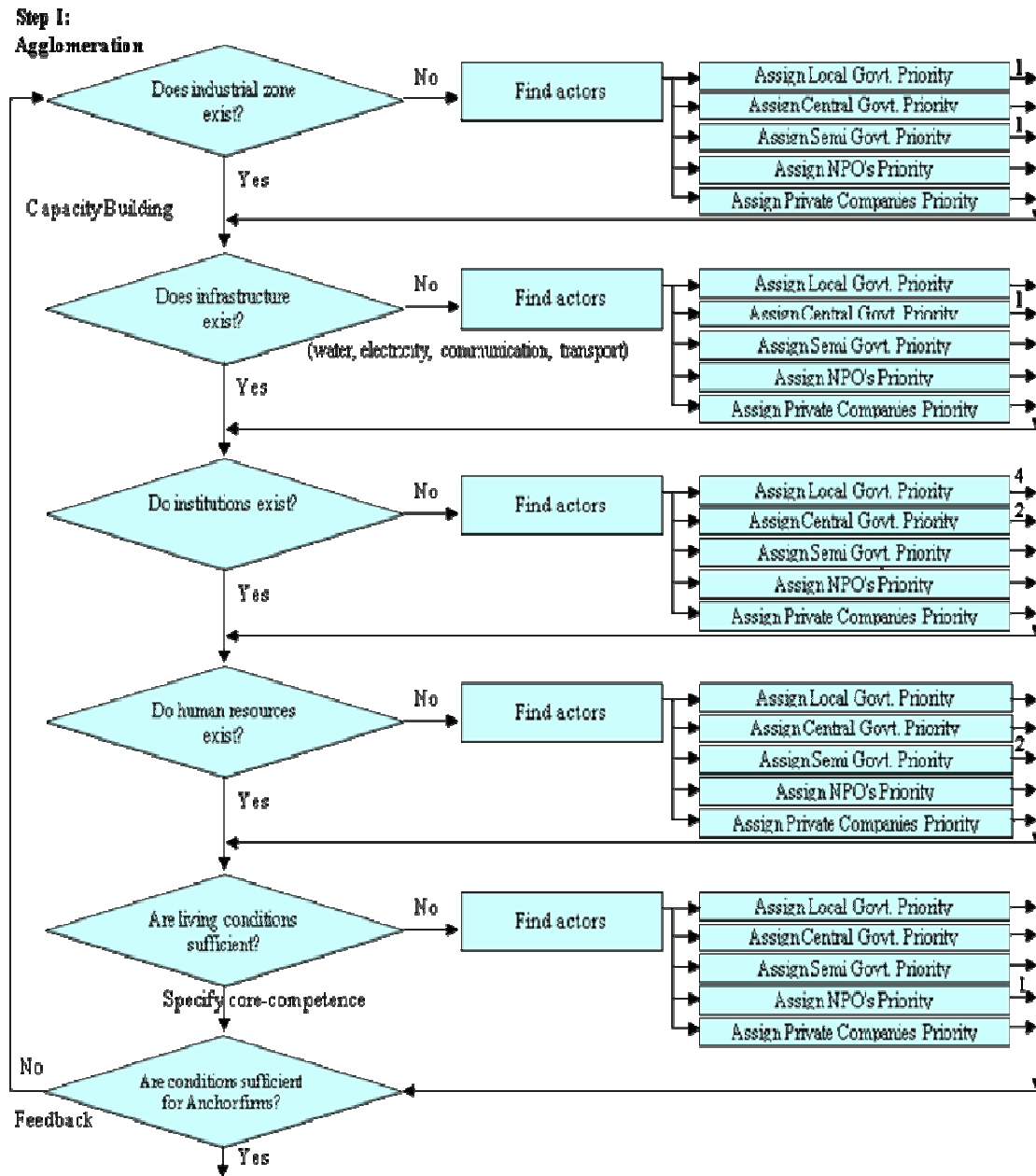
industrial zones have been established. If they have not, we must decide which actors should establish such zones. Once these actors are identified, we return to the main stream of the flowchart.

Next, we look at the second step, capacity building, which takes place after the establishment of industrial zones. We examine whether there is adequate water supply for the industrial zones (Figure 6). We then proceed along the flowchart to examine power supply, communication, and transportation.

After looking at the physical infrastructure, we examine whether institutions are in place. The central government must institutionalize national tax systems and the local government must institutionalize local tax systems. One-stop investment procedures are crucial for successfully attracting foreign investors.

In the area of human resource development, an abundance of unskilled labor with a high literacy rate is a necessary condition for luring foreign investors whose purpose is to employ cheap labor. On the other hand, an industrial cluster sometimes faces a shortage of skilled labor after industrialization has progressed. Universities and on-the-job training centers for innovation are then needed for further development.

Figure 5: Flowchart Approach: Step I. Agglomeration

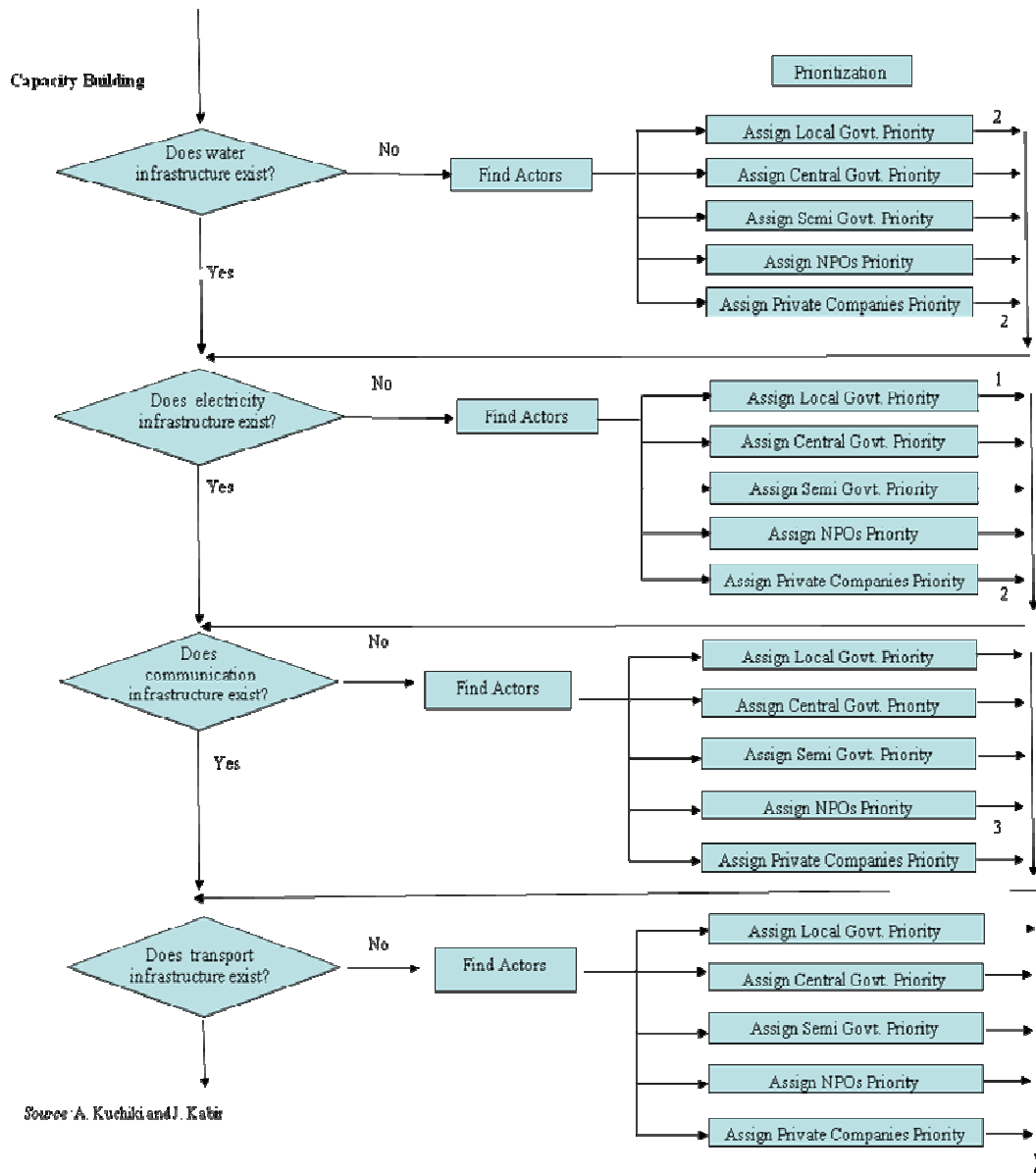


Sources: A. Kuchini and I. Kashi

Living conditions are equally crucial in the equation. Researchers from investor companies have incentives for work hard if they can enjoy their lives; it is important to create satisfactory conditions in areas such as housing, schools, hospitals, etc. These are the final conditions that must be satisfied to bring in anchor firms.

**Figure 6. Flowchart Approach: Step I . Infrastructure**

**(Capacity Building)**



Here, the anchor firm is defined as one belonging to the manufacturing industry and having a high value of backward linkage effect in its input-output relationship

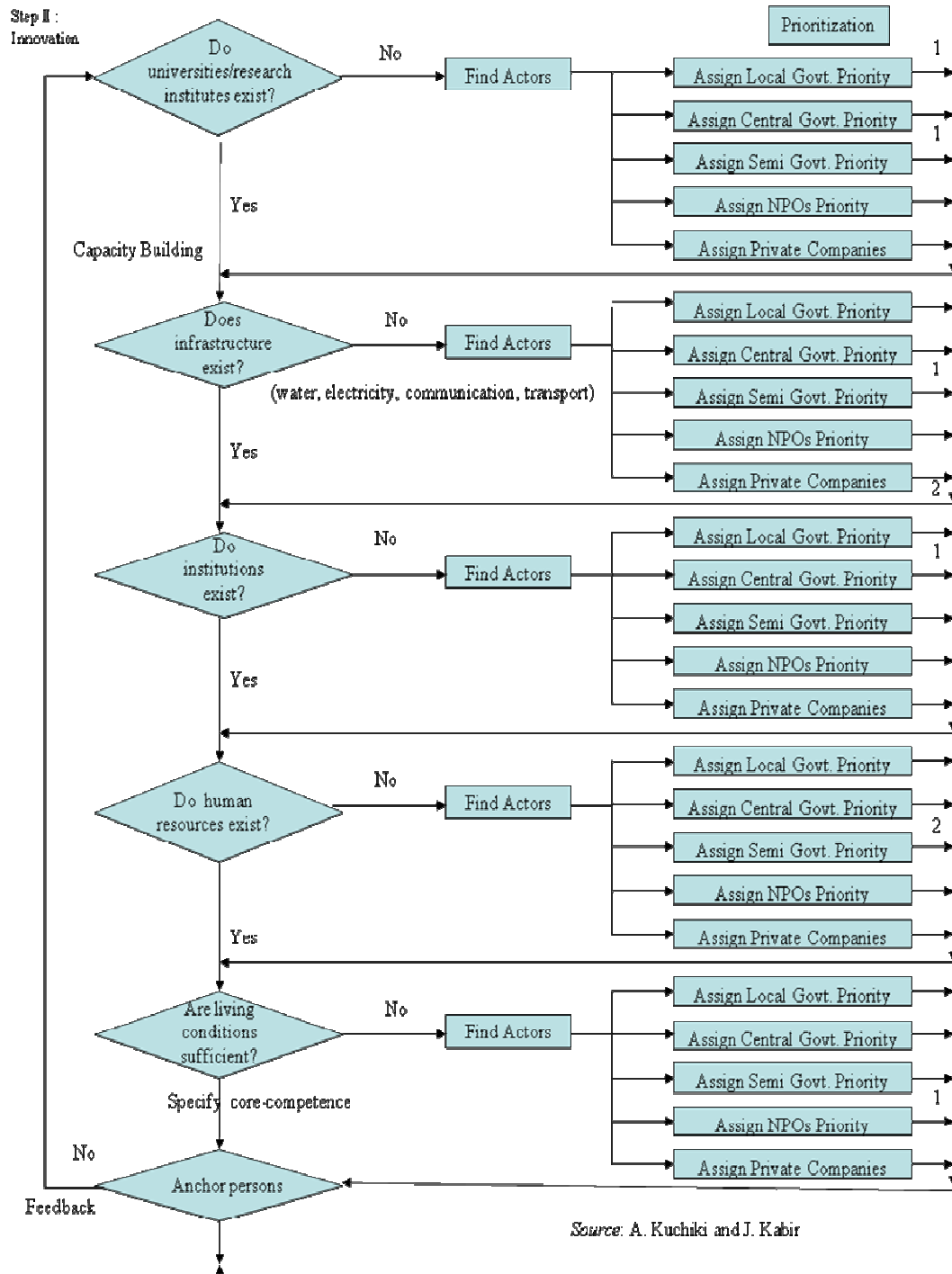
#### 4.4 Step II. Innovation

Intellectual property rights should be enforced in Step II (innovation), as shown in Figure 7. Preconditions for Step II are: (i) Related services: finance and insurance,

logistics, marketing companies, repair shops, and used car shops; and (ii) Professional and other services: lawyers, restaurants, retail shops, and tourism.

**Figure 7. Flowchart Approach: Step II. Innovation**





As shown in Figure 8, the factors that lead to innovation are: (i) universities and

research institutes; (ii) capacity building of infrastructure, institutional reforms, human resources, and living conditions; and (iii) anchor persons.

Meanwhile, joint actions or activities that support innovation are: (i) facilitating cluster skill centers; (ii) establishing collective projects; (iii) creating business associations; and (iv) implementing a branding strategy.

The linear instruments and interactive approach of policy instruments for innovation may be as follows:

*Linear instruments:* (i) direct R&D aids; (ii) transfer of research-based knowledge to firms; and (iii) financial support:

*Interactive approach:* (i) improvement of institutions and programs that provide technology transfer services; and (ii) policy to stimulate networking and business clusters.

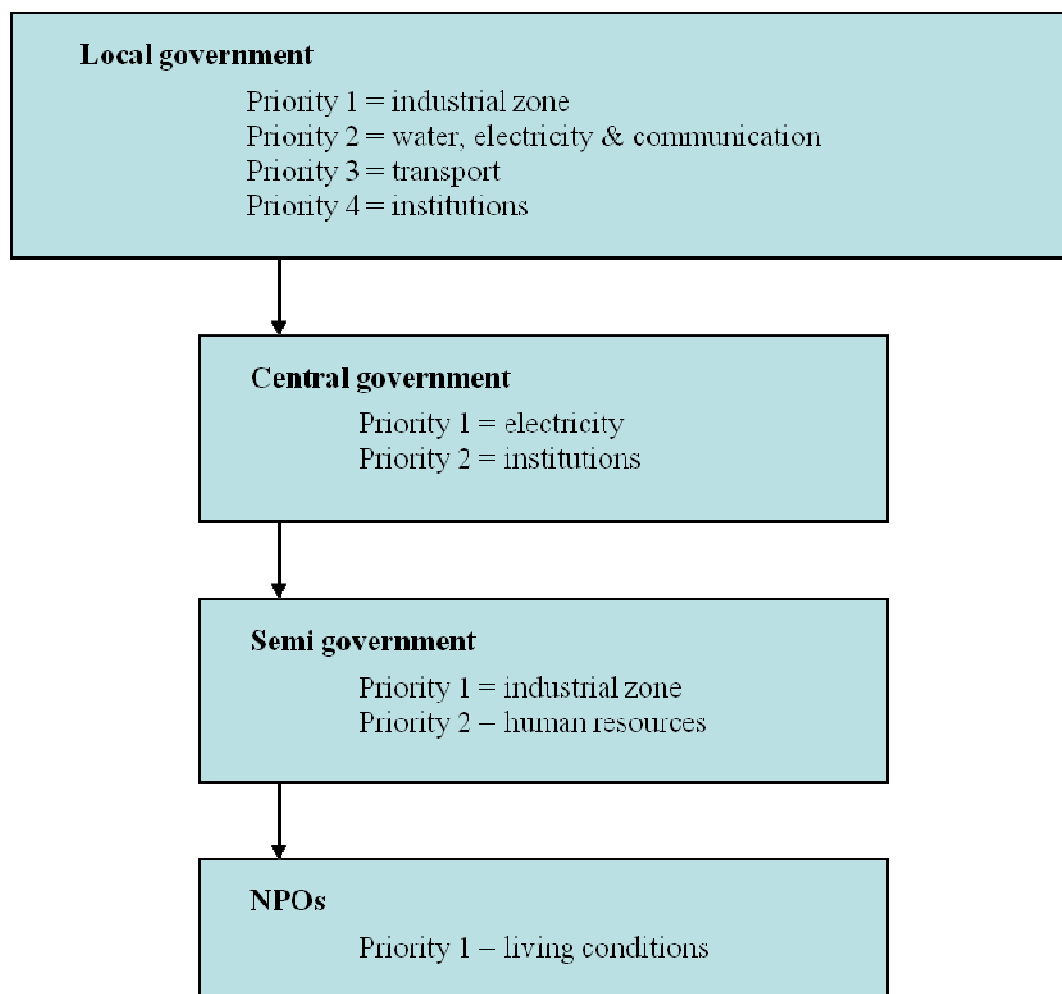
We earlier identified the minimum prerequisites, i.e., universities and research institutes, capacity building and anchor persons, to simplify the flowchart of Step II and prioritize policy measures. Most Asian countries are still at the door of innovation, and we cannot find a huge number of the experiences on innovation in Asia. Step II is still a hypothesis to be further examined.

Figure 8 shows the priorities of each actor or player. Local governments play a crucial role in establishing industrial zones, supplying electricity, facilitating transport, and forming institutions. The first priority of local government in Figure 8 is to construct industrial zones for foreign investors. The second priority during that stage is to supply electricity, facilitate transportation, and form institutions. The central government's main priorities are to supply electricity and build institutions.

The flowchart approach to industrial cluster policy can be applied to other regions

in the following cases:

- (i) Where there are newly-formed industrial clusters (ex-ante application): Examine whether each step of the flowchart is a “Yes” or “No” and find players if the answer is “No”.
- (ii) To evaluate the failed cases of industrial cluster policies (ex-post evaluation): Examine whether each step of the flowchart is a “Yes” or “No”, find reasons why it failed if the answer is “No”, and proceed to the next step.

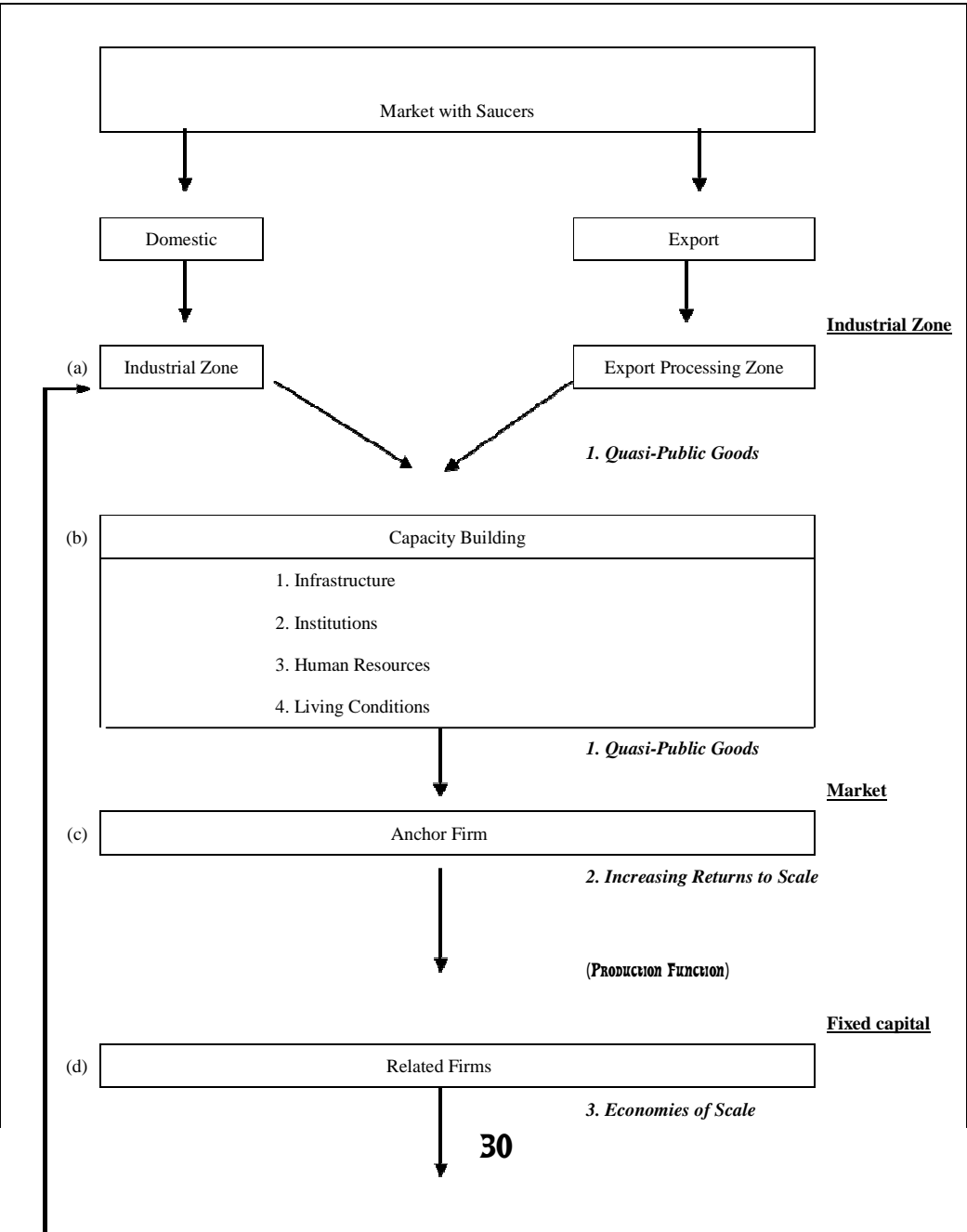


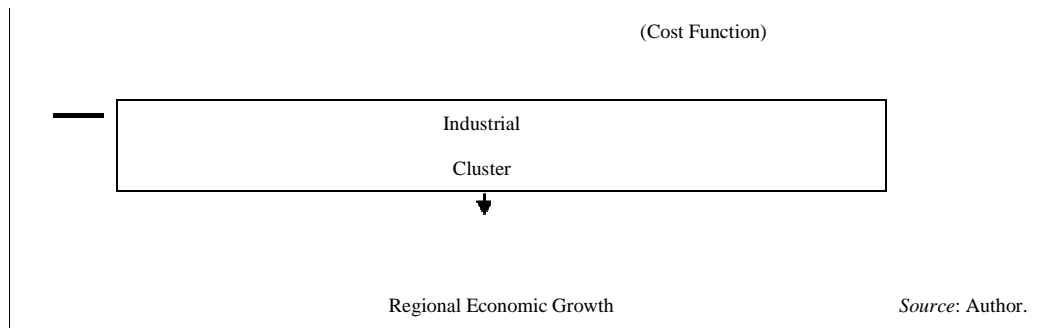
*Source: A. Kuchiki and J. Kabir*

(iii) Where industrial cluster policies have been successful, so as to prescribe such for their next upgrading (ex-post prescription): Examine whether each step of the flowchart is a "Yes" or "No". Find players if the answer is "No", and prescribe the region for its industrial cluster policy.

This section further recommends that for the "flowchart approach to an industrial cluster policy" to help form industrial clusters in the manufacturing industry in Asia, certain conditions would first have to be met. The formation of industrial clusters in East Asia was typically theorized by defining the role of "quasi-public goods". Also, the industrial cluster policy was proven to enhance economic growth under a production function of "increasing returns to scale". Another factor was the critical amount of production under "scale economies", which firms used as basis for deciding whether or not to invest in clusters.

Figure 9. An Industrial Cluster Formed by an Anchor Firm





The importance of the concepts of quasi-public goods, increasing returns to scale, and economies of scale in development is shown in Figure 9. Once more, it is reiterated here that sufficient conditions for development are to establish industrial zones, to build capacity, and to invite anchor firms and their related firms.

First, note that industrial zones, capacity building in physical infrastructure, institutions, and human resources as quasi-public goods are provided by both organizations in the quasi-public sector and firms in the private sector. Second, the ability of an industrial cluster policy to provide industrial zones and capacity as quasi-public goods can enhance regional economic growth in cases where an anchor firm operates under increasing returns to scale. For instance, markets for sales in China are at an early stage of development and large enough for anchor companies to attain increasing returns to scale. Third, the minimum optimal size of car production economies of scale depends on the size of fixed capital of anchor companies' related firms.

The flowchart approach to an industrial cluster policy further emphasizes the importance of ordering and timing of policy measures. The flow of policy implementation is as thus: to establish an industrial zone, to invite an anchor company, and to encourage its related companies to invest in the industrial zone. Then, the

recipient country's government reduces its role in order to promote competition. It transfers greater authority to local governments and makes more use of the quasi-public sector (i.e., public corporations and state enterprises). As a result, the quasi-public sector is likely to supply quasi-public goods. The improvement and expansion of networks in Asia by both multinational corporations and the quasi-public sector are thus prerequisites to the upgrade of Asia's industrial structures. Leadership, too, is crucial to the success of an industrial cluster policy.

#### 5. The electronics industry cluster policy in northern Vietnam

In this section, we propose that, upon considering the current status of northern Vietnam using the flowchart approach, an industrial policy can take one of the following three options. First, the flowchart goes to Step II: Innovation. Second, the flowchart feeds back to the capacity building stage. Third, the local related firms venture into partnerships with foreign firms.

##### (1) Thang Long Industrial Park (TLIP)

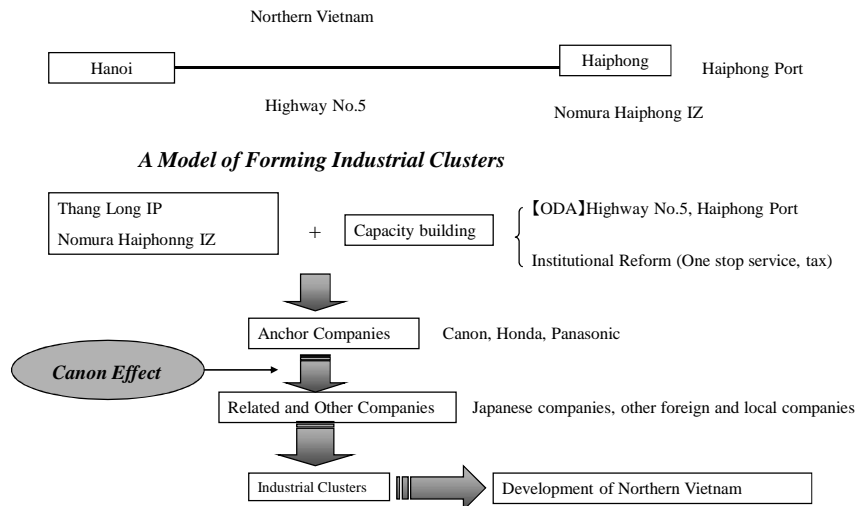
We explain industrial clusters in Hanoi and Haiphong that are located west and east of national highway Route 5. Hanoi is centrally positioned from Hochiminh in Vietnam, Bangkok in Bangkok, Kunming and Guangzhou in China. It is located 1,100 km from Hochiminh, 950 km from Bangkok, 600 km from Kunming, and 850 km from Guangzhou. Therefore we can expect northern Vietnam to be merged with southern China from the supply chain management viewpoint in the future.

Highway Route 5 is 100 km long and links Hanoi in the west and Haiphong in the east. Hanoi is the capital of Vietnam and Haiphong is a port city. Thang Long Industrial Park (TLIP) located in Hanoi was established by Sumitomo Corporation. Its



total area is 220 hectare. Nomura Haiphong Industrial Zone (NHIZ) located in Haiphong was established by Nomura Security Company.

**Figure 10. Industrial Clusters in Northern Vietnam**



Source: Kuchiki (2007).

Both TLIP and NHIZ offer good quality infrastructure as a common incentive. TLIP illustrates national highway Route 5 from Hanoi to the Haiphong port as is shown in Figure 10. NHIZ analyzed the positive effect in a relatively short time due to completion of national highway Route 5 as follows: It took 1 hour and 15 minutes by car from Hanoi to NHIP in 2002 though it had taken 3 to 4 hours before the completion of national highway Route 5.

One factor that influences foreign investors' decision on investment is capacity building within recipient countries. Capacity depends on the following four conditions: 1. Human resources, 2. Infrastructure, 3. Living conditions, and 4. Institutions.

Regarding infrastructure, the Japanese official development assistance loans

contributed to facilitating infrastructure in northern Vietnam. National highway Route 5 and the Haiphong port constructed and rehabilitated by the loans are effective in forming industrial agglomeration.

Regarding living conditions, apartments, supermarkets, restaurants, hotels, direct air flights from host countries to recipient countries, schools, hospitals, and amusement facilities are a key to inviting foreign investment. The Hanoi area cleared the key condition.

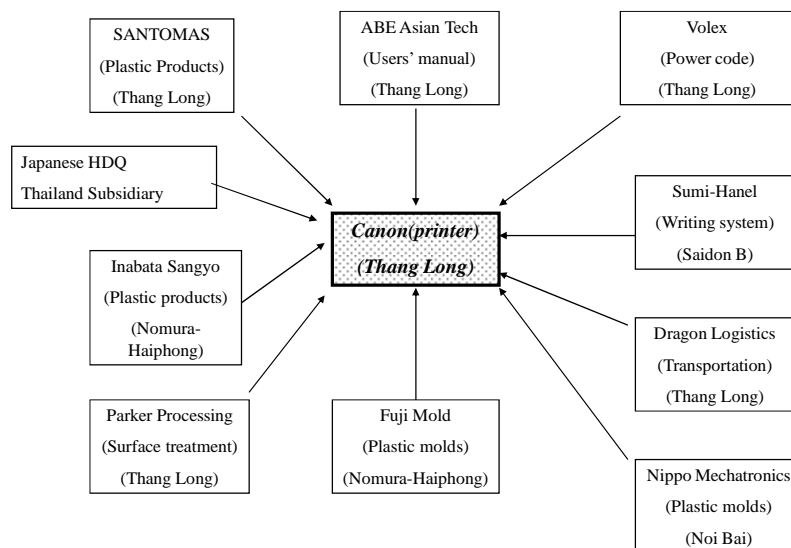
Regarding institutions, one-stop service plays a large role in streamlining investment procedures. This means that, at an office of TLIP, tenant companies can get all approval related to investment licenses, factory operation on export procedures, and so on required from ministries. Streamlined customs clearance helps reduce tenant companies' costs. Industrial zones in Asia offer preferential tax treatment. Corporate tax in Vietnam is exempted for four years after a company makes profit. After the four years the tax rate is 5% for a further four years and then 10%.

The Japan Bank for International Cooperation (2001) survey showed that institutional reform is a key to developing the private sector in Vietnam. Japan's minister of finance in April 1999, Miyazawa, pledged to provide 20 billion yen to support programs for developing the private sector as requested by Vietnam's former Prime Minister Phan Van Khai. The loan was agreed and implemented in September 1999.

According to the survey, private companies positively rated trade liberalization, change from an approval system to a registration system to establish companies, and abolishment of the industries restricted or prohibited by some ministries. The number of restricted or prohibited industries was reduced from 400 to 250. The registration system

in establishing companies has streamlined administrative procedures and reduced the average required time to less than one month from three months before 2000. All of the private companies were permitted to export and import without licenses to guarantee free trade. As a result the institutional reforms have been highly rated. We can conclude from the survey that institutional reforms for streamlining the procedures are effective in developing the private sector and promoting foreign direct investment.

**Figure 11: Anchor Firm and its Suppliers**



(Source) Author.

**Table 1: Benefit of well developed infrastructure**

Type	Production	Market-Local	Market-Export	Import	Haiphong Port	Highway No.5	Example
1	Hanoi		Haiphong	Haiphong	XX	XX	Canon
2	Hanoi	Local	Haiphong	Haiphong	XX	XX	TOTO
3	Hanoi	Local		Haiphong	XX	X	Vietnam Float Glass
4	Hanoi		Via internet	CAD technology			Yabashi
5	Hanoi		Noibai	Haiphong	X	X	Sumitomo Bakelite
6	Haiphong		Haiphong	Haiphong	XX		As'ty
7	Haiphong	Local		Haiphong	XX	X	San Miguel Yamamura
8	Haiphong	Local	Haiphong	Haiphong	XXX (inc. local distribution by ship)	XX	Han-Viet Heavy Industry & Constructio n
9	Haiphong		Noibai	Noibai		XX	ESTELL
10	Vinhphuc	Local		Haiphong	X	X	Honda

(Note) X shows frequency of use

(Source) Japan Bank for International Cooperation (2001).

## (2) Canon's effect

Sumitomo Corporation began selling TLIP land lots in 1997. Canon that was established in April 2001 started operation in May 2002. Companies that provided parts to Canon decided to move into TLIP particularly in 2002. Canon and its related firms established factories in TLIP after national highway Route 5 was constructed and Haiphong port rehabilitated in period 2 starting from 2002.

Table 1 shows that eight of the ten firms use highway Route 5 and that eight of the ten firms use Haiphong Port. Firms moved into TLIP and NHIZ in 2001 and 2002 after Canon established its factory and the number of projects by foreign direct investment increased in Hanoi and Haiphong after 2001. Two companies in 2000, six in 2001, and 11 in 2002 signed up to invest in TLIP. As is shown in Figure 8, Parker Processing VN Co., whose products are paint and surface treatment for metal parts, moved into TLIP in August 2000 to provide parts to Canon. Volex Cable Assembly started producing power supply cords and interconnectors in 2001. The Singaporean company started providing products to Canon, though its intention was not only to sell to Canon. Companies that provided parts to Canon decided to move into TLIP particularly in 2002. They are Sumitomo Coil Center that produces parts for printers, a Japanese company producing dye-casting products, and a Malaysian company, Santomas VN Co. that produces precision plastic injection molding. So Canon is an anchor company to lead other companies to provide parts and components as is shown in Figure 11 based on the analysis of Tran, Kuchiki, Idei, and Sakata (2003).

Table 2. Changes in Direct Investment (Registered Amount)

(Unit: US\$ millions)

	2000	2001	2002	2003	2004
North	62.3	272.9	375.4	604.5	1195.9
Central	58.7	128	145.1	218.4	405.2
South	707.1	2102.2	992.1	1061.1	2609.5

Source: Author based on General Statistical Office of Vietnam (2000–2004), *Statistical Yearbook*.

### (3) Its outcomes

The number of the suppliers to Canon is around 100 including about 20 local companies in 2007. Eighty two foreign firms have invested from 1997 to 2007 and about 37 thousand of people are employed in TLIP. The share of the export by the firms in TLIP as the total amount of Vietnam's export is 3.3 %.

Inflows of FDI into Vietnam inflows totaled US\$2.47 billion. The reasons why the amount approved by the Vietnamese government increased the growth rate were that European companies invested in an electricity supply project and that Canon and its related Japanese companies established factories in export processing zones in Hanoi (*Nihon Keizai Shimbun*, April 9, 2002).

We will show the macroeconomic effects of national highway Route 5 on the economy of northern Vietnam based on the data of growth rates of foreign direct investment from 2000, before completion of national highway Route 5, to 2004 after its completion. The data of Hanoi and Haiphong in northern Vietnam, Danang in central Vietnam, and Hochiminh in southern Vietnam are shown in Table 2, telling us that the

growth rates in northern Vietnam are higher than the central and southern averages and that national highway Route 5 had the positive effects on Hanoi and Haiphong in 2002 as follows. The growth rate in North is high at 19.2% while the growth rates in Center and South are low at 6.9 % and 3.7 %, respectively. The growth of Hanoi began to diffuse over northern Vietnam.

#### (4) The bottlenecks of the industrial cluster policy in northern Vietnam

In 2008, we examined the second option and raise the following 12 questions to find the bottlenecks of the industrial cluster policy: 1. Do industrial zones exist sufficiently? : In terms of capacity building: 2. Is the transport infrastructure sufficient?: 3. Does the electricity infrastructure exist?: 4. Does the communication infrastructure exist?: 5. Does the port infrastructure exist?: 6. Do institutions exist?: On human resource: 7. Does unskilled labor exist?: 8. Is skilled labor sufficient?: On living conditions: 9. Are there sufficient hospitals?: 10. Are there sufficient schools?: 11. Are there sufficient entertainment venues?: 12. Are there incidences of theft in the area?

We carried out a survey on the industrial cluster policy of Northern Vietnam to determine whether we can solve its problems using our flowchart approach. We interviewed 10 professionals. The 10 respondents included six staff of companies in Hanoi, three staff of Japanese semi-government organizations in Hanoi, and one Japanese professor studying the Vietnamese economy. The six results are summarized in Table 3.

**Table 3. Questionnaires on industrial cluster policy: Hanoi**

	1	2	3	4	5	6	7	8	9	10	Results	Problems
1. Do industrial zones exist sufficiently?	O	O	O	O	O	O	O	O	O	O	10	
<b>Capacity building: Physical infrastructure</b>												
2. Does transport infrastructure exist sufficiently?	X	X	X	X	X	X	X	X	X	X	0	X
3. Does electricity infrastructure exist sufficiently?	X	X	X	X	X	X	X	O	O	O	3	X
4. Does communication infrastructure exist sufficiently?	O	O	O	O	O	O	O	X	O	X	8	
5. Does port infrastructure exist sufficiently?	X	X	O	O	X	X	X	X	X	X	2	X
6. Do institutions exist sufficiently?	X	X	X	X	X	X	X	X	X	X	0	X
<b>Human resources</b>												
7. Does unskilled labor exist sufficiently?	X	X	X	X	X	X	X	X	X	X	0	X
8. Does skilled labor exist sufficiently?	X	X	O	O	O	O	O	O	O	O	8	
<b>Living conditions</b>												
9. Do hospitals exist sufficiently?	O	O	X	X	O	O	X	O	O	X	6	
10. Do schools exist sufficiently?	O	O	O	O	O	O	O	O	O	O	10	
11. Do entertainments exist sufficiently?	O	O	X	X	X	X	X	O	O	O	5	X
12. Do thefts happen?	X	X	X	X	X	O	O	O	O	O	5	X

Source: A. Kuchiki and T. Gokan (interviews in Hanoi on Aug. 28-30, 2008)

On the issue of industrial zones, no respondent answered “Yes.” Our survey



confirmed that roads, electricity and ports are insufficient in their support of industrial clusters. Specifically, on the question surrounding highway roads meant for automobiles, all 10 respondents answered “No.” Such refers in particular to the roads in these areas: (i) Hanoi – Haiphong; (ii) Hanoi – southern China; and (iii) Hanoi – Noibai Airport. Seven out of 10 gave a “No” reply regarding the sufficiency of the electricity supply. Three who belonged to firms located in Thanglong Industrial Park, answered “No”. They had no problem regarding electricity supply since their companies were given priority for such.

In terms of communication, two of the 10 respondents answered “No”. That is, the connectivity of the email system in Vietnam sometimes encountered issues.

On the issue of ports, eight respondents answered “No”. The other two also answered “No” but were unaware of problems at the ports since they often availed of the services of logistics companies in the delivery of their materials and products, and therefore did not directly use ports. In sum, these mean that all respondents highlighted the problem with the ports. Haiphong Port in Northern Vietnam is a river port and has a shallow depth of 5-7 meters. Cailan Port is located in Halong Bay and an alternative to Haiphong Port. However, one of the concerns here is that the development of Cailan Port would harm Halong Bay, which is a world heritage. Therefore, it has become necessary to expand the facility of Haiphong Port. Currently, cargoes at the port are loaded into a small ship, sent to the Hong Kong Port, and loaded into a large ship again.

Meanwhile, when it comes to institutions, all respondents answered “No” as well. Of all the 12 questions, this is where the problem was found to be most serious. In particular, it is in customs clearance where there are four grave issues. First, every

document passing through customs clearance needs to be translated into the Vietnamese language. Second, every document should be original. Third, companies should put their stamps on their documents. Fourth, every document needs the signatures of companies. In short, having these original documents pass on from one place to another in Northern Vietnam for the required stamps and signatures carry with them certain costs.

Transporting cargos from Hanoi to the border of southern China also faces three problems. First, working hours at the customs clearance office at the border is short. Operating hours at the Vietnam-China border of 8:00 A.M. to 5:00 P.M. differs from the usual working hours of 9:00 A.M. to 4:00 P.M. Also, because the time difference between Vietnam and China is one hour, actual operation hours at the border total six hours only. Thus, trucks would be required to spend one night at the border whenever they fail to reach the border during the given operating hours. Each night spent presents a cost.

Second, costs add up whenever container cargos have to be trans-shipped (That is, whenever cargos are unloaded from one truck in Hanoi and loaded to another truck at the Chinese border). Other problems related to transshipment of container cargos include theft, damage to goods, and the usual delay. Given that a truck consists of its cab and container parts, transportation costs could be reduced if the container part would be allowed to pass beyond the Vietnam and China border.

Third, the road situation is in a sorry state. First, there are a lot of fatal traffic accidents on the Vietnamese highways since these are not exclusive to automobiles only. That is, bicycles and motorcycles are allowed on the highways. Also, the speed of trucks on the Vietnamese highways is slower compared with those in Thailand and Lao

due to the former's road conditions. For instance, according to one respondent at the Thanglong Industrial Park, the speed in Vietnam is 30 kilometer per hour while that in Thailand is 50 kilometer per hour.

Meanwhile, implementing rules at the customs clearance office in Vietnam are not transparent. Rules allegedly change so often and implemented in a discretionary manner.

All 10 respondents also gave a "No" reply to the question on unskilled labor, partly because illegal strikes occurred in many firms in 2008. Firms have been obliged to establish labor unions starting 2008. Also, the power to designate the labor union president has been transferred from the company boards to the labor unions themselves starting 2009. It is therefore understandable why corporate boards now feel uneasy regarding the future of labor unions.

The unskilled labor market in Hanoi has contracted. For example, when firm A began hiring in 2007 and 2008, the number of its applicants at the Thanglong Industrial Park dropped to 170 in 2008 from 700 in 2007. In the past, this firm employed its workers around the Hanoi area but was increasingly forced to consider those from the mountainous areas far from Hanoi. Later, the firm had to construct an apartment for the workers to live in. The share of workers from Hanoi dropped from 70 percent to 30 percent. Meanwhile, the share of workers from the mountain areas rose to 10 percent by 2008.

On the other hand, two of the 10 respondents answered "No" on the issue of skilled labor. Like in most Asian countries, the phenomenon called job hopping is common. One respondent pointed out that it is difficult to find Vietnamese applicants who can speak Japanese, and that Japanese firms should employ Vietnamese who can

speak English instead. There is also a shortage of Vietnamese who can speak the Chinese and Korean languages.

On the issue of living conditions, most respondents answered "Yes", although four replied "No" on the question specific to hospitals. Respondents usually opt to go to hospitals in Bangkok or Singapore for serious illnesses rather than to a Hanoi-based one. In addition, a few firms periodically bring in food from Japan as a precaution against bird influenza in Vietnam.

On the question on entertainment, some respondents answered "No". They could not enjoy Saturdays and Sundays due to the shortage of entertainment facilities such as shopping centers and movies.

Five respondents pointed out that theft of raw materials such as copper coils happens since some workers have not yet imbibed the values these companies espouse. It takes time before workers begin to change their values.

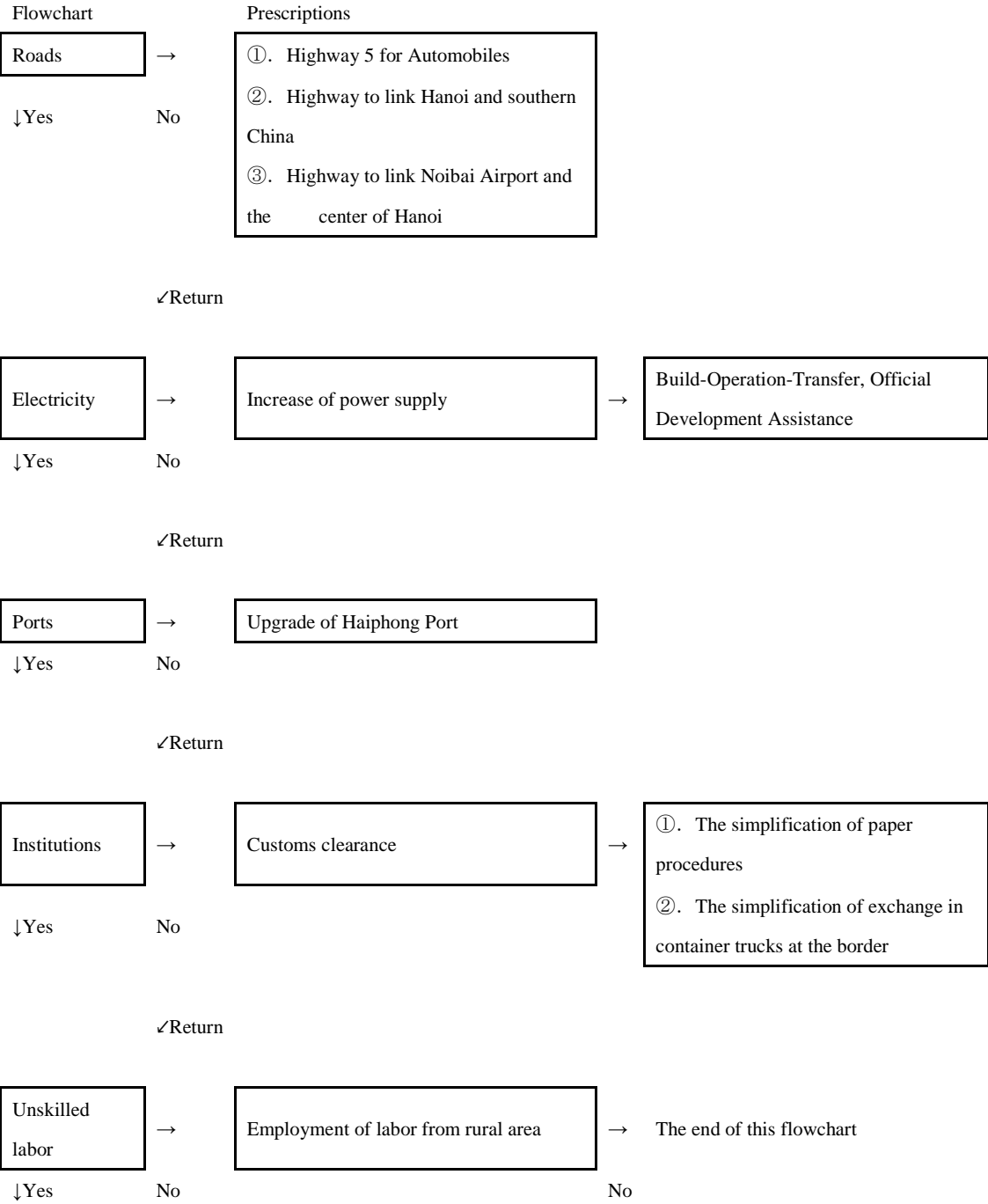
In sum, the issues critical to the improvement of Vietnam's investment environment in 2008 are those on highways, electricity, ports, customs clearance, and unskilled labor.

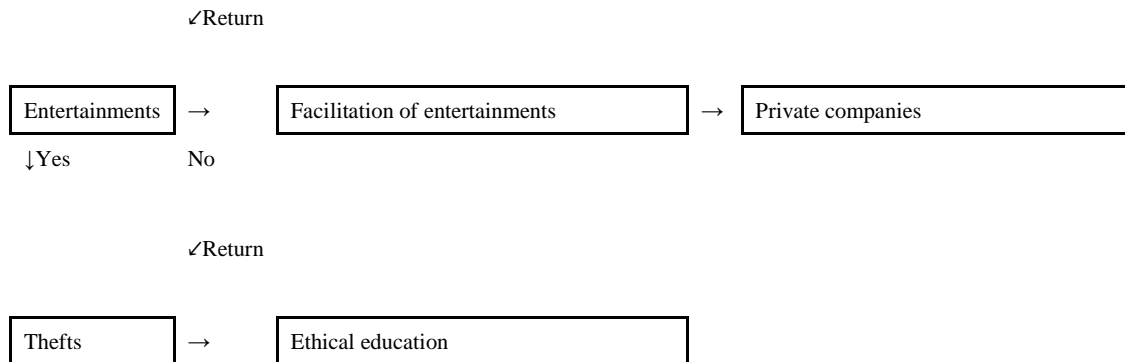
(5) Recommendations on the industrial cluster policy of Northern Vietnam according to the flowchart approach

Recommendations regarding the industrial cluster policy in Northern Vietnam are shown in Figure 12. Northern Vietnam needs the infrastructure that will facilitate its next-stage growth since it has reached around \$900 per capita income in 2008. First, the new route 5 highway specific to cars between Hanoi and Haiphong is needed. Second, there is also a need for a highway between Hanoi and Southern China. Such should be of the same level as China's three-lane highway each way. Third, a highway between

Noibai Airport and the center of Hanoi is needed. Vietnam would benefit from a highway that links Noibai Airport to Hoalac Hitech Park, and Hoalac Hitech Park and the center of Hanoi. The three lanes-per way highways will contribute to economic growth and reduce the number of traffic accidents.

**Figure 12. Northern Vietnam's Flowchart**





Source: Author.

Meanwhile, there would be electricity supply issues in Hanoi even if Northern Vietnam imports electricity from China. Such industry needs to be developed by the private sector through a build-operate-transfer scheme or official development assistance.

Cairan Port should be expanded and Haiphong Port should be further improved. Customs clearance procedures should be more transparent and simplified. For example, the format of customs clearance should be straightforward by omitting signatures and stamps. Transshipment rules should be amended. Rules should allow containers to travel from points of origin to destination instead of having to unload contents at borders and transfer these into another truck.

Unskilled labor should be sourced from all over the country, including local villages. Thus, apartments for the unskilled labor have to be constructed. Their employment will help reduce the income gap of residents living between Hanoi and mountain areas. Meanwhile, the problem of theft takes time to eradicate as this requires educating people on moral ethics.

Guangzhou is losing its competitiveness in the labor-intensive industries and has been moving toward the innovative process stage of Step II in our flowchart approach.

On the other hand, the per-capita income in Northern Vietnam has reached almost \$1000 and is therefore moving toward its turning point; therefore, it should be preparing by upgrading its infrastructure such as roads, ports, and electricity. Hanoi and Guangzhou benefit each other by constructing a highway between Hanoi and Youyi Xian in Southern China and simplifying customs clearance procedures. The reduction of a tariff rate from China to Vietnam will be effective in linking the two cities since the tariff rate is 5 percent higher than that from Vietnam to China.

Regarding the industrial cluster policy, we can refer to the Asian experiences. Official Development Aid functioned effectively to develop the economy in northern Vietnam. The rehabilitation of Haiphong Port, the construction of highway route 5, and the deregulation of investment procedures of ODA contributed to industrial cluster policy in northern Vietnam.

## 6. Application of the flowchart approach to cities in Africa and its conclusions

This section proposes policy recommendations to form industrial clusters in Africa by applying the flowchart approach to cities in Africa based on the lessons from the Asian experiences of industrial cluster policy. Kuchiki (2009) introduced an interview method and an investment environment survey method to find the bottlenecks of industrial cluster policy.

The contribution of this paper is as follows. First, we reclassified industrial clusters based on Markusen (1996) and Iammarino and McCann (2006). Second, we proposed the analysis method of the flowchart approach that can explain an Asian growth model since the 1980s. Third, we applied our flowchart approach to cities in Africa and proposed their policy measures to form industrial clusters.



Unbalanced growth is needed to get away from the vicious cycle of poverty. The growing industry may belong to an industry with high backward linkages. International trade and investment has been liberalized since the 1980s. While Hirschman (1958) recommended fostering the domestic industry by protecting domestic firms before the 1980s, we should introduce his unbalanced growth strategy under the liberalization of international trade and investment after the 1980s. One of the strategies can be industrial cluster policy.

Regarding the industrial cluster policy, we can refer to the Asian experiences. Official Development Aid for northern Vietnam functioned effectively to develop its economy. The ODA contributed to the rehabilitation of Haiphong Port, the construction of highway route 5, and the deregulation of investment procedures that were effective in the industrial cluster policy in northern Vietnam. The flowchart approach derives the ordering of policy measures to foster an industrial cluster and makes clear the bottlenecks of the industrial cluster policy. Capacity should be built to invite an anchor firm with high backward linkages.

The policies recommended by the flowchart approach are as follows: First, an export processing zone is needed to invite multinational firms as anchor firms since domestic markets in Africa are small; On capacity building, primary education should be strengthened; Second, incentives for anchor firms, such as cheap land prices, the construction of roads and railways for the firm, and the establishment of international hospitals and schools, are effective in inviting them to the export processing zone; Third, the flowchart approach makes clear who are actors in forming an industrial cluster.

We have the two methods that can be applied to cities in Africa and finds the players and priorities of policy measures in implementing industrial cluster policy.

The methods are an interview method and an investment environment survey method.

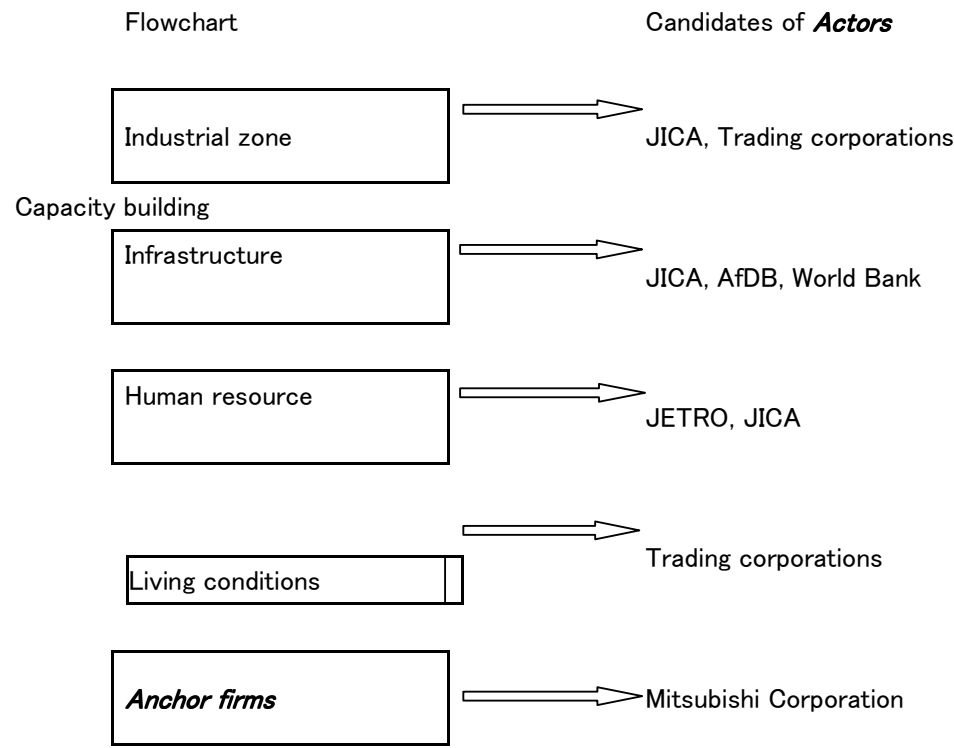
The candidates of anchor firms for Maputo in Mozambique will be illustrated as the following three types of actors. First, African cities must find multinational as anchor firms with high backward linkages. An automobile is composed of more than 20,000 parts and components. An ink-jet printer in the electronics industry is composed of around 800 parts and components. Second, a Japanese trading corporation establishes an export processing zone and introduces its tenants to the zone. We illustrate the following incentives for anchor firms in the case of Asian export processing zones. They are favorable preferential land prices to anchor firms, exemption or reduction of taxes, transportation facilities specific for the firms, and the establishment of international hospitals and schools. Lock-in effects function since the tenants are difficult to close its factory once an anchor firm establishes a company.

As is shown in Figure 13, we specify players, or actors, to implement policy measures of the flowchart approach. Candidates of actors to establish industrial zones will be Japan International Cooperation Agency or Japanese trading corporations. One of the candidates to construct physical infrastructure will be Japan International Cooperation Agency. The candidates to develop human resources will be Japan External Trade Cooperation or Japan International Cooperation Agency. Private firms can play a role in facilitating living conditions such as international hospitals and schools. The candidates of anchor firms may be Toyota of a Japanese automobile firm, Tata of an Indian automobile firm, Hyundai of a Korean automobile firm, Mitsubishi Corporation of a Japanese trading firm, and South African firms.

In sum, foreign investors in the modern economy were instrumental to the big push that paved the way for Asian countries to free themselves from their low-level

equilibrium trap after the 1980s. That is, the idea of industrial clusters was tapped to make foreign investors agglomerate in industrial zones in the Asian economies.

Figure 13. Policy Recommendations: Find Actors



Tata, Hyundai, Toyota  
South African  
firms

Source: Author.

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