Policy rhetoric and the implementation of environmental science and technology parks in Taiwan

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Abstract

The concept of industrial ecology have been applied to local and regional sustainability goals and policies in many countries. To promote the growth of green industry and the formation of a “recycle-oriented society,” the Taiwanese government also launched an eco-industrial parks project in 2002. This research examines stakeholder perceptions of the environmental science and technology park (ESTP) in Kaohsiung County and stakeholder perspectives on sustainable development. The research methods adopted include documentary analysis and in-depth interviews. A matrix framework composed of major dimensions (i.e. environmental, economic, and social) and a sequence of intensity of sustainability (i.e. deep green, strong, and weak sustainability, and treadmill reality) are employed in analysis.

Kaohsiung County has suffered from environmental problems, caused by long-term industrialization. The ESTP project has been seen as a means to solve the increasing waste pollution problem, escape civil complaints about the industrial waste treatment area, and improve the image of the existing industrial estate. To cope with unemployment and economic decline, the government prioritizes economic sustainability. Environmental NGOs focus on environmental sustainability and adopt strong sustainability positions. Although the government and the management center place emphasis on rigid environmental regulations of the ESTP, the environmental NGOs worry that waste recycling and treatment might lead to worsening environmental pollution. The by-product exchange is very limited, and the environmental impact is insufficiently monitored. Local residents seem to know little about the ESTP, which shows a lack of transparency and communication. This study highlights the gap between the policy rhetoric and practical implementation. It concludes by arguing for more dialogue between stakeholders and citizen participation in the development of the ESTP and policies of sustainable development.

Introduction

The concept of sustainable development has become an increasingly important theme in...
various spatial scales: the global, (e.g. calls for the World Trade organization to incorporate environmental policies) regional (e.g. European Union Environmental Action Programs, national (e.g. national sustainability strategies) and local (e.g. Local Agenda 21) scales. Although a widely used phrase and idea in policy documents, sustainable development has many different meanings and interpretations. In broad terms, the concept of sustainable development represents an attempt to “combine growing concerns about a range of environmental issues with socio-economic issues (Hopwood, et al., 2005).” The report *Our Common Future* calls for “changing the quality of growth, meeting essential needs, merging environment and economics in decision making (WCED, 1987: 49),” and it emphasizes public participation, equity, and intergenerational justice. Gangloff (1995) identifies a number of measures to enhance sustainability based on four principles: maximize energy efficiency; minimize waste production and pollution; capture the benefits of natural processes while minimizing damage from natural events; and meeting the economic and social needs of all people in a manner that does not degrade or destroy the productivity or health of natural systems. Environmental, social, and economic sustainability are at the core of sustainability, and issues like energy-use, waste-disposal, land-use planning, and local demands are particularly mentioned as critical.

Eco-industrial parks are seen as the primary arena for examining and implementing the concepts of industrial ecology and sustainable development (Gibbs, et al., 2002). Using an analogy of industrial systems to natural ecological systems, industrial ecology attempts to connect different waste-producing processes, plants, and industrials into an operating web that minimizes waste produced by the larger system as a whole (Brand and de Bruijn, 1999). According to Cote and Cohen-Rosenthal (1998), an eco-industrial park (EIP) is an industrial complex based on “industrial symbioses or by-products exchanges within a continuum of different levels of complexity.” The characteristics of an eco-industrial park are “community, cooperation, interaction, efficiency, resources, and systems.” Denmark’s Kalundborg has been regarded as the prototypical eco-industrial park, which represents waste and energy exchange patterns or networks. Proposals have been developed for Eco-industrial Park through policy intervention in other places in Europe, such as the Emscher Park in Germany, Turin Environmental Park in Italy, and the Sustainable Growth Park in South Yorkshire in the UK. In the USA, the President’s Council on Sustainable Development formed a task force on eco-industrial parks during the Clinton administration. The Environmental Protection Agency and the Department of Energy have taken the position that economic, environmental and social advantages can be gained from the approach of eco-industrial parks (Gibbs, et al., 2002). Recently Japan, India, China, Thailand, Philippines (Lowe, 2001), and South Korea have actively carried out eco-
industrial park project (Kim, 2007).

The Taiwanese government launched a similar eco-industrial park project in 2002. The Environmental Protection Administration (EPA) has recently announced the Resource Recycling and Reuse Act, and the Environmental Science and Technology Park (ESTP) project plays a key role in the promotion of green industry and in the formation of a recycle-oriented society. Four environmental science and technology parks were designated by the EPA in 2003 – Benzou ESTP in Kaohsiung County, Fenglin ESTP in Hualian County, Taoyuan ESTP in Taoyuan County and Ta-Hsin-Ying ESTP in Tainan County. The Economic Planning Council has promoted some strategic guidelines (economic, environmental, science and technology strategies, and social policy) to pursue the goal of a “Green Silicon Island” by means of environmental flows management (Hu and Chong, 2003). The government has adopted the concepts of industrial ecology and symbiotic eco-industries as conduits for industry and society to move toward sustainable development.

The term eco-industrial park is used by many in a much looser fashion; any development project that possesses certain environmental features can be said to constitute an eco-industrial park. There are numbers of potential barriers to the implementation of eco-industrial park projects through public policy; these include the technical, economic, regulatory, and motivational barriers. These are numerous unanswered questions about the environmental and economic impacts that the development of eco-industrial parks may bring to local communities, which shows the paucity of research on these issues (Gibbs, et al., 2002). Current research tends to regard eco-industrial parks as compatible with sustainable development or as an approach to sustainability (e.g. Chung, 2002b; Lan, et al., 2005). However, the substantial gulf between the perceived potential of this concept and its implementation is rarely considered (Gibbs and Deutz, 2007; McManus and Gibbs, 2008). There is a growing recognition of the need for more stakeholder involvement in decisions and public engagement in future policy decision-making at early stages (Bucchi and Neresini, 2008). However, few have conducted empirical research to examine how the concept of sustainable development has played out.

The Environmental Science and Technology Park in Kang-Shan Ben-Chou industrial zone in Kaohsiung, also called the Southern ESTP, is the first environmental science and technology park sanctioned by Environmental Protection Administration. Kaohsiung County has suffered severely from environmental problems caused by long-term industrialization. The ESTP project has been promoted as a means to solve the increasing waste pollution problem, escape civil complaints about the industrial waste treatment area, revitalize the existing industrial estate, and improve its image.

This study examines stakeholder perceptions of the environmental science and technology park (ESTP) in Kaohsiung County and stakeholder perspectives on sustainable development. Research has shown that there are the multiple perceptions and understandings of the concept of eco-industrial parks in different context (e.g. Kim, 2007). This research examines how the environmental science and technology park has been discussed by central and local government officials, the management center of the industrial park, non-governmental organizations (NGOs), and local residents. It also examines the relevant factors in shaping local perception. According to Baker et al. (1997), sustainable development is a political concept that synthetically contains multiple values. The research explores how sustainable development is interpreted and implemented in the case of the environmental science and technology parks in Taiwan. The research methods include documentary analysis and in-depth interviews with the project manager, local and central government officials, local representatives, local residents, non-governmental organizations, business people, and experts. A matrix framework has been adopted for analysis; it is composed of major dimensions (i.e. environmental, economic social) and a sequence of intensity of sustainability (i.e. deep green, strong, and weak sustainability, and treadmill reality).

**Sustainability and eco-industrial parks**

There are many different interpretations of and responses to the concept of sustainable development. Hopwood et al. (2005) presents a classification and mapping of different trends of thought about sustainable development, their political and policy frameworks, and their attitudes towards change. There are three broad views about the nature of the changes necessary in society’s political and economic structures for sustainable development: (a) status quo; (b) reform; (c) transformation. For Hopwood et al. (2005: 47-48), sustainable development crucially embraces the key issues of our relations with the planet; social and environmental equity are fundamental ideas to these relations. Baker et al. (1997: 12-18) offer a comprehensive understanding of the intensity in the Ladder of Sustainable Development in advanced industrial societies (see Table 1). These include: the capitalist treadmill, weak sustainability, strong sustainability and deep green sustainability. “Treadmill reality” indicates subordination to the realities of global capitalism. The weak sustainability approach, according to Pearce and Barbier (2000: 21), indicates that future generations have at least the same potential economic opportunity to achieve welfare as the current generation. It integrates capitalist growth with environmental concerns (Pearce et al., 1989). Its emphasis on economic development and the market mechanism can easily lead to the neglect of aim. The strong sustainable development approach asserts that
environmental protection is a precondition of economic development. It puts more emphasis on qualitative growth than quantitative growth. This approach rejects the dogmatic capitalist principles of profit and efficiency (Brown, 1997: 84-5), and it advocates a concept of eco-centric sustainability. Deep green sustainability argues that almost any development should be banned as inconsistent with the maintenance of natural capital. The primacy of nature over humankind demands radical reform in human society (Richardson, 1997: 43; Rydin, 1999: 468).

| Table 1 The Ladder of Sustainable Development (SD) in advanced industrial societies |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| **Philosophy**                | **Eco-centric/bio-centric** | **Strong SD**                  | **Weak SD**                     | **Anthropocentric**              |
| Role of economy and nature of growth | Right livelihood; meeting needs not wants; changes in patterns and levels of production and consumption | Environmentally regulated market; changes in patterns of production and consumption | Market-reliant environmental policy; changes in patterns of consumption | Exponential growth |
| Geographical focus | Bioregionalism; extensive local self-sufficiency | Heightened local economic self-sufficiency, promoted in the context of global markets | Initial moves to local economic self-sufficiency; minor initiatives to alleviate the power of global markets | Global markets and global economy |
| Nature | Promoting and protecting biodiversity | Environmental management and protection | Replacing finite resources with capital; exploitation of renewable resources | Resource exploitation |
| Policies and sectoral integration | Holistic inter-sectoral integration | Environmental policy integration across sectors | Sector-driven approach | No change |
| Technology | Labour-intensive appropriate technology | Clean technology; product life-cycle management; mixed labour- and capital-intensive technology | End-of-pipe technical solutions; mixed labour- and capital-intensive technology | Capital-intensive production technologies; progressive automation |
| Institutions | Decentralization of political, legal, social and economic institutions | Some restructuring of institutions | Minimal amendments to institutions | No change |
| Policy instruments and tools | Full range of policy tools; sophisticated use of indicators extending to social dimensions | Advanced use of sustainability indicators; wide range of policy tools | Token use of environmental indicators; limited range of market-led policy tools | Conventional accounting |
| Redistribuition | Inter- and intra- generational equity | Strengthened redistribution policy | Equity a marginal issue | Equity not an issue |
| Civil society | Bottom-up community structures and control. New approach to valuing work | Open-ended dialogue and envisioning | Top-down initiatives; limited state-environmental movements dialogue | Very limited dialogue between the state and environmental movements |
| Green label position | Extreme preservationist position | Resource conservationist and ‘managerial’ position | Anti-green economy, unfettered free market |
| Type of economy | Very deep green economy, heavily regulated to minimize ‘resource-take’ | Deep green economy, steady-state economy regulated by macro-environmental standards and supplemented by economic incentive instruments (Els) | Green economy, Green markets guided by Els (e.g. pollution charges, etc.) | Anti-green economy, unfettered free market |
| Management strategies | Reduced scale of economy and population | Zero economic growth; zero population growth | Modified economic growth (adjusted green accounting to measure GNP) | Primary economic policy objective, maximize economic growth (max GNP) |
| Scale | Scale reduction imperative; at the extreme for some there is a literal interpretation of Gaia as a personalized agent to which moral obligations are owed | Decoupling plus no increase in scale. ‘Systems’ perspective—health of whole ecosystem very important; Gaia hypothesis and implication | Decoupling important but infinite substitution rejected. Sustainability rules: constant capital rule. Therefore some scale changes | Takes as axiomatic that unfettered free markets in conjunction with technical progress will ensure infinite substitution possibilities capable of mitigating all ‘scarcity/limits’ constraints |
| Ethics | Acceptance of bioethics (i.e. moral rights/interests conferred on all non-human species and even the abiotic parts of the environment); intrinsic value in nature (i.e. valuable in its own right regardless of human experience) | Further extension of ethical reasoning; interests of the collective take precedence over those of the individual; primary value of ecosystems and secondary value of component functions and services. | Extension of ethical reasoning: ‘caring for others’ motive – intragenerational and intergenerational equity (i.e. contemporary poor and future people); instrumental value of nature | Support for traditional ethical reasoning: rights and interests of contemporary individuals; instrumental value of nature |
| Another | Deep Ecology | Communistalist | Accommodating | Cornucopian |
Although open to many interpretations, sustainable development has gained wide currency and provides a useful framework in which to debate the choices for humanity (Hopwood et al., 2005: 47-48). In this research, I analyze eco-industrial parks in terms of their pursuit of sustainable development. The concept of sustainable development will be examined as a metanarrative within which industrial development continues; yet it remains one in which knowledge claims and ideas, held by a multitude of stakeholders (e.g. NGOs, the industries, the public, experts), can be openly discussed and debated.

By drawing analogies between the industrial circumstances and natural ecosystems, industrial ecology focuses on a redesigned framework; it combines human activities and natural systems to a metaphor for “symbiosis” (Korhonen, 2001). Industrial symbiosis represents efforts to increase the systemic efficiency of material and energy use by considering potential interactions among disparate industrial firms and processes in the entire network (Haskins, 2007: 85). The concepts of industrial ecology not only describes “how industrial systems operate” (i.e. materials and energy flows), but it also moves toward a prescriptive framework that offers concrete solutions and practical measures for policymakers and business managers. Questions of “how the industrial system should operate” in order to evolve toward a sustainable configuration” can be considered within its frame (Boons and Roome, 2001; Korhonen, 2004; Korhonen, et al., 2004b: 292). Scholars have argued that industrial ecology theory should also consider the human dimension (Cohen-Rosenthal, 2000; Ehrenfeld, 2000; Boons and Roome, 2001; Korhonen, et al., 2004b: 292). Korhonen, et al. (2004b: 292) argue that different social actors, such as firms, organizations, households and individuals (and their values and preferences) will drive and affect the physical flows of matter and energy. For them, actual change and a move toward a more sustainable situation will be on the basis of a better understanding of human behaviors, and it will “require shaping the concrete measures that decision-makers, firms and individual consumers implement in practice” (Korhonen, et al., 2004b: 292). The exploration of the concept of industrial ecology and the development of eco-industrial parks cannot neglect the particularity of the context, human factors, and cultural constructs that affect how people interpret industrial ecosystems.

Eco-industrial parks are seen as “the primary arena for testing and implementing the concepts of industrial ecology and the challenges of sustainable development” (Gibbs, et al., 2002; Haskins, 2007: 85). The concept was first made known when Indigo Development, a crucial consultant company for industrial ecology development, introduced
it to the EPA officials in America in 1993 (Lowe, 2001). Cohen-Rosenthal (2003: 19) defines it as:

a community of businesses that co-operate with each other and with the local community to efficiently share resources (information, materials, water, energy, infrastructure and natural habitat) … leading to economic gains, gains in environmental quality and equitable enhancement of human resources for the business and local community.

Unlike existing environmental policies that concentrate efforts on regulation and ”post-treatment,” the concept of eco-industrial parks is very important by putting emphasis on ”preventing the generation of wastes (Kim, 2007: 359).” According to Cote (1998), eco-industrial parks seek to address “the social implications of carrying capacity by balancing ecological and economic factors leading to social equity in the form of opportunities for employment and reasonable quality of life for people in surrounding communities (Haskins, 2007: 85).” There are several categories of eco-industrial parks, as follows (Research Triangle Institute, 2001):

(a) A single by-product exchange pattern or network of exchanges (e.g. the eco-industrial parks in Kalundborg, Denmark);
(b) Recycling business cluster (e.g. Styria, Austria);
(c) Collection of environmental technology firms;
(d) Collection of firms making green products;
(e) An industrial park designated around a single environmental theme (e.g., a solar energy-driven park);
(f) A park with environmentally friendly infrastructure or construction;
(g) A mixed use development (i.e., industrial, commercial and residential).

For Roberts (2004), the parks can be classified into green industry parks (GIPs), integrated eco-industrial parks (IEIPs), and networked eco-industrial park systems (NEIPs). The firms in GIPs focus on cleaner production, waste minimization and emission reduction at site. The IEIPs puts emphasis on the symbiosis of by-production, waste and energy. NIEPs refer to the waste exchange within the park and outside the park.

A mix of available transport links, existing on-site utilities, and funding eligibility are crucial for site selection of eco-industrial parks. Some are existing industrial sites, current or disused, while others are greenfield developments (Gibbs, et al., 2002). Furthermore, eco-industrial parks involve not just the entire network in which that firm does business, but also governmental and community interactions. Managing entities for the eco-industrial
parks include governments and private sectors (e.g. cities, counties, local economic development corporations, and private industry) and non-governmental organizations and households. Inter-firm collaboration and networking based on trust and reciprocal relations are the basis of eco-industrial parks (Haskins, 2007: 86). Cooperation and collaboration are required between firms and between firms and local governments. This raises questions of trust and consensus (Gibbs, et al., 2002). Interactions between governments and societies need to be better understood in order to implement sustainable development initiatives with confidence.

THE ESTPs policy and the Kaohsiung case

The Environmental Protection Administration started to execute the ESTP project in 2002. The EPA is responsible for regulations, site selection, construction supervision, and incentives. The local government is in charge of providing land, constructing infrastructure, recruiting businesses, operating and managing parks, and providing vendor services. The total area of the four ESTPs is 123 hectares. The area of each park is divided into zones of production, R & D, support facilities, and training and exhibition. The percentages allotted to each area are 75, 25, 10 and 5 respectively. The EPA initiated a 185 million USD budget, which is divided into two parts. One part of the budget is provided to local governments for park planning, infrastructure, and sustainable township development around the park. The other part is provided as subsidies for qualified applicants of the park. Three subsidies include land lease subsidies, production subsidies, and research subsidies; they are provided to encourage investment and research related to cleaner production, resource recycling, and emission reduction (Chen, et al., 2009: 61-62).

The scope of introduced industries is limited to six industries, which include (1) industries related to cleaner production technology, (2) industries that recover waste resources in order to create eco-friendly industries, (3) industries that recover and convert resources into new product, (4) industries involved in emerging and strategic environmental technologies, (5) industries in the production of equipment and systems of renewable energy, and (6) industries that deal with solutions for key aspects of environmental protection. The main industries of ESTP are resource recycling, cleaner production, and renewable energy industries. The primary industry in ESTP is the resource-recycling industry, which is seen to play an important role in the amount of recycled resources and in the added values of renewable products. Two types of industries in four ESTP -- industries that recover waste resources in order to create eco-friendly industries and industries that recover and convert resources into new product-- comprise 46.8%. The symbiotic resource-recycling networks of ESTP are not confined within the parks. Therefore, the ESTP seems

Thirty-two companies have been approved to be stationed in Kaoshiung ESTP. There are 11 companies (37.5%) that belong to industries that recover and convert resources into new products; 7 companies (23.8%) belong to industries related to cleaner production technologies; 6 companies (15%) are industries that deal with solutions for key aspects of environmental protection (Chen, et al., 2009: 62-63). The following sections discuss stakeholder perspectives of the ESTPs and sustainability.

The government's emphasis on economic sustainability and environmental regulations

According to the Industrial Technology Research Institute Report (2010), a total 80 companies have been approved to be stationed in ESTP, potentially providing 2,562 jobs. The sold areas of land comprises 48.6 hectares, and the total investments reaches 579.7 US million dollars. Expected annual production values are 1.08 US billion dollars. Recycled resources total 2.53 million tons. The Industrial Technology Research Institute puts emphasis on economic growth indicators, such as qualified companies, sold area, and total expected value per year of the ESPT. The Industrial Technology Research Institute has indicated that the development of four ESTPs under the EPA has “gradually created the perfect balance between economic development and sustainable environment (Chen, et al., 2009: 62).” It shows that the Industrial Technology Research Institute and the EPA adopt the weak idea of SD. The EPA has pointed out that the Executive Yuan set up some policy goals, including the targeted numbers of resource recycling and waste reduction. The local government and the companies have also set their goals. For the EPA, the attainment of the goals seems acceptable in terms of the data (Interviewee G1). However, these criteria are not comprehensive; they are neither explicit nor sufficient to effectively assess the environment, social, and economic benefits (Chen, et al., 2009: 62).

Both the EPA and the ESTP management center have noted that the industries in the ESTP need to obey relevant environmental regulations and put emphasis on supervision. The EAP is responsible for supervision of the ESTPs. Established in 1993, the Institute of Environment and Resources is the first environment policy research institute created and registered by Environment Protection Administration to conduct policy research and disseminate results to the public and industrial sectors. The institute provides technical and policy analysis that supports the formulation of policies with long-term implications for sustaining environmental, social, and economic development in Taiwan. The Institute of Environment and Resources is commissioned to execute assessment of the operation of the
companies in the parks and to see whether the companies in the parks require assistance. It provides information and recommendations, and it reminds the companies to improve the processes of production. The companies need to belong to the six industries and to explain the process of production:

If one company is the industry of waste recycling and disposal, then it needs to declare how they dispose or commission which company to do waste disposal. They need to obey not just the regulations of the EPA but also the regulations of waste management, the park, and the local environmental rules (Interview R1).

Each park can set its own regulations and rules. The EAP and the institute set the basic standards. For example, the Taoyuan ESTP management center has asked the companies in the park to use environmental-friendly construction and low pollution materials in the construction of factories. The institute also assesses the ratio of local employees to see whether the companies have made efforts to hire locals. The parks also cooperate with colleges and university nearby (Interview R1).

For the management center, companies in the park belong to environmental industries, so environmental pollution is very limited. The management center assists the firms to solve problems, and it holds workshops to hear their ideas. However, one of the main problems of the ESTP in Kaohsiung is poor air quality; it is as bad as other industrial areas. One man from a company suggested that the ESTP should not allow high polluting firms to be stationed in the park (Interviewee B2).

In order to promote environmental education, the management center constructs a green ecological exhibition to show innovative clean technology and products. The officer pointed out to us that it attracts many people from the town and other cities to visit the exhibition center, which is also a nice place for school field trip. But one interviewee from the Institute of Environment and Resource has pointed out that costs of maintenance of the green ecological exhibition, such as personnel and administration, exceeds its budget (Interview R1).

At the beginning of the ESTP project, the EPA told the management center that the local government needs to have money to support the operation of the parks. As for the central government's plan to terminate the project in the year 2011 and stop all subsides, the officer of the ESPT Center suggests that the government continue to support the project to pursuit sustainable development. The problem is that it needs money to continue to carry out the EIP project:

It depends on the policy of the Executive Yuan (the cabinet). Whether the policy will continue,
the way to continue will involve high level consideration of possible ways forward. It involves different time and contexts and the distribution of the entire budget. It is uncertain whether we will continue the policy in the same way or let local governments carry on. But local governments have their own financial conditions. (Interviewee G1)

For the interviewee of the EPA, ten years for the project is too limited. It takes a few years to solicit businesses and build the firms. It also involves research and development, and then the next stages require employees to engage in production. He supports the grants that allow the ESTP develop and prosper.

If the grant provided by the EPA and the ESTP plans and regulations stop in 2010, it means that the ESTP will not be much different from the general industrial zones. The Industrial Development Bureau of Ministry of Economic Affairs will be in charge of industrial parks rather the EPA (Interview R1). The institute of Environment and Resources has also suggested that the relative governmental department to provide grants and measures to support these companies and the ESTPs.

**Limited by-products exchanges among firms**

Both the EPA and the Kaohsiung management center recognize that current industrial symbioses or by-products exchanges are not significant. According to the officer of the ESPT Management Center under the Kaohsiung County Government, the man industries there are clean technology. Owing to the divergence of the companies in the park, it is not easy to form symbiosis among industries. The official points out that there were about two linkages among industries and hopes that more companies cooperate closely. The related industries which might have by-products exchange are not enough (interviewee R1). For the EPA, the assortments of firms in the four parks make cooperation difficult. When it involves the problem of technology, the EAP will do the best to provide assistance. But the scope the category of the industry is too complex, which includes the waste recycling industry and electricity. It is difficult to link the firms of different kinds of industries together. It is possible to extend the map of linkages to include those firms near the parks. For the EAP, the government has the duty to forge the regional industrial symbiosis or linkages:

The government needs to try to understand which kinds of firms are less and what linkages lack in the ESTP. Taiwan is small and some people will focus on the industrial symbiosis that includes the Northern, Middle and Southern regions together. It involves the problem of cooperation and trust among firms. We promote the idea of resource flow and the concept of “Cradle to cradle”. (Interviewee G1)
The governmental agency also provides some channels of communication and information exchange. For example, the Industrial Development Bureau provides information exchange on the official website. One firm can register what wastes they produce, and the other firm which needs similar wastes can search and contact the producers through the website. (Interviewee G1)

From the perspective of the EPA, the ESTP has the function of setting an example as the Industrial Development Bureau has planned to revitalize the old industrial areas and adopt the modern and sustainable ways of management (Interviewee G1). For the companies in the park, it is beneficial to be stationed in the ESTP. The companies can get land and production grants and apply for research and development. Economic incentives are the main concern of the companies. Since the incentive program provided by the Industrial Development Bureau of Ministry of Economic Affairs is more favorable than the EPA's, many companies would rather choose to be stationed in the general industrial areas rather then the ESTP (Interviewee G1, R1). One interviewee from the company of clean industry indicated that if there were more companies in the park, they will have more opportunity of cooperation. That company signs a contract with he Kaohsing City Government to produce hydrogen buses and make efforts to promote the idea of the choice of environmental-friendly products (Interviewee B1). However, the other company mentioned that they got grants (e.g. land, construction), but did not get much help on the aspect of research and innovation. One businessman in the ESTP thinks that the companies in the ESTPs still take economic development as priority and the main aim is making profits. Environmental protection would in conflict with the goal of setting up a company. There are competing perceptions of the environmental impacts of the ESTP among firms:

Waste recycling will bring pollution. Industrial linkages is like a slogan. The problem is that other places' wastes came to Kaohsing and left the pollution here. Recycling is high pollution.... Does the firms here really work on environmental protection? For example, there is one firms working on hydrogen, which use H2O to produce energy. Now the government promote the idea of cherishing water resources. If a lot of firms use water for energy, then we will run out of water. It involves the problem of economic efficiency. Only the rich can afford to this kind of products (Interviewee B2).

It shows that different industries have competing ideas and assessment of the ESTP and industrial business operating. The firms tend to expect more governmental incentives and beneficial measures. The active and spontaneous dialogue and interaction among firms and
building reciprocal relations would be crucial to the promotion and development of the ESTP project.

**The ENGOs’ focus on environmental sustainability**

The main concerns of the environmental groups are the impact on the environment. The Kaohsiung County has suffered from environmental problems caused by illegal dumping of industrial waste. The ENGO interviewees mentioned that toxic and copper papayas were found in the late 90s. It was not uncommon to find industrial waste orchards of pineapple, papaya and mango. The companies or dealers rent farmlands and dig. After selling the sandstone, the dealer dump industrial waste, backfill and plant fruit trees (Interviews E1). For the environmental groups, the biggest problem is how to deal with waste properly and have effective regulation, as there is no industrial waste treatment area in Taiwan. Environmental groups have actively asked for building industrial waste treatment area to improve illegal dumping problems. However, considering the no exclusive area for industrial waste disposal might cause residents’ complaints and protest; the government promotes the idea of ESTP. On the other hand, the government promotes ESTP to revive the existing desolate industrial park (Interviews E1). According to one interviewee from the EPA, the EPA submitted a proposal of building industrial waste disposal zone in 2001. However, the Executive Yuan considering waste recycling tends to be limited to particular recycling industry, and decided to set up the ESTP to promote green industry which is broader than waste recycling industry (Interviewee G1). For the environmental groups, building the exclusive area for industrial waste disposal is the crucial solution and the main mission of ESTP should be waste management:

*Why not regulate the industrial waste dealers to set up company in the ESTP to solve many environmental problems? Why not tighten the laws to regulate those illegal and polluting waste disposal dealers? The authority knows that, but not dare to do so, which will displease too many interest groups. The authority can ask those waste dealers to be stationed in the ESTP within two year to solve the long-term problem. Subsides could be provided to those waste management companies that relocate to the ESPT. The development of the ESTP is not much different from the general industrial park (Interviews E1).*

Although the government and the management center put emphasis on the rigid environmental regulations of the ESTP, the environmental groups think that the current regulation of waste management and disposal is incomplete. On environmental activists pointed out that the system of declaration is not enough and continuous monitoring is needed:
The firms declare how much waste they produce and how to deal with it. They also can declare how much wastes they temporarily keep stored. However, there is no complete monitoring system to check whether they find someone deal with the wastes properly in three years later. Take the electric steel smelting industry for example, the firms collect discarded steel to refine iron. But they will produces air pollution and very serious waste materials that are very toxic and have negative impact on the environment. What can be reused are no more than 30 percents. (Interviews E1)

The government prioritizes economic sustainability to cope with unemployment, discarded industrial park and economic decline. Instead, the environmental NGOs pointed out that the government talks in high-sounding tone, such as the increase of GDP. The ESTP also involves promoting environmental technology. But for them, some companies in the ESTP have nothing to do with environmental protection or waste management in reality. The companies might say that they have something to do with environmental protection when apply for being stationed in the ESTP (Interview E1). Also, for them, by-product exchange is very limited. As one said, “Maybe on or two companies in Kaohsiung has by-product exchange. I guess 90% has no by-product exchange. It was as slogan and the EAP talks in high-sounding tone” (Interview E1).

The environmental NGOs focus on environmental sustainability and adopt strong sustainability. They provide criticism of the ideology of materialism and consumerism that focuses on the rate of economic growth and regards no growth as failure. As on said:

All sustainable development policies in Taiwan are slogans. For example, Taiwan is one of the most important producers of solar battery in the world. However, the use rate in Taiwan is very low. This is because the government does not support solar energy. The state-owned Taiwan Power Company (Taipower) does not want to give up the control of power. Now Taipower says that we do not have electricity and need to construct power stations. Otherwise, Taipower will have no reason to construct nuclear power station. So far, I do not think Taiwan has sustainability, but exploitation. (Interviews E2)

The environmental NGOs think that there are gaps between the idea and goals of the EIP and its implementation. The goals of EIP include zero waste, recycling, waste reduction and industrial symbiosis, but the ESTP tend to focus on making green by planting trees, and beautify the build environment (Interviews E1, E2). There were environmental activists who worry that waste recycling and treatment in the ESTP might lead to worsening environmental pollution, and the environmental impact is insufficiently monitored. The interviewees from the environmental NGOs pointed out that so far they has not seen a very
complete report of the outcome of the implementation of ESTP project (e.g. reach the objective set by the EPA). It is necessary to make the information of budgets and performance of the ESTP transparent. They guest that if the case is seen unsuccessful, the government will not willing to make it public (Interviews E1, E2). Besides the complete institutions and regulations, the environmental groups put emphasis on effective enforcement and civic watch over. Considering the illegal dumping problem, the environmental groups ask for building regional waste treatment area and not to keep polluting the land.

**Lack of close interaction between the ESTP and local community**

Local residents seem to know little about the ESTP. The ESTP was set up in the area of existing industrial park, so it is not easy to attract public attention (Interviews E1, E2). One man from the Benchiu Community Development Association indicated that he did not know the ESTP until he heard that the land of the existing industrial park was not sold well and small portions of the land were demarcated for the ESTP. For him, even local representatives or associations do not know much about what the industries do in the ESPT, not to mention the general public (Interview S1). The local government tend to support the ESTP project, since it could bring local tax and prosperity. Local residents might think the industries will bring significant production values, provide job opportunity and will foster economic development. So it might not have significant local opposition (Interviews E1, E2). However, some residents still concerns the problem whether the ESTP might increase local environmental burdens. As one said:

> Many residents do not know the real situation of the ESTP. We are concerned with pollution and noise. I think it is OK if they did not bring us any troubles. They boost that those companies engage in environmental protection and technology. I hope that they will be the model of environmental protection, to produce stuff that will contribute to environmental protection and solve environmental problems. The factories in the ESTP should not produce environmental problems, otherwise they will lose faces. It will be very strange and unreasonable that the so called environmental-friendly companies produce environmental problems. (Interviews L1)

Local residents tend to adopt the position of look on the ESTP from the sidelines. For local residents, the ESTP can provide job opportunity, but it might increase local environmental burdens. The local residents would protest against it if it something harmful to public health happened (Interviews L1).

The management center provides funding to construct town activities center to
improve local infrastructure to enhance interaction between the park and local residents. Also, an interviewee from one company points out that they provide budgets to support local cultural activities and festivals. However, local residents tend to think that the park lacks interaction with local community. The firms seem to come to Benzhou, Kaohsiung, to “make friends” and to be “good neighbours”, but local residents tend to think that what the ESTP do is not enough (Interviews L2).

Small portions of the budgets of the ESTP project is provided by the EPA to local governments for park planning, infrastructure, and sustainable township development around the park. The policy goal of sustainable township development goes together with the promotion of industrial symbiosis. However, the actual relationship between these two project is vague and interviewees do not talk much of the sustainable township development two projects when they express their views on the ESPT project. Although the manager center mentioned the achievements of community development and dredging a stream in Kaohsiung on the official website, the effectiveness of the sustainable township development is not significant. According to a consultant of the Eco-industrial park to the government and NGOs, the budget of sustainable township development provided to the local government is about 13.3 USD million, which is like the symbol of compensation to avoid local opposition. The local government and Environmental Protection Bureau usually work with consultant companies in township planning. However, the budgets are not much, which could not bring fruitful results to sustainable township development (Interviewee C1). It shows the problem of lack of transparent information and local participation in planning and decision-making, and mutual communication among local government, the ESTP local involvement.

Conclusion

The paper highlights the gap between the policy rhetoric and practical implementation of the ESTP project, and differing perspectives on the ESTP and sustainable development among stakeholders. The project of ESTP is promoted by the EPA, which reflects “top-down initiatives” and limited dialogue between the state and civil society. It shows the problem of lack of transparent information and communication, which leads to various expectations and perspectives on the ESPT among ENGOs, local residents, manager center and firms. The implementation of ESTP mainly reflect the idea of weak sustainability which use limited range of market-led policy tools. The EPA uses limited polity tools, such as inducement and setting environmental regulations. The promotion of ESTP adopts “sector-driven approach” rather than policy integration across sectors. The EPA and local government tend to adopt the capitalist principles on profits and efficiency, and economic
development. For the ENGOs, it is urgent and crucial to solve the problem of illegal waste disposal and dumping, and expect that the ESTP could improve waste disposal problem. The ENGOs put emphasis on environmental sustainability and adopt strong sustainability positions which argue for changes in patterns and levels of consumption and advanced use of sustainability indicators and wide range of policy tools.

The promotion of the ESTP and the achievement of the goal of the formation of “recycle-oriented society” need cooperation among the central and local government, industry, household and community, and changes in patterns of production and consumption. The government mainly uses the economic indicators to show that the ESTP has fostered local economic development successfully. However, the evaluations on environmental and social sustainabilities are limited and incomplete. Only a few ENGOs engage in issues of the ESTP. The public and ENGOs tend to pay much attention to major events or incidents that cause significant risks to public health and the environment. The project of ESTP involves interdisciplinary study (e.g. urban planning, landscape, ecology, policy analysis), insights and the imagination of local development. It is necessary to make information public and facilitate “open-ended dialogue” among various stakeholders. The project will be finished at the end of 2011, and the majority of the interviewees of various stakeholders expect that the ESTP project will continue. Public participation in the future development of the ESTP will be crucial to move toward sustainable society.

References

