

A Study of Green Product Industries in Taiwan

Abstract

Based on the model of 'The Smile of Value Creation' (Mudambi 2007) and the theory of concept marketing, this study aims to examine the top 20 Taiwanese environmental marks¹ companies, and explore their circumstances, innovation patterns and value chain system in Taiwan. It found out all of them are information technology product and household appliances companies. In addition, they make special efforts in two parts of value creation: product (including basic and applied 'R and D' (Research and Design), design, commercialization) and marketing (including advertising and brand management, specialized logistics, after-sales services). They also locate their branches depending on different stages of the value chain, and expand them globally.

Vickie Chihhsuan Chiu

Faculty of Creative Industries
Queensland University of Technology

¹ Environmental mark is a label, which can represent the environmental characteristic of products or service to make it easier for customers to purchase green products by referring to the label.

Introduction

Environmental protection has been developed in Western countries since the 1970s. In 1962, '*Silent Spring*'², written by Rachel Carson, which became well known for helping the launch of environmental protection, was published. With the pollution debate, the Environmental Protection Agency was established in Washington in 1970, and the ban on the pesticide DDT was issued in 1972 in the United States.

According to the International Organization for Standardization (ISO) 14024 specification, green products are products made on an environmentally conscious design in order to protect the health of customers and reduce impacts on the environment. The three chief indexes for design of green products are low pollution, resource reduction and recycling (cited in Environmental Protection Administration Government of the Republic of China 2008).

The *Environmental Business Journal* (1999, cited in Chang 2004) estimated the market scale of global green product was US\$ 4,98 billion in 1999 and the annual growth rate was 3.3 percent. The main environment market in the USA, Europe and Japan was 37.4 percent, 31.6 percent, and 17.7 percent of the whole global market, respectively, in 2000. According to the U.S. Department of Commerce Technology Administration Office of Technology Policy (1998, cited in Chang 2004), the growth rate of the green product market in Asian countries (not include Japan) reached 16 percent from 1995 to 2000. The green industries have also been flourishing in emerging Asian countries, such as Japan, Taiwan and Korea.

Under the trends of popular environmental consciousness of consumers, there exist many changes and impacts of business patterns. Firstly, companies cannot ignore the rising of 'green concept' worldwide. They should enhance their green core competences, and further create their own green innovation and green images (Chen 2008). Secondly, customers are increasingly paying attention to the artistic, symbolic, and emotional value of products, which is conveyed by the design language (e.g., form, colors, materials) that provides the meaning to a product (Dell'Era and Verganti 2007). Therefore, firms also need to pay attention in creation of green design language to communicate well with customers.

² The book cataloged the environmental impacts of the spraying of DDT in the US and questioned the logic of releasing large amounts of chemicals into the environment without fully understanding their effects on ecology or human health.

Most environmental research focuses on natural science and social movements, while the research discusses the relationship between green products and business practices limit. Needless to say the scale of research narrows down to the green innovation, value chain and Asian studies. This paper, which aims to explore green product industries' circumstances, innovation and value creation systems in Taiwan belongs to a project for 'Study of Green Innovation and Marketing: Green Product Industries in Taiwan'. The whole project discusses how the successful green firms manage their innovation system and how they communicate their green concept with customers from production to marketing. In addition, this project also emphasises green marketing, especially green design and the different patterns between manufacturing product industries and non-manufacturing product industries.

The Taiwanese green product industries were chosen for three reasons:

1. Taiwan ranks fifth among countries which have awarded environmental marks to 749 companies and 3,433 pieces of products by June 2007 (Environmental Protection Administration Government of the Republic of China 2008).
2. Taiwan green product industries are dominated by several important trading countries, such as Japan, USA, and Taiwan. In addition, Taiwanese green product industries can represent all segments in the green value chain, from R&D, manufacture, and marketing. Therefore, Taiwan is a good example to examine the variety of green product industries.
3. Taiwan plays an important role in the global economy. Its information technology industry is world famous, and has shown its ability in R&D. According to the Ministry of Economic Affairs (2007), Taiwan was the 4th largest recipient of patents from the US Patent Trade Office and ranked 2nd for the number of patents per 1 million people in 2005.

Green Consumption in the 'McLuhan' Stage

Ozawa, Castello and Phillips (2001, 290-292) present a different view of a new economy with stage-based processes of industrial structural transformation, from the 'Heckscher-Ohlin' labour-intensive industries (typified by textiles) to the 'non-differentiated Smithian' scale-driven industries (steel, basic chemicals, and heavy machinery), to 'differentiated Smithian' assembly-based industries (automobiles and electric/electronics

goods), and finally to the 'Schumpeterian' R&D-intensive industries (specialty chips, bio-technology, and new materials) -- where 'knowledge-based industries' can be located. Following this, he identifies a new stage, which can be identified as the 'McLuhan' stage (named after the media guru, Marshall McLuhan), driven-by the information technology (IT) revolution.

The McLuhan industries produce 'abstract goods' or 'conceptual goods' which may not be picked up statistically in conventional national accounting systems, and Internet-based physical goods such as PCs, mobile phones and laptops. The new McLuhan industries impact all the old economy industries in many ways including production, management, distribution, and customer services. In fact, other support industries such as finance, telecommunications, and distribution and government services usually are dramatically affected. This concept is similar to green product industries.

Japan was the first Asian country to move through the previous four stages and enter the 'McLuhan' stage. The Asian NIEs (Hong Kong, Singapore, Taiwan and South Korea), have stepped up their efforts in R&D activities in order to catch up with Japan. China is also taking advantage of its huge domestic market that can attract foreign multinationals and technologies and is entering the assembly-based industries, especially automobiles and consumer electronics industries. In its new 5-year plan, China, however, is also making a move into knowledge-based industries.

Innovation has been proposed for a long time; however, innovation is still in vogue in the McLuhan age. Innovation refers to a corporate environment that promotes and supports novel ideas, experimentation, and creative processes that may lead to new products, services, or processes. Schumpeter (1934; 1942) was among the first to emphasize the role of innovation in the entrepreneurial process. Schumpeter (1942) outlined an economic process of 'creative destruction', by which wealth was created when existing market structures were disrupted by the introduction of new goods or services that shifted resources away from existing firms and caused new firms to grow.

Innovation is the specific instrument for conceptual goods creation. Drucker (2004, 31-32) notes seven sources for innovative opportunity. He proposes that the first four sources are highly reliable indicators of changes that have already happened or can be made to happen with little effort: the unexpected, incongruity, innovation based on process need, and changes in industry structure or market structure. The second set of sources that Drucker (2004, 32) mentions involves changes outside the enterprise or industry. They are demographics, changes in perception, mood, and meaning and new

knowledge. Drucker (1985, 236) also stated that innovation is needed in society as much as in the economy.

Green product industry no doubt is one of the most typical and popular industries in the 'McLuhan' stage. Green innovation could be defined as "hardware or software innovations that related to green products or processes, including the innovation in technologies that are involved in energy-saving, pollution-prevention, waste recycling, green product designs or corporate environmental management" (Chen 2008).

Triebswetter and Wackerbauer (2008) believe many green innovations indeed are driven by economic benefit and general business considerations, such as cost reduction, to enhance competitive advantages and enter new markets. Other green innovations are forced by external pressure (e.g. customer, environmental), especially in customer pressure. Henriques and Sadorsky (1996, cited in Chen 2008, 1487) also stated consumers are more willing to choose green products and even pay relatively high prices for green products. Legislative pressure follows on from the above two main drivers of green innovation. Furthermore, Triebswetter and Wackerbauer (2008, 1487) found out that environmental policy induces investment in green R&D with a small positive result with business performance; however the direct impact of environmental policy on business performance is negative.

The Smile of Value Creation

Mudambi (2008) believes firms are globally dispersing their value chains to leverage capabilities and control costs. The geography of value-creation is the outcome of a dynamic process of the new economy. In Western transaction cost analysis³, 'bounded rationality', uncertainty and complexity of transaction, opportunistic behaviour on the part of some of the players, among other issues, will increase transaction costs and render market transactions inefficient. Carlisle and Flynn (2005) explain a company tends to minimize transaction costs through internal expansion and only deals with outside suppliers when necessary. When firms grow, returns may decrease

³ Coase's landmark paper 'The Nature of the Firm' (1937) introduced transaction costs into economic analysis, and discovered the factors that determine the relative costs of coordination by management within the firm or by transactions in the market.

because of increased transaction costs between different divisions within the same organization.

Following the logic of transaction cost analysis, Mudambi (2008, 704) stated, when firms have a strong tendency to outsource to others, some of them incline to exercise high control and concentrate resources on specific activities. Other firms tend to obtain the greater control over the entire value chain. Based on two dimensions 'geographical location strategy' and 'control strategy', Mudambi (2008, 701) has divided strategic choice of value chain into four parts: onshore in-house (concentrated location-vertical integration control), onshore outsourced (concentrated location-specialization control), captive offshore (dispersed location-vertical integration control), and offshore outsource (dispersed location-specialization control).

Companies have found value-added activities become more concentrated at the upstream and downstream ends of the value chain. Mudambi (2007, 706-707) proposed the 'The Smile of Value Creation' model (as Figure 1) to emphasise two highest value-added activities at two ends. The left end or 'input' end is supported by R&D knowledge, which focuses on 'R&D based' value added activities, such as basic and applied R&D, design, and commercialisation. The right end or 'output' end is sustained by marketing knowledge, which focuses on 'marketing-based' activities, emphasising marketing, advertising and brand management, specialized logistics, and after-sales services. The low end of the 'smile curve' is manufacturing and standardized service. This model represents the disaggregation of value chain, which the production process of firms settles on different locations based on their 'geographical location strategy'. Mudambi (2007, 206) states, 'this disaggregation is the outcome of firms combining the comparative advantages of geographic locations with their own resources and competencies to maximize their competitive advantage'.

Taiwanese green product companies also support this argument, and represent all areas of the value chain. This can be observed in the case studies I have chosen.

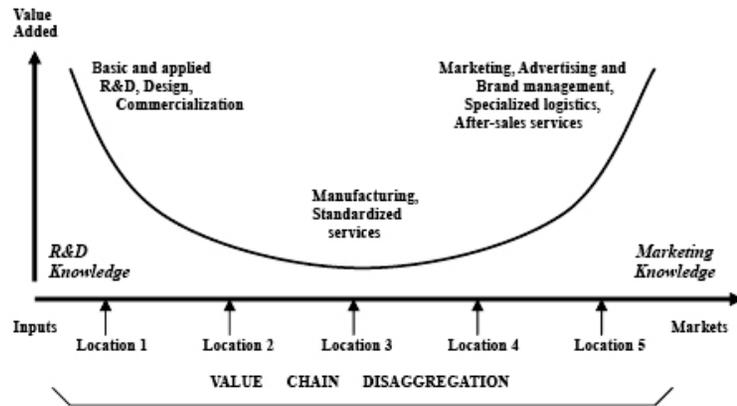


Figure 1: The Smile of Value Creation; Source: Mudambi (2007, 2008)

Research Question

Based on the above discussions of literature review, I lead to the research question:

What Are the Circumstances, Innovation Patterns and Value Creation System in Taiwanese Green Product Industries?

In this qualitative study, I collected data through secondary data analysis. I chose the top 20 environmental marks companies as Figure 2, which represent 52.42 percent environmental marks in Taiwan, and collected pertinent documents from August to September 2008. This type of information can take many forms including formal studies or evaluations, public reports, administrative documents, agendas, announcements, written reports of events, newspaper clippings and other articles appearing in mass media relating to Taiwanese green product industries.

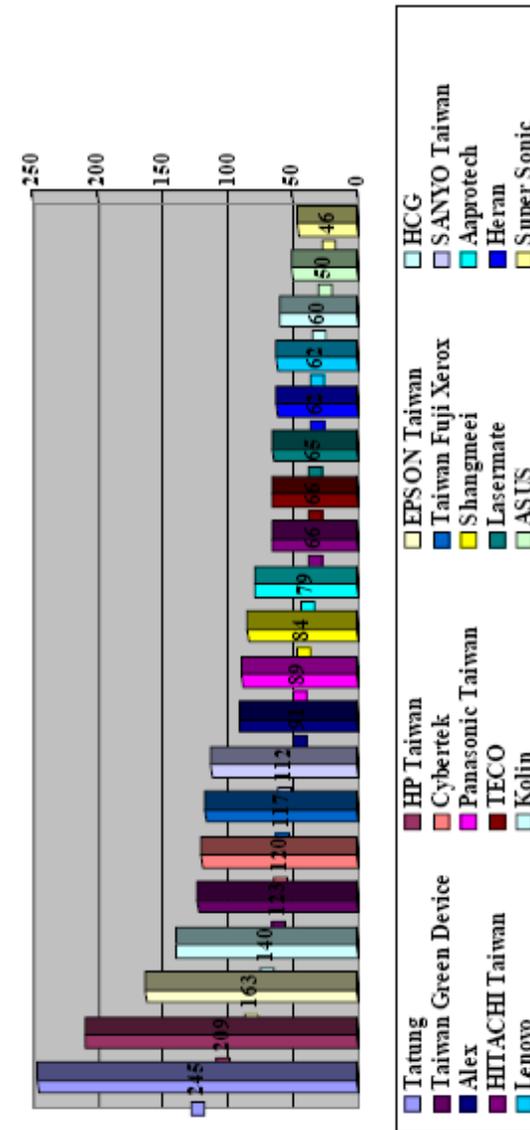


Figure 2: The Statistic of Top 20 Taiwanese Environmental Mark Firms

Source: Environmental Protection Administration Government of the R.O.C. (2008)

Green Product Industries in Taiwan

The Taiwanese environmental protection administration and regulations were formally established in 1979. The Executive Yuan passed the 'Environmental Protection Act in the Taiwan Area' in April 1979, and established an Environmental Protection Bureau to take charge of air pollution, water pollution, traffic noise control and environmental health. At present, the chief administrative organization of green product industries in Taiwan is the Environmental Protection Administration (EPA), which governs seven departments⁴ and was upgraded in August 1987. Other related institutions include the Industrial Development Bureau (IDB) Ministry of Economic Affairs, Bureau of Standards, Metrology and Inspection Ministry of Economic Affairs, Fair Trade Commission and Environment and Development Foundation.

The Taiwan government introduced the 'Green Marks Promotion Plan' in 1992, and began the first round of applications in 1993. Until now, the Taiwan government has developed 105 standards of green mark for application, and ranks third worldwide (Environmental Protection Administration Government of the Republic of China 2008, 4). The Environmental mark is a label, which can represent the environmental characteristic of products or service to make it easier for customers to purchase green products by referring to the label. International Standards Organization (ISO) 14020 has drawn up three types of environmental marks schemes: Type 1 is a multi-attribute label developed by a third party; Type 2 is a single-attribute label developed by the producer; Type 3 is an eco-label whose awarding is based on a full life-cycle assessment (International Institute for Sustainable Development 2008). The most common Taiwan Green Mark as Figure 3 belongs to Type 1.



Figure 3 Taiwan Green Mark [Source: Environmental Protection Administration Government of R.O.C. (2008)]

⁴ Seven departments include Comprehensive planning, air quality protection and noise control, water quality protection, waste management, environmental sanitation and toxic substance management, supervision evaluation and dispute resolution, environmental monitoring and information management.

To discuss the green international activities in Taiwan the Environment and Development Foundation has on behalf of the Taiwan government participated in the Global Ecolabelling Network (GEN) and signed bilateral agreements on the green mark with main trading countries, such as America, Canada, Australia, New Zealand, Japan, Korea, Thailand, the Czech Republic, and Ukraine (Environmental Protection Administration Government of the Republic of China 2008).

Besides the above international cooperation, the Taiwan government also assists companies to update their green process to complement to global regulations. According to statistics from the European Union (cited in Industrial Development Bureau 2008), the estimated export production value of Taiwanese energy-using products (EuP) sold to Europe was over US \$6.21 billion in 2007. The whole value of Taiwanese EuP industries are around US \$18.34 billion per year, which includes the export production and raw materials and parts that Taiwanese firms offer to foreign companies, to produce final products in their original countries. To assist Taiwanese companies to consult on-site with EuP Directives and develop the compliance tools, The Industrial Development Bureau (IDB) has initiated the '2008 International Environmental Regulation Compliance and Cleaner Production Promotion Project'.

In order to promote green products, EPA also established the systems of green product procurement and green stores. According to the Environmental Policy Monthly, August (Environmental Protection Administration 2008), the result of government green procurement in 2007 was satisfied, which accounted for over 90 percent of spending in designated green product areas⁵. In addition, over US\$ 210.28 million has been invested in environmental products, showing an increase of US\$ 3.82 million over the year 2006. Statistics show office equipment accounts for the largest amount of all green purchases at 68.5 percent. Computers rank second at 14.4 percent. Other office supplies and paper account for 13.9 percent and other categories account for 3.2 percent. To register, a Green Store must sell at least three kinds of Green Mark products, have well-labeled green product areas and install recycling facilities. After examination, the EPA will give a Green Store logo to announce that the shop sells Green Mark products, and

⁵ The top three performing agencies in the central government were the Central Bank of Taiwan, the Coast Guard Administration, and the Central Personnel Administration. The top three performing agencies at the local government level were Taipei City, Hsinchu County and Chiayi City. Computer mainframes, household air conditioners, office automation systems and dual-flush toilets are the products on which most green procurement money is spent.

energy or water saving products (Environmental Protection Administration 2008).

Green Information Technology Product

Ten (50 percent) green information technology cases exist in this study including HP Taiwan (printer, ink cartridge, personal computer, monitor), EPSON Taiwan (projector, printer, ink cartridge), Taiwan Green Device (ink cartridge), Cybertek (ink cartridge), Taiwan Fuji Xerox (printer, ink cartridge), Aaprotech (ink cartridge), Lasermate (ink cartridge), Lenovo (laptop, personal computer), ASUS (laptop, personal computer, monitor), and Super Sonic (personal computer).

Their main green products can be divided into six parts: ink cartridge, personal computer, printer, laptop, monitor, and projector (see Table 1). The chief green innovation related to ink cartridge recycling. Ink cartridges not only can be recycled as whole goods, but also as separated plastic, aluminum and iron. In addition, to recycle each ink-cartridge can save 2.89 litres of petroleum, which also means a reduction of 8.93 kilograms of CO_2 . Those cases also have established the direct sales system in which customers can register their order and recycling on phone, and then enjoy the free door-to-door service after a few days. For example, Cybertek, a successful recycling ink cartridge company, has reduced the waste of ink cartridges by around 90 tons per year, including the 69.6 tons of plastic, 7 tons of aluminum and 8 tons of iron per year. Other green innovations with ink cartridges are to refuse harmful materials, reduce print cost and adopt green packaging.

Those green innovations in personal computer, printer, laptop, monitor and projector industries are similar, which focus on energy-saving innovations of product and the production progress (e.g. EPSON Taiwan uses the small watt, long-lasting light bulb and automatic cut off system in projectors; the power consumption of Asus personal computer EeeBOX is 20 Watt, which saves energy up to 90 percent comparing with other computers), harmful material reduction (e.g. HP Taiwan reduces the component of harmful metal such as Hg in monitor), waste reduction (e.g. HP Taiwan designs 10 different print levels of choice; Taiwan Fuji Xerox designs the small size printer to save the room), and green materials and packaging.

Classification	Firms	Green Innovations
Ink Cartridge	HP Taiwan, EPSON Taiwan, Taiwan Green Device, Cybertek, Taiwan Fuji Xerox, Aaprotech, Lasermate	Recycling of ink cartridge (plastic, aluminum, iron), Door to door delivery and recycling system, Harmful materials reduction, Green packaging, Print cost reduction
Personal Computer	HP Taiwan, Lenovo, ASUS, Super Sonic	Energy-saving in production progress and products, Green materials and packaging
Printer	HP Taiwan, EPSON Taiwan, Taiwan Fuji Xerox	Harmful materials reduction, Low power consumption, Auto cut off system, Small size printer, 10 print levels
Laptop	Lenovo, ASUS	Energy-saving in production progress and products, Green materials and packaging, Green design
Monitor	HP Taiwan, ASUS	Energy-saving in production progress and products, Green materials and packaging, The component of harmful metal reduction
Projector	EPSON Taiwan	Small watt and long-lasting light bulb "E-Torl", Automatic cut off system

Table 1: Taiwanese Green Information Technology Products, Companies and Innovations [Source: Compiled by Researcher for This Study]

Green Household Appliances

Another ten (50 percent) firms in this study produce green household appliances, such as Tatung (air conditioner), SANYO Taiwan (air conditioner, washing machine, refrigerator), Panasonic Taiwan (air conditioner, humidity reducing set), HITACHI Taiwan (air conditioner, exsiccator), TECO (air conditioner), Heran (air conditioner), Kolin (air conditioner, refrigerator), HCG (WC suite), Alex (WC suite), and Shangmeei Industrial Co.Ltd (construction materials).

The most popular green product they produce is air conditioner. Following products are humidity reducing set, WC suite, washing machine, refrigerator, and construction materials (see Table 2). The green innovations of air conditioner include reducing power consumption and enhancing the coefficient of performance (COP) value (e.g. enhance the efficiency of coolant and high evaporate machine). All green innovations of humidity reducing set, washing machine and refrigerator focus on reducing power consumption. The green innovation related with refrigerator also put emphasis on reducing harmful materials (e.g. plastic, paint and coolant). For example, Kolin adopts steel plate on the outer-door shell of refrigerator to reduce the use of paint. The focal green innovation of WC suite is water saving. For instance, HCG produces the dual-flush WC suite that estimates can reduce 48 metric ton per household per year, comparing with normal WC suite. Construction materials companies such as Shangmeee focus on recycling and green materials among their green innovations.

Classification	Firms	Green Innovations
Air Conditioner	Tatung, SANYO Taiwan, Panasonic Taiwan, HITACHI Taiwan, TECO, Heran, Kolin	Enhance the efficiency of coolant and high evaporate machine. Low power consumption to enhance the COP value
Exsiccator	Panasonic Taiwan, HITACHI Taiwan	Low power consumption
WC Suite	HCG, Alex (Tien Kuang)	Water-saving, Dual-flush, Long-lasting
Washing Machine	SANYO Taiwan	Low power consumption
Refrigerator	SANYO Taiwan, Kolin	Low power consumption, Disinfect System, No harmful materials in plastic and paint, Adopt stick on steel plate to reduce the paint, Use coolant under the international environmental standard
Construction Materials	Shangmeee Industrial Co.Ltd	Recycling, Green materials

Table 2: Taiwanese Green Household Appliances Products, Companies and Innovations [Source: Compiled by Researcher for This Study]

The Smile of Value Creation of Taiwanese Green Product Industries

In order to analysis the top 20 green mark companies' value chain, I abstract three main ends of 'The Smile of Value Creation' to discuss the phenomenon of locational disaggregation of the value chain: R and D-based, marketing-based and manufacturing-based. This study has divided these green firms into two classifications: Japan, USA, China origination companies and local Taiwanese companies.

Seven companies belong to Japan, USA, China origination companies. Five Japan origination green companies are joint venture or have technology transfer from Japan, as in Figure 4. Taiwan Fuji Xerox was formed as a joint venture with Hexin Company in 1970. Taiwan Fuji Xerox focuses on manufacturing in the initial stage; it also has done R and D for original printers since 1991. However, most functions of Taiwan Fuji Xerox are as a self-operation marketing and manufacturing center for Fuji Xerox. Although Fuji Xerox mainly manufactures their printers in China, Thailand, Philippines, and India and establishes many marketing-based branches globally, they are affected by Fuji Xerox directly. Similar situations also happen in EPSON Taiwan and SANYO Taiwan.

Different from the above three firms, Panasonic Taiwan and HITACHI are involved in more R&D-based value-added activities; furthermore they have also established their own branches in China (e.g. Amoy in Fukien Province, Suzhou) to be manufacturing bases. USA and China originated companies (HP Taiwan and Lenovo) also follow the pattern of Fuji Xerox, through a hierarchical offshore network of local marketing or low cost suppliers to control the core intangible asset and the brand.

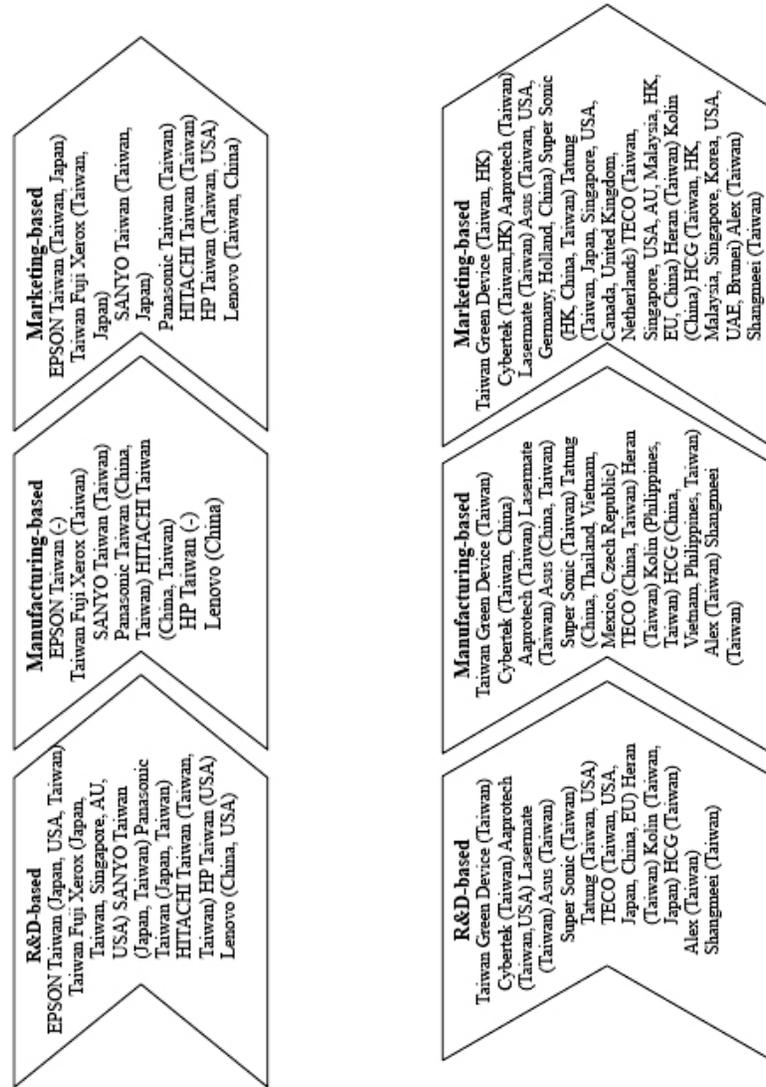


Figure 4: The Abstract 'The Smile of Value Creation' of Japan, USA, China origination companies. [Source: Compiled by researcher for this study] Figure 5: The Abstract 'The Smile of Value Creation' of local Taiwan companies [Source: Compiled by researcher for this study]

To analyze the 13 local Taiwan companies (as Figure 5), I found out that many of them follow the 'The Smile of Value Creation', in which 'R&D-based' (research and design), 'marketing-based' value-added activities will locate in advanced economies, while manufacturing and standardized services locate in low cost places. These green companies have located their value chain in different countries depending on which area has comparative advantages. For example, Taiwan Green Device and Cybertek choose Hong Kong as a base to expand overseas businesses.

However, some firms break this rule: firstly, some totally local companies do not have significant resources to establish a branch overseas, and some do not tend to do that. Therefore, the whole value chain of these companies is in Taiwan (e.g. Lasermate, Heran, Alex and Shangmei). Secondly, some firms follow the rules partly. For example, Tatung locates in China, Thailand, Vietnam, Mexico and Czech Republic for manufacturing. That is because Tatung uses Mexico as a production base to sell its products and provide hardware support to the North American area. In the same pattern, Tatung uses the Czech Republic as a manufacturing base to support the European market. Thirdly, the marketing-based value-added activities are increasing localization, to establish a marketing branch in a chief market, to localize their marketing ideas. China can be a good example of expansion as it can both locate to engage in manufacturing-based and marketing-based value-added activities. Fourthly, some firms also adopt the integrated, technique transfer or contact cooperation strategies to employ resources efficiently. For example, TECO spreads its R&D teams in Taiwan, USA, Japan, China and EU.

Discussion and Conclusion

Green product industries provide a particularly useful setting to illustrate both 'conceptual products' in the 'McLuhan' stage and 'the smile of value creation'. Green products are products of successful convergence of technology, design, concept, culture and lifestyle. To integrate with 'green concept', the green products are not only the industrial goods, but also social goods.

The concept of environmental protection in Taiwan did not develop very early. However, the Taiwanese government is trying to catch up with other Western countries. The chief administrative organization of green product industries in Taiwan is the Environmental Protection Administration (EPA),

which devoted itself to promote green mark, green store, bilateral agreements of green mark with main trading countries, and update Taiwanese companies' green process to complement international regulations.

Fifty percent of cases in this study produce green information technology products, including HP Taiwan, EPSON Taiwan, Taiwan Green Device, Cybertek, Taiwan Fuji Xerox, Aaprotech, Lasermate, Lenovo, ASUS, and Super Sonic. Another ten firms in this study produce green household appliances, such as Tatung, SANYO Taiwan, Panasonic Taiwan, HITACHI Taiwan, TECO, Heran, Kolin, HCG, Alex, and Shangmeei Industrial Co.Ltd.

These companies represent their own characteristics in different sub-industries; however, they also share some aspects in common. All of them conform to low pollution (personal computer, printer, laptop, monitor and projector industries, refrigerator), resource reduction (personal computer, printer, laptop, monitor, projector, air conditioner, humidity reducing set, washing machine and refrigerator, WC suite) and recycling (ink cartridge, construction materials) that the International Organization for Standardization (ISO) 14024 specification has mentioned. Although the aim of green innovations is similar, different firms still adopt varied methods to deal with the same problem.

In Taiwanese green product industries, the locational disaggregation of value chain has been in place for decades. This study has divided these green firms into two classifications: Japan, USA, China origination companies and local Taiwanese companies. Seven companies belong to Japan, USA, China origination companies, and most of them through hierarchical offshore network of local marketing or low cost suppliers to control the core intangible asset and the brand.

To analyze the 13 local Taiwan companies, I found out that many of them follow the 'The Smile of Value Creation', which means activity in 'R and D-based', 'marketing-based' value-added activities will locate in advanced economies, while manufacturing and standardized services locate in low cost places. However, some firms break this rule in some conditions: firstly, some totally local companies do not have significant resources to establish branches overseas, and some otherwise do not tend to do that. Secondly, some firms follow the rules partly. For example, Tatung locates China, Thailand, Vietnam, Mexico, Czech Republic in charge of manufacturing. That is because Tatung uses Mexico as a production base to sell its products and provide hardware support to the North American area. In the same pattern,

Tatung uses Czech Republic as a manufacturing-based area to support the European market. Thirdly, marketing-based value-added activities are increasing localization -- establishing a marketing branch in a chief market to localize their marketing ideas. China can be a good example to expand why it can both locate in manufacturing-based and marketing-based value-added activities. Fourthly, some firms also adopt the integrated, technique transfer or contact cooperation strategies to employ resources efficiently. For example, TECO spread its R&D teams in Taiwan, USA, Japan, China and EU.

Based on the 'smile of value creation', there are two main parts in innovations: 'R and D innovation' which is based on the knowledge management and 'marketing innovation', and is supported by marketing knowledge. Mudambi (2008) writes that that 'R and D-based', 'marketing-based' value-added activities locate in advanced economies, while manufacturing and standardized services locate in low cost places. However, this study does not totally support that view. Some of the advanced economies concentrate on R&D and design and outsourcing offshore in Taiwan, China, Vietnam, and Thailand. Some of them also choose to establish marketing centers in China and Taiwan. This is because marketing knowledge does not only exist in advanced economies any more; localization and cultural adjustment seem to be becoming more important than 'pure' marketing knowledge.

References

- Carlisle, E. and D. Flynn. 2005. Small Business Survival in China: *Guanxi*, Legitimacy, and Social Capital. *Journal of Developmental Entrepreneurship*, 10(1): 79-96.
- Chang, Y.T. 2004. *International Marketing Strategy for Environmental Industry: Exemplified by Asian Rising Countries*. HsinChu: National Tsing Hua University.
- Chen, Y.S. 2008. The Driver of Green Innovation and Green Image-Green Core Competence. *Journal of Business Ethics*, 81:531-543.
- Dell'Era, C. and R. Verganti. 2007. Strategies of Innovation and Imitation of Product Languages. *The Journal of Product Innovation Management*, 24:580-599.

Drucker, P.F. 2004. *Innovation and Entrepreneurship: Practice and Principles, 2nd*. Oxford: Elsevier Butterworth-Heinemann.

Environmental Protection Administration Government of the Republic of China. 2008. *Environmental Policy Monthly, May 2008*. Taipei: Environmental Protection Administration.

Environmental Protection Administration Government of the Republic of China. 2008. *Environmental Policy Monthly, August 2008*. Taipei: Environmental Protection Administration.

Environmental Protection Administration Government of the Republic of China. 2008. *2007 Green Marketing Award: The Achievement of Winners*. Taipei: Environmental Protection Administration.

Environmental Protection Administration Government of the Republic of China. 2008. *2008 Green Consumer Guide*. Taipei: Environmental Protection Administration.

Environmental Protection Administration Government of the Republic of China. 2008. *Historical Development and Background*.

<http://www.epa.gov.tw/en/epashow.aspx?list=9044&path=9055&guid=da6d766e-4053-4dc9-896d-c85421f2b5b6&lang=en-us> (accessed September 28, 2008).

Environmental Protection Administration Government of the Republic of China. 2008. *The Classification of Environmental Products*. <http://greenliving.epa.gov.tw/greenlife/green-life/mark-4.aspx#L13> (accessed September 28, 2008).

Environmental Protection Administration Government of the Republic of China. 2008. *The International Agreements*. <http://greenliving.epa.gov.tw/greenlife/green-life/mark-2-5.aspx> (accessed September 28, 2008).

Environmental Protection Administration Government of the Republic of China. 2008. *The Statistic of Top 20 Taiwanese Environmental Mark*. <http://greenliving.epa.gov.tw/greenlife/green-life/mark-9-2.aspx> (accessed September 28, 2008).

Industrial Development Bureau. 2008. *The Impact of the Energy-using Products (EuP) Directive on Taiwan Industries and the Responsive Action of IDB*.

<http://www.moeaidb.gov.tw/external/ctrl?lang=1&PRO=pda.NewsView&id=4807> (accessed September 28, 2008).

International Institute for Sustainable Development. 2008. *The ISO 14020 Series*. http://www.bsddglobal.com/markets/eco_label_iso14020.asp (accessed September 28, 2008).

Ministry of Economic Affairs Digital Content Industry Office. 2007. *2007 Digital Content Industry in Taiwan*. Taipei: Ministry of Economic Affairs.

Mudambi, R. 2007. Offshoring: Economic Geography and Multinational Firm. *Journal of International Business Studies*, 38(1): 206.

Mudambi, R. 2008. Location, Control and Innovation in Knowledge-intensive Industries. *Journal of Economic Geography*, 8: 699-725.

Ozawa, T., S. Castello and R.J. Phillips (2001) The Internet Revolution, the 'McLuhan' Stage of Catch-up, and Institutional Reforms in Asia, *Journal of Economic Issues* XXXV (2): 289-297.

Seidel, V. P. 2007. Concept Shifting and the Radical Product Development Process. *The Journal of Product Innovation Management*, 24: 522-533.

Siguaw, J.A., P.M. Simpson and C. A. Enz. 2006. Conceptualizing Innovation Orientation: A Framework for Study and Integration of Innovation Research. *The Journal of Product Innovation Management*, 23: 556-574.

Triebswetter, U. and J. Wackerbauer. 2008. Integrated Environmental Product Innovation in the Region of Munich and its Impact on Company Competitiveness. *Journal of Cleaner Production*, 16:1484-1493.

The research interests of Vicki Chiu focus on new media firms' entrepreneurship in Taiwan and mainland China. For her PhD thesis she is using the concept of "Entrepreneurial Guanxi" in pan-Chinese society, and is constructing an "Entrepreneurial Guanxi Taxonomy Matrix" with two axes: "Association, Benefit" and "Trust, Reciprocity" to illustrate four different types of entrepreneurial guanxi. She is also emphasising Taiwanese firms' different entrepreneurial strategies in the Chinese market.