

**THE INFLUENCE OF GREEN INNOVATION OF JAPANESE
ELECTRONIC INDUSTRIES ON COMPETITIVE ADVANTAGE
WITH PARTICULAR REFERENCE TO JAPANESE HOME
APPLIANCE INDUSTRY**

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Abstract

Due to the increasing of restriction and regulation for environment protection also the increasing of consumer awareness of the environment sustainability, business trends tend to become more sensitive to environmental issues. Japan is the pioneer of green innovation that addressing environmental concern. However, Japanese industries, especially Japanese electronic industries are facing difficulties to compete in the market. They disclosed their annual lost. Hence, this study aimed to find out whether green innovation has influence on competitive advantage and for how long green innovation able to deliver competitive advantage. Furthermore, this study wanted to explore Asian consumers on how they view green attributes and whether or not they are willing to buy green products. The purpose is to encourage companies to acknowledge the gap. Hence, they can implement and enhance and sustain green innovation in the global market. The data are collected from literature review, Eco-Product Directory, Capital IQ for financial information and questionnaires for consumers' perspective on green products. Data are analyzed through empirical study using statistic correlation, Spearman and Pierson correlation due to different characteristic of data. This study found that green innovation has significant correlation with competitive advantage, especially competitive advantage on sales and low cost. However, based on five years period of environmental performances, sales and operating income, significant correlation only happened during entry and early act of green innovation. Furthermore, from questionnaires, it is showed that consumers that aware of the importance of environment attributes also consider product quality, brand image also price as their buying preferences.

Keywords: Green, Green Innovation, Eco-Innovation, Sustainable development, Environment Sustainability, Environment-friendly, Green consumers, Competitive advantage

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1. Introduction

One of the most pronounced trends of corporate behavior in recent decades is the growing sensitivities of business toward environmental issues (Lyon and Maxwell, 2004). From the restriction on Chlorofluorocarbon (CFC) of the "Montreal Convention" in 1987, the restriction on the emission of CO₂ of the "Kyoto Protocol" in 1997, to the "Restriction of Hazardous Substances" (RoHS) and "Waste Electronics and Electrical Equipment" (WEEE) which has been prevailed from 2006, have been enforced to regulate and control environmental acts and will bring significant impacts to industries in the world (Chen, Lai & Wen, 2006). Also, nowadays people are more aware of the environmental impacts of human activities and are more willing to make behavioral changes for environmental reasons. "Seventy-eight percent of the public believes that the nation should make a major effort to improve the quality of our environment" (Roper Organization, 1990, p.1). Therefore, it is an essential task to work out policies to respond to the trend of the environmental protection (Petts et al., 1998). Due to the increasing of the strict international regulations and conventions of environmental protection and the increasing of consumer environmentalism, this changes the pace of competition in the industries around the world (Chen et al., 2006 p.331), include Japanese electronic industries.

Nowadays, eco-production, eco-design and integration of environmental sustainability throughout the supply chain are both a brand and identity for most electrical and electronic industry players (Kam and Wong, 2012, p.469). However, environmental commitment and regulatory-compliance represent added costs toward business (Kam and Wong., 2012, p.469). Additional cost may erode global competitiveness for firms (Ambec and Lanoie, 2008). Innovation is costly and risky and the challenge of green innovation is even more intimidating as regulatory compliance, integration of environmental concepts in business

decision making and translating customer aspirations for product greenness and functionality involve significant resources commitment (Kam and Wong, 2012). Haddock-Fraser and Fraser (2008) as cited in Kam and Wong (2012) found that "decision to play-it-green must be spurred by strategic considerations and not by the motivation for short-term cost savings" (p.469). In contrary, several previous studies thought that pollution was the real evidence of inefficient uses of resources, and companies that pioneer in green innovation will gain the "first mover advantage", which allow them to pursue a higher price for green products and, at the same time, improve their corporate images, develop new markets opportunities, and gain competitive advantages (Chen, 2008; Chen et al., 2006; Rennings and Rammer, 2009). Companies implement environmental management and green innovation actively can not only minimize production waste and increase productivity, but also improve whole productivity, increase corporate reputation, and therefore, enhance corporate competitiveness under the rise of environmentalism consciousness of consumers and demanding international regulations of environmental protection (Chen, 2008).

Electronics is expected to be a leading industry in the 21st century because of its enormous potential for growth; revolutionary technology; and impact on other industries and markets (Yamada, 1990). As described in Figure 1.1, half of the world electronic industry is localized in Asia. Japan produce 15 per cent of world electronic goods (*Decision*, 2009), and since the 1970s, demand for consumer electronics equipment has benefited from the economy's high rate of growth (Yamada, 1990). Although the percentage as not as high as Europe and have a little bit difference with North America but Japanese companies have been responsible for a number of important innovations, including having pioneered the transistor radio and the walkman (Sony), the first mass-produced laptops (Toshiba), the VHS recorder (JVC), and solar cells and LCD screens (Sharp) and they earned their fortunes from running

efficient operations at home that shipped in huge quantities to the West ("Japanese electronics firm,," 2011). But since the beginning of 21st century, a number of the largest Japanese electronics companies have struggled financially and lost market share, particularly to South Korean and Taiwanese companies. Japanese companies have lost their dominant position in categories including portable media players, TVs, computers and semiconductors (Bailey, Wendy & Misono, 2007). Big Japanese brand, Sony, Panasonic, Toshiba, Sharp, Hitachi and NEC are losing market share to Samsung and Apple ("Japanese manufacturing, from," 2012). As such competition heats up in the field of innovation, accelerating the speed of product development is becoming a vital issue for Japanese firms (Motohashi, 2011). Hence, Japan's response to the economic crisis and new growth strategy have taken up this challenge by identifying the environment, and in particular innovation aimed at addressing environmental concerns, as a source of economic recovery & long-term growth (Capozza, 2011). Start from 2007, Japan adopted the "Strategy for Sustainable Society in the 21st Century (Gurria, 2010, p.13).

However, Japanese electronics companies focus almost exclusively on the domestic Japanese market (Bailey et.al., 2007). This statement is strengthened by Kiyohiko Ito and Vladimir Pucik (1993), that Japanese manufacturing firms use their strength in the domestic market as the foundation of their international competitive strategies. The domestic competitive advantage may come from a variety of sources, such as lower cost, better products and services, faster innovation, strong distribution channels, and financial strength. But, domestic demand in Japan is always saturated, so new demand can only be created by developing new products. Therefore, the need to modify production lines for new products provides another incentive for moving production of existing products overseas (Yamada, 1990).

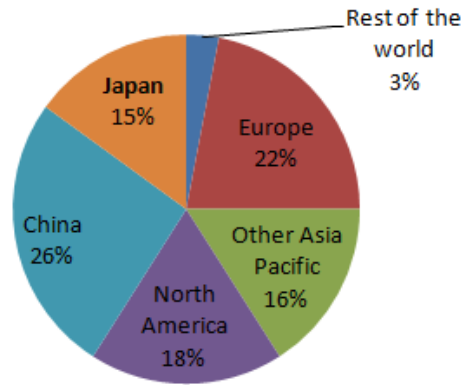


Figure 1.1. World Electronic Equipment Production per Region FY 2008 (Source: Decision, 2009)

According to OECD (Organization for Economic Co-Operation and Development) Development Centre pertaining Internationalization Strategies of Japanese electronics companies: Implications for Asian Newly Industrializing Economies (NIES) (1990), in terms of sales, 45% of overseas production is sold in the United States; 31% in Asia; and 15% in Europe, with 79% of the output sold locally, 9% exported to Japan, and 12% exported to third countries. While the total market growth of electronics lead by Asia Pacific, 7.1%, and China, 6.9% (*Decision*, 2009). As the Asia Pacific-market grows rapidly, it may be an opportunity for Japan to shift or even enhance their market in to Asia Pacific Market. Indonesia could be one of the targets to penetrate. The Indonesian Electronics Association is forecasting a 20% growth in domestic electronics sales for 2012 to \$3.2 billion USD (excluding cell phones and computer hardware) ("Global Business Guide Indonesia", 2013). This trend is also expected to be coupled with the rise of Indonesia as a major manufacturing base for international electronics producers who are keen to take advantage of the country's consumer market while using it to serve as an entry point for the ASEAN region ("Global Business Guide Indonesia", 2013). However, Japanese electronics companies face a tremendous competitive challenge. Rivals in other parts of the world are currently defeat them in terms of productivity, financial performance, brand value (Bailey et.al. 2007).

1.2. Research Objectives

Through their strategy shift towards to green innovation and the growth of consumer electronics in Indonesia, this paper would like to:

1. Find out the influence of green innovation on competitive advantage of Japanese electronic industries with particular reference to Japanese home appliance industry
2. Provide information regarding of what Japanese home appliance businesses should do in regards to implement and enhance green innovation in the market successfully

1.3. Research Question

In order to be able to achieve research objectives, several questions that occur are:

1. Does green innovation influence Japanese electronic industries - with particular reference to Japanese home appliance industry - on their competitive advantage?
2. How long is green innovation able to influence the Japanese home appliance industry's competitive advantage?
3. What Japanese electronic industries - with particular reference to Japanese home appliances - should do in order to successfully maintain their competitive advantage on green innovation?

2. Review of literature

2.1. Green Innovation

According to *Eco-innovation-towards taxonomy and a theory* written by Anderson on 25th celebration DRUID¹ Conference 2008 on Entrepreneurship and Innovation-Organizations, Institutions, Systems and Regions, Copenhagen, Denmark, "environmental innovation research is still in its early phase, and there are worldwide very few actual innovation researchers working with environmental issues". Hence, confusion exists particularly with regards to different notions that describe innovations with a reduced negative impact on the environment.

The most prominent notions used in the literature are “green”, “eco”, “environmental” and “sustainable” to describe this innovation type (Schiederig, Tietze & Herstatt, 2011). Figure 2.1 show notions around the concept of green innovation including eco innovation and sustainable development. While Figure 2.2 describes the scheme of literature review that related with notions contributing to a better understanding how “green” innovation is defined.

Green terms can be confusing. There is no standardized definition of the term green and it is not regulated. According to article from University of Nebraska about “What does Green really mean?” Green refers to adoption of environmental management practices and products intended to minimize the damaging impact on the environment from resource depletion & pollution. Think of "environmentally preferable" products and services that reduce pollution and that have less effect on human health and the environment (Welte, Bartos & Niemeyer, 2010).

¹ DRUID, established in 1995, based on a generous funding from the Danish Social Science Research Council (SSF) and the Danish Ministry of Industry, is associated with the journal *Industry and Innovation*, published by Routledge. The mission of DRUID is to establish itself as a leading European centre for research and doctoral education in industrial dynamics, based on theories of innovation, economic organization, competitive advantage, organizational competencies, economic evolution and growth (Source: www.druid.dk).



Figure 2.1. Notions of Green Innovation

Going green means reducing the overall environmental impact of business. That holistic approach includes compliance issues that protect societies and the environment. When those initiatives are combined with energy efficiency measures that conserve the earth's resources, business can be more efficient, and reduce costs. Going green involves four general objectives, which approach to greening business. Energy – Improve efficiency and reduce consumption. Materials – Use sustainable materials and eliminate waste. Assurance – Comply with environmental regulations. Purchasing – Buy green products, equipment and services (Environmental Management Assistant Program, 2013).

Green and sustainable are used so frequently. As mentioned that going green, which means to minimize the damaging impact on the environment from resource depletion & pollution from the business (Welte, Bartos & Niemeyer, 2010; Environmental Management Assistant Program, 2013), will impact the environment sustainability.

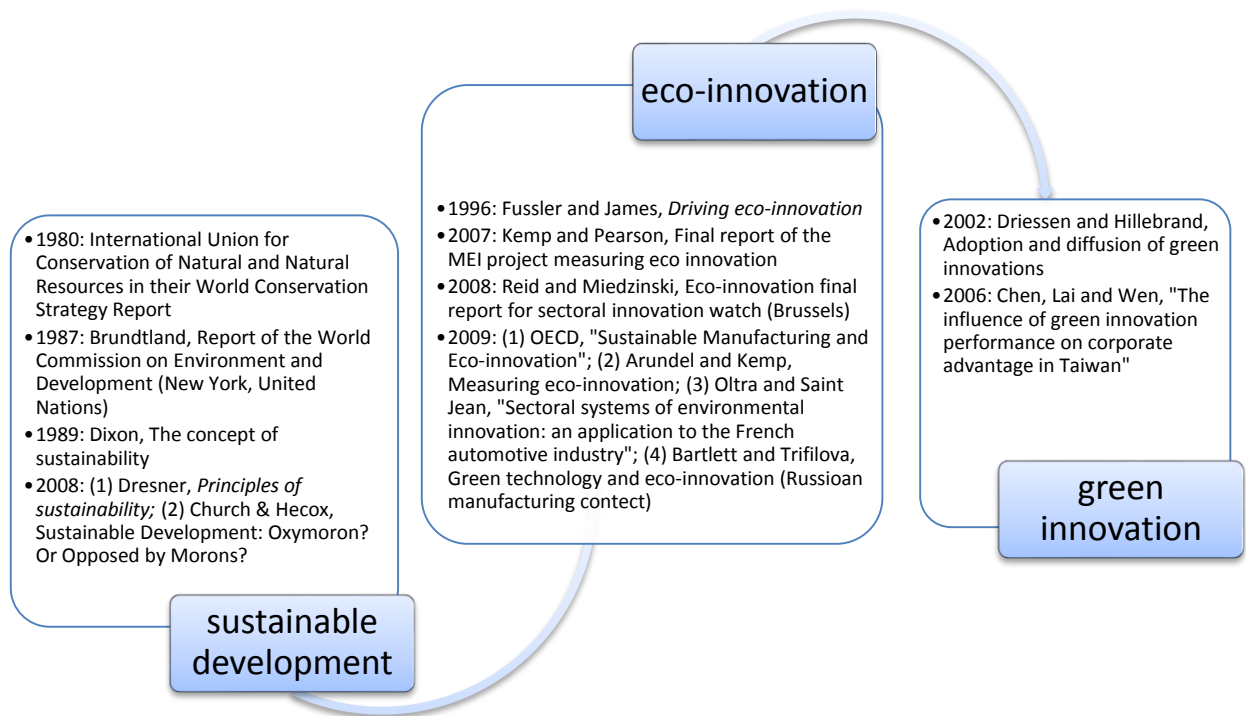


Figure 2.2. Scheme of existing body of literature in the field of green innovations

The idea of sustainability is to ensure that our actions and decisions today do not hinder the opportunities of future generations. It includes looking at how we get the resources we use, using only what is needed in a way to get the most from them and eliminating the idea of waste (Welteet.al., 2010). Sustainability is using natural resources very efficiently without destroying the ecological balance of an area, region, or the world and depleting or wasting natural resources (Schiederig et al., 2011). While according to Schiederig, et al. (2011) citing to Church, et al. (2008), citing Dresner (2008), “sustainable development” was first used in 1980 by the International Union for Conservation of Nature and Natural Resources in their World Conservation Strategy Report. The report defines sustainable development as “the integration of conservation and development to ensure that modifications to the planet do indeed secure the survival and well-being of all people. The notion of “sustainable development” was also essentially determined by the Brundtland

report, commissioned by the UN where it is defined as meeting “the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainable development does imply limits – not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effect of human activities” (Schiederig, et al., 2011 cited from Brundtland, 1987 p. 3).

The notion 'eco-innovation', according to Schiederig, et al. (2011) citing Bartlett and Trifilova (2010) citing Fussler and James (1996) is "new products and processes which provide customer and business value but significantly decrease environmental impacts". While Organization for Economic Co-operation and Development (OECD) (2009) define it as “the creation or implementation of new, significantly improved, products (goods and services), processes, marketing methods, organizational structures and institutional arrangement which – with or without intent – lead to environmental improvement compare to relevant alternatives”. Based on these two definitions Arundel and Kemp (2009) cited by Schiederig et al. (2011) conclude that eco-innovation is about innovations lower environmental impact than relevant alternatives.

While, green innovation is defined pragmatically by Driessenan Hillebrand (2002), stating that it “does not have to be developed with the goal of reducing the environmental burden. [...] It does however, yield significant environmental benefits”. Chen, Lai et al. (2006) defined “green innovation” as hardware or software innovation that is 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. A green new product development team is tasked not only to ensure that the product to be developed is “new” enough to distinguish it from the competing

alternatives in the market, but also “green” enough to meet the local environmental laws where the product is designed, fabricated and packaged; “green” enough to address the environmental concerns of stakeholders along the product value chain; “green” enough to become an “influential – or, better, dominant – force in the green-standards battle” (Unruh and Ettenson, 2011, p.112) and “green” enough to achieve no or minimized environmental impact from the extraction of the product’s raw material to its final disposal after use (Gehin et al., 2008; Huang and Wu, 2010).

Based on all of the notions, concept of green innovation is closely related to eco-innovation but with minor conceptual differences. It's identified that relevant journals and prominent scholars in the broader discipline of business administration, finance and economics, but more specifically in the innovation management field showed that the research focus in the field of "green innovation" in the past has been on industry or national level (Schiederig et al., 2011). Since this study is about industry which related to business, finance and economics discipline, hence the notion is refer to the "green innovation" and will refer to the definition proposed by Chen et al., 2006.

As mentioned in the introduction section that international regulations of environmental protection is one of the forces besides the environmentalism consciousness of consumers, that drives the companies to engage in environmental management. Hence, green innovation is used to enhance the performance of environmental management in order to satisfy the requirements of environmental protection (Chen, 2008 citing Chen et al., 2006). Furthermore, according to Porter and Linde (1995), "Innovating to meet regulations can bring offsets: using inputs better, creating better products, or improving product yields by lower product costs and boost resource productivity" (Porter and Linde, 1995). Hence, Chen et al., 2006 divided "green product innovation performance," as the performance in product

innovation that is related to environmental innovation, including the innovation in product that are involved in energy-saving, pollution-prevention, waste recycling, no toxicity or green product designs (Chen, 2008 citing Chen et al., 2006). Other performances besides the green product performance is "green process innovation performance," as the performance in process innovation that is related to energy-saving, pollution-prevention, waste recycling or no toxicity (Chen, 2008 citing Chen et al., 2006).

2.1.1. Green product innovation

According to the U.S. EPA² (1991), the environmental attribute of a product has become one of the most important factors that affect green customers' purchase decisions in today's consumer market (Chen, 2001). Green product development, which addresses environmental issues through product design and innovation, is receiving significant attention from consumers, industries, and governments around the world (p.251). In response to the increasing public interest in environmental protection, many companies have been actively engaging in designing and marketing environmentally friendly products (p.251). However, although a wide terminology for environmental issues related to products has been developed, there is still much confusion on what constitutes an environmentally product (Albino, Balice and Dangelico, 2009, citing Baumann et al., 2002).

According to Robert (1995) cite by Albino, Balice and Dangelico (2009), a 'green product' is referred to as a product designed to minimize its environmental impacts during its whole life-cycle (p.86). Environmental attributes can be associated with various design decisions, such as material selection, package design, and energy and solvent usage (Chen, 2001). Information about green characteristics of a product can be obtained from different

² USEPA is the United States Environmental Protection Agency. It's an agency of the **U.S.** federal government which was created for the purpose of protecting human health and the environment by writing and enforcing regulations based on laws passed by Congress (Source: www.epa.gov)

sources: producers' claims, information from consumer organizations and third party verified eco-labels. Eco-certification programs have been developed in different countries. They can either encompass several categories of goods or cover a wide range of environmental impacts (e.g., Japan Eco Mark (Figure 2.3) and European Eco-label or be addressed to a specific category of products (such as food labels) or to a specific type of environmental impact (such as energy labels). When applied, eco-labels make the green product clearly recognizable (Albino et al., 2009, p.86 citing Commissions of the European Communities, 2001).



Figure 2.3. Eco Mark (Japan), ISO environmental labels Type I³

Other than the promotion of environmental labels, the Green Purchasing Network (GPN) in Japan formulated guidelines for environment-friendly products and provides the public with environmental information on products (Figure 2.4) (Eco-products directory 2012, 2012). According to Chen (2001), the current trend of green product development, however, is not without obstacles and pitfalls. First, many environmental attributes, such as fuel economy and recyclability, have effects that conflict with traditional product attributes or performances, such as safety, material consistency, and convenience (p.251). Second, despite the introduction of green products as alternatives to already existing ordinary products, many customers still stay with ordinary products with low environmental quality because of cost

³ISO environmental labels Type I are managed in accordance with the standards and principles of the ISO which ensures that the use of the label is accepted by a third party based on an independent, multifaceted standard (Eco products directory 2012, 2012).



Figure 2.4. Other initiatives to raise environmental awareness (Eco-products directory 2012, 2012)

and performance considerations or ignorance and disbeliefs (Chen, 2001 citing Ottman, 1998, p.251). Third, like most innovation activities, green product development is a task characterized by high level of risk and uncertainty. Often the R&D investment is costly and its return is highly uncertain (Chen, 2001, p.252). However, through the efficient use of resources, low impacts and risks to the environment, and waste generation prevention since their conception stage, green products offer high quality and low overall costs to the consumer and society (Albino et al., 2009).

2.1.2. Green process innovation

Resource inefficiencies are most obvious within a company in the form of incomplete material utilization and poor process controls, which result in unnecessary waste, defects, and stored materials. But there are also many other hidden costs buried in the life cycle of the product, which are pollution, wasted resources and effort (Porter and Linde, 1995). Nowadays, managers and regulators need to shift their attention to include the opportunity costs of pollution - wasted resources, wasted effort, and diminished product value to the customer. At the level of resource productivity, environmental improvement and competitiveness come together (Porter and Linde, 1995; Wallace, 1995). Resource productivity improves when less costly materials are substituted or when existing ones are better utilized. Process innovations to comply with environmental regulation can even improve product consistency and quality which will in turn impact product quality and also

will be more appealing to the growing number of customers looking for green manufacturing and products (Porter and Linde, 1995; Deif, 2011). In 1990, the Montreal Protocol and the U.S. Clean Air Act required electronics companies to eliminate ozone-depleting chlorofluorocarbons (CFCs). Many companies used them as cleaning agents. After research, alternate cleaning agent that could be re-used was founded. Furthermore, the new method improved average product quality - which the old CFC-based cleaning agent had occasionally compromised - while also lowering operating costs. Another example, in 1991, law in Japan set standards to make products easier to recycle. Hitachi, along with other Japanese appliance producers, responded by redesigning products to reduce disassembly time. In the process, it cut back the number of parts in a washing machine by 16 per cent and the number of parts in the vacuum cleaner by 30 per cent (Porter and Linde, 1995). Fewer components made the products easier not only to disassemble but also to assemble in the first place. Regulation that requires such recyclable products can lower the user's disposal costs and lead to designs that allow a company to recover valuable materials more easily (Porter and Linde, 1995).

Kaizen, continues improvement, has been recognize as an important feature of the production process in certain internationally successful sectors in Japanese industry. It helps a firm to continually drive down production costs, through greater productivity, fewer errors and reduced scrap and wastes. A widespread culture of continues improvement, or *kaizen*, leads directly to reduced pollution (Wallace, 1995). Improving quality in the right way - reducing rework and mistakes to assure things were done right the first time (better process control) - a great deal of money could be saved while increasing quality (Schroeder & Robinson, 2009 citing Crosby, 1979; Pampanelli, Found & Bernardes, 2011). In 2001, Japan adopted a new legal framework to promote social and technological changes toward establishing a sound material-cycle society in which resources are more effectively used by

following the "3Rs" (reduce, reuse, recycle) principle. These are designed in accordance with characteristics of products, industry structure, market and recovery infrastructure, and they are based on the principle of Extended Producer Responsibility (EPR). Japanese EPR laws are related to manufactured goods (i.e., home appliances and automobile). The twin objectives of EPR are to provide an incentive for producers to incorporate environmental considerations into product design, and to shift the responsibility for end-of-life products upstream to producer and away from municipalities (Ogushi and Kandlikar, 2007).

Companies that adopt the resource-productivity framework and go beyond currently regulated areas will reap the greatest benefits. However, there are scarcely any companies that think about customer value and the opportunity cost of wasted resources at the customer level. Many companies do not even track environmental spending carefully. Hence resisting innovation will lead to loss of competitiveness in today's global economy (Porter and Linde, 1995).

2.2. Competitive Advantage

What makes Japanese firms dominant in consumer electronics, cameras, robotics, and facsimile machines are clearly of great concern to firms that must compete in increasingly international markets (Porter, 1990). Prior studies have found that product and process innovations contribute to a firm's competitive advantages (Chen et al., 2006). According to Porter (1990), the most typical causes of innovations that shift competitive advantage are the following: (1) New technologies, (2) New or shifting buyer needs, (3) The emergence of a new industry segment, (4) Shifting input costs or availability, (5) Changes in government regulations. Furthermore, in international markets, innovations that yield competitive advantage anticipate both domestic and foreign needs. In contrary, innovations that respond to concerns or circumstances that are peculiar to the home market can actually decelerate

international competitive success (p.75). Therefore, a firm must understand what it is about its home nation that is most crucial in determining its ability, or inability, to create and sustain competitive advantage in international terms (Porter, 1990). Porter (1990) elaborated that the activities performed in competing in a particular industry can be grouped into category which is called the value chain which can contribute to buyer value which requires that a firm's value chain is managed as a system rather than a collection of separate parts to gain competitive advantage. A company's value chain for competing in a particular industry is embedded in a larger stream of activities that is the value system which includes suppliers, who provide inputs, firm's value chain, distributors or retailers and buyer value chain. Competitive advantage is increasingly a function of how well a company can manage this entire system. Linkages not only connect company's activities internally but also create interdependencies between a firm and its suppliers and channels. The ability of a nation's firms to exploit linkages with home-based suppliers and customers will prove important to explaining the nation's competitive position in an industry (Porter, 1990).

Besides value chain, core competence is also important. Matching the core competencies of a firm to market opportunities will generate competitive advantage (Porter, 1985). Core competence is the company's collective knowledge about how to coordinate diverse production skills and technologies (Prahalad and Hamel, 1990). An organization's core competence could be in a technology, a product, a process, or the way it integrates its technological assets (Khalil, 2000).

But, the question is, what is the indicator of the competitive advantage itself? According to Porter, the ultimate value a firm creates is measured by the amount buyers are willing to pay for its product or service. If this value exceeds the collective cost of performing all the required activities, the firm is profitable. To gain competitive advantage

over its rivals, a firm must either provide comparable buyer value but perform activities more efficiently than its competitors (lower cost), or perform activities in a unique way that creates greater buyer value and commands a premium price (differentiation) (Porter, 1990).

Over the last decade, 1980 to the second quarter of 2003, Japanese economy has underperformed dramatically. The poor macroeconomic conditions have contributed to the deterioration (Hoshi and Kashyap, 2004). Japan's response to the economic crisis and new growth strategy have taken up this challenge by identifying the environment, and in particular innovation aimed at addressing environmental concerns, as a source of economic recovery & long-term growth (Capozza, 2011). "Green innovation" is one of the six pillars of Japan 2009 New Growth Strategy to 2020. According to some studies, Japan holds the third largest share of the global market of environmental goods and services, and a world leader in environment- and climate related to technological innovation. *Eco-innovation* is a core element of Japan's environmental policy and part of the government's strategy to contribute to economic growth and social progress (Gurria, 2010). According to Lino and Lim (2009), the reliance on other countries for its energy has been the primary motivator for Japan's never-ending search to improve its energy efficiency (p.6). They effort by radically improve the energy efficiency of its technologies, commodities, industrial process, and social infrastructure has helped Japan to become one of the most energy-efficient economies in the world (p.6). However, Japan has been significantly effected by the drop in global demand for its manufactured goods (p.3). Collapse in exports had an immediate effect on Japan's major corporate firms, such as Toyota and Panasonic (p.3). The current economic crisis has negatively affected global sales of Japanese electronic goods (p.24). Since the 1970s, demand of consumer electronics equipment has benefited from the economy's high rate of growth, technological advances have stimulated consumer demandby creating products differentiated by higher functionality

and quality (Yamada, 1990), and now Japan innovates products that concern about the environment sustainability. However, growth in the consumer electronics industry is closely related to the competitive environment, in which a technological breakthrough is followed by development of a new product, creation of a new market, entry of rival firms into this market, and then differentiation of products through further technological advances (Yamada, 1990).

In 2001, the Dutch government was blocking Sony's entire European shipment of Playstation game system. Amount of toxic element cadmium was found in the cables of the game controls. Sony rushed in replacements to swap out the tainted wires. An eighteen month track down the source of problem, including inspecting 6,000 factories. The total cost of this environmental problem was over \$130 million. Looking at Sony's environmental issues nowadays affect a business can drive thinking and strategy in a new way. In other words, an environmental lens is an essential element of business strategy in the modern world (Esty and Winston, 2006). The environmental impact, a consequence of the ever-increasing industrial activities, since the Industrial Revolution, is a growing global problem in the world. Under the trends of strict international environmental regulations and popular environmental consciousness of consumers, many changes and impacts for the rules and patterns of business competition. Many companies thought corporate environmental management is unnecessary investment. On the contrary, companies that pioneer in green innovation will enjoy the "first mover advantage", which allow them to ask for a premium price for green products, improve their corporate images, develop new markets, and gain competitive advantage (Chen, 2008; Chen et al., 2006; Porter and Linde, 1995). Companies engaging in environmental management and green innovation actively can not only minimize production waste and increase productivity, increase corporate reputation, and thereby, enhance corporate competitiveness under the trends of popular environmentalism consciousness of consumers

and severe international regulations of environmental protection (Chen, 2008; Chen et al., 2006; Porter and Linde, 1995). Environmentalism of consumers is increasing in the world nowadays, and thereby drives enterprises to pay more attention in corporate environmental management, because consumers are more willing to choose green products and even pay relatively high prices for environment-friendly products (Chen, 2008 citing Henriques and Sadorsky, 1996). In addition, the enterprises may embody the concept of green products in the design and package of their differentiation advantages of their products (Chen, 2008; Chen et al., 2006; Porter and Linde, 1995).

As mentioned, Japan's response to the economic crisis and new growth strategy have taken up this challenge by identifying the environment, and in particular innovation aimed at addressing environmental concerns, as a source of economic recovery & long-term growth (Capozza, 2011). Drafted by "National Policy Unit" of Prime Minister's Office, with the assistance from Cabinet Office and Ministry of Economy, Trade and Industry (METI), "Basic Policies" for New Growth Strategy decided by the Cabinet on December 30, 2009. One of the strategic areas for growth is Environment and Energy ("Green Innovation") (Nakao, 2010). In order to promote sustainable "green" growth, new growth strategy cope the energy security, energy efficiency, zero-emission energies, environmental goods and services, information technology, recycling, water resources, forest, transportation, tourism and education for sustainable development (Nakao, 2010). In environmental goods and services, Japan promote trade and investment in environmental goods and services, including introducing or harmonizing standards/ labeling on energy efficiency, etc (Nakao, 2010). Currently, Japan is a pioneer in some new green technologies, such as green information and communication technologies (Gurria, 2010). Japan has also promoted the diffusion of cleaner goods in the public and private sector. Green public procurement has been mandatory since 2001 which

has helped to enlarge the market of some eco-products. Information of environmental performance of products is made available through a variety of eco-labels (Gurria, 2010). Japan invest in energy saving and pollution control equipment (Gurria, 2010). Incentive schemes are in place to encourage purchases of energy-efficient household appliances (e.g. the Eco-Point Programme) and vehicles (Gurria, 2010). However, refer to several articles, Japanese firms that once dominated consumer electronic industry, have been overtaken by rivals in U.S., Taiwanese, South Korean and Chinese (Cheng, 2012; Burrus, 2012; Morris, 2012). Japanese electronics firms have decline by many standards measures of industrial performance, such as market share, exports, and profits (Vogel, 2013). Sony, Sharps, and Panasonic, are the big names of firms that have to face high and rapid competition. These three companies posting an annual loss for their business. They were considered premium brands. From televisions, to microwaves and digital music players. Their products often carried higher price tags to reflect their perceived quality, and people snatched them up (Cheng, 2012). They have always been known as innovative (Burrus, 2012). But these days, Japan's electronics industry has fallen increasingly behind rivals like Apple, Samsung, LG Electronics, and numerous Chinese manufacturers that has been doing well along the year 2012 (Burrus, 2012; Duncan, 2012). These rivals aren't just developing hardware innovations to match - or exceed - the Japanese giants; they're bringing them to market faster and cheaper (Duncan, 2012). In the latest example, Japanese companies are falling behind in the race to develop what is likely to become the dominant technology format for the next-generation televisions: OLEDs, organic light emitting diodes. The new displays that are thinner and require less energy. Samsung, Korea's leader of TV maker, already dominates the market for smaller-size OLED displays featured in smartphones and other mobile devices. It is a major step forward compared with the Japanese firms-Sony, Panasonic, Sharp and Toshiba Corp. -

that have spent years developing the technology while struggling with how to commercialize it (Wakabayashi, 2012).

As mentioned earlier, as a source of economic recovery and long-term growth, Japan's innovation aimed at addressing environmental concerns, "green innovation" as one of the pillars of new growth strategy to 2020. But the question occurs within the high and rapid competition against U.S., Korea and China. Does the green innovation have impact on competitive advantage of Japanese electronic industry? Refer to several journals, innovative processes which are green present to cost advantage on a firm over its competitors, innovative products which are also green present to cost advantage on a firm over its competitors, marketed under the green and innovative concept may bring in new customers and fresh revenue (Chiou et al., 2011; Kash and Rycroft, 2000; Lieberman and Montgomery, 1988). Chen et al. (2006) also found that business can not only increase the productivity of the resource through green innovation, but also design and develop the green products that allow them to ask for higher profits and to improve their corporate image. Therefore, invest in the green innovation whether green product innovation or green process innovation will help business develop new market opportunities and increase the competitive advantage. The performance of green product innovation and green process innovation were positively associated with corporate competitive advantage (Chen et al., 2006). Daniel C. Esty, and Andrew S. Winston (2006) in their book, "Green to Gold", stated that "smart companies seize competitive advantage through strategic management of environmental challenge". Furthermore, according to Porter and Linde (1995), innovating to meet regulations can bring offset: using input better, creating better products, or improving product yields.

2.2.1. Green Consumers

Knowing your consumers is one of the important stages in order to develop new market opportunities. And green consumers have their own market segment. According to journal regarding demographics and consumer understanding of environmental labels, there are strong correlations between environmental purchase behavior and the demographic characteristics of income, education and gender (Roper Organization, 1990 cited by D'Souza et al., 2006). Furthermore, journal of environmental segmentation alternatives mentioned, "Typical profiles of green consumers are young, mid-to high income, and educated" (Straughan and Robert, 1999; Tobler, 2011). In addition, in regards to gender, young men that are knowledgeable about environmental issues and women that are more concerned about environmental quality are particular profiles of green consumers (Diamantopoulos et al., 2003 cited by D'Souza et al., 2006). Without knowledge about the importance of environment sustainability, consumers may not consider environment-friendly products.

Figure 2.5. Early models of pro-environmental behavior (Kollmuss & Agyeman, 2002 cited by Tobler, 2011)



In regards, this study will focus on the segment which is particular represent green consumers in order to get reliable result on viewing how environmental purchase behavior is, particularly in Asia using Indonesia as representative.

2.3. Hypothesis

Refer to several researches, this study propose the following hypothesis:

Hypothesis 1: Green innovation has a significant influence on the Japanese home appliance industry's competitive advantage relating to the green consumer market segment.

However, according to Esty and Winston (2006), "resisting innovation could lead to loss of competitiveness in today's global economy and environmental missteps can create public relations nightmares, destroy markets and careers, and damaged billions off the value of a company although companies that do not add environmental thinking to their strategy keeping risk missing upside opportunities in markets that are increasingly shaped by environmental factors" (Esty and Winston, 2006). Refer to those statements, this study propose another hypothesis. As mentioned earlier that several articles wrote that now Japanese electronics industries are falling down. They declared their losses. They are facing tight competition with Korean, Taiwan and U.S. products. Hence, based on the situation the proposition of further hypothesis:

Hypothesis 2: Green innovation has little association with Japanese electronic industries' competitive advantage with particular focus on the home appliance industry.

According to Asia-Pacific Journal, Japanese firms have confronted two critical challenges: the decomposition of production⁴ and the services transformation⁵. Japanese firm's strong orientation toward the domestic market rather than the global marketplace has hindered their ability to take advantage of both the decomposition of production and the services transformation (Vogel, 2013). Japanese manufacturers develop high-quality products that are only suited for the Japanese market (Vogel, 2013 citing Kushida, 2011). Japanese electronics companies produce some of the most sophisticated products that dominate

⁴The decomposition of production refers to the process whereby integral production centered in one country has given way to modular production and global supply chains (Vogel, 2013).

⁵The services transformation refers not only to the growth of services relative to manufacturing but also to the integration of manufacturing itself with more service functions, including software and applications (Vogel, 2013).

Japanese market, and yet they have not succeeded in world markets because the handsets are not suited to global technical standards, their features are tailored to Japanese tastes, and their prices are too high (Vogel, 2013). These dynamics created a "Galapagos effect", in which *winning in an isolated domestic market led to losing in global markets* (Kushida, 2011).

According to Lino and Lim (2009) on their research about competitive advantage in green products of developing countries, in the long term, developing countries stand to gain the most by moving towards a more environmentally sustainable path of economic growth. "Eco-changes" is currently happening in developing countries (Lino and Lim, 2009). With consumer demand in Japan softening, a US market is increasingly mired in recession, and European demand looking problematical, the industry is pinning more of their hopes in Asia (Rowley, 1991). According to Lino and Lim (2009), Asia's rapidly growing middle class will open up new opportunities and challenges for the future. One was estimated by Freedonia group that demand for appliances in the Asia/Pacific grew by 5.1% (1994 - 2004) particularly for products such as microwave ovens, refrigerators and freezers (p.2). By the end of 2009, Japan is expected to lose from 3 - 6% of its GDP (p.3). And since Japan is a highly export-dependent economy, Japan has been significantly affected by the drop in global demand for its manufactured goods (Lino and Lim, 2009). Among ASEAN⁶ countries that has been hurt by the falling demand of ASEAN exports, only Indonesia and Vietnam is forecasted to have positive growth from 2009, presents and next. Refer to the market opportunities for green economy growth, Japan could use this opportunity to growth its green products around ASEAN, developing countries. And this study will refer the opportunity in Indonesia as one of the brightest in the world and Indonesia's consumer electronics market remains one of the most untapped markets in Asia ("Indonesia consumer electronics," 2013). Official also from

⁶ASEAN is Association of Southeast Asian Nations which consists of Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam as a members (<http://www/asean.org>).

Sony and Japan Victor Co. (JVC), they view Indonesia and China as area of major potential growth (Rowley, 1991). In Indonesia, TV set penetration is estimated at around 75%, leaving room for continued growth. A booming market in the past few years has spurred the development of a local TV set manufacturing industry and led to a fall in imports even as the market soared ("Indonesia consumer electronics," 2013). However, marked income disparities mean market size is limited, with low incomes restricting demand outside major cities ("Indonesia consumer electronics," 2013). Although Indonesian government cuts in import tariffs and VAT⁷ on some electronic that have boosted the market, Japanese electronic products, which tends to be more expensive compare to other electronics products made in China or even Korea, Japan could utilize the opportunities to penetrate their market particularly for electronic products which have been rapidly growth and forecasted to continue growing with CAGR⁸ of 15% (2012 - 2016) ("Indonesia consumer electronics," 2013). Comparing in China, although it has become a major destination where global consumer electronics giants make premier releases of their latest technologies and products, but China's economic growth is slowing down with CAGR 9.9% until 2015 ("Winners of 2012-2013," 2013). While in India, consumer electronics devices are projected to grow at an overall CAGR 14% through 2015 ("India consumer electronics," 2011). Hence, this study use Indonesia as one of ASEAN country as a reference of consumer preferences in buying electronic goods that can be utilized by Japanese electronic industries in order to find out what they should do in order to successfully penetrate their market in particular their home appliance products.

⁷Value added tax (VAT) refers to the indirect tax levied for the household consumption of goods and services, apart from those that are zero-rated such as essential drugs and food (<http://www.ask.com>)

⁸The compound annual growth (CAGR) is the year-over-year growth rate of an investment over a specified period of time (<http://www.investopedia.com>).

3. Methodology

This study will use two levels of data analysis. Primary data analysis is the original analysis of data in the research study and secondary analysis which is taken from available data that is re-analyzed for the purpose of answering the research question with statistical techniques (Glass, 1976). Primary data will be used in order to find out market perception about green innovation (eco-friendly product) (Figure 3.2 and 3.4) by spreading questionnaires while secondary data will be used to find out the influence of green innovation - by using environmental performances information, towards competitive advantage by using financial performances information. Literature review also conducted due to define the key terms and terminology of this study.

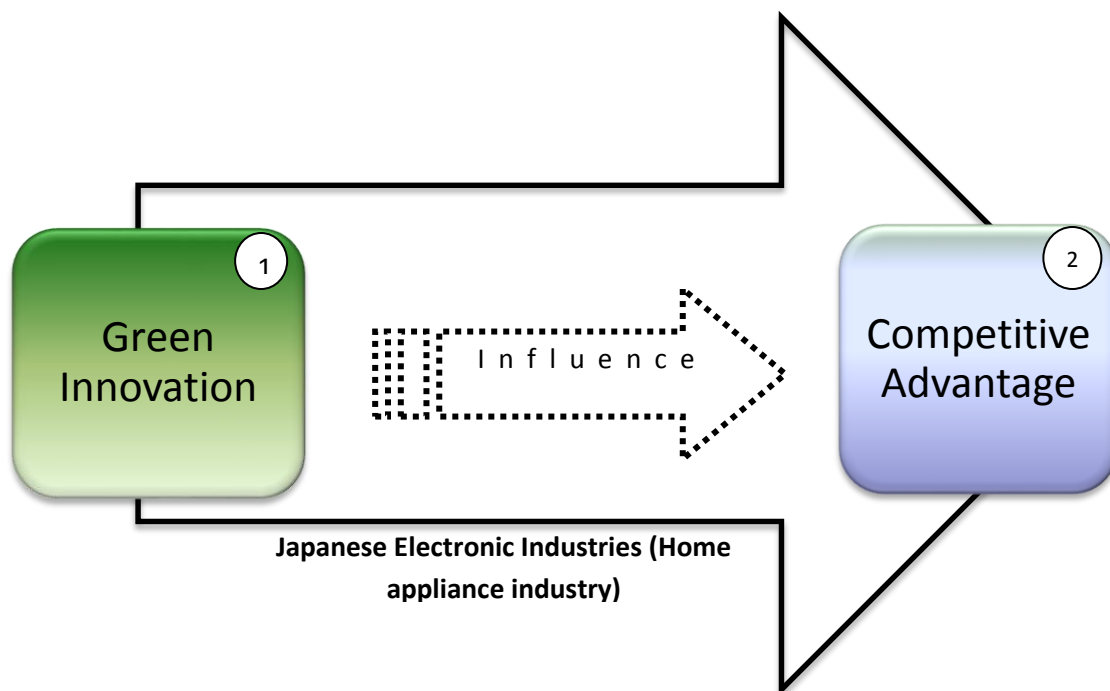


Figure 3.1. Research Hypothesis

3.1. Secondary Data

3.1.1. Literature Review Method

For the literature review, data was collected from the Google Scholar, ProQuest Runner, and several books from library of Ritsumeikan Asia Pacific University. Publications were collected using the search strings "green innovation", "competitive advantage", "green marketing", "green consumers". With this approach the reference chose by topic and not by (top) journal to include "all" published articles in this study as suggested by Schiederig et al. (2011) citing (Webster and Watson (2002). This study utilized Google Scholar database due to its broad data coverage (e.g. including conference proceedings, working papers and books. Also, an analysis based on Google Scholar data results in more comprehensive citation coverage, particularly in the field of management and international business (Schiederig et al., 2011). However, there are several journals that could not be accessed further related to membership and or copyright matters. Hence, Ritsumeikan Asia Pacific University provide ProQuest runner in order to get the journals without membership or copyright limitation. This full-text database contains 17,850 journal articles spanning every genre including the humanities, the social sciences and the natural science. 11,490 of the articles are full-text version.

Total data set that we use as reference for literature review includes 32 publications. The chosen publication types includes journals, conference proceedings, book (-chapters), additional journals and news articles. Regarding the notions that related to green innovation, this study refers to one journal, "What is green innovation?" - A quantitative literature review journal. The journal includes 8,516 publications and extracted with the software "Publish or Parish" (v.3.1.3926).Written by Tim Schiederig, Frank Tietze and Cornelius Herstatt from Hamburg University of Technology, Germany. The journal contribute to a clarification of the

concept "green innovation" and provide an overview of the existing body of literature in the field of green innovations and identify the most active scholars, institutions and relevant publication in the field (Schiederig et al., 2011). Regarding the notions that related with competitive advantage, this study refers to sixteen publications. The chosen publication types are journals, conference proceedings, book (-chapters) also news articles. The notions of competitive advantage in this study extracted by only using its definitions and cases that related to green innovations, green products, green markets.

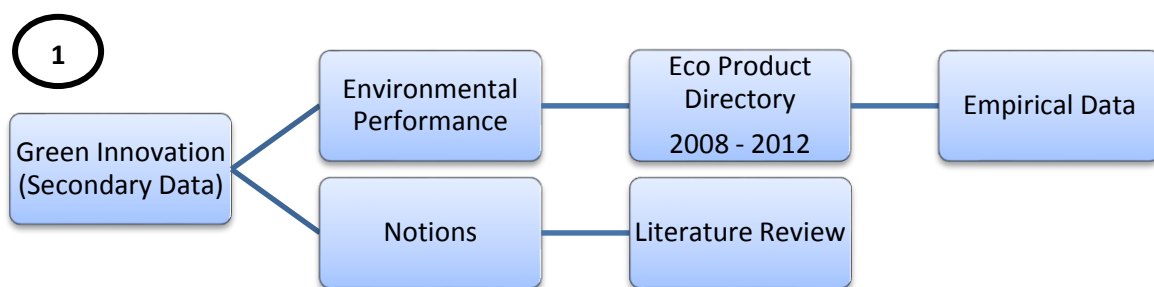


Figure 3.2. Methodology diagram regarding green innovation

3.1.2. Eco Product Directory 2008 - 2012

This study defines green innovation of companies through their environmental performances. Eco Product Directory, published by Asian Productivity Organization (APO) Japan (p.2), is a comprehensive listing of environmentally friendly products and services offered by companies and organizations within Asia Pacific regions which contains all of information related to environmental performances (p.5). The directory consists of four kinds of products, eco-products, eco-materials, eco-components and eco services. Each main category is divided into subcategories. Eco products consist of home electric appliances/ lighting, carriers/ automobiles, OA/ IT equipment, office supplies/ furniture, apparel/ textiles, household goods and equipment, building and civil engineering equipment, machines and equipment, others (p.14). The list of the products has been audited based on their environmental performance

information, certified and approved by the audit team of Eco-products directory working groups. The purpose of the list is to raise consumers' environmental awareness (p.14). This study refers to eco-product list with particular to Japanese home appliance industry. Home appliance is device intended for domestic use, including consumer electronics such as refrigerators, air conditioner, washing machine, vacuum cleaner, televisions, DVD player, microwave and or oven (Daft Logic, 2008). The companies that are chosen are the companies that also sell their products in Indonesia. They are Mitsubishi, Sony, Panasonic, Toshiba, Hitachi, Sharp, and Pioneer. The products that are considered as environmentally friendly are certified according to standards or criteria independently set by countries, regions, organizations, or providers. The International Organization for Standardization (ISO) classifies environmental labels into Type I, Type II, and Type III. Type I labels covers resource extraction, manufacturing, distribution, use, disposal, recycling. This type ensures that the use of the label is accepted by a third party based on an independent, multifaceted standard. Type II independently declares environment-related improvements in their products based on their own criteria. Type III use the life cycle assessment method to show environmental information on products quantitatively from resource extraction to manufacturing/ assembly, distribution, use, and discarding/ recycling and the product evaluation is left to consumers ("Eco Product Directory", 2012, pp.14-16). Other than those types, various environmental labels have been created in many areas including electronic industries. As mentioned in the literature review that green innovation as one of the variables of this study consist of two classification, green process innovation and green product innovation. In order to quantify the green innovation, elements that are includes in green innovation should be designated. Refer to Eco Product Directory (2008 -2012) this study is using five elements that are included in green innovation (Figure 3.3), three elements for green process are determined by how the industries able to reduce their: 1) Global Warming

effect; 2) Chemical substances and 3) how they able to use their source or input efficiently. While elements for green products are the products that have characteristics of: 1) energy-saving and 2) recyclable.

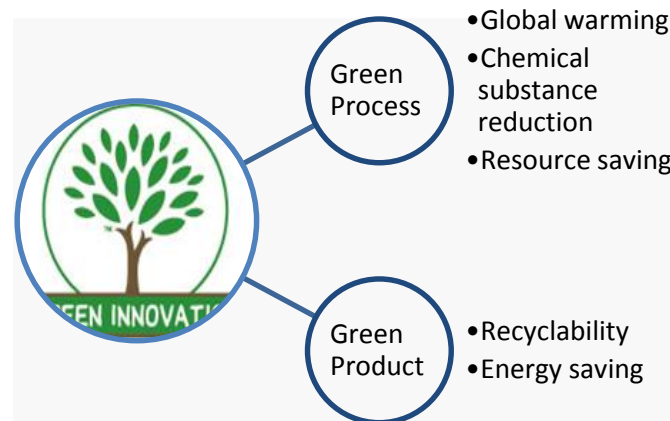
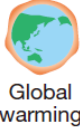







Figure 3.3. Green Innovation

In order to quantify green innovation, this study identifies green innovation activities as environmental performances of the companies. As shown in Table 3.1, the elements to be quantified are each sub elements of green process and green product. Each company will be valued based on the availability of the elements. The availability of each elements will be given value one (1), but unavailability will have no value or zero (0), and those data are classified as nominal data. Due to be able to calculate the correlation between green innovation and competitive advantage, nominal data is not applicable. Hence, the data is modified into ordinal data by sum up all elements of green innovations. The minimum value for green innovation is one (1) and the maximum value is five (5). Each element of green innovation indicates by labels in Eco Directory from 2008 until 2013. This study is trying to find out the influence of green innovation towards to competitive advantage as soon as they apply their strategy for sustainable society in the 21st century that was started from 2007 (Gurria, 2010). Furthermore, it's related to one of the research questions, if green innovation influence competitive advantage, whether it's high or low influence, how long it will last?

Table 3.1. Environmental performance

Green Innovation	Symbol			Environmental Performances
Green Process	1	 Global warming	Global warming prevention Helps reduce emissions of greenhouse gases such as carbon dioxide.	1 = available 0 = unavailable
	2	 Chemical substances	Chemical substances reduction Helps reduce and clean up eco-toxic chemical substances harmful to humans and the environment.	1 = available 0 = unavailable
	3	 Resource	Resource saving Helps reduce the consumption of resources, such as mineral, forest, and water resources includes resource saving by reuse and recycling resource saving in products and the manufacturing process.	1 = available 0 = unavailable
Green Product	4	 Recycled materials	Using recycled materials Recyclable materials (pre- and postconsumer) are recovered and used in the manufacturing process, either entirely or in high volumes.	1 = available 0 = unavailable

Green Innovation	Symbol			Environmental Performances
	5		<p>Recyclability</p> <p>Raw materials can be recovered, processed, and recycled for reuse. Alternatively, they can be recycled efficiently by using designs that are easily disassembled. Reusable and refillable designs may be used in packaging and products.</p>	<p>1 = available</p> <p>0 = unavailable</p>
			<p>Energy-saving</p> <p>Efficient process designs and product weight reduction enable energy saving. This initiative includes the use of energy recovered instead of disposed of.</p>	<p>1 = available</p> <p>0 = unavailable</p>

3.1.3. Capital IQ

Capital IQ is an innovative provider of the most accurate and timely financial information. It provides portfolio management also financial modeling. As mentioned in the literature review that low cost and profit are part of competitive advantage indicators, hence this study refer to financial statement/ performances with particular to sales/ revenue data and operating income as elements that refer to low cost and profitable.

However, this study refers to financial statement that only particular to appliances segments from 2008 to 2013. Hence, all of the information are suitable with the environmental performances that only apply to home appliance products for exactly the same

time series. Yen is the currency that has been used in this study without changing to any other currency.

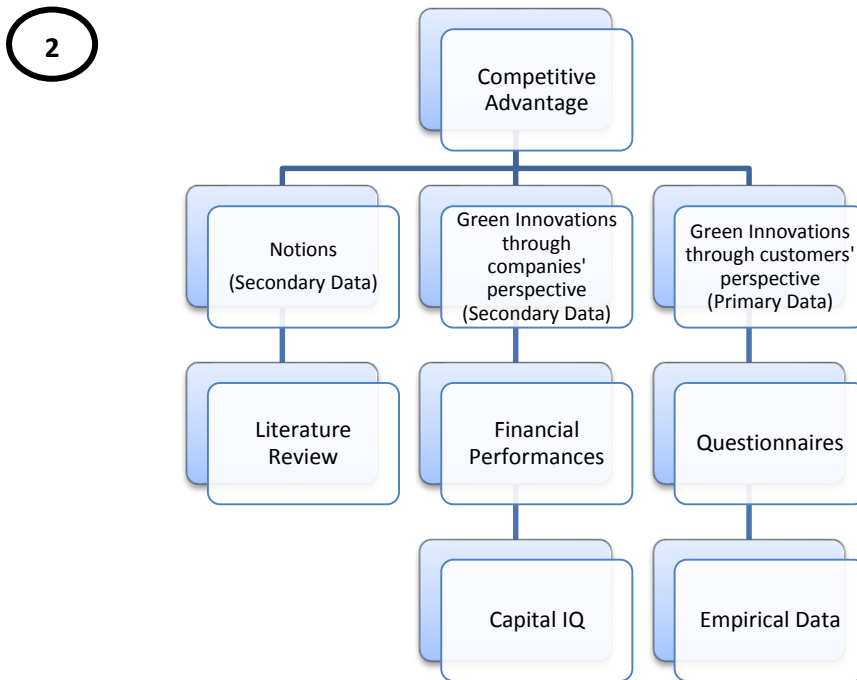


Figure 3.4. Methodology diagram regarding competitive advantage

3.2. Primary Data

3.2.1. Questionnaire development

The data used in this study consist of questionnaire responses from electronic consumers in Indonesia. The questionnaires spread out in two biggest city in Indonesia and it was particularly spread out at the biggest electronic store in Indonesia, Electronics City - Jakarta and Bandung Electronic Centre. And because this study refers to home appliance industry hence the questionnaires spread out at home appliance products section. It was considered that the person responsible for buying from those stores would represent the perception about green products and whether the attribute of green product include in consideration on buying green products. The questionnaires spread out in paper form and 100 questionnaires were completed and were used for data analysis. The questions are divided into two sections: 1)

Five questions regarding respondents profiles; 2) Fifteen questions regarding customer perception towards green electronic product using Likert scales (1 = Strongly disagree - 5 = Strongly agree). On the first section, respondents profiles covering gender, age, income, education (Table 3.2). On the second section - purchase behavior. The attributes in this study are, quality, brand, environment and price. Those attributes are referring to former research related to green products and corporate strategy that aim to examine the influence of multiple factors on the green purchase intention of customers in Australia (D'Souza, Taghian, Lamb and Peretiatko, 2006). They use six attributes to find out the customer perceptions towards green products, which are corporate perception, environmental regulation, price and quality perception, product dimension, product labels and customers' past experience (D'Souza et al., 2006). However, only several attributes that most applicable to this study are included in the questionnaire. Corporate perception and environmental regulation referring to corporate image on doing green innovation, instead of using corporate image, this study consider on using brand consciousness to know how respondents perception of electronics products through its brand. Furthermore, most of the brands of electronics products are the same with the name of its company name. Furthermore, regarding the environmental regulation, this study focusing more on the function of the products that related to environmental sustainability. Hence the questionnaires use environmental consciousness in order to find out the respondents perceptions on how they value green products or eco-friendly products. Price and quality perception are included in the questionnaire, one of the reason is that consumers are price-sensitive when it comes to "buying green" (Mandese, 1991 cited by D'Souza, 2005) and are unwilling to pay a premium price for green products (D'Souza et al., 2006 citing Wasik, 1992). Consumers have displayed a willingness to respond to green concerns whilst not compromising on performance, convenience and price (Berger, 1993 cited by D'Souza et al., 2006). Product dimension, product labels and customers' past experience are not included

in the questionnaire because this study considers that those attributes are not applicable for electronic products in particular home appliance products which are displayed in the stores without packaging or label attach on its body. Most information about the product displayed on the brochures that the stores provided. The customers' past experience also not included because this study focusing on customers' initial perception instead of their past experience towards green products.

The questionnaires spread out on August 10 - August 24, 2013 in two biggest electronic malls in Indonesia. The first mall is Jakarta Electronic City for nine days and the second mall is Bandung Electronic Centre for six days. Jakarta Electronic City (JEC), established in 2001 is the pioneer of electronic store in Indonesia and currently has 61 stores all over Indonesia. Audio-video, home appliance, mobile device and gadgets are available there ("Penjelasan Singkat Perusahaan » Electronic City", 2014). Bandung Electronic Centre (BEC), which is placed in Bandung-the capital city of west Java Indonesia offers the latest, most innovative, and widest range of genuine and value-for-money IT and electronic gadgets. The mall has over 200 merchants which include popular International brand names. Customer segmentation for both of the malls are young generation with relatively high income ("Istana Bandung Electronic," 2012). Those segmentation are appropriate with the target market of the eco-friendly ("green") product. Due to the green innovation, price premiums for "green" product are commanded in order to differentiate the product and open up new market segments (Porter and Linde, 1995). The questionnaires are designated to customers that potentially buy home appliance product, especially green home appliance products. Hence, the respondents were randomly selected but focusing only to customers that visit and willing to buy home appliance products. The questionnaires were spread out during peak hours around four to six o'clock in the afternoon on weekdays and on weekend around eleven to

one o'clock. 78 customers from JEC and 42 customers from BEC filled in the questionnaires. Total, 120 respondents filled in the questionnaires. The results are elaborate in the next chapter of this result.

Table 3.2. Questionnaire

Section 1: Profile				
Gender	Age	Income	Nationality	Education
Section 2: Buying Preferences				
	Attribute 1	Attribute 2	Attribute 3	
Quality	Good quality of product is important to me	One of the reason to buy a product is the quality of product	The higher the price of the product the better the quality	
Brand	Brand represent quality of the product	The famous brands are usually my choices		
Environmental	Environment friendly – electronic product is important for me	Environment friendly products Is part of good quality products	I prefer to buy environment friendly product although the price higher than the regular	
Price	I buy good quality product nor eco-friendly product whenever it's on discount	Cheap price product is usually my choice		

3.3. Limitation and further research

Time restrain

This study is limited only on influence of green innovation toward competitive advantage of Japanese home appliance industry from 2008 to 2013. Japan start to adopt strategy for sustainable society since 2008 (Gurria, 2010). Established environmental policy and implement green innovation are strategy that could have impact in short and long term period. Some of environmental regulations might not difficult to comply for some industries.

European Union (EU) regulation, Restricted of Hazardous Substances (ROHS) restricts six prohibited substances contain in the electronic products. For companies that produce electronic products that are not contaminated with the regulated hazardous substances, they can easily comply with the regulation without doing significant change to their production process or their products. Hence, they can enter European market or any other countries market that follow ROHS regulation, easy and fast. Which means, they able to enhance their market and increase their sales in short term or less than ten years.

However, this study also related to the association between green innovations toward competitive advantage on low cost which is related to green process innovation. There are several investments that companies need to do relate to green process innovation. The purposes of green process innovation are not only to comply with environmental regulation but also in order to have resource productivity. And green process innovations can increase resource productivity that lead to cost efficiency whether in short-term and long-term. Energy efficiency such as reduce electricity consumption to reduce CO₂ will have tendency to reduce cost in short-term period. In contrary in order to find substitute materials, research and development need to be done that will have tendency to increase cost in short-term but possible to reduce cost in long-term. Considering environmental performances and operating income measurement since 2008 to 2013, there are possibilities that the coefficient correlation and significant level will have different results.

Market segment

Sales of environment-friendly products that generates from green innovations are related to green consumers. Young men whose knowledgeable about environmental issues and women that are more concerned about environmental quality, mid-to high-income, educated, are particular profiles of green consumers (Diamantopoulos et al., 2003 cited by D'Souza et al.,

2006; Straughan and Roberts, 1999). In regards, the questionnaires are applicable for respondents that typically represent green consumers. In addition, Indonesia is chosen as a survey site as representative country in Asia that is considered to have green consumers penetration. Hence, this study is particularly applies to green consumers in Asia with Indonesia as the representative market. However, further research can be conducted to broader market segment to get broader perspective of green products in broader market.

Home appliance products

This study focuses on electronic products in particular to environment-friendly home appliance products. Considering that every kind of electronic products has different characteristic of market and applicable environmental regulation, hence, the results of this study might not applicable to other electronic products such as cell-phone or computers. In order to get results that could applicable in broader electronic products, further research can be done to any other electronic products.

Limited industries

Due to conduct research from green consumers in Indonesia, companies that are chosen as research objects are Japanese companies that sell their home appliance products in Indonesia. Hence, there are seven big Japanese electronics companies that are chosen. However, further study can be conducted in broader scope that might be lead in to different perspectives. Further research can be done by comparing to a lot more Japanese companies, or comparing them with electronic industries from other countries that may give different result, different perspectives.

4. Results and Analysis

4.1. Environmental performances measurement

This study, as mentioned earlier in research methodology, is using environmental performances in order to define performance of green innovation. Green innovation is conducted initially to satisfy the environmental regulation through performance of environmental management (Lai, Wen, and Chen, 2003 cited by Chen, Lai, and Wen, 2006). According to ISO 14031 standards, performance of green innovation is "performance of hardware and software involved in the innovation that a company carries out in relations to green products/ processes, including the innovation in technologies that are involved in energy-saving, pollution-prevention, waste recycling, green product designs, or corporate environmental management". Refer to Eco product directory from 2008 to 2012, this study classify five (5) environmental performances (Table 3.1) which quantify using their availabilities. The availability of five elements which consist of global warming, chemical substance reduction, resource saving, recyclability and energy saving (Figure 3.3) are added in order to get the total value of environmental performances. The minimum and maximum value of environmental performances is zero (0) which means none of the five elements available and five (5) which means all of the elements of green innovation are available. In Table 4.1 it is shown the availability of each element of environmental performances that are available in 2008. Each companies that has been chosen has varieties of home appliances that are offered. In order to represent the environmental performances for the whole home appliance products of each company, average calculation has been done towards the environmental performances from each appliance. And this calculation is repeated from 2008 until 2012. Table 4.2 shows the environmental performances for each company after averaging the environmental performances for each home appliance.

4.1.1. Home appliance industry

According to Eco Product Directory 2012, there are 699 eco-products that consist of nine categories which are home electric appliances, carriers/ automobiles, OA/ IT equipment, Office supplies/ furniture, IT equipment, Office supplies/ furniture, apparel/ textiles, household goods and equipment, building and civil engineering equipment, machines and equipment and others. For home appliance products, there are 110 products listed. The products are air conditioners, AV amplifier, blue-ray disc player, recorder and home theater system, car navigation system, compact stereo system, digital cameras, digital video camera, electric lighting fixtures, fluorescent lamps and its stabilizers, general lighting bulbs, LED lamp, starters, halogen lamp, sealed beam lamp units, electric lighting fixtures, energy-savings T5 lighting, LED lighting, recessed lighting, household electric appliances, electric refrigerators, electric rice cookers, electric washing machines, electronics ovens, microwave oven, ion generators, LCD panel, LCD monitor, portable TV, televisions, speaker system, vacuum machines, watches, water/ space heaters, water heater. However, due to find the gap between companies and customers perspective regarding green innovation and its influence on competitive advantage in Asia - Indonesia, this study only selected companies that offer their products in Asia, particularly in Indonesia. Table 4.2 show that only seven companies that have been selling their products in Indonesia. Hence, this study is refer to seven electronic companies which limit the varieties of the products, excluding car navigating system, the lighting bulbs and lamp, ion generators, digital camera and video camera, watches, and water and space heater.

From 26 companies listed in Eco products directory 2012, there are only 7 companies that available in Indonesia. Mitsubishi Electric Company, Panasonic Corporation, Sharp

Corporation, Toshiba Corporation, Hitachi Appliances, Sony Corporation and Pioneer Corporation.

Table 4.3. Environmental performances FY 2008

No	Company Name	Products	Green Process			Green Product		Total	Average 2008
			Global Warming	Chemical Substance Reduction	Resource Saving	Recyclability	Energy Saving		
1	Mitsubishi Electric Co	Room Air Conditioner	0	0	0	0	0	0	0
		Electric Refrigerator	0	0	0	0	0	0	
2	Panasonic Corporation	Room Air Conditioner	1	0	0	1	1	3	3
		Blu-ray disc player	1	0	1	0	1	3	
		Electric Refrigerator	1	0	0	1	1	3	
		Electric rice cooker	1	0	1	0	1	3	
		Electric washing machine	1	0	0	0	1	2	
		Steam microwave oven	1	0	1	0	1	3	
		LCD monitor	1	1	0	1	1	4	
		Televisions	0	1	0	0	1	2	
		Vacuum machines	0	0	0	0	0	0	
3	Sharp Corporation	Air Conditioner	1	0	0	1	1	3	3
		Electric Refrigerator	1	0	0	1	1	3	
		Electric washing machine	0	0	1	1	1	3	
		Televisions	0	1	0	1	1	3	
4	Toshiba Corporation	Air Conditioner	0	1	0	0	1	2	2
		Blue-ray disc player	0	0	0	0	0	0	
		Televisions	1	1	1	0	1	4	
		Air Conditioner	0	0	0	0	0	0	
		Electric Refrigerator	1	1	0	0	1	3	
		Electric washing machine	0	0	0	0	0	0	
		Vacuum machines	1	1	0	0	1	3	
		Electric Ovens	0	0	0	0	0	0	
5	Hitachi Appliances	Air Conditioner	0	0	0	0	0	0	3
		Electric Refrigerator	1	1	0	0	1	3	
		Electric rice cookers	0	1	1	0	1	3	
		Electric washing machine	1	1	0	0	1	3	
		Microwave Oven	0	1	0	0	1	2	
		Vacuum machines	1	1	0	0	1	3	
		Televisions	1	0	1	1	1	4	
6	Sony Corporation	Blue-ray disc player	1	1	1	0	1	4	3
		Televisions	1	0	0	0	1	2	
7	Pioneer Corporation	AV amplifier	0	0	0	0	0	0	1
		Speaker	0	0	0	0	0	0	
		Televisions	1	1	0	0	1	3	

Few companies such as Canon Inc, Nikon Corporation and Casio computer are not selected because this study, focusing on home appliance products. Digital camera, digital video camera and watches are not included. In Table 4.2 the company that has fully complied with environmental regulations and also produce green product through green innovation is Mitsubishi Chemical started from 2012. While Sony, Panasonic and Hitachi started in 2008 since Japan started to adopt the strategy for sustainable society in the 21st century (Gurria, 2010). However, although they started earlier than Mitsubishi but their green innovations are

focusing more on preventing global warming, comply with regulations regarding prohibited chemical substances and produce products that energy saving and recyclable.

Table 4.4. Environmental Performances FY 2008-2013 (in average)

NO	COMPANY NAME	ENVIRONMENTAL PERFORMANCES					
		2008	2009	2010	2011	2012	2013
1	Mitsubishi Electric Co	0	4	4	4	5	5
2	Panasonic Corporation	3	3	3	3	3	3
3	Sharp Corporation	3	4	4	3	4	4
4	Toshiba Corporation	2	2	2	3	3	3
5	Hitachi Appliances	3	3	3	3	3	3
6	Sony Corporation	3	3	3	3	3	3
7	Pioneer Corporation	1	1	2	2	3	3

Hence, any improvements they are doing do not change the value of their environmental performances because the performances only rely on the availability of the five elements of green innovation.

4.2. Competitive advantage measurement

Competitive advantage for this study is refer to Chen et al (2006) which define competitive advantage as a positions occupied by the company whenever its competitors cannot copy its successful strategy and the company can gain the sustainable benefits from its successful strategy (Porter, 1985). Eight items to measure competitive advantage are: (1) the company has the competitive advantage on low cost compared to other competitors; (2) the quality of the products or services that the company offers is better than that of the competitor's products or services; (3) the company is more capable of R&D and innovation than the

competitors; (4) the company has better managerial capability than the competitors; (5) the company's profitability is better; (6) the growth of the company exceeds that of the competitors; (7) the company is the first mover in some important fields and occupies the important position; (8) the corporate image of the company is better than that of the competitors. However, this study is focusing on the empirical result from two items, which are competitive on low cost and the company's profitability.

In terms of profitability, this study refers to industries' financial performances. This study refer to capital IQ, an innovative provider of the most accurate and timely financial information. Segmented financial data are used in order to get exact information regarding home appliances. Japanese currency is used in the calculation. Revenue is used to define the profitability of the company and operating income is used to define the competitiveness in low cost. Table 4.3 shows the revenue from 2008 - 2003. Table 4.4 shows the operating income from 2008 - 2013.

4.3. Empirical Calculation

4.3.1. Research question no 1

Hypothesis testing

In order to proof the hypothesis regarding the influence of green innovation towards the competitive advantage, this study use empirical study, Spearman correlation.

Spearman is used when one or both of the variables are ordinal which do not assume normal distribution of nonparametric statistics data (Morgan, Leech, Gloeckner and Berrett, 2013). Environmental performance in this study is classified as nominal data that transformed into ordinal. While financial performance is classified as an interval data.

Table 4.5. Sales/ Revenue FY 2008 - 2013

No	Company Name	Sales/ Revenue					
		2008	2009	2010	2011	2012	2013
1	Mitsubishi Electric Co	Y 921,948	Y 1,000,258	Y 915,710	Y 924,500	Y 849,300	Y 821,300
2	Panasonic Corporation	Y 1,405,377	Y 1,290,309	Y 1,274,295	Y 1,482,880	Y 1,534,183	Y 1,554,373
3	Sharp Corporation	Y 2,291,706	Y 1,906,589	Y 1,858,208	Y 1,970,570	Y 1,630,999	Y 1,339,741
4	Toshiba Corporation	Y 774,294	Y 674,245	Y 579,846	Y 599,785	Y 575,300	Y 591,504
5	Hitachi Appliances	Y 1,293,517	Y 1,151,066	Y 998,632	Y 1,079,355	Y 1,101,784	Y 1,014,312
6	Sony Corporation	Y 2,646,303	Y 2,317,824	Y 1,553,067	Y 1,712,964	Y 1,283,156	Y 994,827
7	Pioneer Corporation	Y 330,200	Y 209,813	Y 136,208	Y 157,993	Y 123,332	Y 96,182

Source: Capital IQ Database

Table 4.6. Operating Income FY 2008 - 2013

No	Company Name	Operating Income					
		2008	2009	2010	2011	2012	2013
1	Mitsubishi Electric Co	Y 67,467	Y 65,674	Y 34,706	Y 42,000	Y 22,400	Y 19,300
2	Panasonic Corporation	Y 92,474	Y 46,808	Y 56,363	Y 84,032	Y 81,470	Y 66,493
3	Sharp Corporation	Y 79,218	Y -33,769	Y 33,983	Y 79,257	Y 51,008	Y 46,695
4	Toshiba Corporation	Y 3,912	Y -27,144	Y -5,386	Y 8,751	Y 2,090	Y 2,395
5	Hitachi Appliances	Y 54,046	Y 27,322	Y -5218	Y 37,284	Y 49,995	Y 29,382
6	Sony Corporation	Y 441,787	Y -168,084	Y -70,849	Y -73,205	Y -203,211	Y -84,315
7	Pioneer Corporation	Y -17,921	Y -38,622	Y -9,160	Y 2,542	Y 3,560	Y -2,798

Source: Capital IQ Database

Environmental performances, sales or revenue and operating income are set for seven Japanese electronics companies. However, most of the data are not normally distributed. Hence, in order to find the correlation between the variables, Spearman is the chosen method.

The correlation calculation is using IBM SPSS V.20⁹ where the correlation between green innovation and competitive advantage is calculated using correlation between environmental performances and sales/ revenue also correlation between environmental performances and operating profit. Sales/ revenue are used to find out whether green innovation has influence on it as one of the indicator of competitive advantage. And the correlation between environmental performances and operating profit is to find out whether green innovation delivers competitive advantage on low cost form other competitors.

Table 4.5 shows the result of Spearman correlation between environmental performances and sales/ revenue. Apparently the coefficient correlation¹⁰ between environmental performance in 2008 and sales from 2008 until 2013 is high and significant. From the Table 4.5, Spearman correlation 1, it is shown that the coefficient correlation (r) between environmental performances (EP) in 2008 and sales from 2008 until 2011 is 0.847¹¹ with significance value (P)¹² equals to 0.016. However the coefficient correlation and the significant value between environmental performances 2008 and sales in 2012 and 2013 are decreasing.

⁹ IBM SPSS is a data mining and text analytics software application built by IBM (International Business Machine).

¹⁰ Coefficient of correlation measures the degree to which the two variables are related (Source: Taylor, 1990).

¹¹ Correlation coefficients (in absolute value) ≤ 0.35 are generally considered to represent low or weak correlations, 0.36 to 0.67 modest or moderate correlations, and 0.68 to 1.0 strong or high correlations with r coefficients 0.90 very high correlations (Source: Taylor, 1990).

¹² A statistically significant r coefficient merely indicates that the observed sample data provides ample evidence to reject the null hypothesis that the population correlation coefficient parameter (ρ) is zero thereby concluding that the population correlation coefficient is not equal to zero (Source: Taylor, 1990).

Table 4.7. Spearman correlation 1

Spearman	EP08- Sales08	EP08- Sales09	EP08- Sales10	EP08- Sales11	EP08- Sales12	EP08- Sales13
Correlation	0.847	0.847	0.847	0.847	0.757	0.619
Sig	0.016	0.016	0.016	0.016	0.049	0.144
N	7	7	7	7	7	7
		EP09- Sales09	EP09- Sales10	EP09- Sales11	EP09- Sales12	EP09- Sales13
Correlation		0.487	0.577	0.577	0.631	0.595
Sig		0.268	0.175	0.175	0.129	0.159
N		7	7	7	7	7
			EP10- Sales10	EP10- Sales11	EP10- Sales12	EP10- Sales13
Correlation			0.536	0.516	0.5	0.429
Sig			0.215	0.215	0.253	0.337
N			7	7	7	7
				EP11- Sales11	EP11- Sales12	EP11- Sales13
Correlation				0.464	0.393	0.179
Sig				0.294	0.383	0.702
N				7	7	7
					EP12- Sales12	EP12- Sales13
Correlation					0.967	0.216
Sig					0.728	0.641
N					7	7
						EP13- Sales13
Correlation						0.216
Sig						0.641
N						7

However, started from 2012, coefficient correlation of environmental performances in 2008 towards sales is decreasing and insignificant. So as coefficient correlation of environmental performances which started from 2009 to 2013, although the coefficient correlations are higher than 0.5 but the correlation are not significant.

Table 4.6 shows the result of Spearman correlation between environmental performances and operating income from 2008 to 2013.

Table 4.8. Spearman Correlation 2

Spearman	EP08- OP08	EP08- OP09	EP08- OP10	EP08- OP11	EP08- OP12	EP08- OP13
Correlation	0.613	-0.505	-0.216	-0.018	0.09	0.126
Sig	0.144	0.248	0.641	0.969	0.848	0.788
N	7	7	7	7	7	7
		EP09- OP09	EP09- OP10	EP09- OP11	EP09- OP12	EP09- OP13
Correlation		0.487	0.739	0.703	0.541	0.577
Sig		0.268	0.058	0.078	0.21	0.175
N		7	7	7	7	7
			EP10- OP10	EP10- OP11	EP10- OP12	EP10- OP13
Correlation			0.464	0.429	0.321	0.357
Sig			0.294	0.337	0.482	0.432
N			7	7	7	7
				EP11- OP11	EP11- OP12	EP11- OP13
Correlation				0.25	-0.036	0.071
Sig				0.589	0.939	0.879
N				7	7	7
					EP12- OP12	EP12- OP13
Correlation					0.18	0.234
Sig					0.699	0.613
N					7	7
						EP13- OP13
Correlation						0.234
Sig						0.613
N						7

Coefficient correlation between environmental performances and operating income vary. Most of the results are showing insignificance correlation between environmental performances and operating income. However, environmental performances in 2009 and 2010 have coefficient correlation at 0.739 and 0.703 with significant value 0.058 and 0.078 towards operating income. Although the significant values are not strong enough but it still consider as significant.

Both of results proof the hypothesis of this study that green innovation of Japanese electronic industries with particular reference to Japanese home appliance industry have influence on competitive advantage, in this case competitive advantage on profitability and low cost.

4.3.2. Research question no 2

Based on the results, green innovation does has association with competitive advantage. However, it doesn't last continuously. From the results, even though the coefficient correlation is quite high and significance, there are sales and operating income that not influenced by green innovation. As shown in Table 4.5 that only environmental performance in 2008 influenced sales in 2008 to 2011 while improvement in environmental performances in 2009 until 2013 didn't give influence on sales FY 2009 - FY 2013. Similar results happened to the correlation between green innovation and operating income. From Table 4.6, it is shown that only environmental performances in 2010 and 2011 have influenced on operating income in following years. While in early stage (2008), green innovation didn't have any influence on the operating income. And in 2012, green innovation no longer influenced the operating income in the following years.

Figure 2. Green Competitiveness Life Cycle

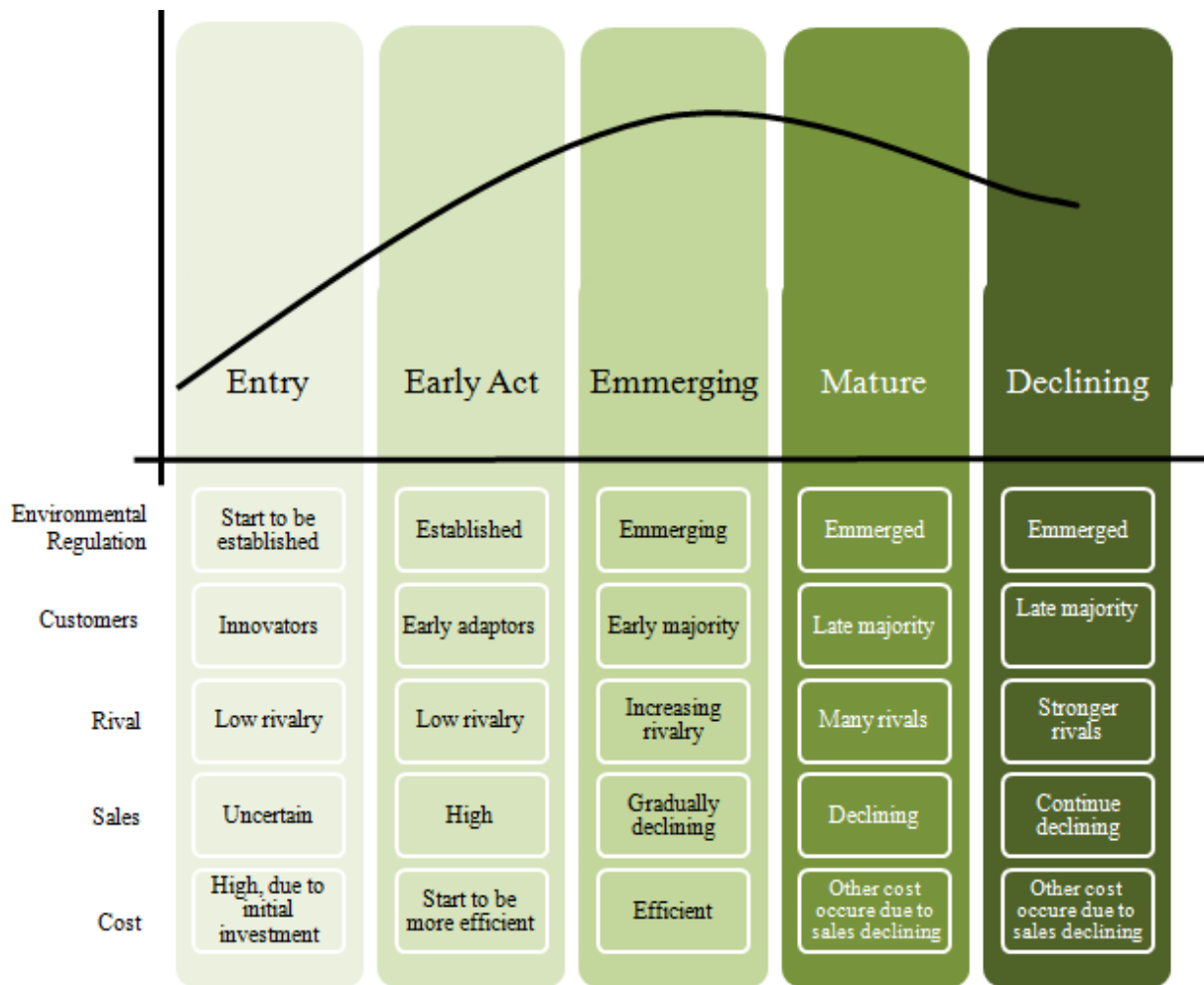


Figure 4.1, Green Innovation Life Cycle Model, describe the possible life cycle stage of Japanese home appliance products that initially change their strategy in order to comply with regulation as well as to enhance new market opportunities. During entry to early act stage, Japanese home appliance industry didn't have any difficulties because they have the abilities to comply with the regulations and capable to invest to perform green process' and green products' innovation. Hence, green innovation has highly significance correlation with their competitive advantage on sales and operating income. However, in time progress, environment regulation became emerged, therefore other competitors that willing to enhance their market follow to comply with the regulation and enter the market as rivals. As high and rapid competition occurred, green innovation of Japanese home appliance products, have no

significant association anymore with their competitive advantage. By the time many and strong rivals occur in the market, consumers will have more preferences on green products that will lead in having competitive advantage on sales and operating income declining. Or in other words, green innovation will influence competitive advantage in entry to early act stage or we can call it first-mover stage when only few rivals available and consumers still in adapting stage. As soon as the markets have many followers or competitors, green innovation seems don't have any significant association anymore with their competitive advantage.

4. 3.3. Research question no 3

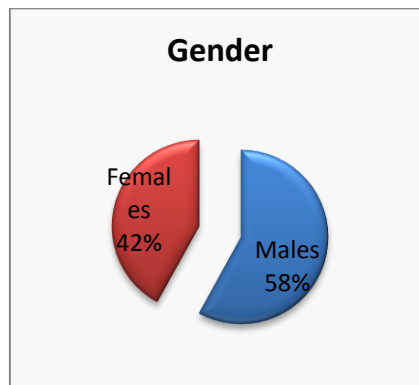
Questionnaires

Due to find out what Japanese should do to successfully implement their green innovation strategy in the market as their competitive advantage, which for this study is Indonesia to represent Asia Pacific market growth. Hence, the questionnaires spread out in Indonesia to find out their perspective on green innovation, green products with particular reference to Japanese home appliance products. On the first section, five questions related to respondents profiles covering gender, age, income, education. On the second section fifteen questions related to consumers' preferences on buying home appliance products.

1. Respondents' profile

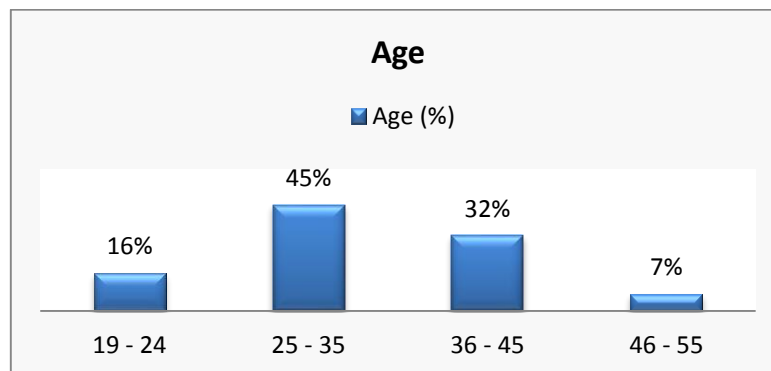
Table 3.2 in research methodology elaborate that the questionnaire consist fifteen questions, five questions are related to respondents profile and ten questions related to four variables that could influence customers to buy green products.

Figure 3. Gender



From one hundred respondents, the ratio between female and male respondents doesn't have big differences (Figure 4.2). However, there was a difference between male and female respondents. This could have happened because home appliance products consist of several products that not only female customers buy but also many products male customers buy, such as television and home theater appliances.

Figure 4. Age

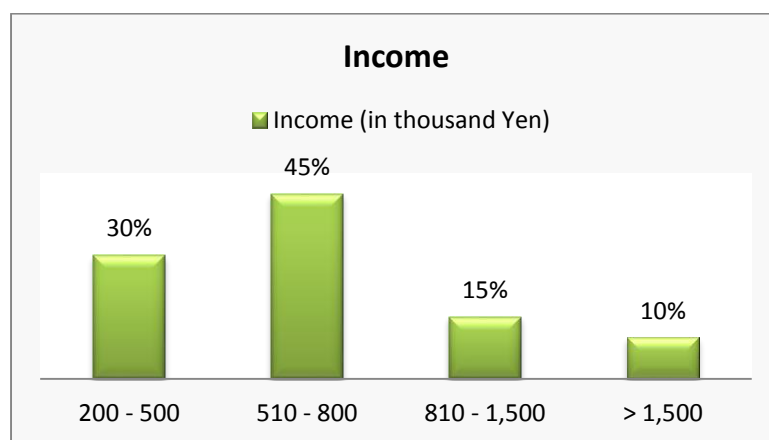


As shown in Figure 4.3, seventy-seven percent respondents that come to electronic stores are mostly twenty-five to forty-five years old. While twenty-three percent respondents are nineteen to twenty-four years old and forty-six to fifty-five years old. Home appliance products like air conditioner, refrigerator, washing-machine, are goods that have relatively long life utilization. And most people that buy these products are usually people who just got married and people that start to live independently. And for old people that need to change

their old home appliances, their children will help him to buy for them. There are few reasons why mostly people who come to electronic stores are people at young age.

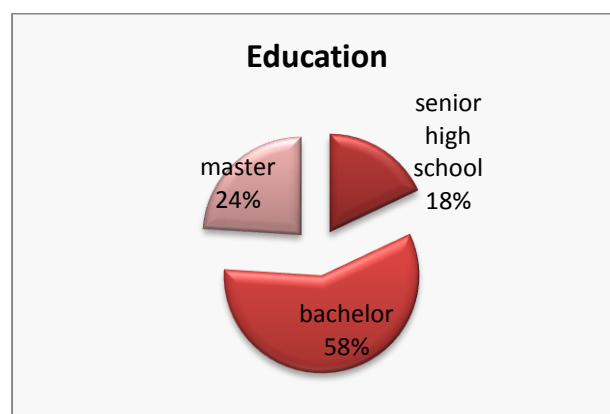
And forty-five percent of young age respondents are around 510,000 to 1,500,000 yen (Figure 4.4). Or it's around 5,100 to 15,000 dollars a year. According to WorldBank data latest update in 2012, Indonesia is lower middle income with purchase power parity per capita is 8,750 dollars (World Data Bank, 2012).

Figure 5. Income



Hence, with its average income, Indonesian Electronics Association is forecasting a twenty per cent growth in domestic electronics sales for 2012 to 3.2 billion USD (excluding cell phones and computer hardware) ("Global Business Guide Indonesia", 2013).

Figure 6. Education



Education profiles of the respondents are fifty-eight per cent bachelors and twenty-four per cent is masters (Figure 4.5). Electronic city - Jakarta and Bandung Electronic centre are electronic store that segmented for middle to high-end customers so as green innovation products. Hence most of the respondents who visit those stores are mostly educated.

2. Buying preferences

The attributes regarding buying preferences covering quality, brand, environment and price. There are two to three questions related to each of the attributes which disclosure how importance of the attributes and whether or not the attributes are included as buying preferences indicators.

Table 4.7 shows that the data set from the survey conducted to one-hundred respondents which randomly selected. As mentioned in the research methodology, the questionnaire using Likert scale (5 = strongly agree; 4 = agree; 3 = neutral; 2 = disagree; 1 = strongly disagree).

Table 4.9. Questionnaire data set

Id	Quality			Brand		Environment			Price	
	Q.Att1	Q.Att2	Q.Att3	B.Att1	B.Att2	E.Att1	E.Att2	E.Att3	P.Att1	P.Att2
1	5	5	2	2	2	5	5	4	2	3
2	5	5	2	5	3	5	5	4	3	3
3	5	5	3	5	5	4	4	3	3	3
4	5	5	5	4	4	5	5	5	3	2
5	5	5	3	4	4	3	3	2	3	3
6	5	5	5	5	5	4	4	4	3	3
7	5	5	4	5	4	4	4	4	4	4
8	5	4	3	5	4	3	3	4	5	4
9	5	5	5	5	3	3	3	2	3	4
10	4	4	3	2	2	3	4	2	2	2
11	5	3	4	4	4	5	4	4	5	3
12	4	4	4	3	3	4	4	3	4	4
13	5	4	5	4	4	3	3	4	4	3
14	5	5	3	5	5	4	4	3	3	4
15	4	4	4	4	5	4	5	4	3	4
16	4	4	4	4	4	3	4	3	2	2
17	5	4	4	4	3	4	4	4	3	3

Id	Quality			Brand		Environment			Price	
	Q.Att1	Q.Att2	Q.Att3	B.Att1	B.Att2	E.Att1	E.Att2	E.Att3	P.Att1	P.Att2
18	4	4	4	5	3	4	4	4	4	5
19	4	4	5	5	5	4	4	3	4	5
20	4	4	4	5	4	4	4	4	4	5
21	4	4	4	5	4	4	4	4	5	5
22	4	4	4	5	4	4	4	3	4	5
23	4	3	4	5	4	4	4	3	4	5
24	5	3	4	5	4	3	3	3	5	5
25	4	4	4	5	3	3	3	3	5	5
26	4	4	5	5	4	3	3	3	5	5
27	4	4	5	5	3	3	3	3	4	5
28	4	4	4	4	4	3	3	3	4	5
29	5	4	4	5	4	5	4	4	4	5
30	5	4	3	4	4	4	5	3	4	5
31	4	5	4	3	3	3	4	3	5	3
32	4	5	3	4	2	3	2	3	5	4
33	2	2	1	4	4	5	5	2	1	5
34	5	5	4	5	5	4	4	3	4	3
35	5	5	2	3	2	5	5	2	2	3
36	3	2	4	2	4	4	4	2	4	2
37	5	4	3	5	3	3	4	3	4	5
38	5	4	3	5	4	4	3	4	3	2
39	5	5	4	3	3	5	4	4	5	2
40	5	4	4	4	3	4	4	4	3	2
41	5	5	5	3	3	5	5	3	2	2
42	5	5	4	4	4	4	5	5	4	3
43	5	5	3	4	4	4	4	4	3	2
44	5	5	3	4	2	4	2	3	2	1
45	5	3	2	3	2	3	3	3	2	2
46	5	5	3	4	4	4	3	4	3	5
47	5	5	1	4	2	3	5	2	2	2
48	5	4	4	4	4	5	4	5	4	3
49	5	4	3	4	3	5	4	2	3	3
50	4	3	3	3	3	4	3	3	4	3
51	5	4	4	4	4	5	5	4	4	4
52	5	5	2	2	2	5	5	4	4	2
53	4	4	3	3	3	4	4	4	4	3
54	2	4	4	4	4	3	4	3	3	3
55	4	4	3	3	3	5	4	5	4	3
56	4	5	2	4	2	4	4	2	5	4
57	5	5	4	4	4	5	5	5	4	3
58	5	4	4	4	4	4	5	4	4	2
59	5	5	2	5	3	5	5	3	2	2
60	4	4	4	3	3	4	4	3	5	5

Id	Quality			Brand		Environment			Price	
	Q.Att1	Q.Att2	Q.Att3	B.Att1	B.Att2	E.Att1	E.Att2	E.Att3	P.Att1	P.Att2
61	5	5	4	4	4	4	4	3	5	3
62	5	5	4	5	5	4	4	4	4	3
63	5	5	5	4	4	5	5	5	2	3
64	5	5	4	5	5	3	3	3	3	2
65	5	5	3	3	3	5	5	2	3	3
66	5	5	3	4	3	4	5	3	4	1
67	5	5	2	4	2	4	2	3	4	5
68	5	4	3	4	3	5	5	4	3	3
69	5	5	4	5	5	5	4	4	4	4
70	4	3	4	4	4	4	4	5	4	4
71	5	4	3	4	3	5	4	4	2	3
72	5	5	2	2	1	5	2	4	2	4
73	5	3	3	4	3	5	4	3	3	3
74	5	4	4	5	4	4	4	4	5	4
75	5	4	4	4	3	3	3	3	4	5
76	4	5	5	5	5	4	4	4	4	4
77	5	5	5	5	5	5	5	5	5	4
78	4	3	2	2	3	2	2	2	3	3
79	4	4	4	3	4	4	5	4	4	5
80	4	4	2	4	2	4	4	4	4	2
81	4	4	2	4	2	4	4	2	4	2
82	5	5	2	4	2	4	4	4	5	2
83	4	4	2	4	4	4	4	4	4	4
84	5	5	4	4	4	4	4	4	3	3
85	4	4	4	5	4	4	4	3	4	5
86	5	4	3	4	4	4	4	4	4	3
87	4	4	5	5	4	4	4	3	4	5
88	4	4	3	4	4	3	3	3	4	5
89	4	5	4	4	4	5	4	4	4	2
90	4	5	4	4	4	5	4	4	4	2
91	5	5	3	4	3	4	4	4	4	2
92	5	5	2	2	2	2	4	2	2	2
93	5	5	3	4	4	4	4	4	4	4
94	5	5	2	2	4	4	2	3	1	3
95	4	4	3	4	4	4	4	4	2	2
96	4	4	2	4	4	3	3	3	3	4
97	5	5	5	5	5	4	4	4	4	3
98	5	5	3	4	4	3	4	3	3	3
99	5	5	3	5	3	4	4	3	3	3
100	4	5	4	4	4	5	4	4	4	2

Figure 7. Quality

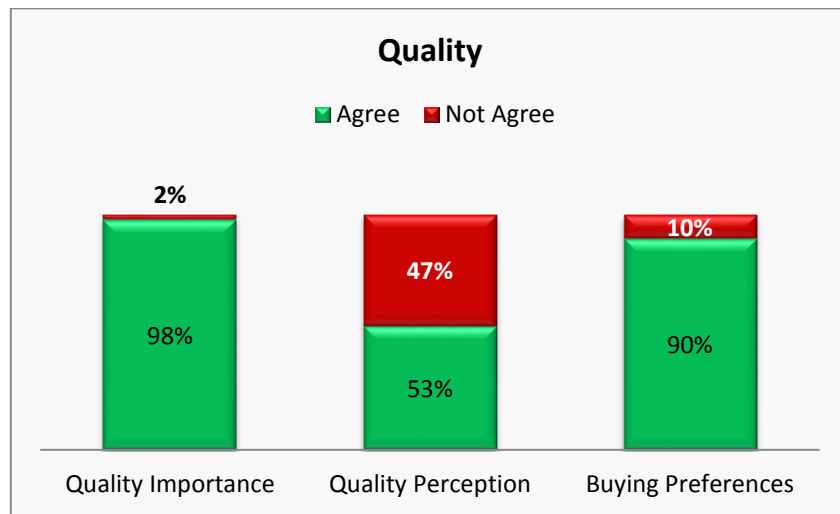
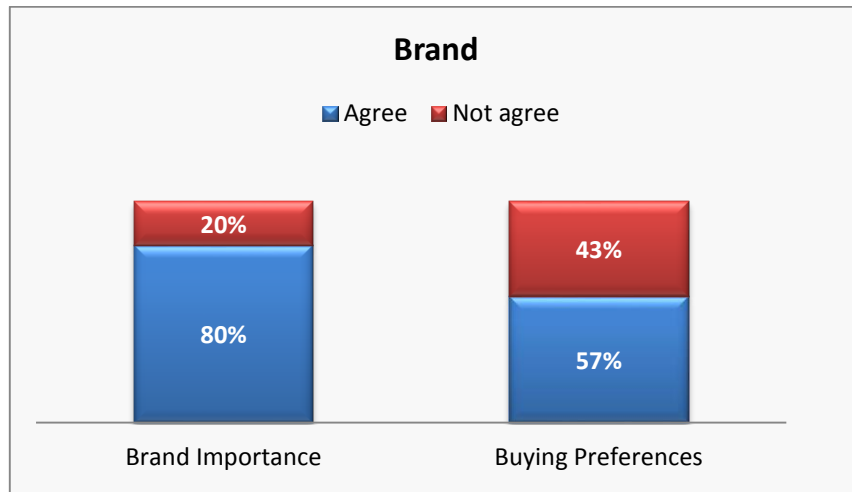


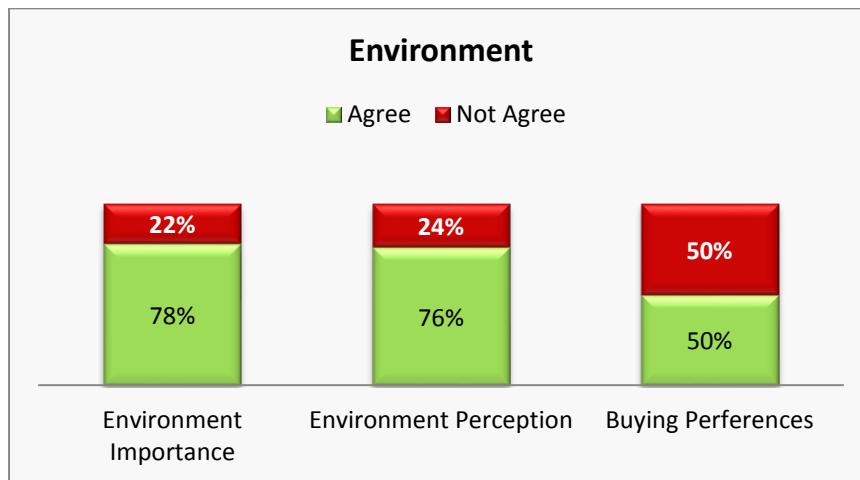
Figure 4.6 shown that according to survey, 98 % of the respondents agree that product quality is important and 90% of them include it as their buying preferences of electronic-home appliances products. However, although quality is important, 47% of respondents do not agree that price is indicator of product quality. Only 53% agree that the higher the price the better the quality.

Figure 8. Brand



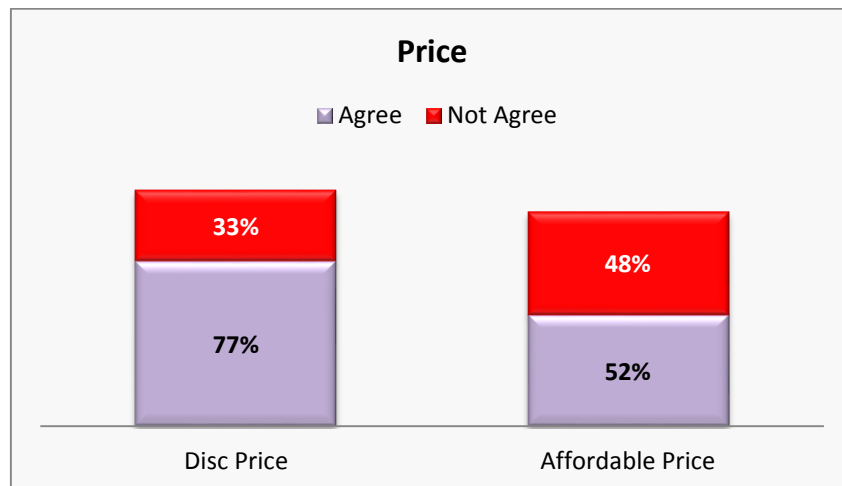
Next attribute is brand. According to survey (Figure 4.7), 80% respondents agree that brand is one of important attributes of an electronic product and 57% of them include it as their buying preferences of electronic-home appliance products.

Figure 9. Environment



Regarding environment attribute, according to survey (Figure 4.8), 78% of respondents agree that environment-friendly products are important. 76% of them agree that environment-friendly is part of good product quality and half of them agree that they are willing to buy environment-friendly products although the price is higher than regular products.

Figure 10. Price



Last attribute, price, according to survey (Figure 4.9), 77% respondents agree to buy good quality product nor environment-friendly product whenever it's on sale or discounted while 52% of respondents still choose any kind of electronic-home appliance products as long as the price is affordable.

Based on the survey result, it is shown that respondents, in this study, visitors of biggest electronic stores in Indonesia are aware of the importance of quality, brand and environment aspects. However, the respondents are still sensitive to price. They will buy good quality products or environment-friendly products whenever it's discounted. Furthermore, they will choose to buy affordable electronic-home appliance products.

In order to find out more about the influence between one and another, this study use Pearson correlation. The data from questionnaires are normally distributed hence Pearson correlation is appropriate way to be used.

Table 4.10. Pierson correlation (Quality)

Correlations											
		Quality 1	Quality 2	Quality 3	Brand 1	Brand 2	Env 1	Env 2	Env 3	Price 1	Price 2
Qua 1	Pearson Correlation	1	.506**	-.020	.088	-.057	.180	.051	.232*	-.081	-.257**
	Sig. (2-tailed)		.000	.846	.384	.571	.073	.615	.020	.421	.010
	N	100	100	100	100	100	100	100	100	100	100
Qua 2	Pearson Correlation	.506**	1	.018	.074	-.029	.142	.104	.159	-.071	-.279**
	Sig. (2-tailed)	.000		.860	.463	.772	.158	.303	.114	.480	.005
	N	100	100	100	100	100	100	100	100	100	100
Qua 3	Pearson Correlation	-.020	.018	1	.399**	.566**	.021	.073	.333**	.380**	.222*
	Sig. (2-tailed)	.846	.860		.000	.000	.837	.472	.001	.000	.026
	N	100	100	100	100	100	100	100	100	100	100
**. Correlation is significant at the 0.01 level (2-tailed).											
*. Correlation is significant at the 0.05 level (2-tailed).											

Table 4.8 is the result of Pierson correlation between attributes of quality and attributes of brand, environment and price. As shown in the table, Quality (Qua) 1 have significant correlation at the 0.01 level with Qua 2 (.506), at 0.05 level with Env 3 (.232), and negative

significant correlation with Price 2 (-.257) at 0.01 significant level. Qua 2 has negative significant correlation at the 0.01 level with Price 2 (-.279). The last attribute of quality, Qua 3, has significant correlation at 0.01 level with Brand 1 (.399), Brand 2 (.566), Env 3 (.333) and Price 1 (.380). It also has significant correlation at 0.05 level with Price 2 (.222).

Respondents that consider quality is important have strong correlations will most likely include it as one of the reason why they buy the home appliance products. They also agree that attribute environment-friendly product is part of the good quality products. Due to those considerations, those respondents most likely will not buy home appliance products just because the price is cheap. Respondents that agree the higher the price the better the quality of product (Qua 3) also consider brand represent of product quality and will most likely willing to buy environment-friendly product although the price is higher than regular products. However, respondents are price sensitive, hence they will buy home appliance products that are high quality and environment-friendly product whenever the products are discounted and the price already cheap.

Table 4.11. Pierson correlation (Brand)

Correlations											
		Quality 1	Quality 2	Quality 3	Brand 1	Brand 2	Env 1	Env 2	Env 3	Price 1	Price 2
Brand 1	Pearson Correlation	.088	.074	.399**	1	.528**	-.031	.019	.171	.316**	.359**
	Sig. (2-tailed)	.384	.463	.000		.000	.759	.848	.088	.001	.000
	N	100	100	100	100	100	100	100	100	100	100
Brand 2	Pearson Correlation	-.057	-.029	.566**	.528**	1	.036	.145	.305**	.183	.238*
	Sig. (2-tailed)	.571	.772	.000	.000		.724	.151	.002	.068	.017
	N	100	100	100	100	100	100	100	100	100	100
**. Correlation is significant at the 0.01 level (2-tailed).											
*. Correlation is significant at the 0.05 level (2-tailed).											

Regarding Pierson correlation between attributes of brand and attributes of other variables are shown in Table 4.9 It is shown that Brand 1 has significant correlation at 0.01level with Brand 2 (.528), Price 1 (.316) and Price 2 (.359). While Brand 2, has significant correlation at 0.01 with Env 3 (.305) and Price 2 (.238).

Respondents who consider brand and price as quality association will most likely buy famous brand of home appliance. However, due to price sensitivity, they will buy whenever on sale or whenever the price already decreased. And the respondents who are willing to buy environment-friendly product are the respondents who include famous brand as preference to buy home appliance products.

Table 4.12. Pierson correlation (Environment)

		Correlations									
		Qua 1	Qua 2	Qua 3	Brand 1	Brand 2	Env 1	Env 2	Env 3	Price 1	Price 2
Env 1	Pearson Correlatio n	.180	.142	.021	-.031	.036	1	.526**	.447**	-.076	-.156
	Sig. (2- tailed)	.073	.158	.837	.759	.724		.000	.000	.453	.122
	N	100	100	100	100	100	100	100	100	100	100
Env 2	Pearson Correlatio n	.051	.104	.073	.019	.145	.526**	1	.244*	-.058	-.181
	Sig. (2- tailed)	.615	.303	.472	.848	.151	.000		.015	.564	.071
	N	100	100	100	100	100	100	100	100	100	100
Env 3	Pearson Correlatio n	.232*	.159	.333**	.171	.305**	.447**	.244*	1	.231*	-.045
	Sig. (2- tailed)	.020	.114	.001	.088	.002	.000	.015		.021	.655
	N	100	100	100	100	100	100	100	100	100	100

Table 4.10 shows Pierson correlation between attributes of environment and attributes of other variables. Env 1 has significant correlation at 0.01 with Env 2 (.526) and Env 3 (.447). Env 3 has significant correlation at 0.01 with Env 2 (.244) and Price 1 (.231).

Respondents who are willing to buy environment-friendly products are respondents who consider environment-friendly products are important not only for the environment but also as quality association.

Table 4.13. Pierson correlation (Price)

Correlations											
		Quality 1	Quality 2	Quality 3	Brand 1	Brand 2	Env 1	Env 2	Env 3	Price 1	Price 2
Price 1	Pearson Correlation	-.081	-.071	.380**	.316**	.183	-.076	-.058	.231*	1	.358**
	Sig. (2-tailed)	.421	.480	.000	.001	.068	.453	.564	.021		.000
	N	100	100	100	100	100	100	100	100	100	100
Price 2	Pearson Correlation	-.257**	-.279**	.222*	.359**	.238*	-.156	-.181	-.045	.358**	1
	Sig. (2-tailed)	.010	.005	.026	.000	.017	.122	.071	.655	.000	
	N	100	100	100	100	100	100	100	100	100	100
**. Correlation is significant at the 0.01 level (2-tailed).											
*. Correlation is significant at the 0.05 level (2-tailed).											

Last result is the correlation between attributes of price with attributes of other variables (Table 4.11). Price 1 has significant correlation at the level 0.01 with Price 2 (.358).

Due to price sensitivity, respondents who willing to buy environment-friendly products and consider price and brand as quality association will most likely buy the good quality products whenever it's on sale. And the respondents who prefer to buy cheap products are the respondents who don't consider the importance of quality. However, they still consider the importance of brand. Hence, although it seems they don't care enough on quality and environment matters but they still do care on brand image or reputation of a product.

5. Conclusion and discussion

5.1. Conclusion

Association of green innovation and competitive advantage

According to this study's result, through environmental performances of Japanese home appliance industry from year 2008 to 2013, green innovation has significant correlation with competitive advantage on sales and low cost. Green innovation has association with competitive advantage. However, there are certain situation and condition that also influence how long green innovation able to influence competitive advantage.

Through comply with environment regulations and do green products innovation, Japanese home appliance industry open opportunity to enter market with strict environment regulations. They are able to enhance their market. Hence, as the empirical results shows, green innovation has association with competitive advantage on sales. Another finding from this study, green process innovations have association with low cost, operating income. Green innovation will help companies to reduce cost through source efficiency in order to reduce pollution and waste that will lead to cost reduction and higher income.

First mover advantages

From seven big Japanese electronics industries, Panasonic, Mitsubishi, Pioneer, Sony, Hitachi, Sharp and Toshiba, that addressing green innovation as one of their environment management, their competitive advantage that related to sales and low cost only significantly influenced by green innovation during entry and early act of green innovation (Figure 4.1). During entry and early act stage, Japanese home appliance industry has the ability to enter the market more freely because of the low competition. In regards, being a pioneer or "first-mover" gave the advantages to ask for premium price for green products due to better

products and better corporate images which allow them to develop new markets opportunities and gain competitive advantages. However, in time progress, environment regulation became established and other industries able to follow the regulations. Hence, the market became full of many and strong rivals. Consumers have many options in the market that can make the advantages of becoming "first-mover" gradually declined.

Similar with green innovation's correlation with the competitive advantage on sales, the influence of green innovation towards on competitive advantage on operating income only for certain times as well. From year 2008 - 2013, green innovation only influenced operating income in 2010 and 2011. This finding, appropriate with previous researches that in the entry and early act of green innovation, companies tend to spend more cost due to investment on research and development, material replacement, equipments, and other activities to support environment policy targets. However, in time progress green innovation will help companies to reduce cost. By reducing CO2 pollution, certain activities such as production process efficiency will lead to reduce electricity consumption which will reduce electricity cost. Managing waste, such as using material more efficient, reduce scrap waste from materials will also reduce process cost. At the stage when green innovation able to reduce cost from efficiency, that is when green innovation is associate with competitive advantage on low cost. But as Japanese home appliance not becoming "first-mover" anymore, which give impact on sales declining, then the operating income will also declining. In that stage green innovation have no significant correlation with competitive advantage on low cost or operating income.

Asian market

In Asian market, particularly Southeast Asia, where environment regulation relatively loose, Japanese home appliance products have the power of product differentiation. From the survey

in Indonesia, it shows that most of respondents are aware of the importance of environment sustainability and environment attributes in a product. However, other attributes, quality, brand and price are also comprehensively influence their buying behavior. From the survey, Japanese home appliance products offer products that not just have good quality and good brand image but also environment-friendly. Their products could save energy utilization and recyclable. In regards, Japanese home appliance products have higher price compare to competitors' products which mostly are regular products. As mentioned, according to the survey results, consumers are aware of the importance of environment as well as quality and brand image. But at the same time, price is still one of important attributes due to price sensitivity in developing countries. It is shown that green consumers in Indonesia will most likely buy environment-friendly products whenever it's discounted or already having price decreased. Hence, in order to enhance market penetration in Asia, price is item that need to be included as a consideration.

5.2. Discussion

Based on this study, to be able to get the advantages on apply green innovation strategy, time is one of the factors that could make competitive advantage on green innovation sustain. To be the first that follow environment regulations or promote green products in the green market will delivers advantages not only towards to the sales but also corporate image that could lead to social benefits.

It is important to become a pioneer in green market, especially in market that has certain environment regulation that have to be followed in order to be able to enter the market. Whenever Japanese home appliance already in the Emerging stage, it is important to continuously innovate their products. Furthermore, whenever the environment regulation

updated, being the first companies or industries that comply with it will also give another chance again to gain "first-mover advantages" in the market.

In regards on penetrating market, as mentioned in literature review, Asia could be one of consideration. However, Asian market could be considered as more challenging market due to lack of regulations. Competitors do not have to follow strict regulations whenever they want to enter the market. Hence, regarding home appliance products, consumers have a lot more option to be considered depend on what consumers' need and want. According to the questionnaire result, although most Asian countries do not have strict environment regulations, the consumers are aware with the importance of environment as well as quality and brand image. However, price is also one of consideration of their buying preferences. In regards, consumers that are aware of the importance of environment sustainability, due to price sensitivity, will buy green products whenever on sale, discounted or price decreased because Japanese home appliance products are relatively more expensive than other products, regular products. Currently, other producers from Korea and China are able to follow environment regulations, they also able to produce green products. With their competitive advantage on price, they can sell their products in developing Asian countries and can be considered as strong rivals. Due to be able to compete in Asia, especially Asian developing countries, Japanese home appliance industry should also include price attributes as a consideration in the competition.

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