Chapter 6

An Assessment of Vietnamese Firms' Readiness to Adopt a Circular Economy

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Chapter 6

An Assessment of Vietnamese Firms' Readiness to Adopt a Circular Economy

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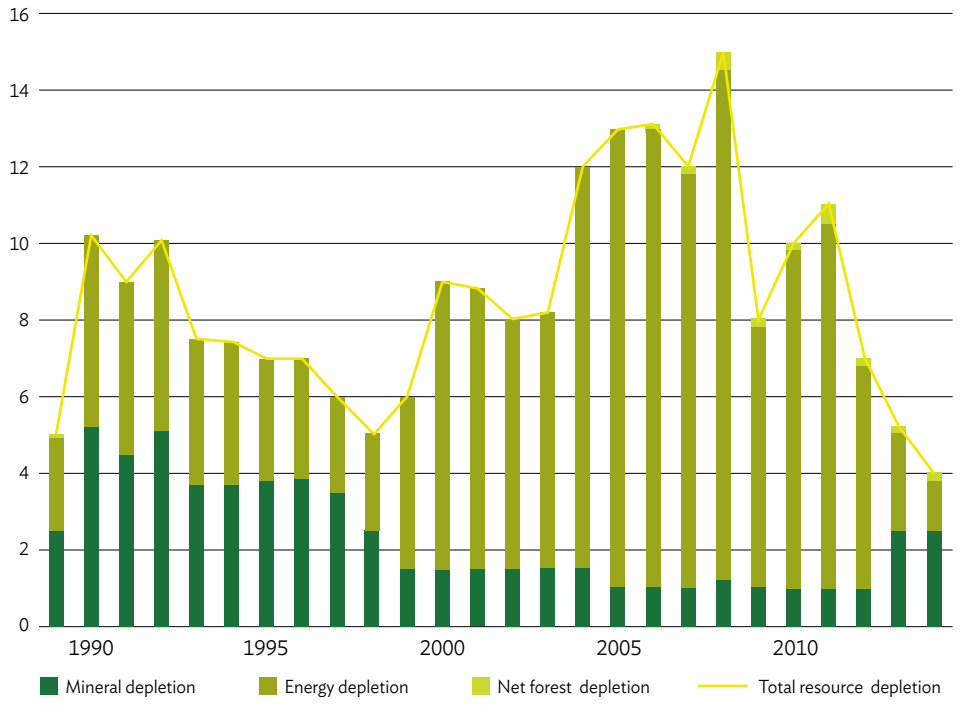
1. Introduction

Viet Nam is a development success story. It has been amongst the fastest growing economies in the world, with an annual economic growth average of 5.5% per year since the 1990s, 6.4% growth average per year in the 2000s, and continued strength with an estimated gross domestic product growth rate of 6.7% in 2015 (World Bank, 2015). Viet Nam's economy has extraordinarily come a long way in a short time. Today, it faces complex challenges that require a transition to a better development model (Breu et al., 2012) Viet Nam's economy is highly dependent on foreign direct investment (FDI), not only in terms of industrial production (FDI accounted for 50% in 2014) or exports (70% in 2014), but also in terms of ownership structure (almost 100% of enterprises have foreign capital and only 17% of the total number of FDI projects by the end of 2014 were joint venture projects with local investors) ([Tho, 2015]). Viet Nam also has very weak linkages between FDI and domestic enterprises. The main reason for such situation is that Vietnamese domestic enterprises are unable to supply qualified components and intermediate goods to FDI businesses (Tho, 2015). This situation may split the economy of Viet Nam into two separate areas – the FDI sector and the domestic sector – which may deter the spread of the FDI sector's technology and business knowledge to the entire economy (Tho, 2015). Moreover, according to the standards of the World Bank, Viet Nam has become a low middle-income country as its per capita income surpassed US$1,000 in 2008 and reached US$2,000 in 2015. In this context, Viet Nam's economy is still low and its enterprises have generally weak competition capacity and management ability. Thus, it can be said that without strong reforms, Viet Nam may fall into the low middle-income trap. These are some of the major challenges in Viet Nam's economy at present.

Viet Nam's rapid growth also came with a price (Ni et al., 2015). For over three decades, many production sectors were formed and developed, and there was an increased need for commodities, materials, and energy to boost national socio-economic development. This has resulted in depletion of natural resources, pollution in urban areas, and generation of solid wastes (Ni et al., 2015). Environmental pollution from urban and industrial wastewater leaves waterways toxic, while urban water and air pollution are beginning to pose serious health hazards, especially near Hanoi and Ho Chi Minh City, and particularly for children (World Bank Group, Ministry of Planning and Investment, 2016). Exacerbating the risks is rapidly growing energy consumption, increasingly reliant on coal-powered electricity generation. In recent years, Viet Nam's increase in greenhouse gas emissions has been one of the world's fastest (World Bank Group, Ministry of Planning and Investment, 2016).

Figure 1. Status of Natural Resources Depletion in Viet Nam 1988– 2014

Unit % of gross national income



Notes: Natural resources depletion is the sum of net forest depletion, energy depletion, and mineral depletion. Net forest depletion is unit resource rents times the excess of round wood harvest over natural growth. Energy depletion is the ratio of the value of the stock of energy resources to the remaining reserve lifetimes (capped at 25 years). It covers coal, crude oil, and natural gas. Mineral depletion is the ratio of the value of the stock of mineral resources to the remaining reserve lifetime (capped at 25 years). It covers tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite, and phosphate (World Bank, 2015).

Source: World Bank, 2015.

Figure 1 shows the natural resources depletion (percentage of gross national income) in Viet Nam for 25 years. The highest peak was 14.82%, followed by a downward trend until 2014 with 3.97%, except in 2011 where depletion was recorded at 11.12%. At present, Viet Nam is facing serious air pollution problems in big cities such as Hanoi and Ho Chi Minh. Sea pollution is also a serious problem for Viet Nam. Forest resources have also been depleted by mining and furniture-making activities, causing floods and disasters.

Based on the origin of waste generation, 46% of solid waste is produced in urban areas; 17% come from industrial production, rural solid waste, and waste released by craft villages; and the remaining percentage comes from the medical sector (VEA, 2013). A World Economic Forum research in 2013 indicated that Viet Nam is amongst the 10 countries that have the lowest air quality that critically impacts human health. Waste problems have become stressful environmental, social, and economic issues that the government and people must cope with.

The pollution in Viet Nam is expected to get worse if the current pattern of industrialisation continues and no further control on the environment is activated. For air pollution nearly half of nitrogen dioxide emission is due to industrial development while sulfur dioxide emission is caused by industry (Clean Air Initiative for Asian Cities, 2010). These two substances are hazardous to both human health and the environment. According to a 2015 report by the Vietnamese government, there were 815 violations of environmental protection regulations in 2010, 393 of which incurred a total fine of D100 billion. In 2015, there were 10,900 violations of environmental protection regulations, of which 4,600 were fined a total of D358 billion. The number of violations was 17,000 (Lam, 2016).

In a circular economy, waste from factories would become a valuable input to other processes. Rather than being disposed, defunct products could be repaired, reused, or upgraded (Preston, 2012). Many countries and regions such as Germany, Japan, the European Union (EU), the United States (US), and France have launched circular economy plans (Geng et al., 2008; Albertini, 2014). The circular economy concept is especially considered and experimented in the EU where it is deemed to help reduce environmental pressures in Europe and beyond and minimise the continent's high and increasing dependence on imports. This dependence is increasingly becoming a source of vulnerability. Growing global competition for natural resources has contributed to marked increases in price levels and volatility. Circular economy strategies could thus result in considerable cost savings, increasing the competitiveness of Europe's industry while delivering net benefits in terms of job opportunities (EEA, 2016). Circular economy seems to be an essential solution for Viet Nam so it can continue to serve the growing energy and resource demands in the domestic market while at the same time decrease the pressures from waste, pollution, and climate change.

The Vietnamese people in general and Vietnamese enterprises are active and flexible agents that take advantage of spillover and learning effects from experiences of advanced countries to increase the economic value and improve competitiveness of their companies. They also follow new international development concepts/trends. However, there is a big gap between good ideas and the real possibility of implementing the proposed concepts/trends due to lack of infrastructure and human resource capabilities and finance availability, and weak cooperation between different sectors of the economy in pursuing joint goals.

Is it possible and profitable for Vietnamese firms to apply circular economy in Viet Nam? This chapter aims to answer this question by exploring the possibility of applying circular economy in Vietnamese firms using the Political, Economic, Social, and Technological (PEST) model and considering the current perception of Vietnamese entrepreneurs about circular economy. This chapter also focuses on the economic values and firms' competitiveness gained from applying circular economy business models to prove the profitability of the concept. Some successful case studies with innovative circular business models (conducted by the Business Model Canvas) will be given as proofs of the concept. Barriers and challenges are analysed in this chapter, along with suggestions for potential solutions and information provided for further study on the implementation of circular economy in Viet Nam's economy.

2. Assessing the Possibility of Vietnamese Firms Applying Circular Economy

To examine the possibility of Vietnamese firms applying circular economy even when empirical data is lacking, the authors examined firms' awareness and behaviours towards circular economy by conducting a survey of 500 enterprises, and applying the PEST tool to analyse the business environment in Viet Nam.

The concept of no-waste production was very popular in Viet Nam during the 20th century, when agriculture was the country's main industry. At that time, there was a concept similar to circular economy called the V-A-C model, which stands for *vuòn* (garden), *ao* (pond), and *chuông* (cage). This was applied in agricultural activities only, the idea being that the three factors would work smoothly with each other so that the outputs, including waste, from one process would become inputs to the other. The model was able to cover the biological materials circle of the circular economy butterfly diagram. However, after Doi Moi (1986), waves of industrialisation and urbanisation placed the country in a different situation, covering economic, social, and cultural elements. It also

transitioned the whole country from a poor agricultural country to one of the most active producers of the world, focusing on light industries and processing services. Through Doi Moi, people's incomes increased and the average living standard improved such that the society became more specialised and not many people were working in paddies anymore. The introduction of advanced farming tools from foreign countries also helped speed up the progress of social specialisation. However, the abundance of assets and variety of choices in the market strongly reduced the V-A-C model as well as the natural materials recycling system from the upstream. Consequently, the biological materials circle in agricultural production was neglected for years. Nowadays, with the use of chemicals (fertilisers, pesticides) in farming, Vietnamese farmers not only break the natural circle of materials but also release more waste, even toxic waste, to the environment.

Viet Nam, like many other developing countries, has achieved very little in closing the mechanical materials circle due to its dependence on investors' technology. According to the Vietnam Environment Administration report (2014), waste reduction in production, services, and consumption is still almost neglected. However, related terms in circular economy such as cradle-to-cradle, resource efficiency, renewable energy, and cleaner production have been popularised across various industries in Viet Nam by the Vietnamese government and some development programmes. Many companies have applied cleaner production technologies and activities in their factories, although the number is still modest (less than 30% of the total companies all over Viet Nam). Recycling activities in Viet Nam today mainly depend on micro enterprises, which currently use poor tools and outdated technologies to process waste through the waste collection network of garbage buyers. Most companies that participated in the survey have not used recycled materials as inputs for production. Nor do they collect renewable end-of-life materials from their own products for recycling. Therefore, although Vietnamese firms have a good awareness of concepts related to circular economy, the application or intention to apply these concepts is still limited and not popular.

2.1. Firms' Awareness of Circular Economy Concepts

Since there are no empirical data on Vietnamese enterprises' awareness of circular economy concepts, the authors conducted a survey on this issue using a sample of 500 enterprises operating in a variety of industries in Viet Nam. We received 152 usable responses. We reached the samples through the Viet Nam Social Enterprises Network, the Creative Enterprises Club, and the Viet Nam Entrepreneurs Association. We also arranged in-depth interviews with nine enterprises. Respondents' characteristics are shown in Table 1.

Table 1. Characteristics of the Respondents

Characteristics	Frequency	Percentage
Gender		
Male	115	76.5%
Female	37	23.5%
Educational level		
College	10	6.3%
University	57	37.5%
Higher study	85	56.3%
Industry type		
Food processing	54	35.5%
Textile manufacturing	23	15.1%
Furniture manufacturing	26	17.1%
Steel manufacturing	1	0.7%
Ceramic manufacturing	27	17.7%
Cosmetics manufacturing	1	0.7%
Research and development service	20	13.1%
Positions in the organisation		
Marketing department deputy	20	13.3%
Production manager	51	33.3%
CEO	41	26.7%
CFO	40	26.7%

CEO = chief executive officer, CFO = chief financial officer.

Source: Authors' questionnaire and survey results.

The multiple-choice questions from the survey were the main data sources for the analysis. Since the awareness and behaviours of firms towards developing a circular economy are multidimensional constructs (Liu and Bai, 2014), the study should have involved specifying the construct domain, generating items, collecting data, and purifying measures, in addition to assessing reliability and validity. However, under the limited scope and timeframe of the project, we directly used the primary data to imply the actual status of firms' awareness and behaviours towards applying circular economy in their businesses.

Table 2. The Questionnaire

Question purpose	Questions
Awareness	1. Have you heard of circular economy?
	2. Do you know any other concepts of sustainable development? a. CP b. SCP c. Resource efficiency d. Renewable energy e. Green growth f. 3Rs
	3. Do you agree that circular economy can be applied in Viet Nam as a business ethic?
	4. Does your firm have willingness to: a. recycle waste within the factory b. use inputs from recycled materials c. collect used products of the company from the market to re-produce.
Behaviour	5. Has your firm used recycled materials as inputs?
	6. Does your firm apply CP technology?
	7. Has your firm worked with professional recycling companies?
	8. How much percentage of your products can be recycled or renewed?
	9. Has your firm minimised the use of materials form natural resources?

3Rs = reduce, reuse, recycle; CP = cleaner production; SCP = sustainable production and consumption.
Source: Authors.

Data were collected through emails, phone calls, or social network. A total of 152 usable responses were received.

The interview included 17 questions, six were about general information on the company and its current business model, 10 were closed questions focusing on the research purposes, and one was an open question. The 10 interview questions were:

(i) Have you heard about the circular economy concept?
(ii) Do you follow the trend of circular economy?
(iii) Have you heard about Industry 4.0?
(iv) Do you care about processing wastes?
(v) Do you intend to solve waste problems within your production process?
(vi) Do you know of any stakeholder in your product value chain who can help solve the waste or resource efficiency issues?
(vii) Do you work with any stakeholders in your product value chain who can help solve the waste or resource efficiency issues?
(viii) Do you intend to invest in cleaner production (CP) technology?
(ix) Do you intend to switch to sustainable energy?
(x) Does your company operate any social responsibility activity?

The open question was:
(xi) Do you have any suggestions to improve circular economy awareness and practice amongst Vietnamese firms? (All the respondents answered 'no' to this question.)

Almost all surveyed companies (96.2%) understand how hard the challenges caused by natural resources scarcity and climate changes are, and how price increases of raw materials and pollution will affect their revenue, threaten their business growth, and decrease their competitiveness in the market. They also understand that they are getting into a big risk given the context that many free trade agreements (FTAs) such as the ASEAN Economic Community, Trans-Pacific Partnership, and the like will take place soon, making the market more and more intensely competitive.

Moreover, the survey results showed that 82% of companies assumed that the three most significant production costs for them are labour (50%), materials procurement (35%), and fossil energy consumption (15%). Therefore, they are afraid that their company revenues would be vulnerable if one of the three factors would increase its price dramatically given increasing resource scarcity. However, these firms are still quite unclear about the possible ways to deal with the current situation towards building a sustainable business in the long term. They are not willing to innovate their business models either. According to the survey result, 78.8% of the firms' managers do not have a perception on the concept of circular economy, which explains why they have no action plan towards implementing circular economy in their business models.

About 13.3% of the firms know about some related concepts such as sustainable production and consumption, CP, cradle-to-cradle, and resource efficiency. However, their practice towards applying these concepts in businesses are very limited, particularly for CP, which has several national action programmes sponsored by the Vietnamese government. Another survey, conducted by the Ministry of Industry and Trade in 2014, showed that only 2,509 enterprises, equivalent to 28% of industrial production units across the country, were aware of the concept. This result was far lower than the initial objective of the National Action Programs.

Regarding the 'reduce, reuse, recycle' (3R) concept, 90% of the firms have clear understanding of the 3R and the environmental corporate social responsibility concepts. However, the survey revealed that a modest number of firms (21%) implemented corporate social responsibility as one of their main activities and recorded their expenses for such activities in the company's financial balance. About 62% of the responses assumed that their products had more than 40% of materials that were recyclable after use, and about 2% of which could be renewed. In reality, only 36 companies or 25% intend to collect the renewable materials for recycling/reproduction. Only one company operating in the cosmetics industry collected used packaging materials, relying on the voluntary actions of their customers to give back packaging boxes after use through the company's distribution systems, though the scale was small. This is because there is no effective collection channels in Viet Nam to help companies take their renewable elements back and Vietnamese consumers do not have the habit of separating wastes at source nor return recyclable wastes to producers through their distribution channel or by any other channels (Dao, Downs, and Delauer, 2013).

2.2. Firms' Behaviour Towards Circular Economy Concepts

The survey results showed that 75% of the participants have never procured recycled materials as inputs for their production process. Among them, 80% had no idea about a recycling facility that could provide suitable secondary materials to fit their production needs. The other 25% who responded affirmatively imported plastic granulates, the same recycled material. Processing waste after production (recycling/exchanging materials) also presented the same scenario, with 75% of the respondents stating that they had never cooperated with a professional waste processing company to find solutions for their production wastes. This may be because every industrial park in Viet Nam has its own landfill or a waste processing partner who collects unsegregated waste and either incinerates or sends them to landfills. Moreover, based on our experience, some recycling companies face many difficulties and costly procedures in securing a licence to process wastes of companies.

Outside of industrial zones, some micro enterprises process wastes at household level through a collection system of individual garbage buyers and collectors. There are some households, mostly in rural areas, that separate recyclable wastes such as plastics, paper, metals, and the like to sell to garbage buyers. Through this system, recyclable and reusable materials are collected separately and delivered to recycling facilities in craft villages. These craft villages, which recycle paper, plastics, metals, etc. from household wastes, are strongly developed and have contributed to job creation, poverty reduction, and improving people's incomes and lives. Statistics in 2003 showed that about 52,000 tonnes of plastics and 735,000 tonnes of waste metals were recycled by those craft villages in the north. However, most recycling technologies used by craft villages are out of date and have caused serious pollution that impairs people's health and lives (Yap et al., 2013).

In terms of compost production from household garbage, the number of compost production facilities is too small and thinly distributed in some big cities. The compost market has not been really developed and people still prefer to use chemical fertilisers for crop production. Despite the recent development and application of new technologies, which have been proven to be effective in recycling and treating solid wastes, the replication of these models and technologies in the entire country still requires a much larger investment from the government and the communities.

Based on our survey, nearly 50% of the survey participants (70 enterprises) have applied at least one CP technology in their factories. Moreover, 25% said that they had planned to apply cleaner technology but lacked financial resources. We believe that if these companies knew about the preferred financial loans for applying cleaner technology provided by the National Financial Ministry and the Ministry of Industry and Commerce, they would be ready to take one more step to CP. The other 25% of companies that had never applied cleaner technology were in rural areas or operate in craft villages. On a national scale, according to a much wider survey conducted by the Viet Nam Environment Administration (VEA) in 2014, only about 200 out of 200,000 enterprises (0.01%) have been applying the CP approach, which is very effective in reducing wastes in production activities (VEA, 2014). The Ministry of Industry and Trade undertook another baseline survey of CP implementation against the objectives of the Strategy on Cleaner Production in Industry from August 2010 to February 2015. The survey was conducted in 63 provincial branches of the Department of Industry and Trade and 9,012 industrial production units in Viet Nam.

The findings from the survey are summarised in Table 3.

Table 3. Cleaner Production Implementation Status in Viet Nam in Achieving National Strategic Objectives

Strategy's Objective	Objective during		Situation in 2010	Situation in 2015
	2010–2015	2016–2020		
Percentage of industrial production units aware of CP application benefits	50%	90%	28%	55%
Percentage of industrial production units applying CP and able to cut down the consumption of energy, fuel, and raw materials per product unit	25%	50%	11%	24%
Level of reducing consumption of energy, fuel, and raw materials per product unit	5%–8%	8%–13%	Varying	Raw materials, chemicals: 1%–92%
				Water: 1%–99%
				Coal: 2%–98%
				DO: 1%–70%
				Electricity: 1%–68%
				Biomass fuels (firewood, rice husks): 3%–61%
				FO: 7%–43%
				Gasoline: 5%–34%
				Gas: 3%–30%
Percentage of medium-sized and large enterprises having focal points responsible for CP on-site	–	90%	–	
Percentage of full-time DoIT employees fully capable of providing guidance and advice on CP application	70%	90%	18%	73%

CP = cleaner production, DoIT = Department of Industry and Trade, DO = diesel oil, FO = fuel oils.

Source: (Ministry of Industry and Trade, Viet Nam, 2010-2015).

At the time of the survey, CP had been applied in 1,031 enterprises, equivalent to 11% of industrial production units nationwide. Among those, 309 enterprises (equivalent to 3% of the surveyed enterprises) reduced their fuel and material consumption by 5%–8%, meeting the strategy objective in the first period.

CP is widely applied and it reduced 5% of energy and material consumption per product unit in all industrial sectors. The textile and cement-brick-porcelain sectors have the largest number of enterprises applying CP (84 enterprises by each sector). Of these, 16 enterprises from the textile sector and 36 enterprises from the cement–brick–porcelain sector reduced their energy and material consumption by 5%.

3. Examining the Possibility of Applying Circular Economy at Firm Level: Application of PEST tool

3.1 Introduction to PEST Tool and its Application

Political, Economic, Social, and Technological (PEST) analysis is an important tool used for market and environmental analysis and to support the strategic decision-making of a company. It is very useful for understanding market growth or decline, business position, and potential and direction for operations (Narayanan, 2001).

PEST analysis describes the framework of macro-environmental factors used in the environmental scanning component of strategic management. The different macro-environmental overviews provided by the PEST analysis are important inputs that a company must take into consideration when conducting business strategy and planning. It is regarded as effective in long-term strategic planning and works from a macroeconomic perspective. The political, economic, social, and technological factors allow firms to get a deeper understanding of the market trends (FME team, 2013).

3.1.1. The application of PEST tool in this chapter

In applying the PEST tool, we examined the external factors in Viet Nam's business environment to see if they encourage or discourage Vietnamese firms to implement circular economy in Viet Nam.

Political factors Political factors are basically how the government intervenes in the economy. Specifically, in this chapter, political factors will cover the stability of the Vietnamese political environment, focusing on the existing policy framework relating to green growth as well as environmental laws and trade policies, to see if the Vietnamese government commits to sustainable economic development. Hence, it will examine if the convergence of political factors in Viet Nam is good for the implementation of circular economy in Viet Nam or not.	**Economic factors** Economic factors include economic growth, interest rates, exchange rates, inflation rate, and market prices of raw materials and energy, which greatly affect how businesses operate and make decisions. These factors will reflect if the circular economy concept is applicable for Vietnamese firms to apply at firm level. It also examines if the circular economy concept would increase the risks for applied firms or vice-versa by considering the transaction cost for circular economy.
Social factors Social factors involve trends in population, domestic markets, culture, and demographics to see if the market is ready for the application of circular economy with new sustainable consumption habits. The service industry in Viet Nam will also be examined. The circular economy concept will be considered to see the benefits it can bring to the Vietnamese society, including both local wealth creation and environmental benefits.	**Technological factors** Technology is a crucial component of any business as it determines whether it can increase productivity and compete in the market. In this chapter, the analysis will focus on research and development as well as technology transferring activities to develop better sustainable technologies. Existing types of current technology and innovation systems will be considered to find their benefits to apply the circular economy concept at firm level.

3.2. Examining External Factors that Affect the Application of the Circular Economy at Firm Level

Viet Nam has advantageous conditions in terms of its policy, economy, society (available market), and technology to develop the circular economy concept. The policy framework of Viet Nam has covered many important target groups of green growth such as resource efficiency, renewable energy, sustainable consumption, and CP. All its supporting policies aim to contribute to economic restructuring for the transformation of the growth model towards better sustainability by improving the productivity, efficiency, and competitiveness at company level. Although the political system is still weak, causing different policies that overwhelm each other, and the implementation/enforcement efforts become complicated and ineffective, the economic, social, and technological factors seem to positively respond to the green development pathway with remarkable results.

The PEST analysis below shows that Viet Nam's business environment and market are quite ready and attractive for enterprises to implement the circular economy concept at firm level.

3.2.1. Policies support the development of the circular economy

In a region of the world where some countries remain vulnerable to political and economic instability, Viet Nam has benefited from its stable government and social structure (Ernst and Young Viet Nam, 2013). Therefore, the Vietnamese political environment is considered safe for operating businesses.

Regarding the political environment, Viet Nam has an extensive legal framework that supports scientific activities, innovation, and technology transfer towards a better sustainable development in various industries. It also has an open trade political framework, with FTAs with developed countries, and sustainable production and consumption policies. These will be considered to see how they affect the circular economy concept application in Viet Nam.

In this section, the authors give an overview of these policies to prove that circular economy can also be encouraged in Viet Nam as it is the umbrella term for all other sustainable production and consumption activities.

3.2.2. Policies on CP

CP issues have been put on the political agenda in this century. Viet Nam's prime minister has issued the 'strategy on cleaner industrial production to 2020' in his Decision 1419/QD-TTg on 7 September 2009. The overall objective of the policy is to observe CP in all industrial production establishments to improve the use of natural resources, materials, and fuels; minimise emissions and curb pollution; protect and improve the quality of environment and human health; and secure sustainable development. To achieve this, government offices have issued many activities such as communications solutions to improve awareness; solutions relating to organisations, management, mechanism, and policy; technical support, human resource training, and international cooperation; and investment and financial solutions.

In terms of resource efficiency, the National Assembly promulgated the Law on Economical and Efficient Use of Energy on 17 June 2010, pursuant to the 1992 Constitution of the Socialist Republic of Viet Nam, which was amended and supplemented under Resolution No. 51/2001/QH10. This law aims to state management policies on the economical and efficient use of energy at firm level in Viet Nam, particularly the application of measures to use energy economically and efficiently for socio-economic development; the provision of financial support and energy subsidy and other necessary incentives to promote economical

and efficient use of energy; the increase of investment in scientific research, development, and application of advanced technologies using renewable energy; the encouragement to use energy-saving devices and equipment, eliminating back-dated technologies and low energy yield devices and equipment; and the encouragement to develop counselling services and rational investment in information dissemination, education, and support for organisations, households, and individuals to use energy economically and efficiently.

The renewable energy issues, a concern since early 2007, have been addressed by the prime minister with the issuance of Viet Nam's national energy development strategy 2020, with 2050 vision, on 27 December 2007. Its overall objective is to contribute to successfully fulfilling the tasks set in the Communist Party of Viet Nam's socio-economic development strategy. The overall objectives of the national energy development strategy are to assure national energy security, contributing to firmly maintaining security and defense and developing an independent and self-reliant economy; supply adequate high-quality energy for socio-economic development; exploit and use domestic energy resources in a rational and efficient manner; diversify forms of investment and business in the energy domain and develop an energy market conducive to fair competition; boost the development of new and renewable energies, bio-energy, and nuclear power to meet the requirements of socio-economic development, especially in deep-lying, remote, and border areas and offshore islands; and develop the energy sector in a quick, efficient, and sustainable manner in line with environmental protection.

3.2.3. Policies on sustainable development vision

Many policies encourage sustainable production at firm level in Viet Nam. Based on the Viet Nam 2035 vision report by the World Bank and the Ministry of Investment and Planning (2016), growing economic prosperity in accordance with the protection of environmental sustainability is one of the three main pillars to establish a sustainable economy in Viet Nam. This must-have vision was first mentioned in 2012, when Viet Nam's prime minister issued Sustainable Development Strategy 2011–2020, which sought to maintain sustainable economic growth; gradually carry out green growth, develop clean renewable energies, and ensure the development of low-carbon economy as well as guarantee national energy security; gradually implement market-oriented energy prices; gradually raise the ratio of clean and renewable energy in the energy consumption structure; design an environmental-economic cost accounting system and add environment and social aspects to the system of national accounts; pursue sustainable development in the industrial sector with professional structure, environmentally friendly technology and equipment; proactively prevent and handle industrial pollution; develop 'green industry'; give priority to the development of sectors, technologies,

and products that are environmentally friendly and speed up high-technological development in big cities; gradually formulate environmental industry; intensify mass application of CP to increase the efficiency of natural resources, materials, energy, and water while reducing emissions and pollution rate; and protect the quality of the environment and people's health for sustainable development (Viet Nam Government Portal, 2012).

3.2.4. Policies on establishing eco-industrial parks

In August 2014, the prime minister approved the project 'Implementation of eco-industrial park initiative for sustainable industrial zones in Viet Nam'. The objectives of Decision No. 1526/QD-TTg are to strengthen the transfer, application, and dissemination of technologies and CP methods to reduce hazardous wastes, greenhouse gas emissions as well as water pollutants; and to better manage chemicals in industrial zones in Viet Nam (Ministry of Planning and Investment, 2014). The project led to some specific results:

- Issued several policies and regulations that meet the criteria of eco-industrial park in the fields of industrial park planning and management, environmental pollution control, industrial pollution in the industrial zones, responsibility and investment support methods of the stakeholders for investing in clean-technology activities, and low carbon emissions of the industrial park businesses, encouraging the participation of many firms to the eco-industrial park ideas.
- Strengthened the planning and management of eco-industrial parks for the industrial park management agencies at central and local levels.
- Strengthened the technical capacity for technology transfer and application of clean technologies and low carbon emission, safe production methods, and effective use of resources for the management agencies of industrial zones and businesses in the industrial parks such as industrial zones in the provinces of Binh Duong and Quang Ngai; industrial zone for high-tech companies in the cities of Ho Chi Minh, Hanoi, and Bac Ninh; software industrial zone in Ho Chi Minh city and so on.
- Identified potential businesses in the industrial park that can participate in clean technology applications, low carbon emissions, and technical solutions to use resources effectively and develop projects to strengthen community capacity.
- Converted model projects into eco-industrial parks.
- Increased community awareness about ecological industrial zone development.

3.2.5. Policies on sustainable production and consumption

On 11 January 2016, the prime minister issued the National Action Program on Sustainable Production and Consumption through 2020, with a Vision Toward 2030, through Decision No. 76/QD-TTg. The overall objectives of the national action programme are to gradually change production models and consumption towards enhancing efficiency of resources and energy; increase the use of raw materials, renewable energy, environment-friendly products; reduce, reuse, and recycle waste; and maintain the sustainability of the ecosystem at all stages in product life cycle (PLC) from extraction of raw materials to the production, processing, distribution, consumption, and disposal of products.

This policy states clear specific objectives through each period, encouraging Vietnamese firms to innovate to strive for the same goal of developing a sustainable production and consumption society in which both producers and consumers are key players to decide the result of the action programme.

The Vietnamese government also issues new laws on environmental protection with more strict regulations and higher responsibility level for companies whose operation activities may harm the environment. The most significant change is the issuance of by the prime minister of the new law on environment protection, Decision No. 55/2014/QH13, on 23 June 2014. This law hastens environment protection especially in manufacturing, trading, and service provision within economic zones, high-technology zones, and other business zones.

3.2.6. Active and open policies on international trade and international integrations

Viet Nam became a member of the World Trade Organization in 2007. Since then, Vietnamese manufacturers have not only approached many export markets with fewer restrictions and lower tariffs but have also gained many benefits from improving access to imports of cheaper raw materials and semi-processed inputs as Viet Nam's import tariffs drop. The active participation of Viet Nam in many cross-border FTAs is also a competitive advantage that contributes to the development of the economy and creates good conditions for enterprises to improve their competitiveness through spillover effects and learning effects from FDI projects. Viet Nam now has economic relations with 224 countries and territories. According to the Viet Nam Chamber of Commerce and Industry, Viet Nam signed 12 FTAs, including the Trans-Pacific Partnership, and ASEAN, ASEAN–India, ASEAN–Australia/New Zealand, ASEAN–Korea, ASEAN–Japan, ASEAN–China, Viet Nam–Japan, Viet Nam–Chile, Viet Nam–Korea, Viet Nam–Eurasian Economic Union, and Viet Nam–EU free trade agreements. These international integrations usually go along with strict regulations and

limitations on environmental activities and technological added value within products, which force the domestic companies to change production processes and improve productivity as well as product quality to meet the common environmental requirements of these agreements. These types of markets bring good opportunities for Vietnamese enterprises to approach new markets (customers) by innovating business models, creating new products/services, and following the world production and consumption trends, including circular economy. The intense competition with foreign competitors already following the world trends and global standards also creates pressure on Vietnamese companies to improve themselves via learning effects, hence encouraging the whole industry to adopt global economic trends. To utilise the advantages of these FTAs, the country should continue to improve the regulation systems and reform the institutions. The Vietnamese government should continue to complete institutions related to ownership and development of economic sectors as well as business types and improve policies to boost the growth of enterprises and the synchronous development of all kinds of market (Hoa, 2016).

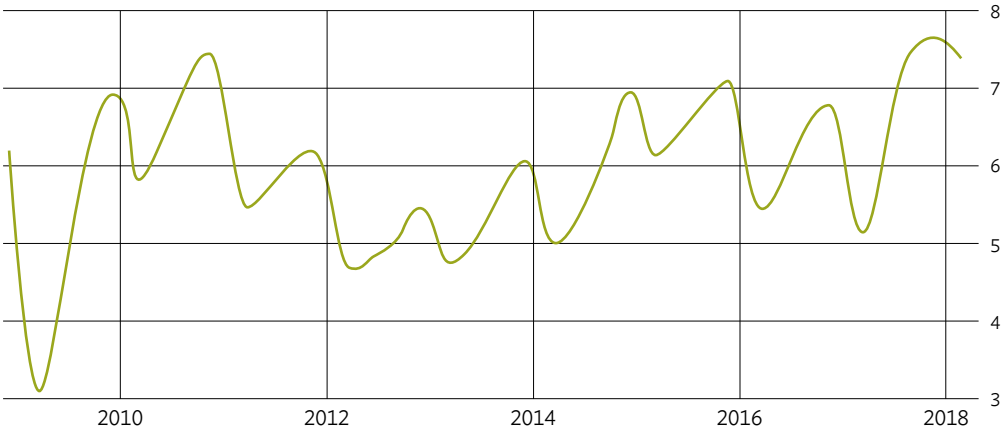
Many cross-border FTAs between Viet Nam and the global south countries, such as the Trans-Pacific Partnership, Viet Nam–EU, etc., as well as between Viet Nam and ASEAN countries such as the ASEAN Economic Community, ASEAN+, etc., have shown convergence of political factors committing to the sustainable development in the long term in Viet Nam. Therefore, circular economy, as a new effective concept of doing business in a sustainable way, should absolutely be encouraged by the development of the political framework of Viet Nam.

4. Prevalent Economic Factors

Viet Nam is at the top of the gross domestic product growth leader board in Southeast Asia-based on FDI and the private sector (Uyen, 2015).

According to the General Statistics Office of Viet Nam, 2017, the country has achieved a relatively stable high speed of economic growth. In 2017, Viet Nam witnessed an economic growth of 6.8%, exceeding the target set by the National Assembly. In 2018, the government targeted 7% growth (Figure 2).

Figure 2. Viet Nam's GDP Annual Growth Rate



GDP = gross domestic product.

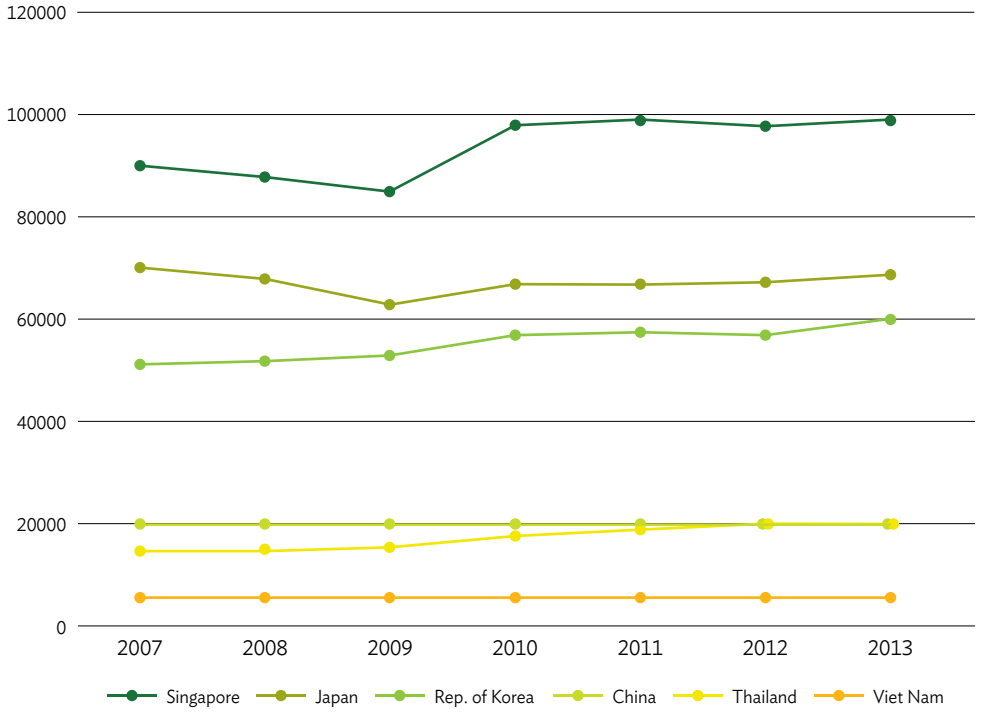
Source: Graph – tradingeconomics.com; Data – General Statistics Office of Viet Nam.

In recent years, inflation and interest rates in Viet Nam fell dramatically while a relatively high growth was seen in its exports. In addition, the macro-economy continues to be kept stable, with inflation constrained at 4% while FDI growth is expected to increase the amount of FDI disbursement to more than US$17 billion (State Bank of Viet Nam, 2015) .

Viet Nam also retains a 'measured depreciation' of the dong over the years. The Bank of Viet Nam devalued the Vietnamese currency three times in 2015, pushing the dong down nearly 6% against the US dollar (Varathan, 2015). That move brought advantages to Vietnamese enterprises, especially exporters.

In terms of labour cost, although Viet Nam's current monthly minimum wage of US$96–US$138 seems to remain wage-competitive in comparison to the minimum wages of other Asian countries such as Cambodia (US$121.90), China (US$135.43–US$296.96), and Thailand (US$265.68) (Shira, 2015), it does not reflect the exact labour cost in Viet Nam because the average productivity of Vietnamese workers is still low and the added value created by Vietnamese workers is low as well. Viet Nam's productivity is still considered below the regional average (see Figure 3). As of 2013, the productivity of a Vietnamese worker was US$5,440, whereas it was 2.8 times higher in Singapore, which recorded a productivity of US$98,720 or 18 times higher (Phuong, 2016). This situation urges Vietnamese enterprises to consider circular economy, which encourage them to apply new business models, processing technologies, as well as creative and utilised product designs to decrease production cost while increasing the value added of each selling unit, so that they will be free from depending on the productivity of the domestic labour market.

Figure 3. Productivity of Asian Countries



Source: Asian Productivity Organization, databook 2015.

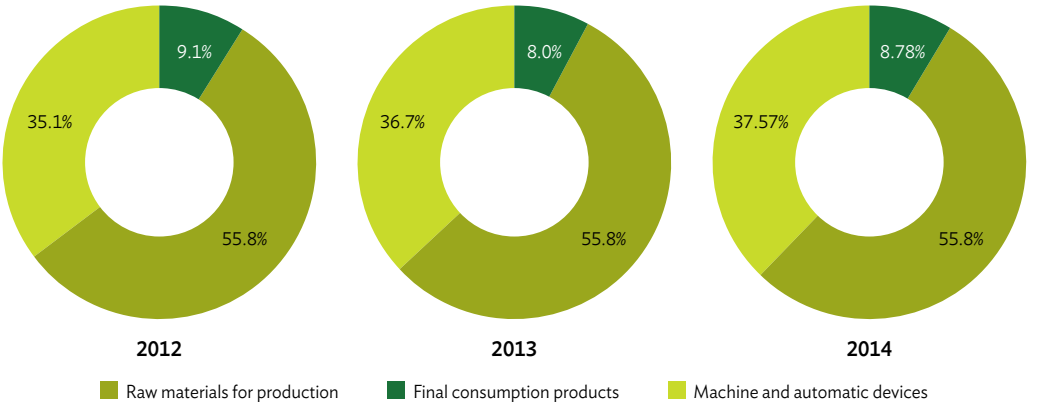
In conclusion, Viet Nam has a very active and dynamic economic environment that performs a high rate of economic growth, operates a competitive market with various trading partners from different countries, and provides an advantageous depreciation currency system.

Therefore, the Vietnamese economy has many domestic advantages in terms of stable economic growth, with low risks to apply the circular economy trend. It can also get the chance to develop circular economy models and sell innovative products in huge common markets under the advantageous conditions set in the free trade deals between Viet Nam and foreign countries such as the EU, the US, Japan, the Republic of Korea, and ASEAN.

Besides these encouraging factors, there are also many existing situations and challenges that force Vietnamese enterprises to consider circular economy as a solution to reform their companies and the way they do business. Currently, due to underdeveloped auxiliary industry, Viet Nam's industry mainly focuses on providing processing services operated by labour-intensive business models. Only some 300 Vietnamese enterprises are qualified to participate

in the global supply chain but most of these only provide spare parts and have not been involved in main production (Dione, 2017). This leads to the high dependence of domestic enterprises on imported raw materials for production. According to the Viet Nam Ministry of Industry and Trade, more than half of the imported goods in Viet Nam are raw materials for production (see Figure 4). Most of the imports are from China, ASEAN countries, and Middle East countries. Therefore, Viet Nam's economy is extremely vulnerable to changes in prices of raw materials as well as exchange rate fluctuations.

Figure 4. Viet Nam's Import Structure in 2012, 2013, and 2014



Source: The Ministry of Industry and Trade, Viet Nam, 2015.

Viet Nam is facing energy shortage challenges. Imported energy could account for 37.5% of its total supplies in 2025 and more than half (58.5%) in 2035 (Embassy of Denmark, 2017). Viet Nam's demand for electricity has increased dramatically over the last 10 years while its electricity generation still depends on thermal coal. More than 80% of the total electricity comes from thermal coal while the other 20% is shared by hydropower and gas. The dependence on thermal coal is intended to continue in the next 10 years, with more than 50% electricity yield planned to be generated by thermal coal (Vietnam Sustainable Energy Association, 2016). In the vision to 2035, the forecast for total final energy demand in the business-as-usual (BAU) scenario is nearly 2.5 times higher than in 2015. In 2035, energy consumption in the transportation sector (covering 27.5%) is projected to achieve the highest growth (5.7% per year), while the industrial sector (covering 45.3%) is expected to see growth of 5.0% per year in the period 2016–2030 (Embassy of Denmark, 2017). This will surely put domestic enterprises under pressure from rising prices of electricity.

The above challenges show the vulnerability of Vietnamese enterprises to changing prices of raw materials and energy now and in the future. However, these difficulties strongly motivate Vietnamese enterprises to innovate their business and operational models towards smarter and more sustainable ways. In this case, the circular economy concept can be considered a very good choice for them to help save materials and energy, and hence reduce both production costs and dependence on imported raw materials.

With the existing 301 focused industrial parks and company clusters along the country, the transaction cost for the company and a group of companies in a cluster switching to the circular economy concept is not high.

Therefore, Viet Nam's economic factors now and in the future are very supportive of Vietnamese companies adopting the circular economy concept.

5. Social Factors Affecting the Application of Circular Economy in Viet Nam: The Consumers' Consumption Behaviours Towards the Circular Economy Value

Viet Nam is an emerging and potential market for new and innovative products. Its population is approximately 91.7 million, with 70% aged between 15 and 64, and this is expected to continue (World Bank, 2015). According to the Ministry of Education and Training of Viet Nam, the country's literacy rate also reached 97.3% by the end of 2015. Moreover, the number of consumers in middle-income class are predicted to double in size between 2014 and 2020, from 12 million to 33 million people (Amcham Viet Nam, 2017). These factors will spur the demand for greater selective choices in products, brands, and product categories (Deloitte, 2014), which require products of high quality, sophisticated design, and better environmental friendliness.

The tertiary sector of Viet Nam's economy has been growing very fast over the last decades, especially for business services and retail services. Although the service industry only officially appeared in Viet Nam after Doi Moi due to the manipulation of state-owned enterprises under the previous subsidy regime (1976–1986), it still achieved incredible breakthrough developments and significantly contributed to the dynamic economic development nationwide, especially after Viet Nam joined the World Trade Organization in 2007. The service sector is quite varied and helpful, including banking and finance, insurance, logistics, consulting services, legal services, tourism, retailing services, and some offshore services such as data analysis, business process outsourcing, and information technology. In 2015, the share of the services sector in the national GDP was 44%. This was its highest share compared to the industry (39%)

and agriculture (17%) sectors (Viet Nam GSO, 2016). The development of the service sector also promotes the development of the infrastructure system in Viet Nam. Hence, it creates many social positive effects and increases the attractiveness of the domestic business environment. The retail sector in Viet Nam is also dramatically developing, growing at a healthy double-digit rate of approximately 10% year-on-year in 2013, regardless of the global economic slowdown in that year, beating the neighbor economies of Malaysia (7%), the Philippines (7%), Singapore (3%), and Thailand (1%) (Deloitte Southeast Asia, 2014). Recently, Viet Nam's retail sector achieved impressive growth of about $129.6 billion in 2017, up 10.6% from 2016 (Bradstreet, 2018). These achievements have been drawn by Viet Nam young population, of which 70% are aged between 15-64 years old and 64% are females, who are most involved in shopping and day-to-day consumption decisions (World Bank G. , 2018). The business environment for consumption products in Viet Nam is thus very efficiently supported and highly competitive.

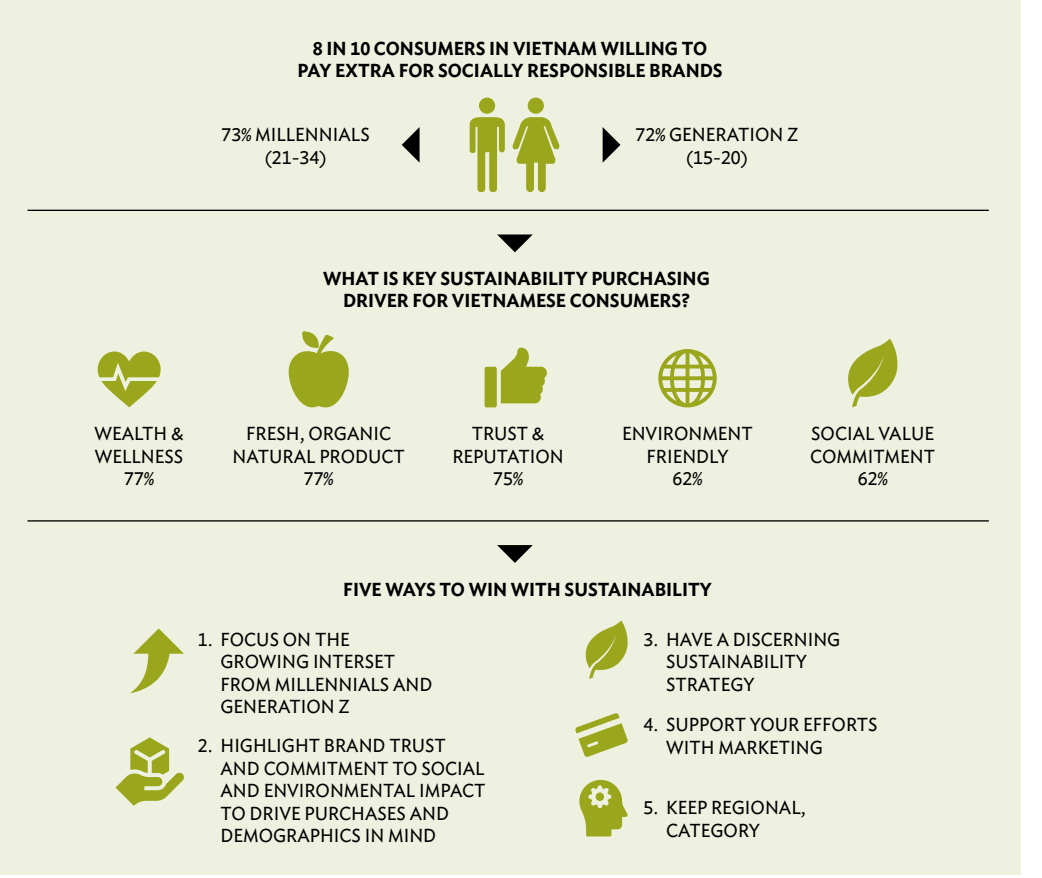
Powered by huge waves of FDIs and FTAs as well as the promising prospects offered by the new cross-border FTAs such as the Trans-Pacific Partnership, the ASEAN Economic Community, the EU–Viet Nam Free Trade Agreement, etc., ASEAN countries are more likely to keep more foreign investors interested in them. FDIs that flowed into the tertiary sector of Viet Nam's economy was 32.6% of the total number of projects by 2015 (Viet Nam GSO, 2016) and soared by 6.3% year-on-year by May 2016 (Viet Nam GSO, 2016).

The above evidence proves that the Vietnamese market has a great potential and is dynamic and profitable not only for Vietnamese enterprises but also for future FDIs.

The environmentally preferred purchasing, often referred to as 'green purchasing', is an emerging global trend. This trend is considered as a strategic alternative for all stakeholders in society to promote the sustainable development of the global production chain with the active involvement of consumers. Although this approach is still at its infancy in Viet Nam, Vietnamese consumers have recently demonstrated, especially in big cities, their environmental concerns, as evidenced by the increase in purchase of green products, which can save energy and water spending while at the same time reducing the environmental impact (Giang and Tran, 2014). The market for green/sustainable products in Viet Nam has high potentials. Nielsen conducted in 2014 a comparison of countries in the ASEAN region (Figure 5) and found that Vietnamese consumers lead in having a social spirit towards sustainable development. The report also found that consumers in Southeast Asia exceed consumers in other areas in terms of the willingness to pay more for products/services that are committed to sustainable development.

The report (Nielsen, 2014) shows that nearly nine out of 10 consumers (86%) surveyed in Viet Nam are willing to pay more for products/services with commitment to sustainable development (compared to 73% in the 2014 survey). This is also the general trend in other countries in the region such as the Philippines (83%), Thailand (79%), and Indonesia (78%). The figure for the whole of Southeast Asia is 80%.

Figure 5. Vietnamese Consumers' Behaviours Towards Sustainable Consumption

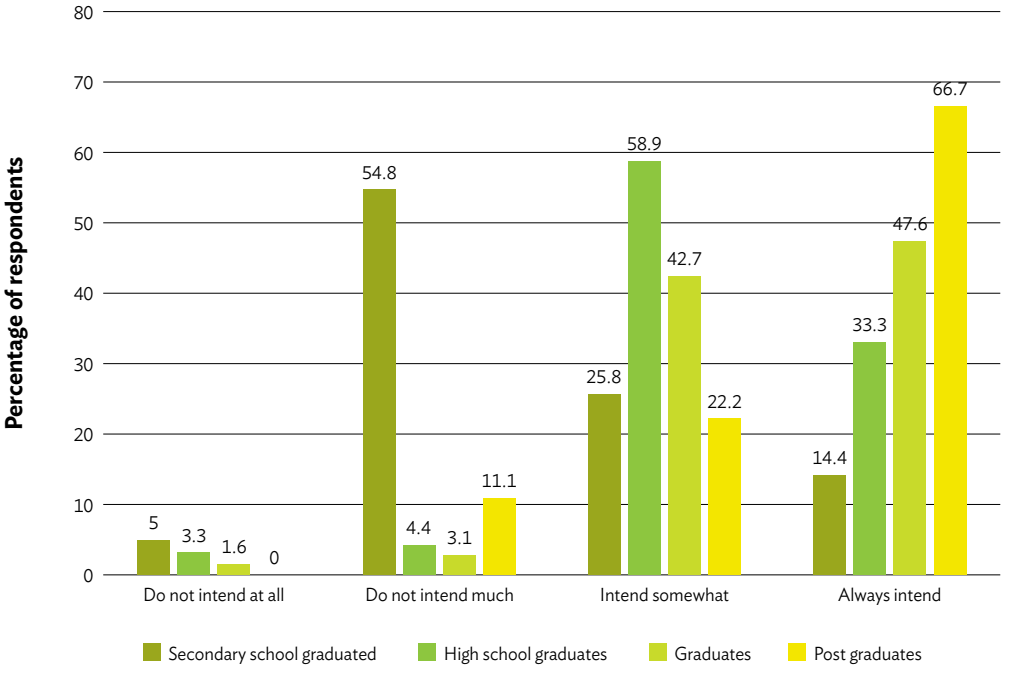


Source: Nielsen, 2014.

The report also points out that the youth sector is the sector most concerned about sustainability and that affects the sale of products/services committed to sustainable development. Specifically, over 73% of global consumers aged 21–34 (millennials) and 72% of consumers aged 15–20 (Generation Z) are willing to pay more to buy products/services with commitment to sustainable development. According to the Nielsen report, sales of products with sustainable development commitments increased by 4% globally compared to the 2014 figure.

However, since green products (eco-products) are relatively new for Vietnamese people and the choices limited for green products in the market, the use of sustainable products or eco-products is not popular or obvious in Viet Nam. The results of a survey by Giang and Tran in 2014 on the consumption of green electronic products show that more than 75% of the 263 respondents have never bought a green electronic product before and more than 50% of the respondents do not care whether the electronic products are green or not (Giang and Tran, 2014). According to another survey, conducted by Hai and Mai in 2012, with 315 participants, there is a new trend of consuming eco-products in three big cities (Hanoi, Ho Chi Minh, and Da Nang). The trend shows that only consumers with a high level of education are more concerned about environmental issues and have sufficient knowledge of eco-products and green purchasing. The others have limited understanding of eco-products. As a result, consumers with different levels of education differ in their purchase of green products or eco-products.

Figure 6. Intention to Buy Eco-products



Source: Hai and Mai, 2012.

The research also shows there are several more important factors that consumers consider when making an eco-product purchase. These include descriptions on products, and information from television and the internet. Graduates and post-graduates seem to consider all factors when making a purchase.

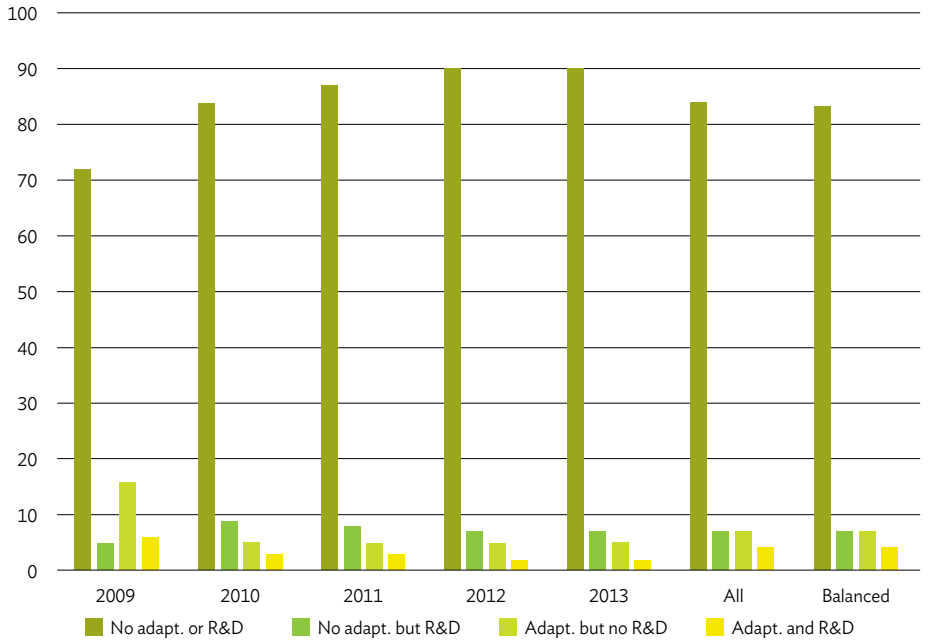
These prove that the market potential for innovative, sustainable, and high value added products, such as the ones with circular economy characteristics, is indeed very large and possible in Viet Nam. There is, therefore, much room for Vietnamese companies to apply the circular economy concept to their business model as an innovation advantage (or what can be referred to as first-mover advantage) to promote their products and grasp the large potential market shares in Viet Nam, against foreign competitors.

6. Technological Development Trends: What is the Progress of Technology Innovation Towards Circular Economy?

Although Viet Nam's policy framework seems to bring pull factors to encourage firms to apply circular economy in their business model, particularly to new advanced and clean technology in production processes, and the market is gradually following sustainable consumption trends, not many firms invest in innovating (researching and developing new technology) or adapting (receiving technology transfer from other organisations) new clean and advanced technologies.

According to the 2009-2013, Technology Competitiveness Survey of around 7,000 companies about research and adaptation on technology, most companies do not engage in any technology research and development (R&D) or adaptation activities (depicted in Figure 7). Only 7% of firms pursue either R&D or adaptation, while 3% of firms operate both R&D and adaptation to innovate their production chain.

Figure 7. Share of Firms Doing Research on and Adaptation of Technology
(Unit in %)



Adapt. = Adaptation, R&D = research and development.

Source: General Statistics Office, Viet Nam, 2015.

We noticed a declining trend in adaptation and R&D activities, with adaptation declining sharply from 16% in 2009 to 3% in 2013. R&D activities have returned to 5% after peaking at 8% in 2010. Overall, 83% of firms do not have an adaptation or R&D strategy. Complementary with the goals of increasing the productivity of the Vietnamese manufacturing sector, the findings presented so far suggest that industrial policies have not offered strong enough support for firms to invest in adaptation of technology as it appears to be more costly in the short run. With productivity gains attributed to advanced technologies, it is possible that greater policy support of adaptation would lead to increased productivity, hence the competitiveness amongst manufacturing enterprises.

In terms of Industry 4.0, despite Viet Nam having at least three high-technology industrial parks, none of the companies operating there is of Vietnamese ownership. All the industrial parks have been built so far to attract foreign high-technology companies as well as FDI for high-technology development. These industrial zones were established with the vision that Vietnamese enterprises can take advantage of the horizontal and vertical technology transfer as well as improve the capacity of Vietnamese engineers. Therefore, it is very hard to conclude that the development of Industry 4.0 in Viet Nam is ready to be the foundation for circular economy development.

7. Profitability of Circular Economy: Finding Economic Values and Firm Competitiveness of Circular Economy Through Case Studies

7.1 Indicators to Assess the Economic Values and Competitiveness of a Firm in Circular Economy

In this chapter, we used the definition of a firm's economic value from *The Principles of Microeconomics* by Gregory Mankiw, which states that 'economic value is assessed based on the people's preferences, represented by the maximum amount a consumer is willing to pay for an item in a free market and the trade-off value, which is the amount of time or value of the other item an individual will sacrifice to get that item.' Therefore, we examined the economic value of a firm based on its ability to generate revenue, business growth rate, and market share volume.

Definitions differ, but normally, firm competitiveness is defined as the ability to face competition and to be successful when faced with competition. Competitiveness would then be the ability to sell products that meet demand requirements (price, quality, and quantity) and, at the same time, ensure profits over time to enable the firm to thrive. Competition may be within domestic markets (firms or sectors in the same country are compared with each other) or international (comparisons are made between countries). Competitiveness is therefore a relative measure. It is also a broad concept and there is no definitive agreement on how to measure it precisely. To assess a firm's competitiveness in circular economy, we used the following characteristics:

- possesses new innovative/creative solutions to the market: ability to gain market share at high speed;
- minimises production cost: focuses on the ability to avoid the hassles and to procure new raw materials, labour, capital, and energy; and
- the business model is flexible to sudden spike of commodity price.

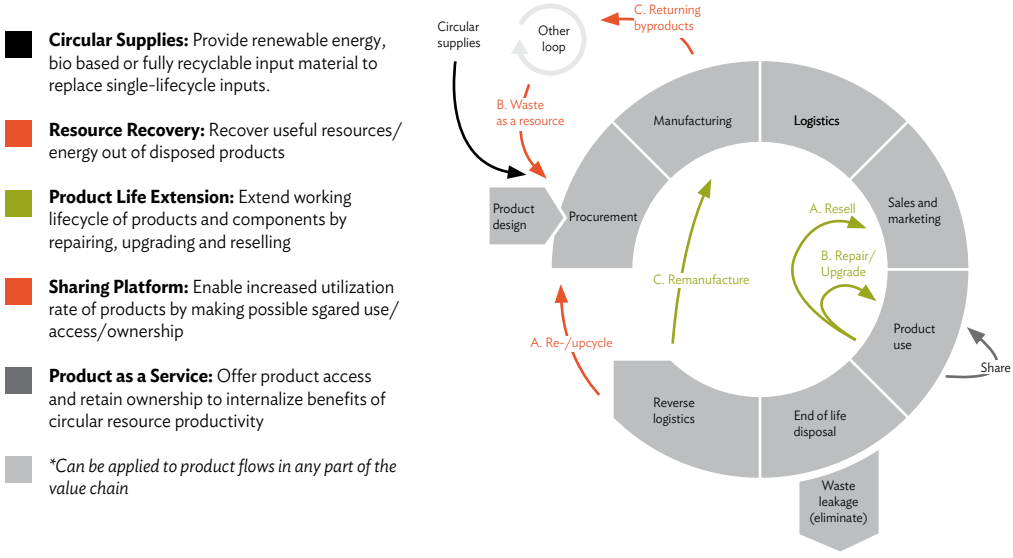
Applying the circularity calculator tool developed by the Ellen MacArthur Foundation, we calculated the economic impact of moving to a circular system at the product level in five case studies. In addition, we included quantitative data on the business result of these companies to prove their economic values and firm competitiveness gained from circular economy.

7.2. Finding Economic Values and Capturing Competitiveness of Enterprises Applying Circular Business Models in Viet Nam

Though not many companies acknowledge knowing exactly the term circular economy, a variety of circular business models in Viet Nam have been proven to not only improve firms' economic value and competitiveness but also to generate many good externals for society as well as the environment.

According to the five business models of circular economy identified in the 2014 Accenture report *Circular Advantage* by the National Zero Waste Council Circular Economy Working Group, different types of circular business models exist in Viet Nam.

Figure 8. The Five Business Models of Circular Economy



Source: Accenture, 2014.

Case Study 1: Circular Supplies Business Model: Hamona Limited Company – How a coconut fruit can decouple the relationship between high growth rate and environmental pollution

The company name Hamona is an abbreviation of 'Harmony with Mother Nature' and is inspired by the strong willingness of the circular economy to build a good business, gaining high revenue while not harming nature, and helping the environment, particularly the natural sources of the company, to be more healthy and sustainable. It is one of the big success stories that prove the possibility of decoupling economic development without destroying the environment.

Hamona Ltd. was founded in 2013, with fresh coconuts as its main product, processed through bio-technology without affecting its natural taste and using no package (except for the reusable plastic tray for delivery purposes). It has 50 employees, of which 80% are local labourers.

Hamona operates a very innovative business model. It signs farming contracts with coconut farmers in Ben Tre and Tra Vinh provinces, provides technical support and financial services to farmers so they can follow the GLOBAL G.A.P. cultivating standard, and then buys all the coconut fruits from contracting farms at stable prices all year long. After processing, the by-products are collected and processed to make clean soil and organic fertilisers to be returned to the coconut farms. Hamona also provides financial services to farmers to encourage them to build ecosystems under the coconut shade, such as growing beans, chickens, and bees to maintain the natural biodiversity, develop the natural enemies of harmful insects, and utilise by-products to make fertilisers and increase the productivity of coconut trees. This activity also helps to increase the income for farmers, especially in between two coconut harvesting seasons. To avoid monopoly, Hamona's contract with farmers only lasts for a year. Hamona's main revenue comes from selling the processed coconut to wholesalers in domestic markets and the US.

After two years of implementing the business model, Hamona has signed contracts with more than 550 coconut farms in Ben Tre and Tra Vinh provinces. Their revenues increased by more than three times from US$50,000 per year in 2014 to US$250,000 at the end of March 2016. Its exports–domestic sales ratio was recorded as 60:40 in 2016. Its strategic goals in the next three years are to build a coconut farm network of more than 2,000 households to assure stable and high-quality raw materials, successfully establish export markets in Japan and the Republic of Korea, and create jobs for more than 2,000 women in the Mekong Delta area.

In terms of competitiveness, Hamona surpasses its competitors in innovative and varied high-quality products from coconut, in close relationship with a firm network of GLOBAL G.A.P. coconut farms and the addition of value over the product value chain. Moreover, Hamona has the first-mover advantage in the market in terms of processing fresh coconut by applying bio-technology. Hamona differentiates its products as the most natural and fresh coconut water without preservatives, additives, and chemicals. Hamona also has competitive advantage over cafés in that it serves fresh juices in convenience stores. Customers can bring Hamona's coconut anywhere, drink fresh coconut water anytime they want without paying any service fees. Moreover, Hamona implements corporate social responsibility by contributing to the leasing of financial funds for farmers.

Case Study 2: Product as a Service: The Case of Viet Lien

The Viet Lien Investment and Commerce Limited Company (hereinafter called Viet Lien) was founded in 2005 with a factory located in the guava-growing area and new community tourism site of Cu Khoi Ward, Long Bien District, in Hanoi. It has 38 employees producing dried guava tea and guava bio-dishwashing soap that are sold all over the country. Its average annual revenue, entirely from the domestic market, is about US$620,200 per year. Viet Lien's products have always been the first choice of Vietnamese women because of their safety, quality, unique use experience, and reasonable prices. However, in the last 7 years, the use of chemical fertilisers and toxic pesticides in local guava farms has become worse, resulting in the accumulation of toxic materials in Viet Lien's products. As a result, the sale of its products dramatically decreased, with sale activities facing great difficulties. Moreover, soil erosion and insect attacks on their farms occur more frequently and more severely. Consequently, the price of the raw material supplies of Viet Lien (guava fruit and guava leaves) increased while their quality and quantity decreased. This situation forced Viet Lien to innovate its business model, develop high-quality supplies, and find new markets.

In October 2015, Viet Lien applied a new innovative business model, where farmers are both the customers and key suppliers of the company. It provides services for farmers in processing their standard guava raw materials into guava tea and guava bio-dishwashing soap under the local brand name Cu Khoi Guava. It also continues to sell processing products from safe and tasty guava to the domestic market. To operate this business model, the company works with local government representatives (particularly agricultural development officers) to operate technical hubs that provide technical support, cultivation consultancy, and non-chemical agricultural inputs such as organic fertilisers, bio-pesticides, and the like. These technical hubs help enable farmers to cultivate their guava farms safely while increasing the productivity of guava trees and protecting farmers' health. Consultancy fees and revenues from agricultural input sales are returned to the local

government to improve the infrastructure that serves guava cultivation in the areas. The company also signs service-providing contracts with farmers to ensure their commitment. To scale up the model and gain more revenue, Viet Lien also invests in R&D activities to introduce more products from guava materials to the market.

With this open business model, Viet Lien gains sustainable income from processing services for farmers while maintaining the environment clean and sustainable. The business is expected to break even after two years, double its sales revenue in the next three years, and gain stable point at about US$1,500,000 per year. Farmers can gain more knowledge and techniques in cultivating high-quality guava while gaining much higher revenue from selling guava-processed products to tourists participating in community tourism in the area.

With this business model, Viet Lien has achieved extraordinary competitive edge over its competitors in the tea processing industry as well as in the chemistry industry as it is a pioneer in providing processing services to farmers. Further, it can take advantage of having a local brand name, and increase the quality of raw materials, farmers' income, and the company's revenue. Farm contracting with this business model also protects the company from the variable prices of raw material and minimise inventory in the company. It also helps many stakeholders in the local areas develop more sustainably. In its proposed strategies for 2020, Viet Lien aims to shift its guava farm in Cu Khoi from chemical base to eco-agricultural base, which meets the GLOBAL G.A.P. cultivating standard.

Case Study 3: Sharing Platform: The Case of Dichung

Dichung is a social enterprise that provides a convenient platform on the web to solve the transporting needs of its customers. It connects people who need a ride with others who want to share empty seats in their vehicles. The goal is to create a ride-sharing culture in Viet Nam, where the company acts as the middleperson, bringing users (riders and drivers) together and overcoming barriers to be able to share vehicles. It also works with transport companies that provide standardised ride-sharing services (taxi-sharing, van pools) via a business-to-business-to-customer platform (dichungtaxi.com), which helps companies collect extra customers and commodities to utilise empty seats in their vehicles.

Established in 2010, Dichung has successfully engaged 20 business customers (70% of which are airport taxi companies and the other 30% are truck taxi service companies) all over Viet Nam to use the dichungtaxi.com platform. In the period 2010–2016, the platform provides an average of 500 shared rides from cities to airports and vice-versa every day, earning €147,100 per year. There have also been 233,770 success rides between vehicles' owners and passengers, technically matched by the dichung.vn

platform. From 2014 to 2016, Dichung has popularised its mobile application with more than 200,000 users (both share-riders and drivers) in Hanoi and Ho Chi Minh cities, and an average revenue of €90,000 per year from advertising and registration fees.

To develop its customer database, Dichung runs a marketing campaign aimed at students, officers, travellers, and tourists. The company has also set up a volunteer team providing free ride sharing for people with disabilities. Unlike Grab Taxi and Uber Taxi, which subsidise drivers and give them economic incentives to make money from using their apps and working like taxi drivers without any tax burden and social responsibility, Dichung focuses on utilising empty seats in individual vehicles and taxis only. This means that Dichung helps drivers save on fuel costs and reduce transportation cost for share-riders based on their willingness to match and not for any profit purposes.

Over the last eight years (2010–2018), the innovative business model of Dichung has helped drivers of private vehicles, and taxis and truck taxis to save D17,337,962,675 in total, reduce 1,562,218 kg of CO_2 emissions, reduce travel cost for passengers, and reduce traffic jams (dichung.vn, 2018). Still, Dichung operates at a very low cost as it provides motor ride and taxi sharing without owning any motorbikes or cars.

Case Study 4: Circular Supplies Business Model: Elegance Company Ltd., for Research & Development, Manufacturing, and Services – How a gasification cook stove can decouple the relationship between high growth rate and environmental pollution

Founded in May 2011, Elegance Ltd. focuses on R&D, testing, and manufacturing heating devices using renewable energy sources. The main products of Elegance are gasification cook stoves for households, which are designed according to the principle of biomass gasification technology. Basically, the biomass gas stove converts biomass into syngas and then mixes this combustible gas with air for burning like gas cookers. The stove can adjust the amount of gas generated, thus it can adjust the power of the flame. Biomass fuel is much cheaper than the more popular liquefied petroleum gas. Elegance also produces biomass gasification boilers for industrial use, industrial solar heating dryers, as well as hybrid solar-gasification systems for non-wood material drying.

The new cooking solution that Elegance brings to low-income people is a clean, cheap, safe, and handy cooking stove. After 6 years of research, Elegance has mastered the biomass gasification technology for a minimum scale. The company's gasification has reached the world's highest performance of 57% efficiency, recorded in 2016. The exhaust gases from the stove are also very clean, classified under Tier 4, the cleanest level of the Global Alliance Cook Stoves' standards.

Elegance sells gasification cooking stoves and their changeable modules to local dealers who distribute the stoves and provide maintenance services in the community. The company also transfers biomass pellet-making machines to local cooperatives and provides pellet-processing service for farmers. With this system, farmers can actively collect agricultural by-products (straw, rice husk, corn cob, and the like) as well as biomass wastes (tree branches and the like) and buy processing services from cooperatives to make their own energy source (biomass pellets) at very low cost.

Elegance's strategic goals in the next three years are to gain US$600,000 revenue per year by building 50 product-service systems all over Viet Nam, focusing on rural areas where 70% of the Vietnamese population live, to assure stable supply and consumption of sustainable products (gasification cooking stoves, biomass pellets). It also aims to successfully export to the Lao People's Democratic Republic, Cambodia, and Myanmar, create jobs for more than 150 low-income people, and liberate 2,000 women in the Mekong Delta area from unhealthy cooking habits. It also aims to protect low-income people from agro-waste hazards and air pollution risks.

Elegance surpasses its competitors in innovative and varied high-quality products, applied gasification technology, and having close relationship with local communities. The company also has the first-mover advantage in the market in terms of creating clean, convenient, and very low-cost cooking devices using renewable energy, gaining competitive advantage over other types of products.

The case studies above are just some of the cases that prove the concept of circular economy in Viet Nam and the profitable ways to apply circular economy in the current context. The significant notion in this section is that four out of five company case studies apply eco-innovation tools to develop their business model towards the concept of circular economy in Viet Nam. Circular economies innovate their business models by considering the whole value chain of their products, take advantage of the chain by cooperating with a variety of related stakeholders, and reduce wastes and CO_2 emissions not only within the factory processing line but in every possible activity along the products' value chain. Hence, the companies aim to increase business revenue and improve business sustainability by reducing production costs, using resources more efficiently, reducing waste or turning waste into products, outsourcing specialised activities to other stakeholders; and maximising profits by accessing new market, innovating new products, and building a firm brand name.

8. Barriers and Challenges for Vietnamese Enterprises to Overcome

Although perceptions on circular economy and related concepts are quite popular amongst Vietnamese firms and some successful initiatives prove the profitability of the circular economy concept in Viet Nam, numerous barriers can still hamper its implementation today. These barriers are listed and analysed below.

8.1 Business Environmental Culture

Viet Nam's economic growth was mainly based on quantitative rather than qualitative development, using high fuel and energy consumption as well as labour-intensive models in making products, thereby hurting the environment. The natural resources in Viet Nam are extracted using poor and outdated technology, posing damages and extreme pollution to the ecosystem around the mining areas. The consumption of natural resources, both in industries and society, are irrational and uncontrolled, which threatens not only the living conditions of the Vietnamese people but also the sustainability of the environment. Sustainable and environmentally friendly industries are largely underdeveloped until now. Consumption demand in Viet Nam quadrupled in the past decade due to incredibly strong economic development and population boom (the population of Viet Nam is approximately 91 million, 70% of which is at working age). Consequently, the demand for more energy spiked and there is more wasteful and ineffective use of energy, proven by the fact that fuel consumption per product in Viet Nam is 1.5 to 1.7 times higher than in Thailand and Malaysia. Escalating energy prices also contribute to production costs, and products and services have become costly, which in turn undermine business efficiency, competitiveness, and profit margins (Dat and Tuong, 2013).

8.2. Lack of Effective Support and Legislation from Government

Although the economic structure of Viet Nam has shifted towards industrialisation and modernisation, energy-intensive and natural resources-intensive industries are still popular. Most of these are state-owned companies that are too big to change and rely on outdated and ineffective technologies.

As the Vietnamese economy is accelerating, it is difficult to either cut down fuel consumption or use alternative fuels, such as wind power. This process will reduce growth in the short term and affect employment, income, and welfare (Dat and Tuong, 2013).

Moreover, the application of sustainable consumption and production ideas and the implementation of green policies are not concrete and sufficient to generate positive and disruptive results in a large scale. The weak and unclear policy framework, consistent with the complicated government system, results in weak enforcement and ineffective operations. The reasons for these are the lack of cooperation between different government offices in implementing related actions, the infrastructures and firms are not ready for the changes, the government does not have good enough incentives in both policies and finances to encourage more firms to participate, corruption, and global economy changes. Growth model transformation also remains slow and coordination amongst agencies and departments in transition is ineffective. The goals of economic development and the goals of protecting the environment are conflicting. All these are major challenges hindering green and sustainable growth in Viet Nam. These potential ideas for a better sustainable development are not interesting to enterprises and not many enterprises are willing to innovate their current business model by applying the given concepts.

8.3. Lack of Finance

The cost of green (or no-waste) innovation has been extensively considered in literatures as one of the major barriers to the adoption of sustainability practices by SMEs (Vasilenko and Arbačiauskas, 2012; Lawrence et al., 2006; Trianni and Cango, 2012). The upfront costs of any type of investment and the anticipated pay-back period are particularly important for SMEs, which are generally more sensitive to additional financial costs resulting from green business activities compared to large enterprises (Oakdene Hollins, 2011; Rademaekers, Asaad, and Berg, 2011).

Financial resource is also one of the fundamental barriers to the application of circular economy (and other types of green growth) in Viet Nam. About 90% of enterprises in Viet Nam are SMEs, of which technology investment only accounts for 1%–3% of total revenue annually. Therefore, the government should have clear policies to support business investment in clean technology, especially tax policy, funding incentive, or interest rate support. The World Bank has said that the financial mechanism should be more clearly

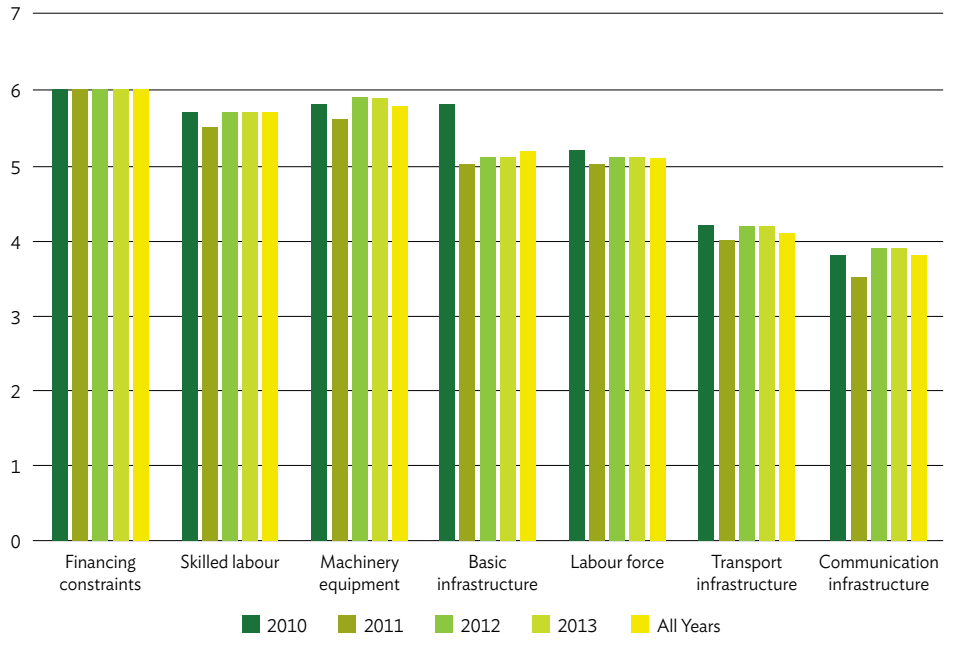
defined in the Viet Nam Green Growth Strategy, especially incentives for the private sector, because there should be more involvement of this sector in this strategy (UNIDO, 2012).

8.4. Constraints on Firms' Economic Performance

Technological progress raises the potential for economic growth by increasing the availability of a wider number of new products and production processes for which the role of private sector investment in innovation and new technologies cannot be overemphasised. While firms may be aware of the benefits of innovation, they may lack the capacity and resources to put in place technological improvements such as updating equipment and machinery.

The General Statistics Organization of Viet Nam conducted a technological competitiveness survey of 7,000 enterprises in Viet Nam from 2010 to2014. Firms were asked to assess constraints to the economic performance they face on a 10-point scale and the overview of the scores is shown in Figure 9.

Figure 9. Constraints on Firms' Economic Performance



Source: General Statistics Office of Viet Nam, 2015.

Figure 9 shows an overview of the constraints faced by firms in improving their economic performance, which are the reasons that discourage them from investing in innovation or applying new technologies. First to note is that financial constraints dominate at any time of the survey, with the average score of six for all years. The second significant constraint of the company is the skills level of labour, followed by limited access to equipment. However, firms do not seem gravely constrained by labour availability, or deficiencies in transport and communication infrastructures.

Figure 9 reveals that the most important constraints faced by Vietnamese firms remain unsolved for years, regardless of how many supporting policies have been issued.

9. Conclusions

The results of the PEST analysis and the survey on the factors proving the potential of applying circular economy in Viet Nam show that Viet Nam is ready for circular economy. Although there is only a small number of firms that are aware of the concept of circular economy, a large proportion of firms already know about the concepts relating to circular economy such as CP, sustainable production and production, resource efficiency, and the like.

The implementation of existing plans and actions towards developing circular economy is still inefficient and slow. However, many case studies have shown that by innovating the business model at the firm level, Vietnamese firms can gain high economic value and competitiveness to develop the business and gain more revenue.

To gain the advantages of circular economy in Viet Nam and learn experiences from pioneering companies, Vietnamese firms should consider the whole value chain to find opportunities for innovating their business models. Building capacity and increasing productivity, especially the creative ability of employees and stakeholders along the value chain, are also necessary for companies to successfully apply circular economy for long term. Lastly, there must be a strong commitment to the long-term sustainable strategies and plans to ensure the development of circular economy business models and convince investors to help scale up the good ideas.

To ensure green growth in Viet Nam, the government should be more decisive in accelerating economic restructuring, focusing on intra-industry structural change in favour of lower-carbon sectors, especially resource efficiency and renewable energy industries.

Local government bodies should also raise awareness and enhance coordination amongst ministries, taking motivational policies towards sustainable growth goals.

Moreover, attracting foreign investment is not only about attracting foreign capital but also about attracting the technology and their management skills so that Vietnamese firms can use the spillover and learning effects from international enterprises in developing their business model.

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