Reshaping the World's Supply Chain? A Case Study of Vietnam's PAN Group Adopting the Circular Economy Concept

Tung Bui
APEC Study Center, University of Hawaii, Honolulu, Hawaii, USA

Quan Le
Institute for Circular Economy Development, Vietnam National University, HCMC; YSEALI Academy, Fulbright University Vietnam

Jason Nguyen
Institute for Circular Economy Development, Vietnam National University, HCMC, Vietnam

Abstract

As a repercussion of the Sino-American trade war and the global outbreak of the COVID-19 pandemic, major economies are seeking ways to reduce dependence on China's production prowess. A much touted reaction is the relocation of manufacturing activities of multinationals out of China. East Asian economies, including Vietnam, are actively lobbying industrialized economies to consider them as alternate or expanded suppliers in the new global supply chain system. We argue that the current relocation of factories is at best a political move that might soothe the current protectionism mood, and at worst an inefficient business decision. We advocate that the reshaping of the global supply system would be best achieved by engaging all members of the supply chain to embrace the Circular Economy (CE) core principles to ensure a sustainable and equitable economic and social development, both locally and globally. We present a case study of the PAN Group, a young, unconventional, and growing 17,000-farmers-strong agricultural group in Vietnam that has been aggressively taking strategic moves toward the circular economy. The early success of the PAN Group in assisting a variety of independent farms and food industries across the country to innovate and, by doing so, enabling them to join the global economy in a self-reliant and resilient manner has caught the attention of the Vietnamese government. The latter sees the PAN Group as an integral part of its CE national policy in promoting public-private-partnership (PPP). Throughout the case analysis, we discuss the feasibility, opportunities and challenges of an economy in search of a new path to join the future world's supply chain.

Keywords: National economic policy, Circular Economy, Global supply chain management, sustainable and equitable development, Vietnam's Economy

Introduction

Using a case study of a young and unconventional agricultural conglomerate in Vietnam, we discuss and propose a national approach – that includes both a pro-active firm-level business strategy and a supportive governmental trade policy – to take advantage of the on-going effort to re-define the global supply chain system.

The supply shock triggered by the lockdown of Wuhan, China in February 2020 crippled the entire global supply chains and exposed many vulnerabilities. The overreliance on China as the world's factory, together with the obsession of cost reduction by offshoring, minimizing inventories, and maximizing assets utilities, allowed little buffer and flexibility to react to such a globally disrupting incident like the COVID-19 pandemic.

Recent evidence suggests that the global political move to reduce the trade surplus from China has not worked. Thanks to its manufacturing agility, China has responded to the protectionism move from the US, Europe and Japan with a substantial export increase. With millions of people working from home and students attending school online, worldwide strong demand for personal protective equipment, cleaning products, home improvement goods, electronic products for working from home and ecommerce goods, the trade balance has leaned in favor of China again.

In the U.S., the Biden administration announced on 2/24/2021 a review of the global supply chains for critical components such as batteries for electric vehicles, medical gears, computer chips, and minerals as US manufacturers are severely affected by shortage of raw materials. It would take months before the review outcome and recommendations that would follow to come out. But the executive order from President

Biden is the latest sign that a new world order that has been the US-China trade dispute triggered by the Trump administration for global supply chain management will take place.

Any shake-up of the well-oiled China-dependent production system involves building an all-new multinational reliable supply chain network with a diversified supply base as well as exploring and establishing new, reliant demand markets. The task has become even more critical for nations with close trade ties with China. Take, for example, the case of Vietnam, who has suffered devastating economic impacts during the pandemic due to close trade ties with China on both ends of the supply chain. At the demand end, many of Vietnam's key industries, including textile and garment, leather, that rely heavily on Chinese raw materials were paralyzed in March and April of 2020 due the lockdown of raw materials import from China. As a result, Vietnamese firms were forced to rotate, cut down their workforce, or even shut down the business, resulting in thousands of lost jobs. At the supply end, China remains the largest export market for Vietnam, accounting for more than US$43.1 billion in 2020 revenue, creating a sizable revenue loss during the pandemic. One of the hardest hit industries is Vietnam's agricultural sector, which recorded an almost 10% reduction (approx. US$1 billion in value) in export revenue to China in 2020.

Given the unsettling and uncertain business climate, what should Vietnam do in terms of economic and business strategies to navigate its economy out of the pandemic crisis, and position itself in the upcoming new world order? We postulate in this case study, that Vietnam - like any other developing economies in the upstream of the supply chain

-- needs to strategize beyond the low-cost production model that has helped China become the world's second largest economy.

The unprecedented uncertainty leads to an undesirable, but timely, wake-up call for many countries to re-assess and transform their economic strategies to be more resilient and avoid over-reliance on any country, or even a region. We advocate that adopting the Circular Economy concept in reshaping the global supply chain would create a more sustainable and equitable economy for all participating economies.

2. Vietnam and the Reshaping of the Global Supply Chain

While most world's economies have experienced a GDP contraction, the World Bank estimated a 2.8% GDP growth for 2020 and the Vietnam Institute for Economic and Policy Research (VEPR) predicts that expansion could be up to 5.8% for 2021. According to the Japan External Trade Organization (JETRO), Vietnam was the only economy that posted an increase in exports for 2020, up 7% to US$282 billion, outpacing Indonesia, Malaysia, Singapore, Thailand and the Philippines. Notably, Vietnam's exports to the world top two economies – the United States and China – rose by 25.7% and 18% respectively.

Vietnam has been recognized as one of the most effective countries in the world in containing the spread of COVID-19. Its economic outlook is praised by UBS as one of the brightest in Asia as the world is struggling to sustain their economies with the pandemic looming. As major economies are seeking ways to adapt to the new global supply chain system, Vietnam and other East Asian economies are being actively

courted to be part of a new global strategy to reduce dependence on China's production prowess.

As evidenced by a recent resurgence in FDI, the unexpected and unprepared opportunity poses a daunting challenge to Vietnam that is to strategically prove itself as a global cost-efficient partner to be at least as competitive as China, India, Malaysia, Thailand and others. In doing so, the issue at hand is how an economy such as Vietnam would set its firm-level business strategies and economic policies and to avoid the common pitfalls of rapid growth and industrialization.

2.1. Low-hanging Fruit Approach to Relocation

On July 20, 2020, Japan announced its "China Exit" policy. It released a list of 87 manufacturing projects eligible for subsidies to move production out of China. Fifteen of them have been designated to be more to Vietnam, and the Japanese government would subsidize US$567 million to facilitate this migration. The move by Japan and the Western economies has certainly benefited countries like Vietnam, at least in the short run. However, recent trade statistics have shown that since the midst of the 2020 pandemic, China's exports to developing countries have increased substantially.

A closer analysis of the profiles of these Japanese companies suggests that the selection seems to be based on what the Japanese perceive of what Vietnam can produce. The 17% share of the pie (15 out of 87) also indicates Japan's move to diversify its supply chain network with other South East Asian economies.

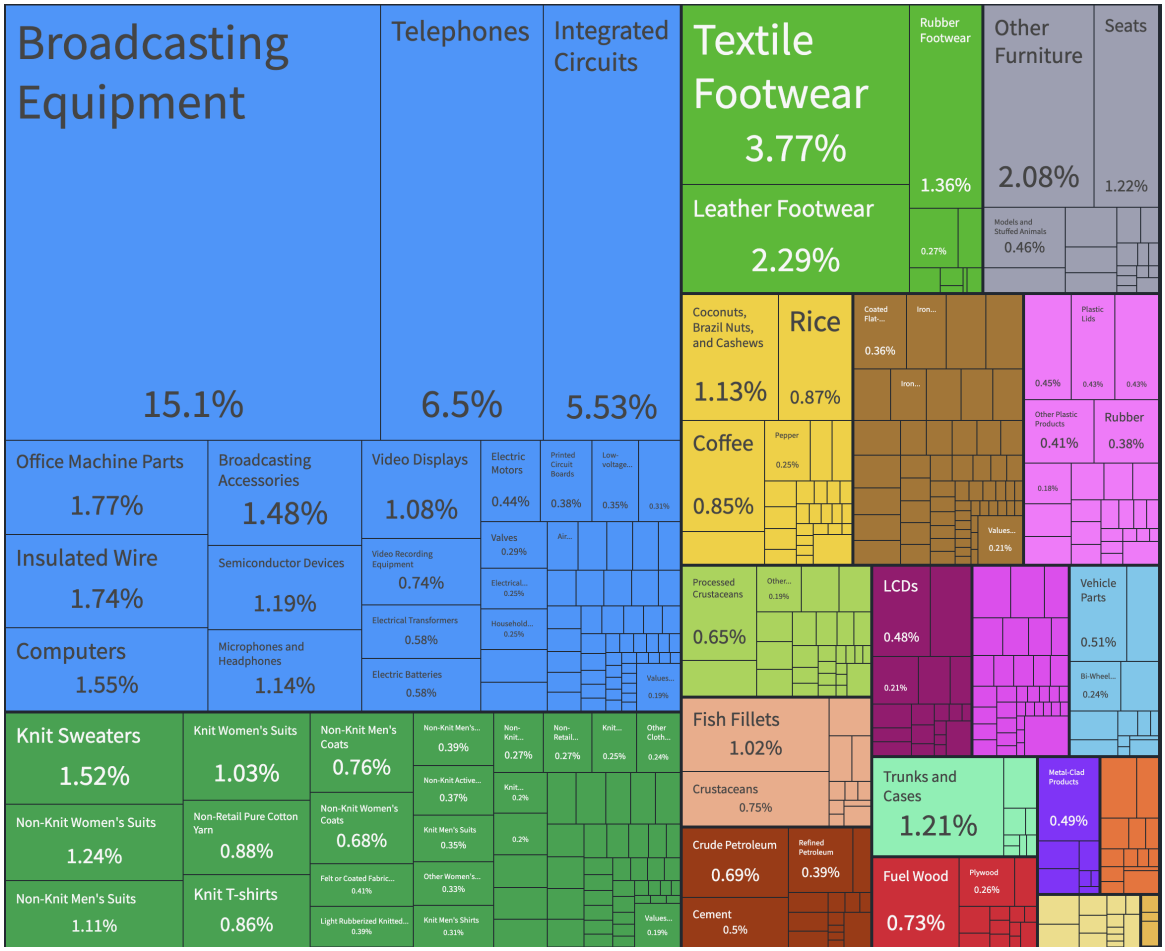

Figure 1. Vietnam's Exports by Product Categories in 2019

Source: MIT, The Observatory of Economic Complexity[1]

[1] https://oec.world/en/visualize/tree_map/hs92/export/vnm/all/show/2019/

	Name of Japanese Companies	Industry Type
1	Akiba Die Casting	High pressure die casting and manufacturing
2	Inoue Iron Works	Manufacturer of pharmaceutical equipment
3	Able Yamauchi	Manufacturer of infection prevention garments
4	Showa International	Manufacturer of equipment
5	TechnoGlobal	Machinery and Trading
6	Hashimoto Cross	Manufacturing of medical hats and masks
7	Fujikin	Manufacturer of sanitary valves
8	Plus	Manufacturer of office furniture and stationary
9	Pronics	Manufacturer of precision parts
10	Hoya Corp.	Manufacturer of optical products
11	Matsuoka Corp.	Manufacturer of protective clothing
12	Meiko Electronics Co.	Manufacturer of PCB and imaging devices
13	Yokoo Corp.	Manufacturer of frozen food
14	Shin-Etsu Chemicals	Manufacturer of semiconductor silicon and magnetic materials
15	Nikkiso	Manufacturer of high precision industrial, medical equipment and aerospace products

Table 1. List of Japanese firms subsidized by the Japanese government to relocate their factories to Vietnam (source: Vietnam Investment Review[2])

Japan's policy seems to be driven more by political moods than by sound economic analysis. Before the COVID outbreak, Google did already take over the Nokia factory outside Ho Chi Minh City to produce their Pixel phones. Less than a year after, in May

[2] https://www.vir.com.vn/vietnam-welcomes-expansion-of-japanese-business-activity-78093.html

2020, Apple announced it would speed up the production of their best-selling AirPods in Vietnam and it is shifting iPad production from China to Vietnam sometime in May 2021. While Intel remains committed to keep its production facilities in China, primarily to serve this gigantic market, it joins Nintendo and Puma to open factories in Vietnam[3].

There is an apparent correlation between the types of products Vietnam has manufactured as a nation (see Figure 1) and the names of the MNCs that have plans to move the mass production from China to its southern border (e.g., the 15 Japanese firms being subsidized by the Government of Japan to move to Vietnam and the electronics for Apple and Google).

We contend this is a low-hanging-fruit solution that requires little structural change in the current supply chain, and all of the 15 Japanese companies already had their limited business presence in Vietnam.

An August 2020 study by the Bank of America suggests that moving the locations of some of the low-value manufacturing nodes in the chain out of China to neighboring economies would cost the U.S. and European firms US$1 trillion[4]. Since it is an expensive move, it remains to be seen if newly relocated factories could achieve the "low production cost" strategy that took China more than a couple of decades to perfect. In fact subsidies from governments to attract these shifts would actually be counterproductive, from an economic perspective. Shifting a complex manufacturing

[3] This link provides a list of companies shifting their production from China to other countries, to include Bangladesh, Cambodia, India, Indonesia, Malaysia, South Korea, Taiwan, and Vietnam. https://www.lovemoney.com/gallerylist/98705/big-multinational-companies-moving-out-of-china

[4] https://www.cnbc.com/2020/08/18/bofa-us-european-firms-face-1-trillion-to-relocate-china-supply-chains.html

system driven uniquely by tax incentive might cause long-term economic and social costs if the move cannot warrant a more cost-efficient production. In the next section, we briefly describe the importance of Foreign Trade Investment (FDI) to developing economies like Vietnam.

2.2. The Role of Foreign Trade Investment

National economic policies can help create a business climate that is conducive to trade and business cooperation. In its 2021 assessment, the International Monetary Fund acknowledges the resiliency of Vietnam's economy thanks to robust economic fundamentals, swift containment measures of the pandemic, and government support in strategic sectors[5]. However, it seems that the multinational companies (MNCs) have the final say in re-shaping the global trade. Kim, Liao and Miyano (2020) study the relationships between Vietnamese foreign trade investments (FDI) into Vietnam and the country's exports from 2003 to 2017. Their findings show that not only MNCs dictate how factory locations are selected, and consequently, how the production networks and composition of trade of the world is redistributed. But most strategically, location choices may reassign production technologies across countries, in favor of those who manage to win FDI.

Using data provided by Vietnam's Ministry of Planning and Investment (MPI), Trading Economics reports that FDI contracted by 2% in 2019-2020, but picked up by 6.5% in

[5] https://www.imf.org/en/News/Articles/2021/03/09/na031021-vietnam-successfully-navigating-the-pandemic

2020-2021[6]. It is expected that FDI will rise to US$22 billion, or approximately 8% of the GDP -- a significantly higher than the world's average estimated to be between 2 to 3%.

2.3. A National Policy for Sustainable Development through the Circular Economy

If Vietnam is just seen by MNCs as a partial substitute to China's low-cost production powerhouse, the nation's primary challenge would be to change how the world perceives its economic, social and political environments. With a young but rapidly aging labor force, rising living standards, and an inadequate infrastructure, can Vietnam get a larger share of some of its neighboring countries, such as Cambodia, Myanmar, Malaysia, Thailand and India?

The World Bank reminds that the global environment remains severely affected by the raging pandemic and Vietnam's economic health which depends on exports is not immune to an economic crisis. It argues that only a competitive and dynamic private sector could mitigate these external risks[7].

In its January 2021 national assembly meeting, the Vietnamese government passed a resolution to consider the circular economy approach to be a national strategy to sustain economic development through the implementation of the Circular Economy principles. The resolution that encourages the private-public partnership (PPP) model illustrates an offensive-defensive economic strategy. One the defensive side, the country is trying to sustain its exports in a global recession and to expand its domestic market with continuous cost-cutting efforts. On the offensive side, the country is seeking to market

[6] https://tradingeconomics.com/vietnam/foreign-direct-investment
[7] https://www.worldbank.org/en/news/speech/2020/01/08/speech-by-ousmane-dione-world-bank-country-director-for-vietnam-at-the-event-vietnam-doing-business-2020-challenges-and-solutions

itself as a more desirable environment for FDI through an aggressive corporate strategy that includes business process (re)engineering, HR policies that aim at talent management, and national branding. Throughout the case analysis, we will discuss the feasibility of a national effort to become a world's supplier and buyer that embraces the basic principles of the circular economy.

3. The Circular Economy and the Reshaping of the Global Supply Chain

3.1. The Emergence of the Circular Economy as a National Economic Strategy

The Circular Economy (CE) has recently emerged as a promising and innovative approach to increase competitiveness and self-reliance, thanks to its combined economic, environmental, and social benefits (Murray, Skene, and Haynes 2017). China, Japan, US and the European Union were among the earliest nations to issue policies to support the adoption of CE (Ghisellini, Cialani, and Ulgiati 2016; Winans, Kendall, and Deng 2017). Emerging economies, including Vietnam, have also recently pivoted to CE (Preston et al. 2019)

Among the earliest advocates of CE, the Ellen MacArthur Foundation (2012) suggests four fundamental building blocks for the transition towards CE:

(i) Circular product designs which aim to maximize the utility and value of raw materials, components and products by extending the product life, changing to recyclable materials and adopting eco-design approach (Mont 2008, Bakker et al. 2014);

(ii) Servitized business models which encourage switching from selling to renting, leasing or sharing technical products, thus promoting better management of product life cycle (De Angelis et al., 2018; Batista et al., 2018; Lacy and Rutqvist, 2015);

(iii) Reverse logistic supply chains that enable 'renovation' activities such as repair, reuse, refurbishment, remanufacturing and recycling, allowing companies to reduce waste and improve profits (Parajuly and Wenzel 2017, Kazemi, Modak, and Govindan 2018);

(iv) A number of enablers and favourable conditions including users' awareness towards sharing, policy and regulation, financing and the creation of a market for secondary products, and digital technologies (Bressanelli et al. 2018, Saidani et al. 2018).

CE thus differs from the traditional linear economy based on the "take-make-dispose" model, in that it disentangles the economic growth from resource extractions and the associated negative impacts on the environment (Elia, Gnoni, and Tornese 2017). This allows businesses that integrate CE into their supply chains to obtain both environmental, social, and economic benefits (Ongondo et al. 2013, Cucchiella et al. 2015, Genovese et al. 2017).

The five R's principles that govern CE models, namely *Reduce, Reuse, Refurbish, Remanufacture,* and *Recycle* are expected to alleviate many issues inherent to vulnerable supply chains. Theoretically, recycled and reusable products could ensure a closed loop supply chain of inputs, and so improve competitiveness through less reliance on raw materials from external sources. Through remanufacturing, businesses could also reduce emissions and wastes, helping them save money as well as meet environmental regulations. Also, making repurposable products could allow businesses to quickly adapt their facilities and shift production to another product allowing them to be more agile and resistant to external shocks.

With these potential benefits, CE has recently attracted attention from both academics and practitioners, who have focused mostly on the integration of the CE concept into

supply chains for its impacts on sustainable development. However, CE's concern of implementing and developing self-reliant and resilient supply chains is critically overlooked. Moreover, most of the existing works take the perspective of developed economies while insufficient attention has been paid to developing countries. Differences in institutional and political antecedents, and the rapid pace of growth and industrial development in emerging nations may require very different approaches for CE integration than those applied in developed countries. For example, the agricultural sector has received minimal attention in global CE discussions to date, but may need to take a central role in the CE pathways of many developing countries.

3.2. The Circular Economy and the New Global Supply Chain

The supply disruption during the early months of the COVID pandemic caused a global shock. Manufacturers and their suppliers around the world were reminded how interdependent they are between them. With the increasing complexity in product design and manufacturing, contractors and subcontractors are highly specialized. As an example, Boeing has more than 12,000 supplier-partners, and approximately 6,000 of them are small and diverse businesses[8]. While the company claims that its dense global network of suppliers has significantly added value to their products and services, it also acknowledges that coordination is time-consuming and expensive. A surprise disruption such as the one caused by the pandemic did temporarily bring many manufacturing projects to a halt. A conventional mitigating strategy would be to increase inventory to face another disruption due to shortage. But, this strategy is equally costly

[8] boeing.com / July 2020.

and it would not even work if more and more suppliers are rendered incapacitated due to the production interdependence.

The Circular Economy would alleviate this problem, as the production ecosystem would be broken down to local and tightly-coupled eco-systems, while interdependencies across ecosystems are reduced thanks to a loosely coupled design.

The Circular Economy would also advocate for a redeployment of markets. Instead of following the decades-long linear supply chain that originates from low-labor economies and ends up to consumption at high-purchasing-power economies, CE would have region-centered “sub-systems” to partially turn inward. That is only a proportion of the location production will be exported along the global supply chain, and the rest will be consumed locally.

As such, what we contend here is that a CE-driven supply chain system will alter the current structure of supply and demand, from a quasi-linear one-way supply chain architecture to a honeycomb-like web of circular structure that takes into consideration the national and regional geo-political realities, as illustrated in Figure 3. The historical and conventiontal supply chain is for developed economies to take advantage of low-cost off-shore production. In return, the arrangement would allow developing economies to implement their export-driven economic policy (Part A of Figure 3). In the proposed CE-based supply chain, each node in the supply chain is a business entity (either independent partner-enterprises within a country, or a participating economy as a whole) is loosely coupled with other nodes as part of the collaboration and coordination of flow of goods (i.e., raw materials, semi- and finished goods), financial resources (i.e.,

investments, equity, profit sharing), and information (i.e., production, R&D, and market data).

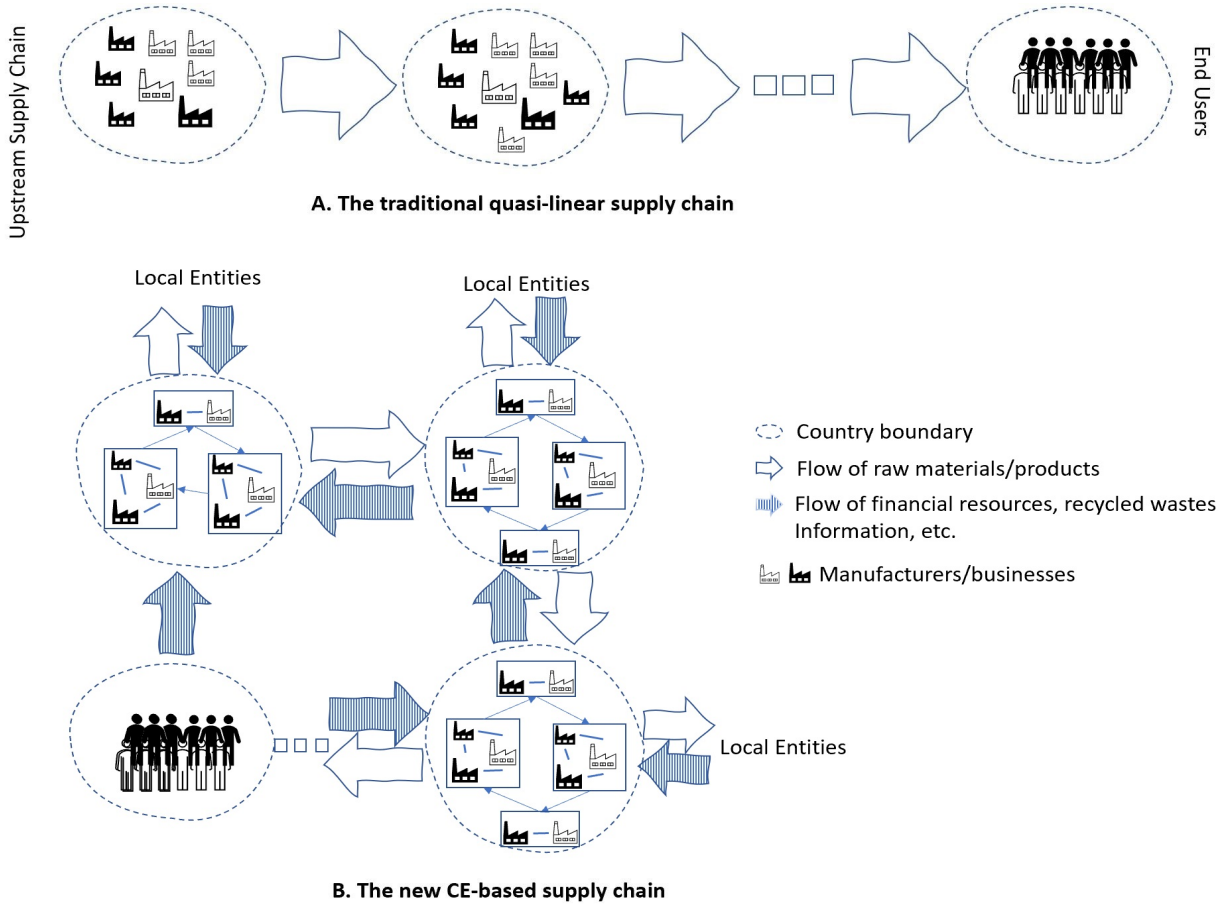

Figure 2. Proposition of a new global supply chain concept based on circular economy

4. Vietnam and the Circular Economy Movement

4.1 The Circular Economy Movement

As a developing economy anxious for raising its living standards, Vietnam is facing an increasing amount of wastes while raw materials and fossil fuels are exhausted at a rapid rate. As such, the transition to CE would offer Vietnam an opportunity to develop rapidly and sustainably, not only fulfilling its economic, social, and environmental

potentials but also reducing the dependence on external economies. However, as the CE concept is relatively new to Vietnam, the transition will require policymakers, development actors and businesses to understand and address challenges specific to the country's conditions. This is crucial since differences in each country's stage of development, economic and structural conditions, capacity and financial constraints, resource endowments, and more importantly, political institutions, would necessitate tailored strategic responses that could not be easily replicated from developed-country experiences (Preston et al., 2019).

The potential challenge for Vietnam in its CE transition is the lack of institutional capacity and enabling governance frameworks. Preston et al. (2019) cautions that the lack of strong governance frameworks could lead to problems with the establishment and enforcement of appropriate regulations and mandatory standards to govern circular activities, as well as result in developing countries installing cheaper but limited-quality technologies and equipment mis-sold under the guise of a CE approach. There is evidence, for example, that waste-to-energy technologies reliant on incinerators are regularly sold in developing countries that lack proper testing facilities or oversight for the use of such equipment. Access to finance and/or technology is some other potential roadblocks in Vietnam's pathway to CE. Activities associated with 'linear' (i.e. non-circular) resource extraction and processing often account for the bulk of financing, foreign exchange earnings and foreign investment in emerging economies. Resource-led development – which focuses on leveraging the potential investment in, and revenue and jobs from, natural resource sectors – has been a popular goal among foreign investors and even major international donors in recent years. International

partners have often been significant supporters of resource-led development: between 2008 and 2015, multilateral development banks (MDBs) provided over US$83 billion in public financing for fossil fuels alone OECD analysis of private-sector resources mobilized for development reveals that almost half of these resources are focused on energy, industry, mining and construction.

The above discussion highlights that the restructuring of Vietnam's economy to enable more 'circular' activities will require a major shift in infrastructure, industrial processes, innovation priorities and more importantly, strong government's support. Many steps in the right direction have been taken by Vietnam's government. In the recent National Congress of Vietnam's Communist Party 2021, CE has been fully endorsed as a key national strategic direction in the next decade. That is the latest step following national action plans on promoting Green, sustainable growth and modernizing rural areas that includes many policies, plans and actions that fit perfectly with the transition towards a circular economy, especially in the agricultural sector. At a lower level, academic institutions, governmental organizations and businesses have also been actively involved in the movement. In July 2020, Vietnam National University in Ho Chi Minh City established the Institute of Circular Economy Development, the nation's first institute on CE. Similar institutes and organizations have also been founded by the UNDP (Da Nang Circular Economy Hub, and the governmental Central Institute of Economic Management (CIEM) and the Vietnam Chamber of Commerce and Industry (VCCI).

4.2 Circular Economy and the Agriculture Sector in Vietnam

Around the world, leading industries have begun to operate on the CE model. According to research by Accenture Strategy[9], the CE model can open up opportunities worth up to US$4,500 billion and create millions of jobs for the global economy by 2030. The new job creation is mainly in the manufacturing sector. In Vietnam, the circular economy is more opportunistic to the agriculture sector at the present since it is in a transitional phase from producing low value-added commodities to high value-added final food products. The application of the circular economy model is a sustainable development path to achieve two goals: responding to the depletion of resources on the input side and addressing the environmental consequence on the output side.

In developed countries, the agricultural sector has received minimal attention in global CE discussions. The percentage of people working in the agricultural sector in Vietnam has steadily decreased over time. Yet, it still accounts for 39% in 2020[10]. As such, a CE transition in the agricultural sector will take a meaningful and impactful pathway since agriculture contributes for almost 15% of the national GDP and 76% of the population living in the rural and mountainous areas. In these areas, agricultural labor accounts for 52% of the workforce. Vietnam's overall agri-food industry (including food processing) is expected to grow further in the coming years, presenting tremendous opportunities for applying CE to realize its full potentials and improve the livelihood of small-holder farmers who constitute the majority part of the sector and still produce to earn marginal

[9] https://newsroom.accenture.com/news/the-circular-economy-could-unlock-4-5-trillion-of-economic-growth-finds-new-book-by-accenture.htm#:~:text=The%20Accenture%20Strategy%20book%20identifies%20five%20business%20models,mature%20economies%20are%20used%20only%20once%20a%20month.

[10] https://www.statista.com/topics/5653/agriculture-in-vietnam/

profits. Vietnam, as a largely agricultural society, does benefit from many traditional practices in agriculture that are naturally circular. For thousands of years, Vietnamese farmers have used cattle manure as organic fertilizers or utilized rice straw for heat and power generation. The challenge thus is to design innovative CE models to systematically scale up these practices and generate tangible benefits for all involved stakeholders.

Over the past 22 years, Vietnam's agriculture sector has made significant achievements, with an average growth rate of 3.4% per year (World Development Indicators), firmly ensuring domestic food security and agricultural export turnover. During the same period, value-added per worker in the agriculture sector has increased from $541 in 1997 to $1,306 in 2019, while the contribution of the sector to national GDP has reduced from 26% to 14% (Word Development Indicators). In recent years between 2015 and 2019, the agriculture sector has shifted positively in the direction of modernization by efficiently reducing the proportion of the farming sector from 49.7% to 46.3%, increasing proportion of the fishery sector from 22.5% to 25.1%, and increasing the forestry sector from 3% to 4.25% (MARD[11]).

However, until recent years, the development of the agriculture sector in Vietnam has only been focused on mass production of output, neglecting the utilization of wastes in the production process, leading to wasteful use resources and environmental damage. Moving up the value chain, the agriculture sector has the opportunity to integrate the CE model into the production process through utilizing less raw materials, reducing the

[11] Ministry of Agriculture and Rural Development (MARD), http://www.mard.gov.vn.

amount of waste to the environment; thus, generating more economic value while achieving sustainable development. It is the nature of the CE to turn waste from producing one product into the resource for producing another product, which is biologically natural in the agriculture sector. For agricultural commodities, CE is applied to the production processes for minimizing, reusing, recycling and recovering materials at different stages, thus reducing the production costs for businesses. This is the main difference from the traditional agricultural economy that is only interested in exploiting resources to maximize production, causing environmental damage.

The development of the CE must be associated with technological innovation and R&D. However, because most forms of agricultural production in Vietnam are small-scale and lack of forward and backward linkage, there are not many production facilities that apply innovative practices and make use of raw materials efficiently to increase the value-added of agricultural products. For large agricultural production establishments, agribusinesses have applied a number of technological innovations in the production process to take control of the value chain. However, the number of these businesses is relatively small and currently at different stages of integrating the CE model. Investment activities for building infrastructure to support the circular economy model only limit to projects that yield immediate and short-term benefits, not including the complete infrastructure system to make the most out of the model in the long run. The next section provides a case study of the PAN Group, one of the most successful agribusinesses in Vietnam that has developed a sustainable development strategy using the CE model.

5. Circular Economy and the Sustainable Transformation of the Agricultural Sector: A Case Study of the PAN Group[12]

5.1. The PAN Group

The PAN Group is an agribusiness established in 1998 with a mission to advance Vietnamese agriculture. As a pioneer, the PAN Group differentiates its business from other large agriculture conglomerates in Vietnam by integrating value chains through acquisitions as an accelerated means to provide people with food security, quality and safety, and nutrition. The company's vision is an integrated value chain and innovative solutions connecting *Farm*, *Food*, *Family*. Recently, the PAN Group has acquired small- and mid-cap size companies nation-wide and has strategically invested in them with the goal to turn them into sustainable businesses. Acquired companies such as Aquatex Bentre, Bien Hoa Confectionery Corporation (Bibica), Vinaseed, 554 Nha Trang Seaproduct JSC, Sao Ta Foods JSC, Lafooco, Vietnam Fumigation Company JSC, and Golden Beans have become leading sustainable agriculture and food companies under the PAN Group.

Green production is the sustainable development strategy of the PAN Group. The PAN Group is a member of the Vietnamese Business Council for Sustainable Development (VBCSD), which is a member of the World Business Council for Sustainable Development. The company is also a member of the Sustainable Trade Project of the World Trade Organization, UN Food and Agriculture Organization (FAO), the International Union for Conservation of Nature (IUCN). The Group is committed to

[12] This section benefited from interviewing with senior executives at the PAN Group and public information available from the company's website.

economic growth with long lasting values of sustainability – economic development, environmental protection, and corporate social responsibility.

The sustainable development strategy of the PAN Group fits into the framework of CE promoted by the Vietnamese government. One of the main criteria to acquire and invest in companies is the potential to promote CE towards sustainable development. Vietnam currently has approximately 750,000 enterprises, of which only 2,000 enterprises are members of VBCSD. This is relatively a small number since the CE is still a new model for many Vietnamese businesses, especially SMEs. The PAN Group is in fact leading the implementation of CE strategies in their business model.

5.2. More Than Meets the Eyes: The Circular Economy in Action

The PAN Group invests in companies through acquisitions to integrate and increase value added, bringing the highest benefits to all stakeholders while respecting their management, existing resources and potential development. The Group ensures information transparency, provides best interests and equality to all shareholders, including minority shareholders. With respect to environmental sustainability, the PAN Group is committed to minimizing negative impacts on the environment. The Group has created an environmental management system based on international standards to strictly control the effects of the production process on the environment. Last but not least, the PAN Group's CSR focuses on creating the best value to employees, customers, partners, suppliers, and the communities. The long-term strategy for sustainable growth has yielded significant progress in expanding the agricultural market, developing new products, and strengthening production capacity.

The PAN Group's core business is divided into two groups integrating the value chain from inputs to outputs: farm and food. The Group's farm business has been built and developed through PAN Farm JSC (PAN Farm), with a comparative advantage of innovative solutions in seeds and agricultural inputs, and advanced farming practices. PAN Farm has partnered with foreign firms and universities in R&D to develop premium inputs, including seeds, sustainable tillage measures, green infrastructure, agritech products, and eco-friendly farming materials that are highly resistant to climate change; thus addressing the pressing problems of the agricultural sector in Vietnam. On the farming practice side, the Group aims to add value to the products through innovative farming solutions developed internally and acquired from Japanese partners. By applying sustainable certifications in the production process such as Global Gap and Viet Gap to flowers, fruits, vegetables, and rice, the Group provides high quality and safe, traceable products to the domestic consumers, and exports to high-end markets such as Japan and EU. The success of PAN Farm is attributed to having a completed and traceable production value chain from seeding, cultivating, processing, preserving, and packaging.

The PAN Group's penetration strategy into the food industry is through PAN Food JSC (PAN Food) with two core segments: everyday food and indulgence food. The everyday food segment targets Vietnamese consumers with traditional products such as packaged rice, frozen seafood, and fish sauces. These products are traceable, high quality and nutrition value at reasonable prices. The indulgence food segment provides products such as cake and candy, organic cashews nuts, and other natural foods. This is the strategic segment of the PAN Group in the coming years and is expected to

become the fastest growing segment of the company. The Group has developed a domestic distribution network with more than 137,000 points of sales (POS) and exports to more than 30 countries.

Another key success of the PAN Group is its commitment to R&D. The R&D team comprises highly respected research institutes and universities in Vietnam and overseas, as well as strategic partners in the agriculture industry, including with leading national universities in agricultural research (e.g., Can Tho University, Nong Lam University) and foreign institutions (e.g., KU Leuven, Universiteit Gent, APSA, and Sakata). PAN owns three R&D outlets and 10 testing centers across Vietnam, suitable for testing plant varieties in different climate and soil conditions. In the agricultural sector, R&D emphasis is on plant breeding and biotechnology to develop stable food crops to stabilize the quality and productivity of farmers. In the aquacultural sector, R&D activities focus on fish dietary requirements and nurseries, disease control, efficient aquaculture solutions, and development of value-added products. In the food sector, the core objectives of R&D are enhancement of nutrition, food quality and affordability, and environmentally production process through the development of new technology, products and packaging design.

Another effort in the CE drive is the participation of Huro Probiotics, a member of the PAN Group, in a UK research project to develop SPOR-COV, a COVID-19 preventive product. Huro Probiotics provides raw materials in the trial stage, but later the company will be responsible for the development of industrial-scale production if the vaccine is successful. The participation of the PAN Group in this scientific research project was the

result of the R&D partnership between the Group and researchers at the University of London a few years earlier.

Both PAN Farm and PAN Food have achieved sustainability in their operations at different stages. In recognizing that these achievements bring tremendous benefits, the model also has its drawbacks. One of the drawbacks is short-term costs. Since the implementation of the circular economy concept requires substantial initial fixed costs, but the benefits are expected to be materialized over the long-run, the company must strike a balance between costs and benefits in order to respond to divergent expectations of its stakeholders, both domestically and internationally. Economic sustainability must be guaranteed first before social and environmental sustainability can be completed in the CE model. In order to achieve economic sustainability, PAN's long-term strategy is to penetrate the global markets while sustaining the lucrative local markets, as reflected by the group's investment portfolio. The Group's portfolio consists of 55.75% domestic shareholders and 44.25% foreign shareholders. The company seeks to develop strategic partnerships with foreign companies with expertise in agriculture and food, including TAEL Two Partners Ltd. and Sojitz Corporation. These strategic investors support the PAN Group to create a full value chain in the agriculture and food processing industry in Vietnam and to support the company in gaining overseas market access. For instance, the business alliance between the PAN Group and Sojitz Corporation provides the opportunity for the company to gain Japanese technological expertise and consumer network in Vietnam at home and abroad in order to create new value. Similarly, Daiwa Security Group's equity investment in the PAN Group supports the joint venture PAN-SALADBOWL in expanding the market in Japan.

The International Finance Corporation (IFC)'s investment in PAN Farm supports the company's effort on sustainability by applying the strict IFC performance standards on environmental and social responsibility in its agricultural business. In short, by offering equities to international investors, the PAN Group has successfully leveraged best practices in sustainability as well as gaining domestic and global market shares.

International trade is a core strategic component of the PAN Group. The Group has prepared to capitalize on free trade agreements, including the Vietnam-EU Free Trade Agreement (EVFTA), the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), and the Regional Comprehensive Economic Partnership (RCEP). In order to gain access to high-end markets in these member countries, businesses in Vietnam must meet the requirements and regulations stipulated in the trade agreements on sanitary and phytosanitary measures such as food safety, animal and plant quarantine; country of origin; rules of origin; environmental and labor standards, and social responsibility. The CE model towards sustainable development has helped the PAN Group position itself as the leading agriculture and food company to enter the toughest export markets. For example, Sao Ta Foods JSC, one of the largest shrimp producers in Vietnam, was immediately capitalized from the EVFTA when the trade agreement came into effect in 2020 thanks to its strict compliance with international standards, including the Aquaculture Stewardship Council (ASC). Only 5% of shrimp producers in Vietnam have this certification. In another example, Vinaseed, a member of the PAN Group, is able to export high quality rice to the EU under its own brands JV Pearl Rice and RVT Fragrant Rice, at a much higher price, due to its comprehensive value chain to ensure the products meet EU standards. Other Vietnamese rice

producers export through conventional channels to the EU, involving only hulling and milling, under foreign brands when the products reach the retailers.

6. High Cohesion/Low Coupling Strategy as a CE Approach to Supply Chain Design

As an ecosystem, the success of the PAN Group is its respect of the current market structure of the Vietnamese agricultural sector that is historically highly fragmented and firmly anchored in local traditions and best practices. The Group deploys a unique merger-and-acquisition (M&A) strategy, that brings in additional financial resources, R&D assistance, and management know-how to assist the businesses that the acquire to re-invent themselves and to be part of a “group” network to help them reach out to a larger network. This concept is similar to the design principles in computer software architecture. As a “bottom-up” approach, the Group is, by its very nature, a collection of independent businesses. By bringing new resources -- financial, technological know-how, and business best practices -- the management “tightens” the cohesiveness of each of the business units, so that each could excel in its individual and specific business activity and sustain itself, as a location-dependent business ecosystem.

At the corporate level, the PAN Group is a conglomerate of quasi-independent, autonomous farms and food enterprises with a revamped and tightly cohesive organizational structure. Relationships between all stakeholders of each “local” enterprise are strengthened with a conglomerate policy to promote: (i) shared knowledge, (ii) shared goals, and (iii) mutual understanding and respect. Personnel training to improve internal quality of communications with focus on frequency, timeliness, accuracy and problem-solving (Gittell, 2006). The Group also seeks to

ensure best organizational practices promoting cross-functional activities and address conflict resolution.

The loose coupling between independent business units is to coordinate strategic decisions related to investments, R&D, marketing research, public relations, and coordination mechanisms with emphasis on synergistic efficiency. In terms of governance, the group plays an advisory role with no major change of management at subsidiaries after the merging. The PAN Group also exerts effort to support management practices consistent with the CE principles. In particular, subsidiary-level innovation through R&D support, process improvement, quality control, export market expansion is greatly encouraged. As the group grows with the acquisition or creation of new business units with new identities and new products, The PAN Group also attempts to link independent businesses by sharing resources whenever appropriate and opportunistic. This allows for knowledge spill-over and great synergy for mutual benefits among the group members. For example, Shin Cà Phê (Shin Coffee - owned by the Golden Beans) learned greatly from Lafooco's compliance process to export cashew nuts to Japan. This enables them to gain access to the Japan market shortly after being acquired by the PAN Group, which would have taken much longer without the knowledge sharing from Lafooco.

The high cohesion and low coupling strategy, as illustrated in Figure 3, allows the PAN Group to establish a corporate structure that facilitates the transformation from a quasi-linear one-directional supply chain structure to a circular one.

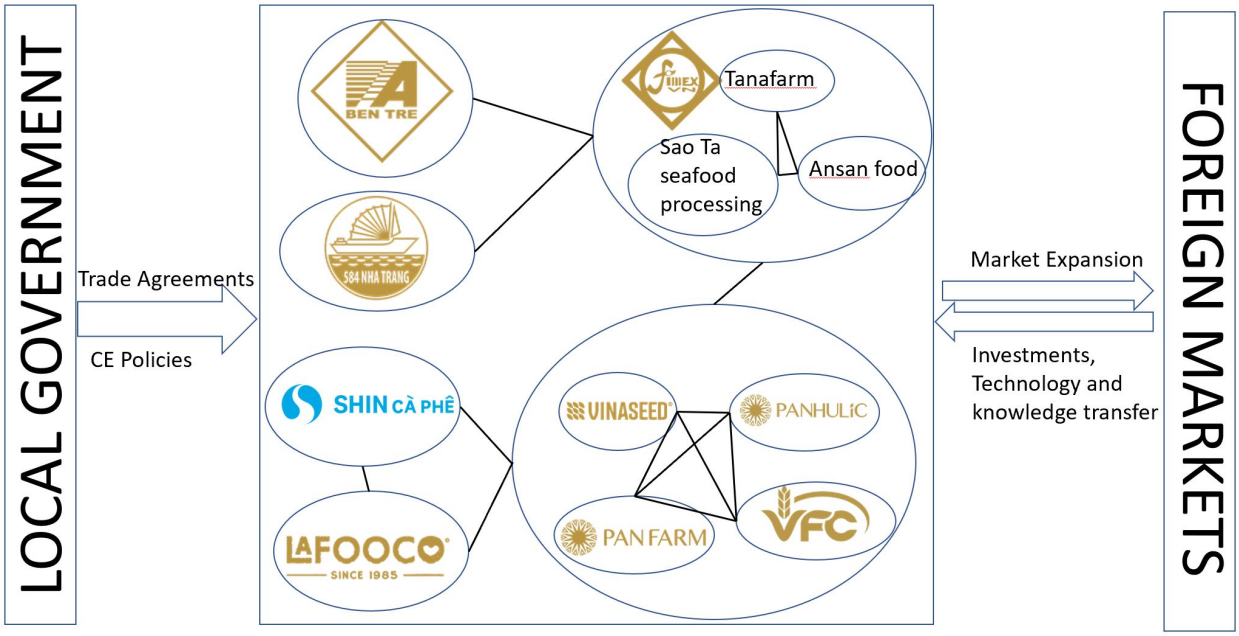

Figure 3. The PAN Group CE-based Supply Chain

On the one hand, each "local" node in the supply chain is allowed ample flexibility to craft its own CE-strategy based on the very nature of the products it produces and the local ecosystem it is in. Investments are subsidized to develop waste and recycled materials. On the other hand, the synergy at the corporate level enables these nodes to link in a true CE approach where the wastes from one process are utilized as inputs for another. According to the CEO of the PAN Group, the Group has successfully implemented the CE model in the following member companies (The PAN Group[13]):

- Aquatex Bentre uses pangasius by-products as animal feed and to extract oil. Wastewater from the factories is treated and reused. Water in the ponds is reused according to RAS technology.
- At Sao Ta, shrimp shells and heads are acquired by partners to produce chitin and chitosan which are important materials in agriculture, food and healthcare industry.

[13] https://thepangroup.vn/the-pan-group-from-circular-economy-to-sustainable-development-2797.htm

- Lafooco's cashew nut shell has been reused as a kiln fuel. It is also pressed to extract essential oils to use as fuels or film-forming gels in marine paints production and the production of other heat-resistant materials.
- 554 Nha Trang sells fish sauce by-products to partners to reuse as fertilizer.
- Vinaseed's rice by-products are reused as kiln fuel. Rice bran is sold to food and alcohol brewing companies.
- At PAN Food and Bibica, confectionery by-products are reused for animal food. The product packaging has smart design so that consumers can reuse it as utensils or children's toys.
- Solar power systems have been installed at factories to reduce electricity costs and CO2 emissions into the environment.

Marketing mix strategies are focused on exports with the goal to change production culture to quality versus quantity. The rationale is if the finished products meet the expectations of foreign markets, they would become competitive at home. Fluctuations of production outputs can be controlled by promotion planning between domestic and international markets.

We close this section with a remark that in order to secure a sustainable position in a global economy, national companies would not just enter unfamiliar foreign markets as a small, unknown and financially disadvantaged supplier. The PAN Group has been able to reach out to their foreign partners in a variety of ways, introducing their business units with corresponding foreign investors, international R&D experts, importers and distributors, to create a self-sustained circular supply chain.

7. Conclusion

As if the trade war triggered by the U.S. under the Trump administration has not sufficiently caused chaos to the world's economy and trade, the looming COVID pandemic has forced individual economies to revisit their respective position in the global supply chain. To reduce the impacts of interdependence, many MNCs are looking to repatriate their manufacturing bases or to diversify their global manufacturing to more locations beyond China. This strategic move risks to be costly and does not necessarily warrant an improvement to the current arrangement. In the short term, it is a challenge to replace the Chinese well-oiled and cost-effective production system. In addition, the decades-long supply chain with China relies on a complex modus operandi involving complex air, land and sea transportation networks, and a complex web of financial and trading institutions, and other logistical issues. We argue that attempting to just relocate the Chinese manufacturing system to other neighboring economies would not make much economic sense.

We contend that an all-new supply chain system driven by the CE principles would enable the current global structure of supply and demand, from a quasi-linear one-way supply chain arrangement to a honeycomb-like web of circular structure that takes into consideration the national and regional geo-political realities

We conducted a case study of an original agricultural group to explore and propose a conceptual framework for emerging economies to integrate the CE concept and develop a resilient and self-reliant supply chain that minimizes the over-dependence on any trade partners and ensure a sustainable development. In just a few years, the PAN Group has acquired an extraordinary comparative advantage. Many of its business units

have been able to expand to the global market thanks to its CE-inspired credible value chain traceability from inputs to end-use.

A known limitation of a case study is the issue of generalizability. Can the rest of the country duplicate what the PAN Group has successfully done? A typical view from case study researchers is that it is the reader, and not them, to determine what can be learned and applied to his/her context (Stake, 2005). The PAN Group possesses a young cadre of highly-educated leaders with international experience and networking. It also has strong financial backing from solid local and international financial institutions. Success begets success. PAN Group's CE-inspired model has caught the attention and interest of the highest levels of national, regional and local government offices. It remains to be seen how the PAN group will change the entire agricultural sector. It would also be of interest to see how other traditional sectors, e.g., the obsolete manufacturing industry, react to PAN's successful strategy. In any case, we believe that our proposed concept would allow an economy such as Vietnam to move forward, and eventually be able to join the league of advanced economies in Asia.

References

Accenture Strategy. 2015. The Circular Economy Could Unlock $4.5 trillion of Economic Growth, Finds New Book by Accenture. Retrieved from: https://newsroom.accenture.com/news/the-circular-economy-could-unlock-4-5-trillion-of-economic-growth-finds-new-book-by-accenture.htm#:~:text=The%20Accenture%20Strategy%20book%20identifies%20five%20business%20models,mature%20economies%20are%20used%20only%20once%20a%20month.

Bakker, Conny, FengWang, Jaco Huisman, and Marcel den Hollander. 2014. Products That Go Round: Exploring Product Life Extension Through Design. Journal of Cleaner Production 69: 10–16.

Bressanelli, Gianmarco, Marco Perona, and Nicola Saccani. 2019. Assessing the Impacts of Circular Economy: A Framework and an Application to the Washing Machine Industry. International Journal of Management and Decision Making In Press: 1–27.

Cucchiella, Federica, Idiano D'Adamo, S. C. Lenny Koh, and Paolo Rosa. 2015. Recycling of WEEEs: An Economic Assessment of Present and Future e-Waste Streams. Renewable and Sustainable Energy Reviews 51: 263–272.

Elia, Valerio, Maria Grazia Gnoni, and Fabiana Tornese. 2017. Measuring Circular Economy Strategies Through Index Methods: A Critical Analysis. Journal of Cleaner Production 142: 2741–2751.

Ellen MacArthur Foundation. 2012. Towards a Circular Economy – Economic and Business Rationale for an Accelerated Transition.

Genovese, Andrea, Adolf A. Acquaye, Alejandro Figueroa, and S. C. Lenny Koh. 2017. Sustainable Supply Chain Management and the Transition Towards a Circular Economy: Evidence and Some Applications. Omega 66: 344–357.

Ghisellini, P., Cialani, C., Ulgiati, S., 2016. A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems. J. Clean. Prod. 114, 11-32.

Gittell J.H. 2006. Relational Coordination: Coordinating Work Through RElationships of Shared Goals, Shared Knowledge and Mutual Respect. In Psychology.

Kazemi, Nima, Nikunja Mohan Modak, and Kannan Govindan. 2018. A Review of Reverse Logistics and Closed Loop Supply Chain Management Studies Published in IJPR: A Bibliometric and Content Analysis. International Journal of Production Research.

Kim, I. S., S. Liao, and S. Miyan. 2020. Why Trade and FDI Should be Studied Together? Working Paper. Cambridge, Mass.: MIT Department of Political Science.

Ministry of Agriculture and Rural Development (MARD). Retrieved from: http://www.mard.gov.vn

Mont, Oksana. 2008. Innovative Approaches to Optimising Design and Use of Durable Consumer Goods. International Journal of Product Development 6 (3/4): 227.

Murray, A., Skene, K., Haynes, K., 2017. The circular economy: an interdisciplinary exploration of the concept and application in a global context. J. Bus. Ethics 140 (3), 369-380.

Ongondo, F. O., I. D. Williams, J. Dietrich, and C. Carroll. 2013. ICT Reuse in Socio-Economic Enterprises. Waste Management 33 (12): 2600–2606.

Parajuly, Keshav, and Henrik Wenzel. 2017. Potential for Circular Economy in Household WEEE Management. Journal of Cleaner Production 151: 272–285.

Preston, F., Lehne, J. and Wellesley, L., 2019. An inclusive circular economy: Priorities for developing countries. Working Paper, Analysis and Policy Observatory.

Saidani, Michael, Bernard Yannou, Yann Leroy, and François Cluzel. 2018. Heavy Vehicles on the Road Towards the Circular Economy: Analysis and Comparison with the Automotive Industry. Resources, Conservation and Recycling 135 (August): 108–122.

Shih, Willy C. 2020. Global Supply Chains in a Post-Pandemic World. *Harvard Business Review*, September-October

Stake, R.E. 2005. Qualitative Case Studies. In N.K. Denzin & Y.S. Lincoln (Eds.). Thousand Oaks, CA: Sage

The PAN Group. 2021. From Circular Economy to Sustainable Development. Retrieved from: https://thepangroup.vn/the-pan-group-from-circular-economy-to-sustainable-development-2797.htm.

Winans, K., Kendall A., and Deng, H. 2017. The History and Current Applications of the Circular Economy Concept. Renewable and Sustainable Energy Reviews 68: 825–833.

World Development Indicators 2020. The World Bank, Washington, D.C.