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VIET NAM INDUSTRY WHITE PAPER 2019

Manufacturing and Subsector Competitiveness

INCLUSIVE AND SUSTAINABLE INDUSTRIAL DEVELOPMENT

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Manufacturing and Subsector Competitiveness

Contents

Figures

Tables

Preface

Viet Nam has experienced sustained and rapid economic growth over the last decade, which has mainly been driven by widespread growth in the processing and manufacturing sectors. Viet Nam recorded a moderate level of economic growth in 2018, with an annual growth rate of 7.1 per cent. The manufacturing sector continues to contribute significantly to the country's economy with a growth rate of 13 per cent and has maintained a share of over 80 per cent of Viet Nam's total exports in recent years. In light of its economic achievements, the Government of Viet Nam released the Strategy on Viet Nam's Industrial Development Through 2025, With a Vision Towards 2035 (Decision 879/QD-TTg, 2014) and the Central Committee of the Communist Party of Viet Nam issued the Formulation for Developing National Industrial Development Policies to the Year 2030 With a Vision to 2045 (Resolution No. 23-NQ/TW, 2018).

Despite the considerable progress achieved in recent years, Viet Nam's manufacturing sector still faces numerous challenges, such as low value-added products with low-skilled work and weak internal strength of the sector. The Government of Viet Nam recognized the importance of enhancing domestic value added, building institutional capacity and improving competitive sub-sector strategies. Accordingly, the Viet Nam Industrial Competitiveness Report (VICR) 2011 was produced with the support of UNIDO to identify key areas of intervention to boost the manufacturing sector's industrial competitiveness. As a continuation and expansion of the VICR 2011's sub-sector industrial strategies, the White Paper Viet Nam Industry 2019 – Manufacturing and Subsector Competitiveness was produced to improve Viet Nam's policy framework and to close the institutional gap in the ministries responsible for formulating, implementing and monitoring industrial strategy and policy by Vietnamese industrial policymakers with consolidated capacities.

The main focus of the White Paper is on four competitive manufacturing sub-sectors, namely food processing, textile - apparel and leather - footwear, electronics and the automotive industry, which were selected in consideration of the targets of Decision 879 and Resolution 23 and the analysis of the current status of Vietnamese sub-sectors. The key issues in each industry were researched and analysed in detail, including classification, the development of the industry, production and employment, trade, value chain analysis, market structure, dynamics and diversification, a comprehensive SWOT analysis, the strategic objectives of the industry and policy recommendations. The analyses of the four sub-sectors were prepared by a task team consisting of Vietnamese officials from different ministries with the support of specialized industry experts.

We hope that the White Paper will contribute to achieving Viet Nam's objective of becoming a modern industrialized country with an internationally competitive manufacturing sector that is deeply involved in the global value chain. We also hope that the policy recommendations are incorporated in the industrial policy development strategies of the Government of Viet Nam to strengthen the role of competitive manufacturing sub-sectors. UNIDO is pleased to accompany the country in its future endeavour of designing detailed action plans to realize the recommendations made in the White Paper.

Acknowledgement

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This report was prepared by UNIDO under the overall guidance of Cecilia Ugaz Estrada, Director of the Department of Policy Research and Statistics of UNIDO. Advice on technical and operational issues was provided by Michele Clara (Senior Coordinator), Anders Isaksson (Senior Research and Industrial Policy Officer) and Nobuya Haraguchi (Chief of Research & Industrial Policy Advice Division). The project was launched by Seung Chul Oh (Senior Industrial Policy Advisor) and managed by Sejoo Nah (Industrial Policy Expert), who coordinated and implemented activities in detail. The project was mainly managed by Jaehwan Jung (Senior Industry Policy Expert) who played an instrumental role in the successful completion of the paper. Kyung Hyun Park (Project Associate) provided support during the project, the production of the report and this publication.

Colleagues from the Research and Industrial Policy Advice Department, Adot Killmeyer-Oleche (Senior Industrial Policy Officer), Fernando Santiago Rodriguez (Industrial Policy Officer), Franz Brugger (International Consultant), and external experts Andrea Antonelli (Industrial Policy Expert) and Ruth Pollak (Industrial Policy Expert) contributed to training Vietnamese officials in analytical capacity-building. Nevena Nenadic (Research Assistant), Camelia Soare (Research Assistant) and Fernando Russo (Research Assistant), provided extensive administrative support to ensure a smooth production process, and Niki Rodousakis (Senior Research Assistant) provided editorial assistance in finalizing the report. Practical support in the field was provided by Le Thi Thanh Thao (UNIDO Country Representative) and Hoang Mai Van Anh (National Project Coordinator) from UNIDO's Country Office in Viet Nam.

A task team consisting of staff members from different ministries of Viet Nam greatly contributed to the production of this document by drafting sub-sectors of the White Paper. The task team consisted of Nguyen Thi Xuan Thuy, Pham Thanh Trung and Nguyen Anh Tu from the Viet Nam Industry Agency, Ministry of Industry and Trade (MOIT), Hoang Trung Hieu and Pham Ngoc Dung from the Viet Nam Institute for Industry and Trade Policy and Strategy, MOIT.

This White Paper benefited considerably from valuable policy recommendations and the experiences of the Republic of Korea contributed by experts from the Korea Institute for Industrial Economics and Trade (KIET), namely Sanghoon Kim (Research Fellow/Director of KIET), Jongchol Moon (Research Fellow of KIET), Eun Kyo Cho (Associate Research Fellow of KIET), and Junghyun Yoon (Senior Researcher of KIET) from the Korea Institute of Industry Economy and Trade (KIET). It also benefited from input on monitoring and evaluation by external experts, Nathan Fiala (University of Connecticut, USA) and Michele Di Maio (University of Naples Parthenope, Italy).

We would like to take this opportunity to express our special thanks to the Ministry of Foreign Affairs of the Republic of Korea for their generous financial contribution. We are also grateful for the continued support from the Embassy and Permanent Mission of the Republic of Korea in Vienna, Austria.

Our sincere gratitude also extends to the policymakers of the Ministry of Trade and Industry of Viet Nam and other related Ministries, and the experts of the Viet Nam Industry Agency including Truong Thanh Hoai, Director General who provided support and inputs from the outset of this project.

Abbreviation

AAF	ASEAN Automotive Federation
ASEAN	Association of Southeast Asian Nations
BEC	Broad Economic Categories
CAGR	Compound Annual Growth Rate
CBU	Completely Built-Up
CIP	Competitive Industrial Performance
CKD	Completely Knocked-Down
CMT	Cut, Make, and Trim
EQuIP	Enhancing Qualities of Industrial Policy
FBT	Food, Beverage, and Tobacco
FDI	Foreign Direct Investment
FTA	Free Trade Agreement
GCR	Global Competitiveness Report
GDP	Gross Domestic Product
GIZ	Gesellschaft für Internationale Zusammenarbeit
GSO	General Statistics Office of Viet Nam
GVC	Global Value Chain
ICOR	Incremental Capital-Output Ratio
ICT	Information and Communications Technology
ImWMT	Impact of a country on World Manufacturers Trade
ImWMVA	Impact of a country on World Manufacturing Value Added
INDint	Industrialization intensity
IP	Industrial Policy
IT	Information Technologies
ISIC	International Standard Industrial Classification of All Economic Activities
KBC	Knowledge Based Capital
KIET	Korea Institute for Industrial Economics and Trade

MARD	Ministry of Agriculture and Rural Development of Viet Nam
M&E	Monitoring and Evaluation
MVA	Manufacturing Value Added
MVApc	Manufacturing Value Added per capita
MXpc	Manufactured Exports per capita
MXQual	Manufactured Exports Quality
OECD	Organisation for Economic Co-operation and Development
OICA	International Organization of Motor Vehicle Manufacturers
OT	Operational Technologies
QCD	Quality-Cost-Delivery
R&D	Research and Development
SITC	Standard International Trade Classification
SMEs	Small and Medium-sized Enterprises
SOEs	State-Owned Enterprises
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TALF	Textile, Apparel, Leather and Footwear
TiVA	Trade in Value Added
UNCOMTRADE	United Nations International Trade Statistics Database
UNIDO	United Nations Industrial Development Organization
USD	United States Dollar
VAMA	Viet Nam Automobile Manufacturer's Association
VAMM	Viet Nam Association of Motorcycle Manufacturers
VICR	Viet Nam industrial Competitiveness Report
VSIC	Viet Nam Standard Industry Classification
WDI	World Development Indicators
WEF	World Economic Forum
WITS	World Integrated Trade Solution
WTO	World Trade Organization
4IR	The Fourth Industrial Revolution

I. INTRODUCTION

Chapter 1. Background

1.1. Purpose of this paper

The Government of Viet Nam has emphasized the need to speed up the country's industrialization process through value addition and technological upgrading. In 2014, the Ministry of Industry and Trade (MoIT) released Viet Nam's industrial development strategy through 2025 with a vision to 2035, which identified three key industries (manufacturing and processing, telecommunications and electronics, new and renewable energy) and priority subsectors in the manufacturing industry, with a focus on developing high value-added industry as well as on industries with strong backward and forward linkages. Prior to releasing this strategy, MoIT, with the support of UNIDO, produced the Viet Nam Industrial Competitiveness Report (VICR) 2011, which provided theoretical underpinnings and key recommendations to the country's industrial development strategy.

Building on the successful collaboration that produced the VICR 2011 and the subsequent release of the industrial development strategy, UNIDO, in partnership with the Republic of Korea, launched a new cooperation project "Support to the Government of Viet Nam in the formulation of Sub-Sector Industrial Strategy and of the related Implementation Policy through Institutional Capacity Building" which aims to contribute to the upgrading of industrial competitiveness in terms of further elaborating its strategy at the subsector level as well as fostering the implementation of a set of industrial policies to promote priority sectors and value chains.

In this context, the project aimed to boost Viet Nam's industrial competitiveness by elaborating subsector industrial strategies as well as comprehensive industrial policies based on enhanced institutional capacity of the Government of Viet Nam and the private sector. The objectives were a) consolidation of industrial policymaking capacity in Viet Nam to eliminate the institutional gaps at MoIT and the bottlenecks in the policy framework; b) capacity-building in industrial intelligence focusing on sector competitiveness and value chain analysis; c) sharing industrial development experiences and policies from industrialized economies such as the Republic of Korea; d) support in the design of evidence-based subsector industrial strategies and in defining industrial policies and the necessary policy instruments to successfully implement the strategies.

The Central Committee of the Communist Party of Viet Nam recently issued Resolution No. 23-NQ/TW on the formulation of a national industrial development policy by 2030 with a vision to 2045. It contains specific objectives such as for the share of industry to GDP and of processing and manufacturing industries to GDP to increase to 40 per cent and 30 per cent, respectively, for the high-tech processing and manufacturing value added share to account for at least 45 per cent, and for the growth rate of industrial value added to attain an average of 8.5 per cent annually, with processing and manufacturing industries averaging over 10 per cent per year.

This paper contributes to the successful implementation of Resolution No. 23-NQ/TW by:

- Analysing and evaluating the current status of manufacturing and processing industries in Viet Nam in the period 2006 – 2016 at the macro-level using international methodologies and evaluating their performance by comparing them with relevant comparators (mostly ASEAN members);
- Identifying key bottlenecks and issues that need to be addressed at both the macro and sectoral level;
- Making recommendations and providing feasible solutions to achieve the objectives established in government policy documents.

1.2. Conceptual framework

In this paper, industrial competitiveness is understood as "the capacity of countries to increase their industrial presence in domestic and international markets while developing industrial structures in sectors and activities with higher value added and technological content" (UNIDO, 2002-2003 and UNIDO 2012-13). The drafting team[1] made ample reference to UNIDO's Competitiveness Industrial Performance (CIP) methodology, which measures countries' capacity to increase their industrial presence on the basis of eight indicators. The Central Committee of the Communist Party of Viet Nam also referred to the CIP ranking in Resolution No. 23-NQ/ TW on the formulation of a national industrial development policy by 2030, which includes increasing Viet Nam's CIP ranking to be among the top 3 ASEAN members.

The CIP Index and its indicators is a benchmarking tool that can be used to compare a country's industrial growth with that of other countries and regions across the globe and over time. The indicators use publicly available data from international databases (such as the World Bank's World Development Indicators, UNCOMTRADE's trade database and UNIDO's Industrial Statistics database, INDSTAT). Such data can be used for cross-country comparisons and time-series analyses and allows identifying and tracking the development of economies identified as role models as well as current or future competitors to better understand the given country or region's position. Figure 1.1 summarizes the CIP Index's different dimensions and indicators.

[1] They are the White Paper Task Team and comprise government representatives and government research institutions.

Figure 1.1 Component indicators of UNIDO's Competitive Industrial Performance Index (CIP)

Source: UNIDO (2017)

The index of a country's industrial competitiveness was developed by UNIDO based on three dimensions and eight manufacturing indicators.

The first dimension is a country's capacity to manufacture and export processed goods, which is determined by two indicators: 1) the added value of manufacturing and of processed goods per capita (Index 1: MVApc) and 2) exports of manufactured goods per capita (Index 2: MXpc).

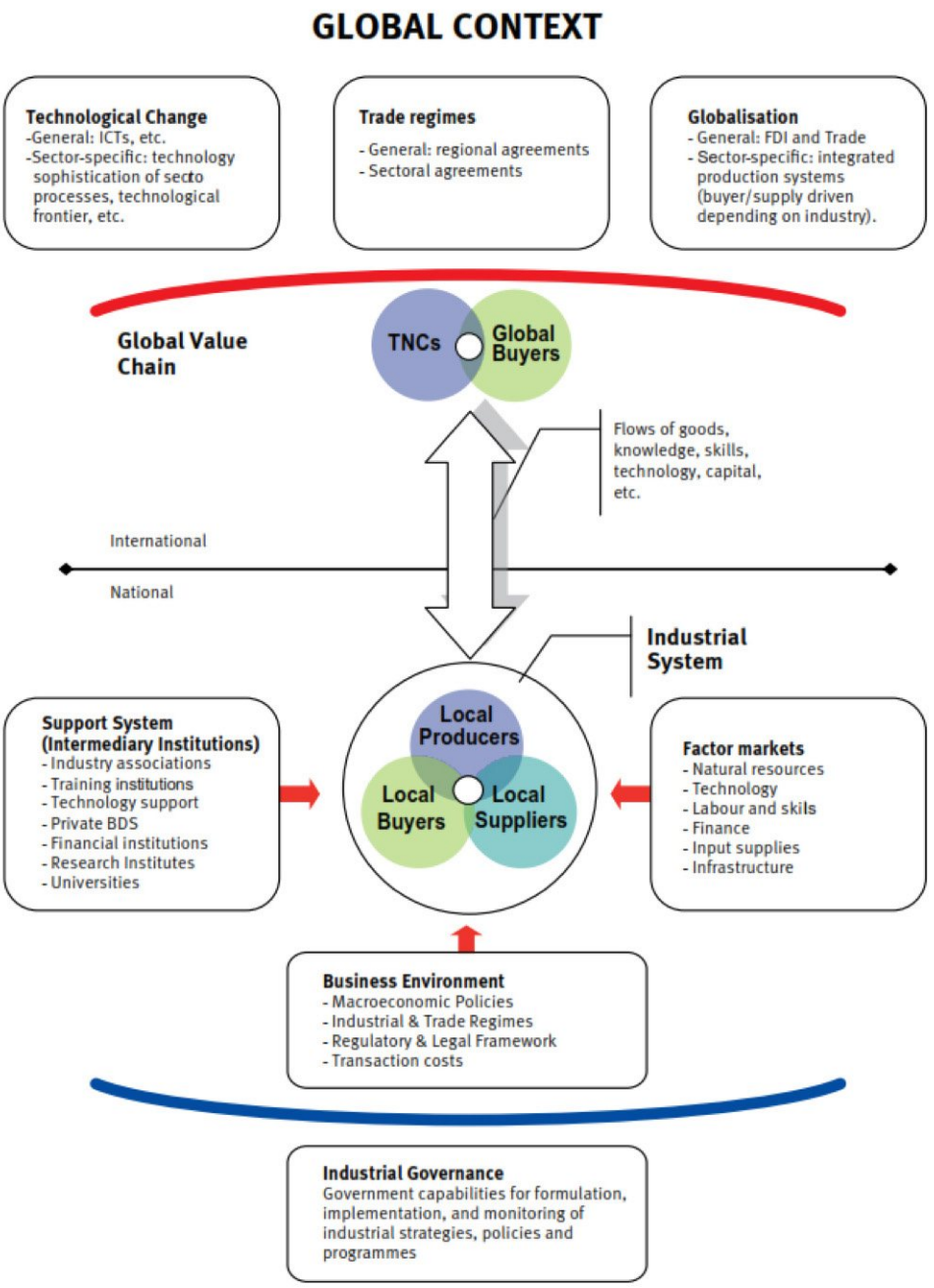
The second dimension is the country's level of technological development, which is measured on the basis of two general indicators: 1) the country's industrialization intensity (INDint) and export quality (MXQual), where INDint is the share of added value of manufacturing and processing industries in gross domestic product (GDP) (Index 3: MVAsh) and 2) the share of high- and medium-technology MVA in total MVA (Indicator 4: MHVAsh); MXQual is the share of exports of high- and medium-technology goods in the total export turnover of manufactured goods (Index 5: MHXsh) and of the exports of processed and manufactured goods in total export turnover (Index 6: MXsh).

The third dimension is the country's impact on world MVA and manufactured exports, which is measured by its share of MVA and manufactured exports in total world MVA and global manufactured exports, thus indicating the country's relative performance and impact.

While these indicators measure the performance of the country's industrial sector—and more specifically, of its manufacturing sector—industrial competitiveness is embedded in a conceptual framework (Figure 1.2). The figure depicts how a country's industrial sector is affected by national and international factors. International factors that have an impact

on national industrial performance include the changing dynamics and effects of globalization, trade regimes and the rapid pace of technological change, causing precipitous shifts both in demand and production. Domestically, a range of factors play a substantial role, such as the country's overall business environment and the extent to which it is conducive for manufacturing, the availability of reliable intermediary institutions providing the necessary services and support for manufacturing firms and the available inputs and capabilities of the national industrial sector.

Figure 1.2 Analytical and conceptual framework of industrial competitiveness



Source: UNIDO

While a national government is in a weak position in terms of its degree of influence on international factors, it can—taking global trends into consideration—ensure that national factors encourage, rather than deter, industrial development.

The paper also makes reference to other methodologies and has benefitted from analytical trainings associated with the tool "Enhancing Qualities of Industrial Policy" (EQuIP), which entails a range of methodologies to conduct industrial diagnoses and design strategies. It is an institutional capacity-building package to train public servants and analysts to devise public policy based on informed decisions and thorough empirical evidence. This capacity development package builds on an integrated EQuIP toolbox which compiles globally available industrial performance and capability measurements as well as a number of customized new methodologies to conduct an industrial diagnosis that take the social and environmental dimensions of development into account.

1.3. Preparing the White Paper

As mentioned previously, the project underlying this paper was carried out with the aim of strengthening Vietnamese policymakers' capacities. The following conclusions were drawn:

First, analyses and recommendations for advanced industrial policies of Viet Nam were compiled from a series of workshops and included in the White Paper. The White Paper focuses on a number of industrial policy issues that were to be addressed before the government submits a bill or decree. The intention is to present all stakeholders' points of view and perspectives and how these fed into the process of decision-making rather than to present final and fixed conclusions.

Vietnamese officials took the lead role in preparing the White Paper. To this end, a task team was created with officials from the Ministry of Industry and Trade and related institutes, who actively contributed to the project. Different task team members[2] were responsible for different components of the analysis and descriptions of each sector-related issue. This White Paper is of great significance because it was prepared by the young Vietnamese policymakers who will implement the policies proposed in this paper and gain experience in the future instead of by external experts, who supported the policymakers in finalizing the White Paper by providing inputs on the latest global issues and detailed policy recommendations.

The sector-specific analysis included classifications, a history of development, production, employment, trade, value chain, market analysis, a comprehensive SWOT analysis and policy recommendations. To ensure consistency, the same analytical framework and statistical data sources were used to the extent possible to determine the status of subsectors. In addition, the views of institutional representatives and private sector experts were included to supplement the quantitative analysis with a qualitative analysis.

[2] List of task team members: Nguyen Thi Xuan Thuy, Pham Thanh Trung and Nguyen Anh Tu from Viet Nam Industry Agency, MOIT; Hoang Trung Hieu and Pham Ngoc Dung from Viet Nam Institute for Industry and Trade Policy and Strategy, MOIT.

1.4. Workshop series[3]

A series of workshops were held as part of the project "Support to the Government of Viet Nam in the formulation of Sub-Sector Industrial Strategy and of the related Implementation Policy through Institutional Capacity Building". These training workshops for analytical capacity-building in industrial intelligence were conducted with a focus on Viet Nam's specific needs, including sector competitiveness and value chain analysis. UNIDO's methodologies on industrial intelligence were introduced as useful training tools. Executive trainings for high-level decision makers on industrial strategies and institutional development were carried out as well. These training activities aimed to enhance Viet Nam's capacity to generate and capitalize on industrial intelligence required to conduct industrial diagnosis and for strategic decision-making. In total, six training workshops were organized within the scope of this project.

Table 1.1 Lists of workshops

	Title	Time	Contents
1	Enhancing the Quality of Industrial Policies (EQuIP) Training	16-19 January 2018	The main objective of the training was to introduce the quantitative Enhancing the Quality of Industrial Policies (EQuIP) methodologies for subsector analyses of industrial performance and to identify the components of EQuIP that are most relevant for strengthening the country's industrial policy process. The training focused on calculating the baseline indicators of Viet Nam's current economic and social performance at subsector level. It covered indicators that measure the scale and structure of industrial production, export, import, employment and wages to better understand how industrial subsectors currently contribute to the "expansion of industrial production" and the "domestic benefits from production".
2	Capacity Development for Industry 4.0 in Viet Nam	5-9 June 2018	The workshop addressed the opportunities and challenges posed by Industry 4.0. It provided a brief overview of current policy options and strategies in relation to Industry 4.0 and featured case studies from a range of countries, focusing on current initiatives in the Republic of Korea and South Africa in particular. The workshop concluded with a panel discussion on the private sector's perspective, including Siemens and ABB (electrical equipment company) and allowed participants to further elaborate on the issues and added exercises to initiate a policy dialogue.

[3] See Annex 1 for details on each workshop

3	Enhancing the Quality of Industrial Policies (EQuIP) Training	13 – 17 August 2018	This workshop informed the process based on which a task team of selected individuals from different ministries would be developing a series of sector studies and addressed issues relevant to the country's industrial development, which were to be integrated into a White Paper. The training evaluated sector competitiveness in terms of productivity and market performance, sectors' revealed comparative advantage, the growth rate in comparison with that of competitors, risks and dynamism. It also considered Viet Nam's advantages and the potential of individual manufactured products.
4	White Paper on Viet Nam's New Industrial Development Strategy	12 – 16 November 2018	An overview of three horizontal factors—the aging population, the Chinese-US trade conflict and Industry 4.0—that have an impact on the development of manufacturing in Viet Nam were reviewed. Members of the task team presented their preliminary findings of the sector studies. Four selected subsectors (food processing, textile/apparel/leather/footwear, electronics and automotive) were evaluated by KIET experts from a global perspective with a particular focus on the Republic of Korea's experience. Reviewing the status of the respective industries in Viet Nam, lessons learned were explored collectively.
5	Workshop to Support the Drafting of the White Paper for Viet Nam's New Industry Policy	25 – 28 March 2019	The workshop was preceded by a meeting with representatives from various Vietnamese business associations and a senior Vietnamese economist. This workshop provided assistance to members of the task team in the preparation of the White Paper in an intensive 3-day coaching event.
6	Training Workshop to Develop a Monitoring and Evaluation (M&E) System for Viet Nam's Manufacturing Sector	25 – 26 June 2019	The M&E workshop provided support to the Government of Viet Nam in the development of a monitoring and evaluation plan. The workshop included a discussion on how to develop a high-quality monitoring system and an example of an M&E system in industrial development policy. Group level discussions were held on how to integrate M&E into the programme in Viet Nam.

II. POLICY ENVIRONMENT

Chapter 2. Challenges in the global context: The 4th Industrial Revolution[4]

2.1. General definitions

Many scholars and experts describe the Fourth Industrial Revolution (4IR) as the fourth major transformative industrial era since the first Industrial Revolution of the eighteenth century. It is characterized by the fusion of technologies that blur the lines between the physical, digital and biological spheres, and is also marked by emerging technological breakthroughs in a number of fields, including robotics, artificial intelligence, nanotechnology, quantum computing, biotechnology, the Internet of Things, 3D printing and autonomous vehicles, among others. Table 2.1 presents the major distinctions of each revolution. These definitions are widely accepted.

Table 2.1 Characteristic of the Industrial Revolutions

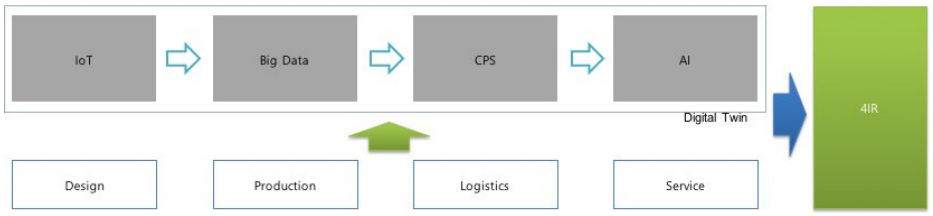
					
When		18th Century	19~ early 20th Century	Late 20th Century	Approx. 2000~
Connectivity		Connectivity Increase in a Country	Connectivity Increase between Country-Enterprise	Connectivity Increase between Human-Machine-Environment	Maximisation in Automization & Connectivity
First Implementation		Mechanical Loom (1784)	Cincinnati Slaughter-house (1870)	PLC: Modicon 084 (1969)	-
Motivation for Momentum		Steam Power	Electric Power	Electronics & IT	Iot, BD, AI based Hyper-Connection
		Change in Power Source		Change in Information Manipulation Method	
Characteristics	Cause	Mechanisation	Electrification	Information	Intelligence
	Result	Industrialisation	Mass Production	Automation	Autonomisation
Phenomena		Industrialisation of Textile manufacturing (Britain)	Mass Production using Conveyor Belt (USA)	IT Innovation based upon Internet (USA)	Industry Reorganisation via eHyper-Connection and Hyper-Intelligence based upon Human-Things-Space

The process through which 4IR is realized is illustrated in Figure 2.1. As previously described, if the entities are connected to each other (that is, IoT), the summation of data produced is enormous. Previously unnecessary data produced by isolated entities can become useful if connected to other nodes within a system. Data generated by connected

[4] Sanghoon Kim from KIET contributed to this chapter.

systems are far more voluminous than expected (that is, Big Data). In a system in which each entity is connected and communicates seamlessly with the other (CPS), artificial intelligence (AI) can be implemented, allowing for smarter decision-making.

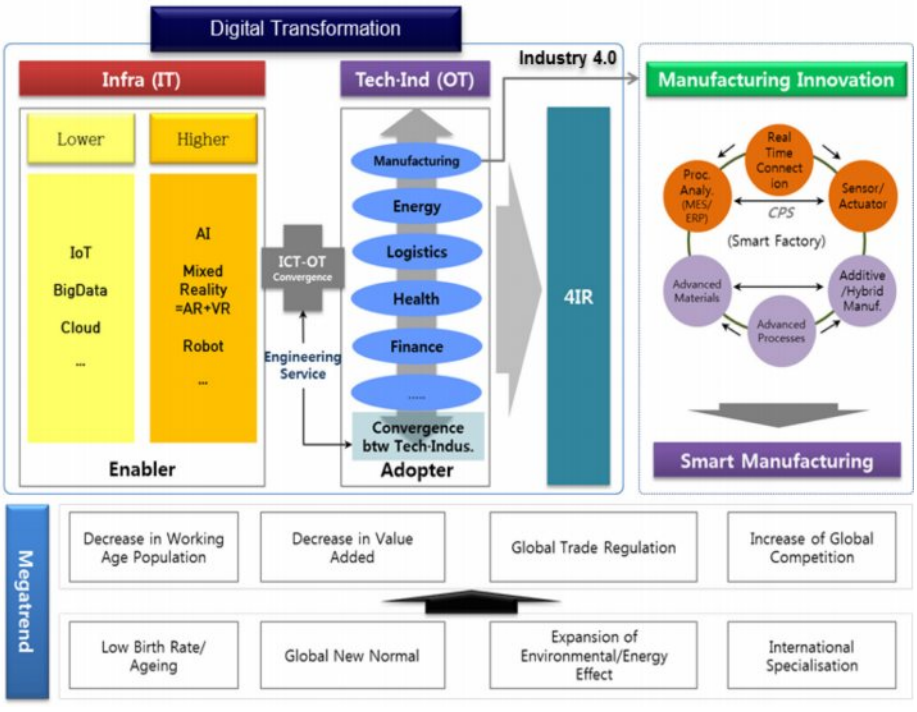
Figure 2.1 Typical example of a general process leading to 4IR



Source: Sanghoon Kim (2017b)

It is well known that the term '4th Industrial Revolution' was popularized by WEF[5] in 2016. We also know that Germany began using the term Industry 4.0 (Industrie 4.0: I4.0) in 2011. Today, these terms are used interchangeably. However, I4.0 initially referred to the digital transformation of Germany's manufacturing industry which was aimed at maintaining the country's global competitiveness. 4IR can therefore be defined as an overall digital transformation based on hyper-connected entities in a physio-biological space, leading to a completely new production-consumption paradigm, accelerated by converging existing operational technologies (OT: Adopter) with emerging information technologies (IT: Enabler) in most industries.

Figure 2.2 Global megatrend and 4IR triggered by digital transformation



Source: Sanghoon Kim (2017b)

[5] Schwab, Klaus (January 11, 2016). The Fourth Industrial Revolution. World Economic Forum. ISBN 1944835008.

I4.0 is essentially another term for 4IR, but refers more explicitly to manufacturing industries which require a substantial transformation due to ongoing megatrends. The ultimate goal of I4.0 is manufacturing innovation, which can be achieved by making manufacturing processes smarter through 'smart manufacturing'.

The concepts behind a number of 4IR buzzwords and terminologies such as Industry 4.0, manufacturing innovation, smart manufacturing and smart factories, which are all frequently (and flexibly) used in the literature, are in fact related; this relationship is depicted in Figure 2.2.

2.2. 4IR in different countries

Although governments might take any number of approaches to deal with the challenges of 4IR, they can be classified into four broad strategies outlined in Table 2.2. All cases will require a transition and will entail chronic unemployment, leading to an accompanying drop in tax revenues, thus further constraining the ability of governments to mitigate problems in worst-case scenarios. This fact partly justifies countries determining their own strategies instead of simply following others.

Table 2.2 4IR scenarios for governments

Strategy	Countries	Characteristics	Risks
Managing the market	Most of EU (incl. Germany) USA Some ASEAN	Articulate a "Digital Single Market" strategy and set a framework of rules within which technological change takes place while ensuring stability and fairness for all	Inability to control the exponential firms at the leading edge of technology or elements resistant to change, making inward investment increasingly unattractive, leading to chronic economic decline
Taking control	China Partly Germany Partly the Republic of Korea	Take ownership of new technologies and use them for national advantage, whether for economic and domestic political purposes or for more assertive ends	Freer countries are able to achieve faster progress and can quickly develop new business and social models, while less free countries will continue to play catch-up
Open for Business	Singapore Most of ASEAN Some EU countries Partly the Republic of Korea Ireland UK Japan Australia	Governments, particularly (but not only) smaller ones may not be able to control 4IR, but can choose to surf the wave instead by doing all they can to attract inward investment through attractive tax regimes, light-touch regulations, investment in infrastructure (such as 5G) and openness to trade with other parts of the world	Requires refined and well-prepared strategies
Hands-Off	None		

Source: Sanghoon Kim (2017a) based on http://www.gereports.com/fourth-industrial-revolution-challenges-government/

In addition to Germany and the United States, China and Japan's responses to 4IR have attracted much attention given that they are two of the largest economies. Table 2.3 presents a detailed comparison of these four countries and of Singapore and Australia, two other countries that have proven competitiveness in 4IR.

As already mentioned in the previous section, Germany's response to 4IR is more focused on SMEs in the manufacturing sector. This response includes numerous stakeholders and is coordinated by a government-industry network. In the United States, it is primarily the private sector that drives progress; the United States government has not undertaken efforts like in Germany to boost SMEs' 4IR competitiveness. In China, the government appears to have taken the lead in 4IR, with the private sector closely following in its footsteps. Initially, the government's efforts seemed to be focused on the manufacturing sector to improve product quality, but has since expanded its focus to include IT and OT in various industries. Japan's strategy is similar to Germany's approach in many ways, although a number of differences are evident. Japan seems to be focusing its efforts on individual goods at the product level rather than the industry level. Japan's 4IR strategy is furthermore inextricably tied to the concepts of "monozukuri" and "hitozukuri." The former refers to the art of making things with excellence, while the latter refers to the need to educate and train an individual to become an expert who is capable of "monozukuri." In this context, robots play a special role in Japan's 4IR strategy in relation to 'hitozukuri', namely an extension to "jobs for all, including the old".

Many researchers have recently taken note of Singapore and Australia's active pursuit of 4IR strategies. Singapore's leaders are fully exploiting the fact that the city-state is a hub for global trade and logistics, that it has a well-educated population, and uses its standing to attract global enterprises that require human resources with a high level of skills. Singapore's aim is to thereby transform its industrial structure. For example, 3D printing and smart factory systems have been actively explored by the government, which in turn can transform older assembly lines into manufacturing lines for aircraft maintenance, repair and overhaul (MRO) facilities. The Singaporean government also sees great potential in "Fintech" or financial technology, as many financial institutes are located in the region. The government is generally pursuing a strategy that emphasizes high value-added production and increased employment for well-educated individuals rather than equal welfare.

The Australian government became aware of the significance of 4IR relatively later than most countries. As a latecomer, it has tried to maximize the absorption of 4IR concepts in a short time, while remaining cautious of implementing 4IR principles in the real world. Leaders are cautious about applying 4IR principles to all industrial sectors prior to making a significant and demonstrable impact on a small number of strategic ones. The industries identified by the Australian government in the Industry Growth Centres Initiative (Department of Industry, Innovation and Science) represent a starting point for Australia's transition to smart, high-value and export-focused industries. The government aims to increase the capability of the industrial sector, boost productivity and skills, create jobs, reduce regulations and pursue international opportunities.

Australia's initiatives in 4IR were developed by the Prime Minister's Industry 4.0 taskforce, led by the chairman and CEO of Siemens Australia, established in April 2016 to support Australia's transition to a new economy and to connect the nation to 4IR. The creation of the taskforce is a direct outcome of the recommendations of the Australia-Germany Advisory Group, established in November 2014 to build closer ties between Australia and Germany and identify opportunities for increased trade and investment. Building on this close relationship between the two countries, the Australian Prime Minister's Industry 4.0 Taskforce and its German counterpart, the aforementioned Plattform Industrie 4.0, signed a cooperation agreement in April 2017 to advance the manufacturing sectors of both countries.

Table 2.3 4IR-related polices of selected countries

Type	Nation	Driver	Core Tech.*	Policy Direction	4IR Response
Big	Germany	PPP (promoting SME participation)	‹OT› smart factory & solution	• Project/hegemony seeking • Long term • Collaboration between human & machine - Maintaining competitiveness of German manufacturing - Building a factory that creates future factories around world	- **LE, SMEs, associations, strong linkage industry-academia-research inst., strong government engagement** - Plattform Industrie 4.0 - Proposing a comprehensive framework for manufacturing innovation through Industrie 4.0 - For successful innovation with service: Smart Service World 2025('15) - De jure standard - Examples : Audi AGV, etc
	USA	Private-driven gov. support (LE-based)	‹IT› Big data AI	• Positioning/hegemony seeking • Mid, long term • Lacking human viewpoint • Strategic utilization of existing facilities - Business model creation based on IT - Engineering design & new materials development	- **LE-based, IT-based, no strong linkage industry-academia-research inst.** - IIC (Industrial Internet Consortium) - Focused on new areas such as industrial internet and AM, which promote manufacturing innovation rather than the existing manufacturing sector - Manufacturing promotion with AMP (Advanced Manufacturing Partnership), IMI (Institutes for Manufacturing Innovation) - De facto standard - GE Predix, etc
	Japan	PPP (industrial structure reorganization)	Industrial robot & related IT	• Solution for consumer welfare/ main industry • Mid, short term	- LE and special SMEs for parts & materials, **loose linkage industry-academia-research inst.** - IVI (Industry Value Chain Initiative)

Big	Japan			• 4IR for humans (hitozukuri) - Productivity improvement for existing processes - Microscale methodology for facilities/factories/processes - Finding new business based on Japan's competitive edge (robotics) - Join IIC and expanding BD/AI Investment	- More conservative than the United States and Germany (4IR is a tool to assist manufacturing industries) - Focus on robots, mechanics, control and instrumentation, which have been Japan's strengths - Announced 'New Industrial Structure Vision' (16) which includes IT-related policies, including BD, IoT for 4IR - Loose standard - Edge computing, hybrid manufacturing
	China	Gov-driven private sector activity (manufacturing focused on quality improvement)	Manufacturing OT & IT	• Complex balance-hegemony seeking • Transforming from a large manufacturing sector to a strong one - Gov. policies focus both on manufacturing & internet	- **Large domestic market, government-driven new industry innovation strategies** - Made in China 2025 - Internet Plus
Strong	Singapore	Gov-driven private sector activities	AI 3DP	• Solution for consumer-welfare-new industry - High value-added manufacturing for/with a high level of human resources - Linked withstrategic industries	- Focused on aviation, electronics, chemical, biomedical, marine-plant, water industries - Singapore I4.0 provides strong industry-research-academic network programmes with various multinationals in Singapore for the promotion of designated technologies, especially for field application
	Australia	PPP	3DP	• Problem solving - Resurrection of manufacturing industries and technologies that were competitive in Australia	- Proactively absorbs 4IR capacity for food/beverages, medical, oil/gas, mining, AM industries - Private sector including enterprises, associations, has proposed meaningful responses to 4IR; the government's response was Industry 4.0 TF under the Prime Minister in April 2016, which is closely related to the National Innovation Plan

Source: Sanghoon Kim (2018a, 2018b, 2017a, 2017b)

2.3. Challenges

Any response to 4IR should be optimized only after careful consideration of the country's current status. There are numerous examples of differences between countries. The popular 4IR readiness ranking presented in Table 2.4 is a good example of these differences. The factors affecting a country's rank may differ considerably, even for countries with a similar rank.

Table 2.4 4IR readiness of various countries

	Labour structures flexible?	Skill level high?	Education allows adaptive skills?	Infrastructure suitable?	Legal protections?	Overall impact
GCR Pillar	7th	5th	12th	9th and 2nd	1.01, 1.02 & 1.17	
Switzerland	1	4	1	4,0	6,75	3,4
Singapore	2	1	9	3,5	9,00	4,9
Netherlands	17	3	8	6,5	12,50	9,4
Finland	26	2	2	19,0	1,25	10,1
United States	4	6	4	14,0	23,00	10,2
United Kingdom	5	18	12	6,0	10,00	10,2
Hong Kong	3	13	27	4,5	10,00	11,5
Norway	9	7	13	19,0	11,50	11,9
Denmark	10	9	10	15,5	17,75	12,5
New Zealand	6	10	24	21,5	6,25	13,6
Sweden	20	12	7	12,0	19,75	14,2
Japan	21	21	5	12,0	18,00	15,4
Germany	28	17	6	9,5	18,75	15,9
Ireland	13	15	21	19,0	11,50	15,9
Canada	7	19	22	16,0	20,50	16,9
Taiwan	22	14	11	20,0	31,25	19,7
Australia	36	8	23	18,5	17,75	20,7
Austria	40	16	17	19,5	17,25	22,0
Belgium	54	5	16	17,5	21,50	22,8
France	51	25	18	12,0	31,00	27,4
Israel	45	28	3	26,0	38,50	28,1
Malaysia	19	36	20	35,5	34,50	29,0
Portugal	66	26	28	24,5	32,25	35,4
Czech Republic	47	29	35	35,0	44,75	38,2
Republic of Korea	83	23	19	20,0	62,25	41,5
Chile	63	33	50	42,0	39,25	45,5
Spain	92	30	37	17,5	61,25	47,6
China	37	68	31	56,5	64,25	51,4
Kazakhstan	18	60	72	59,5	68,25	55,6
Poland	81	31	64	48,5	58,00	56,5
Russia	50	38	68	47,5	114,00	63,5
Thailand	67	56	57	51,0	88,00	63,8
Italy	126	45	32	31,5	87,75	64,5
Hungary	77	57	51	48,0	90,25	64,7
South Africa	107	83	38	59,0	42,75	66,0
Greece	116	43	77	35,0	67,00	67,6
Philippines	82	63	48	79,0	78,00	70,0
Indonesia	115	65	360	73,5	70,25	70,8
Turkey	127	55	60	58,5	77,75	75,7
Colombia	86	70	76	77,0	102,75	82,4
India	103	90	42	100,5	81,50	83,4
Mexico	114	86	59	66,0	100,00	85,0
Viet Nam	63	83	73	85,5	91,00	
Brazil	122	93	84	64,0	97,75	92,2
Peru	64	82	116	88,5	113,25	92,8
Argentina	139	39	93	78,0	125,75	95,0

*Relative rankings from WEF Global Competitiveness Report, using 4IR categories

Source: UBS (2016)

This also applies to ASEAN countries – Viet Nam is less ready in terms of legal protection, while Indonesia has weaknesses in education for innovation. The structure of the labour market and legal issues seem to pose challenges for the Republic of Korea.

The manufacturing industry plays an important role for ASEAN countries, as it is expected to grow at a much faster rate than in other countries (Table 2.5). This may also imply that ASEAN countries need to be more vigilant with regard to smart factory issues within relatively shorter periods.

Table 2.5 Global Manufaturing Competitiveness Index

2016 (Current)				2020 (Projected)			
Rank	Country	Index score (100 – High) (10– Low)		Rank	2016 vs 2020	Country	Index score (100 – High) (10– Low)
1	China	100.0		1	(▲+1)	United States	100.0
2	United States	99.5		2	(▼-1)	China	93.5
3	Germany	93.9		3	(—)	Germany	90.8
4	Japan	80.4		4	(—)	Japan	78.0
5	Republic of Korea	76.7		5	(▲+6)	India	77.5
6	United Kingdom	75.8		6	(▼-1)	Republic of Korea	77.0
7	Taiwan	72.9		7	(▲+1)	Mexico	75.9
8	Mexico	69.5		8	(▼-2)	United Kingdom	73.8
9	Canada	68.7		9	(▼-2)	Taiwan	72.1
10	Singapore	68.4		10	(▼-1)	Canada	68.1
11	India	67.2		11	(▼-1)	Singapore	67.6
12	Switzerland	63.6		12	(▲+6)	Viet Nam	65.5
13	Sweden	62.1		13	(▲+4)	Malaysia	62.1
14	Thailand	60.4		14	(—)	Thailand	62.0
15	Poland	59.1		15	(▲+4)	Indonesia	61.9
16	Turkey	59.0		16	(▼-1)	Poland	61.9
17	Malaysia	59.0		17	(▼-1)	Turkey	60.8
18	Viet Nam	56.5		18	(▼-5)	Sweden	59.7
19	Indonesia	55.8		19	(▼-7)	Switzerland	59.1
20	Netherlands	55.7		20	(▲+3)	Chech Republic	57.4
21	Australia	55.5		21	(▼-1)	Netherlands	56.5
22	France	55.5		22	(▼-1)	Australia	53.4
23	Chech Republic	55.3		23	(▲+6)	Brazil	52.9
24	Finland	52.5		24	(—)	Finland	49.7
25	Spain	50.6		25	(▲+2)	South Africa	49.3

Source: House of Commons, UK (2016)

Building a smart factory is not an easy task in many established factories, since various conflicts of interest exist between stakeholders and those promoting transformation. Many workers in advanced countries are susceptible to any changes and reluctant to learn new processes that affect their daily routine. In this respect, ASEAN countries are told to have more adoptability for the 4IR. Table 2.6 outlines several challenges to be kept in mind for building a smart factory from scratch or transitioning from an existing facility.

Table 2.6 Continuous challenges for the manufacturing sector

Challenges in Production Line	Challenges in Execution Line
• Full observability over the entire manufacturing process • Failure spotting & solution • Preventive warning • Enhancing both life time and product quality • Intelligent automation (Automatization)	• Qualitative expansion • Improving both quality and productivity • Cost minimization for facilities • Optimal coordination between factories (domestic and abroad) • Digitalization of production and operation management • Lack of experts

Source: Sanghoon Kim (2018b)

The purpose of pursuing 4IR is not only to increase efficiency. 4IR is important not only for growth but also for equality. On the one hand, automation can increase opportunities for creative social entrepreneurship by transferring human capital from low-skilled work to more creative work. On the other hand, big data does not only identify problems, it can also provide solution processes and evaluation processes, especially for undeveloped societies.

In this respect, international and regional cooperation requires novel approaches that differ from traditional ones. Reshoring is one example of this. Many discussions seem to conclude that traditional global value chains (GVCs) based on traditional international cooperation have become weaker; reshoring will thus be a consequence of 4IR. This is logical if we consider the cost of labour and tangible assets as the only factors determining offshoring. Yet the effectiveness/efficiency of logistics, skilled human resources, consumer demand/adoptability and many other determining factors in addition to wage levels and land costs play a role as well. In addition, social conditions, such as openness and/or readiness for smart manufacturing and related training conditions are also key factors in offshoring.

Reshoring will not be as simple as generally anticipated due to the complex nature of the GVC structure. It is more likely that GVC patterns will further diversify as a result of 4IR, rather than to expect that future transformations will give rise to a shift from offshoring to reshoring. Table 2.7 presents examples of some determinants of GVCs and resulting reshoring strategies. Conventional offshoring strategies were based on labour costs and logistical efficiency. However, 4IR will intensify the significance of certain factors as determinants in formulating new offshoring strategies. These factors include absorption potential and readiness for 4IR (social openness, human resource levels, market characteristics, etc.), which developing countries are said to be more competitive in in many instances.

Table 2.7 Examples of determining factors for reshoring						
			Conventional		With 4IR	
			Past	Present	Fail	Success
Factors	Wage and Land Cost	Incumbent Factors	o	o	o	o
	Efficiency in Logistics		∆	o	o	o
	Level of HR	Emerging Factors	x	x	x	o
	Demand Characteristics		x	∆	o	o
	...		-	-	-	-
	Production Response		Offshoring	Offshoring	Reshoring	Reshoring +Offshoring

Source: Sanghoon Kim (2018b

As mentioned in previous sections, 4IR seems to represent a business strategy for firms or governments that believe they are facing a crisis rather than viewing it as a spontaneous trend caused by ICT advancements. 4IR policies should differ by industry and technology, as well as by country and culture. For these reasons, a more deliberate approach is necessary when implementing 4IR strategies rather than simply following other countries' strategies. Moreover, there is plenty of evidence that 4IR innovation trajectories exhibit both continuous (systematic) and disruptive characteristics, as the realization of 4IR may take a substantial amount of time.

The evolution of smart manufacturing can be grouped into several phases. The first phase is plant- and enterprise-wide integration, for which sensors and actuators are installed and connected for each process. Efficiency, safety and the environment are improved during this phase, which does not significantly differ from factory automation. The second phase is successful if complete processes are interconnected and generate process simulations, leading to manufacturing intelligence and enabling so-called "factories of the future". This manufacturing intelligence may evolve into manufacturing knowledge, triggering innovation and market disruption where consumers' immediate demands can be met. This market disruption is the final and third phase of 4IR in the manufacturing sector

Many experts tend to only emphasize the last phase, although intermediate levels must clearly be achieved before the final goal is reached. Many SMEs have not even completed the first phase yet. However, they are frequently urged to pursue the final phase and are at risk of obsolescence if they do not, which in turn generates a lot of confusion.

In short, 4IR can be defined as a process of profound transformation in the way we think, learn, conceive, produce, distribute and use products and services, powered by the development and availability of a new generation of digital technologies at increasingly competitive prices. This also means that the widespread digitization of the economy is not limited to the technology dimension. It is, therefore, crucial to prepare for the impending changes caused by several factors including (1) the speed, scale and unpredictability of production; (2) greater fragmentation and reorientation of value chains; (3) new relationships between knowledge centres, particularly between research institutes, higher

education institutions and businesses; (4) new business models and new links between large companies and SMEs; (5) new forms of cooperation between all levels of business activity (human resources, design, production, sales, logistics, maintenance, marketing, communication); (6) the need to renew the portfolio of qualifications and skills in the face of impending changes, and finally (7) the closer relationship between companies and consumers.

This paper proposes recommendations for all countries with a strong manufacturing potential, including Viet Nam. Pursuing 4IR more effectively in the manufacturing sector, that is, smart manufacturing, becomes conceivable when undertaking the following efforts:

(1) Establishing long-term R&D plans, especially for OTs, to avoid technology dependency (or subordination) on developed countries (OT dependency will lock in IT dependency as well).

(2) Advancing existing technologies (or industries) is crucial for facilitating effective IT-OT integration.

(3) Acknowledging that engineering service is a key factor in converging IT with OT. It is a critical step in the successful implementation of smart manufacturing. This is strongly related to technology dependency problems as well.

(4) Typical manufacturing problems always play an important role. Unreliable interoperability among and between machines and software may hamper transformation into smart factories.

(5) Efforts to create new markets need to accompany technological advancements. Exploration of new markets and business models are essential, regardless whether or not they promote[6] or are promoted by[7] smart manufacturing.

(6) A strategic approach for future human resources development is necessary. The ASEAN countries are believed to have a strong potential in terms of absorption and adoptability.

(7) Strategic positioning for global cooperation is becoming more important than ever. Each country should develop a reference model optimized for its economy and determine global horizontal and vertical specializations. For example, a balance between mass production and customized production is important for some countries (especially high-wage countries) while economies of scale are important for others from the supply perspective. Planning orientation based on a highly focused strategy is more crucial for some countries, while value orientation is more important for others.

[6] For example, sensors, 3dp, production design, production technology, IT, etc.
[7] For example, client-oriented flexible manufacturing systems, factory-less manufacturing, etc.

Chapter 3. Overall performance of industry in Viet Nam

3.1. Viet Nam's position in global competitiveness rankings

Competitive Industrial Performance (CIP) Index

UNIDO's Competitive Industrial Performance (CIP) Index tracks the relative overall progress of a country's manufacturing sector in the global context and confirms Viet Nam's tremendous achievements. The country climbed 27 positions, from 69th to 42nd in the global ranking, by far the biggest leap among ASEAN countries in the period 2006-2016. The gap between the top five countries in the region (Singapore, Malaysia, Thailand, Indonesia and the Philippines) has now narrowed significantly, and the Resolution No. 23-NQ/ TW's goal for Viet Nam to belong to the top 3 ASEAN competitors by 2030 is no longer a chimera but a real prospect that is within reach if current trends are maintained.

Table 3.1 Industrial competitiveness ranking of Viet Nam and comparator countries

	Asean members					Other comparing countries				
		CIP Ranking			Change 2006-2016		CIP Ranking			Change 2006-2016
		2006	2011	2016			2006	2011	2016	
1	Singapore	17	7	12	5	Japan	2	2	2	0
2	Malaysia	22	22	22	0	China	15	6	3	12
3	Thailand	25	25	25	0	Rep. Korea	6	4	5	1
4	Indonesia	39	38	38	1	Taiwan	11	12	13	-2
5	Philippines	44	56	44	1	Russia	35	33	33	3
6	Viet Nam	69	62	42	27	Brazil	30	31	36	-5
7	Brunei	85	82	83	2	India	53	41	39	14
8	Cambodia	100	94	88	12	Viet Nam	69	62	42	27
9	Myanmar	107	101	90	16	South Africa	42	43	45	-3
10	Lao PDR	119	121	103	19					

Source: CIP 2019, UNIDO INDSTAT

Even if we briefly skim each of the eight CIP indicators over the past 10 years, divided into production and export performance, we immediately notice the pivotal role export has played in helping Viet Nam take a leap in the industrial competitiveness ranking. Viet Nam's export per capita (MXpc) in particular increased six-fold, from USD 261.7 in 2006 to USD 758.5 in 2011 and to USD 1,603.2 in 2016. Even the exports quality index (MX-qual), which tracks the share of medium- and high-tech (MHT) manufactured exports over total manufacturing trade, increased from 0.42 in 2006 to 0.55 in 2011 and 0.71 in

2016, which has also contributed to positive structural change in the export basket. This has increased the global weight of Viet Nam's total value of manufactured exports, i.e. the country's impact on World Manufacturing Trade (ImWMT) has risen from 0.25 per cent in 2006 to 0.53 per cent in 2011 and 1.29 per cent in 2016. This remarkable achievement masks some fragility, however, and has not been accompanied by the same progress in manufacturing production capacity.

Table 3.2 Disaggregated CIP Index for Viet Nam and ASEAN comparators

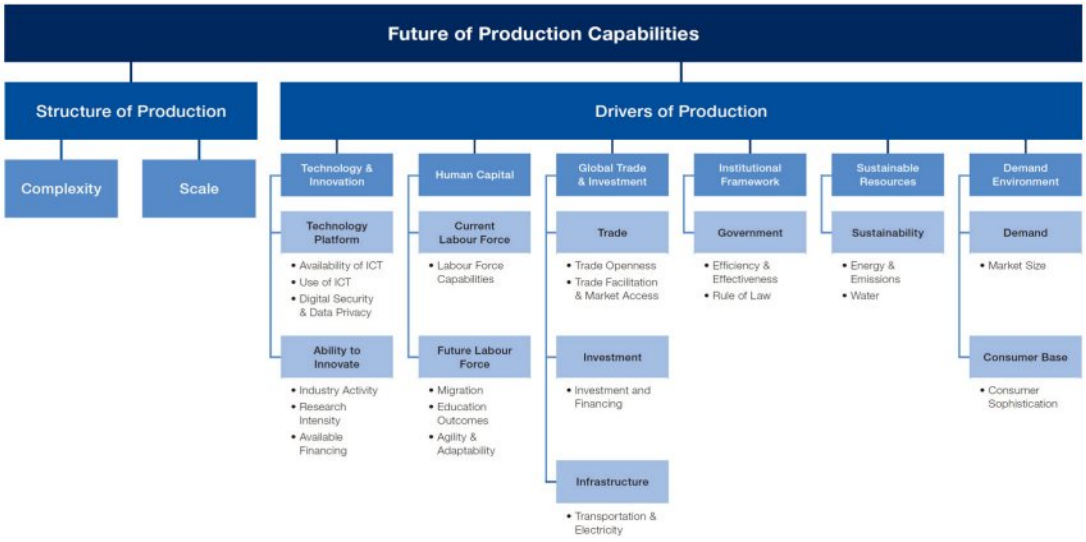
	CIP Ranking (2016)	Indicators					
		MVApc ($)	MXpc ($)	INDint	MXqual	ImWMVA (%)	ImWMT (%)
Singapore	12	9,414.9	2,6028.8	0.76	0.84	0.42%	1.24%
Malaysia	22	2,548.8	5,240.2	0.61	0.77	0.63%	1.39%
Thailand	25	1,640.9	2,706.9	0.65	0.78	0.90%	1.59%
Indonesia	38	850.2	392.9	0.53	0.52	1.80%	0.87%
Philippines	44	617.3	506.6	0.59	0.88	0.51%	0.45%
Viet Nam	42	281.4	1,603.2	0.48	0.71	0.21%	1.29%
Brunei	83	4,705.2	1,365.7	0.23	0.51	0.02%	0.00%
Cambodia	88	177.2	592.4	0.24	0.53	0.02%	0.08%
Myanmar	90	269.2	88.9	0.38	0.31	0.11%	0.04%
Lao PDR	103	179.9	290.5	0.17	0.43	0.01%	0.02%

Source: CIP 2019, UNIDO INDSTAT

Readiness to produce in the future

UNIDO's CIP Index only provides a picture of countries' current manufacturing competitiveness without providing any indications about their future trajectory. To determine the readiness of countries' manufacturing industries in the face of the 4th Industrial Revolution, the World Economic Forum (WEF) projects the future potential of countries and has developed evaluation criteria based on two key factors, such as production structure and production drivers (Figure 3.1). The index of production structure, which denotes the current capacity of a country's manufacturing sector prior to 4IR, is calculated on the basis of the country's production scale and sophistication of production. The index of production drivers, which denotes a country's potential to adopt 4IR technologies, is calculated on the basis of the country's level of technology and innovation, human capital, investment and global trade, suitability of framework, sustainable resources and environmental demand. These factors are reviewed and evaluated based on information and data available from global databases, which can be used to benchmark and rank countries around the globe.

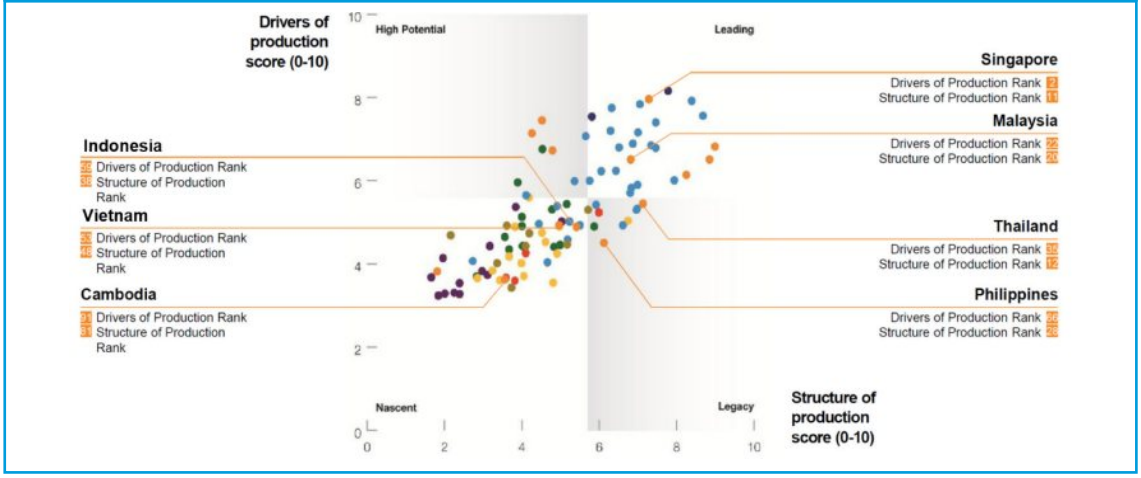
Figure 3.1 Criteria to assess readiness for production in the future



Source: WEF, 2018

The results of the evaluation reveal that Viet Nam is in the group of countries that have not yet established the appropriate conditions to jump on board the new industrial revolution. Viet Nam ranked 48th in production structure and 53rd in terms of production agents. Within the group of ASEAN countries, Cambodia, Indonesia and Viet Nam are "young" countries. Singapore and Malaysia are "leading" countries with higher average ratings. Thailand and the Philippines belong to the group of "inheritance" countries that have a highly ranked production structure, but their production agents are lower than average. The scores and rankings of ASEAN countries are presented in Figure 3.2 below.

Figure 3.2 Readiness of ASEAN countries for 4IR

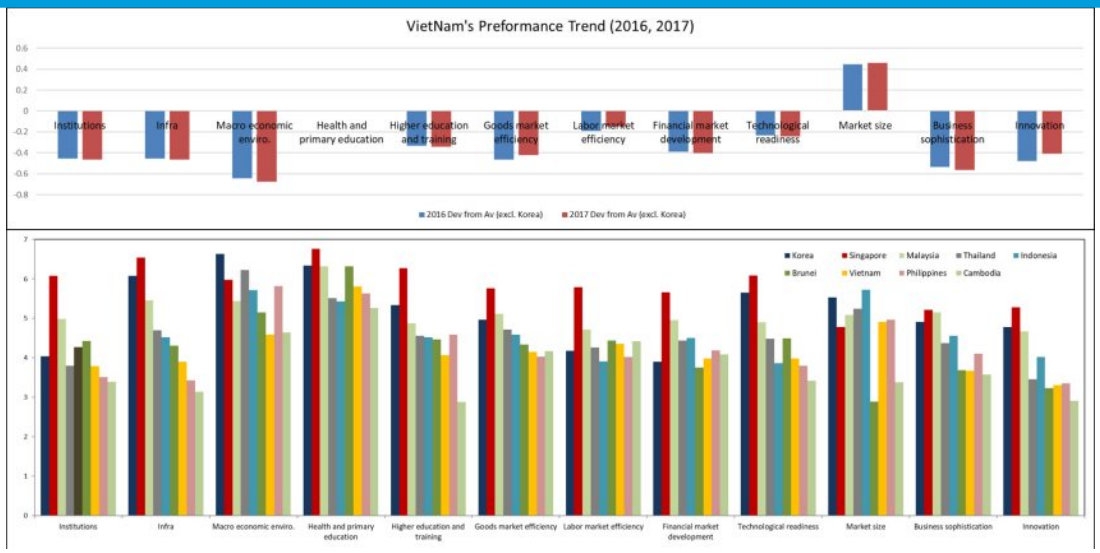


Source: WEF, 2018

Considering each index component, Figure 3.3 compares Viet Nam with the average ASEAN countries and reveals that Viet Nam only has a competitive advantage in terms of market size; the other indicators are lower than average for Viet Nam. The country's "macroeconomic environment" and "business perfection" are much lower than the regional average. There were no signs of improvement in 2017. The domestic market is the

only factor that creates a competitive advantage for Viet Nam, i.e. other indicators related to business environment and labour quality are below average. Viet Nam's scientific and technological level is less competitive than that of other countries in the region.

Figure 3.3 Viet Nam compared to ASEAN average



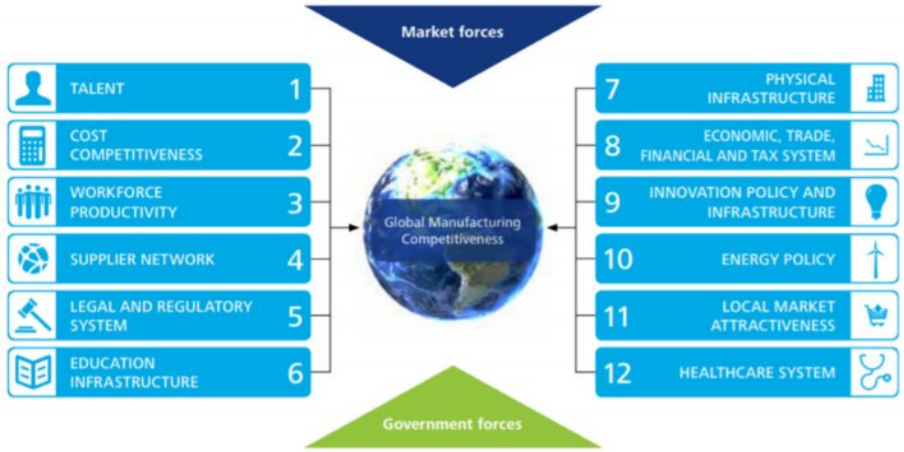
Source: WEF, 2018

Global production competition

Deloitte also conducts annual manufacturing surveys (including in Viet Nam) and collects statements from business owners in 40 countries on their perceived competitiveness at present and their projected competitiveness in the next five years. The survey collects feedback from selected enterprises on the significance of factors that contribute to production competitiveness at present and in the future on a scale from 1 to 10, with 1 being less important. Figure 3.4 shows 12 factors that affect production competitiveness and their ranking. The top 6 factors include talent, cost competitiveness, labour productivity, supplier network, the legal system and education infrastructure. The remaining six factors are physical infrastructure, the tax-finance-trade system, infrastructure and policies on innovation, energy policy, the attractiveness of the domestic market, and the health care system.

The results of Deloitte's 2018 Global Production Competitiveness Report show that Viet Nam's businesses ranked 18th in 2016 and is projected to climb six places to rank 12 by 2020. Compared to other ASEAN countries in 2016, Viet Nam was less competitive than Singapore, Thailand and Malaysia, but by 2020, Viet Nam is expected to surpass Malaysia and Thailand and to rank 2nd in the region after Singapore. This result indicates that Viet Nam's businesses are optimistic about Viet Nam's future production based on its status in 2016. If Viet Nam does not continue to improve its competitiveness, however, particularly with regard to the most important indicators, the projection for 2020 may not become a reality.

Figure 3.4 Factors affecting production competitiveness



Source: Deloitte, 2016

Table 3.3 Ranking of global production competitiveness

2016 (Current)				2020 (Projected)	
Rank	Country	Index score (100 = High) (10 = low)	Rank	2016 vs 2020	Country
1	China	100.0	1	(▲+1)	United States
2	United States	99.5	2	(▼-1)	China
3	Germany	93.9	3	(—)	Germany
4	Japan	80.4	4	(—)	Japan
5	Republic of Korea	76.7	5	(▲+6)	India
6	United Kingdom	75.8	6	(▼-1)	Republic of Korea
7	Taiwan	72.9	7	(▲+1)	Mexico
8	Mexico	69.5	8	(▼-2)	United Kingdom
9	Canada	68.7	9	(▼-2)	Taiwan
10	Singapore	68.4	10	(▼-1)	Canada
11	India	67.2	11	(▼-1)	Singapore
12	Switzerland	63.6	12	(▲+6)	Viet Nam
13	Sweden	62.1	13	(▲+4)	Malaysia
14	Thailand	60.4	14	(—)	Thailand
15	Poland	59.1	15	(▲+4)	Indonesia
16	Turkey	59.0	16	(▼-1)	Poland
17	Malaysia	59.0	17	(▼-1)	Turkey
18	Viet Nam	56.5	18	(▼-5)	Sweden
19	Indonesia	55.8	19	(▼-7)	Switzerland
20	Netherlands	55.7	20	(▲+3)	Chech Republic
21	Australia	55.5	21	(▼-1)	Netherlands
22	France	55.5	22	(▼-1)	Australia
23	Chech Republic	55.3	23	(▲+6)	Brazil
24	Finland	52.5	24	(—)	Finland
25	Spain	50.6	25	(▲+2)	South Africa
26	Belgium	48.3	26	(▼-4)	France
27	South Africa	48.1	27	(▼-2)	Spain
28	Italy	46.5	28	(▲+5)	Romania
29	Brazil	46.2	29	(▼-3)	Belgium
30	United Arab Emirates	45.4	30	(▼-2)	Italy
31	Ireland	44.7	31	(—)	Ireland
32	Russia	43.9	32	(—)	Russia
33	Romania	42.8	33	(▼-3)	United Arab Emirates
34	Saudi Arabia	39.2	34	(▲+2)	Colombia
35	Portugal	37.9	35	(—)	Portugal
36	Colombia	35.7	36	(▼-2)	Saudi Arabia
37	Egypt	29.2	37	(—)	Egypt
38	Nigeria	23.1	38	(—)	Nigeria
39	Argentina	22.9	39	(—)	Argentina
40	Greece	10.0	40	(—)	Greece

Source: Deloitte, 2016

The competitiveness report highlights a group of emerging countries referred to as the "Mighty Five", comprising five Asian Pacific economies, namely Malaysia, India, Thailand, Indonesia and Viet Nam (the countries' initials are MITI-V, pronounced "Mighty Five"). These countries are expected to rank among the 15 countries with the highest production competitiveness within the next five years and will replace China based on their advantages in terms of labour costs, production capacity, population structure, market size and economic growth.

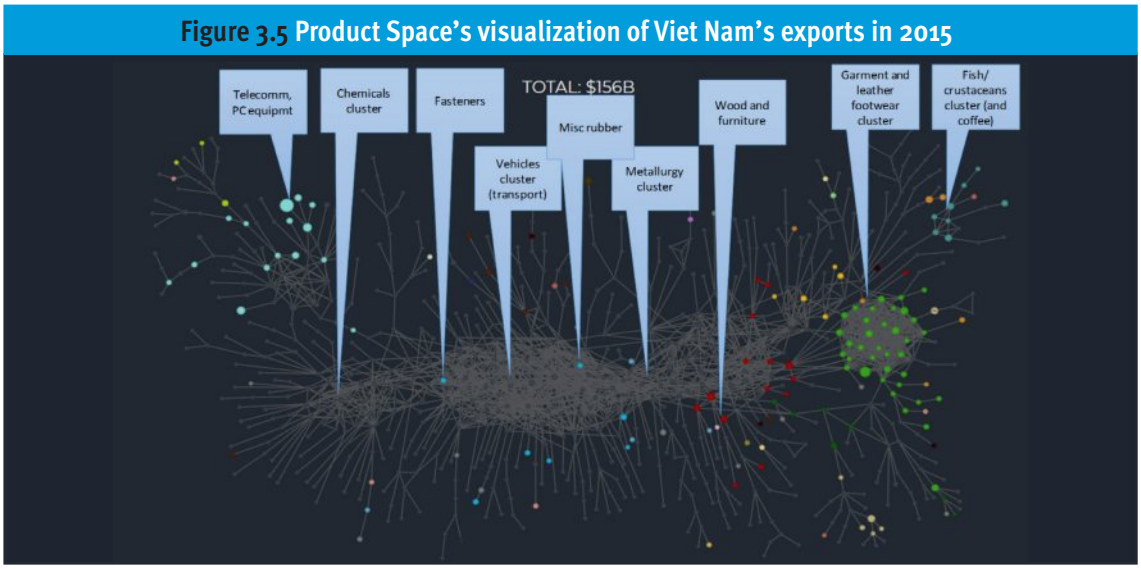
Product space scenarios

Another methodology that can be used to assess the future trajectory of Viet Nam's manufacturing trade is the Product Space[8]. The Product Space is a network that formalizes the concept of relatedness between products traded on the global market. One of the factors that enhances competitiveness and attracts foreign investment is the availability of supporting industries and the ability to link industries. The Product Space network has considerable implications for economic policy, as it helps elucidate why some countries experience steady economic growth while others remain stagnant and are unable to develop.

This is of particular relevance for Viet Nam's policymakers. PM Decision No. 879/QD-TTg attaches great importance to building horizontal and vertical links among industries (i.e. enhancing industrial density) by 2025, by focusing on the development of supporting industries, especially those producing mechanical, chemical, electronic and telecommunications goods to serve industrial production, and concurrently participate in the global production network.

CEC guidelines for formulating the national industrial development policy to 2030 acknowledge the importance of strengthening linkages across sectors of the economy and identify potentials for spill-over effects on other sectors of the economy as a key criterion for sector selection.

Figure 3.5 Product Space's visualization of Viet Nam's exports in 2015



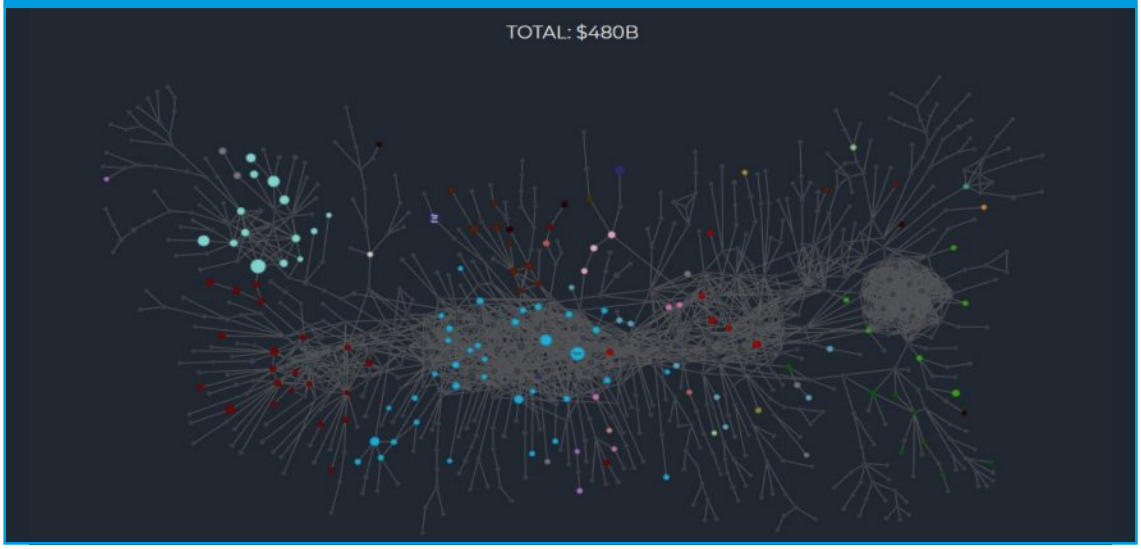
Source: Observatory of Economic Complexity

[8] It first appeared in the July 2007 issue of Science in the article "The Product Space Conditions the Development of Nations", by Cesar A. Hidalgo, Bailey Klinger, Ricardo Hausmann and Albert-László Barabási.

The coloured circles in Figure 3.5 represent exports that Viet Nam had a revealed comparative advantage in globally, i.e. products that Viet Nam was more specialized in than the world average. Industries Viet Nam has a global comparative edge in include textile/apparel, fish/crustaceans and telecommunications equipment, but the rising stars among the country's exports over the past ten years appear in isolated clusters with limited potential for linkages to central sectors, namely chemicals and metallurgy, and vehicles at the centre of the Product Space.

If we create the same Product Space visualization for a developed economy like the Republic of Korea, we find that the majority of coloured dots are larger and lie at the centre of the Product Space.

Figure 3.6 Product Space visualization of the Republic of Korea's exports in 2015



Source: Observatory of Economic Complexity

3.2. Benchmarking Viet Nam's manufacturing performance

Manufacturing production capacity and structural change

Manufacturing value added (MVA) per capita is an important indicator of a country's production capacity and overall competitiveness. Viet Nam's absolute MVA growth has been impressive. MVA at 2010 constant prices increased sharply from USD 15.15 billion in 2006 to USD 26.61 billion by 2016. It is also worth noting that Viet Nam's MVA growth experienced rapid acceleration in the period 2011-2016, almost four times higher than in 2006-2011.

Compared to other countries in the region, however, Viet Nam's absolute MVA remains low, and is less than half of the Philippines', about 1/3 of Malaysia's, 1/4 of Thailand's and 1/8 of Indonesia's. To narrow the gap and catch up with the other countries over the next 10 years, Viet Nam must maintain an average MVA growth rate of over 7 per cent annually.

Table 3.4 MVA and growth rates for Viet Nam and comparators (2006-2016)						
	MVA (constant 2010, bil. USD)			CAGR (%)		
	2006	2011	2016	2006-2011	2011-2016	2006-2016
Japan	1,179.48	1,155.14	1,288.07	-0.4%	2.2%	0.9%
India	192.62	288.39	419.03	8.4%	7.8%	8.1%
Rep. Korea	239.23	324.19	370.75	6.3%	2.7%	4.5%
Indonesia	143.27	176.83	221.87	4.3%	4.6%	4.5%
Thailand	89.65	100.87	114.34	2.4%	2.5%	2.5%
Malaysia	56.47	63.01	79.00	2.2%	4.6%	3.4%
Philippines	37.44	44.83	63.78	3.7%	7.3%	5.5%
Singapore	37.81	51.43	52.99	6.3%	0.6%	3.4%
Viet Nam	15.15	17.12	26.61	2.5%	9.2%	5.8%

Source: World Development Indicators

Comparing countries' MVA is more meaningful when it is adjusted to country size in terms of population. Viet Nam's per capita MVA (in 2010 constant prices) increased from USD 178 in 2006 to USD 281 in 2016.

Nonetheless, Viet Nam lags far behind most ASEAN comparators. Viet Nam's per capita MVA in 2016 was still about half of that of the Philippines, 1/3 of Indonesia's, nearly 1/6 of Thailand's and 1/9 of Malaysia's. Hence, if Viet Nam's per capita MVA continues to grow at the same rate as in the previous 10 years, it will take 15 years and 25 years, respectively, to reach the current level of the two countries closest to Viet Nam in the ranking, namely the Philippines and Indonesia. Even if Viet Nam's impressive growth rate during the most recent quinquennium, 2011-2016, continues, Viet Nam's catching-up would take 20 years against those two countries using their growth rates over the same period.

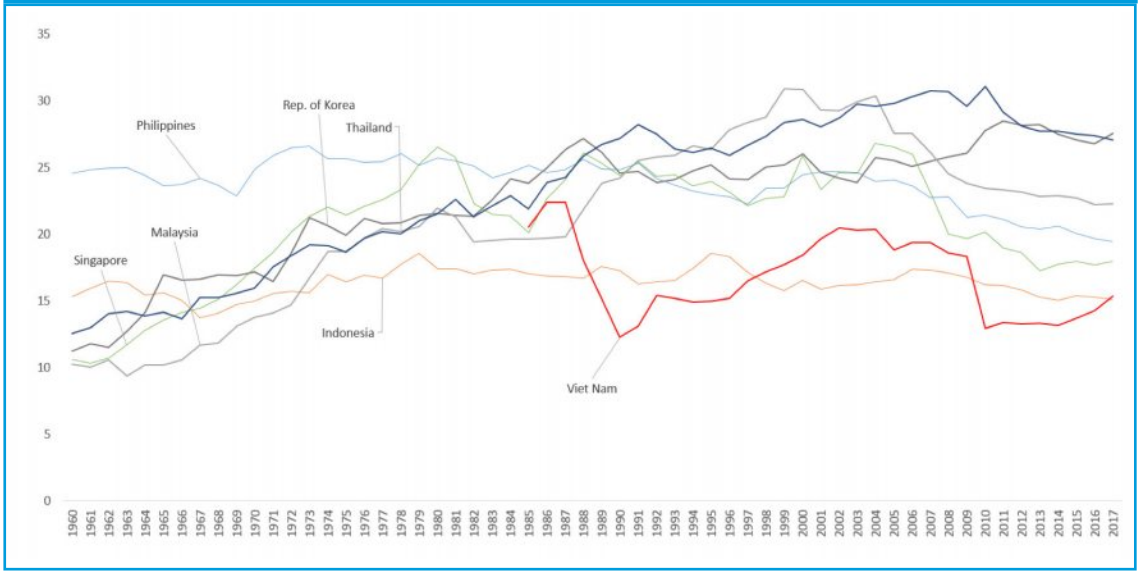
Table 3.5 MVA per capita and growth rates of Viet Nam and comparators (2006-2016)						
	MVA per capita (USD)			CAGR (%)		
	2006	2011	2016	2006-2011	2011-2016	2006-2016
Japan	9,225	9,036	10,143	-0.4%	2.3%	1.0%
Singapore	8,590	9,921	9,450	2.9%	-1.0%	1.0%
Rep. Korea	4,939	6,492	7,235	5.6%	2.2%	3.9%
Malaysia	2,160	2,200	2,533	0.4%	2.9%	1.6%
Thailand	1,362	1,494	1,660	1.9%	2.1%	2.0%
Indonesia	623	720	850	2.9%	3.4%	3.1%
Philippines	426	470	617	2.0%	5.6%	3.8 %
India	166	231	316	6.9%	6.5%	6.7%
Viet Nam	178	191	281	1.5%	8.0%	4.7%

Source: World Development Indicators

Despite the considerable progress achieved in the last decade, Viet Nam's structural change, measured by the evolving contribution of manufacturing to GDP, is still quite limited compared to that of other countries in the region.

The share of MVA in GDP of advanced industrialized countries usually ranges between 20 per cent and 30 per cent. Figure 3.7 shows that Viet Nam's MVA share in GDP has remained below 20 per cent since 1986, when Viet Nam implemented the "Doi Moi" policy. The figure presents the development of MVA share in GDP across comparators since 1960, when the Republic of Korea and other ASEAN countries began industrializing. With the exception of the Philippines, whose share of MVA in GDP started at a higher rate and has declined in recent years but remains over 20 per cent, the Republic of Korea and Thailand have maintained an MVA share in GDP of over 25 per cent, while Malaysia and Singapore's has dropped to 22 per cent and 17 per cent, respectively. Indonesia's MVA share in GDP has not changed over the past 50 years, and has remained stable at 15 per cent to 20 per cent.

Figure 3.7 Manufacturing value added (% of GDP)



Source: World Development Indicators

Manufactured exports and structural change

The rate of Viet Nam's manufactured exports over the past decade has been impressive, increasing from USD 23.68 billion in 2006 to USD 149.33 billion in 2016. Over nearly two decades, from 2000 to the present, Viet Nam's export growth of manufactured products has always reached double digits, much higher than other countries in the region.

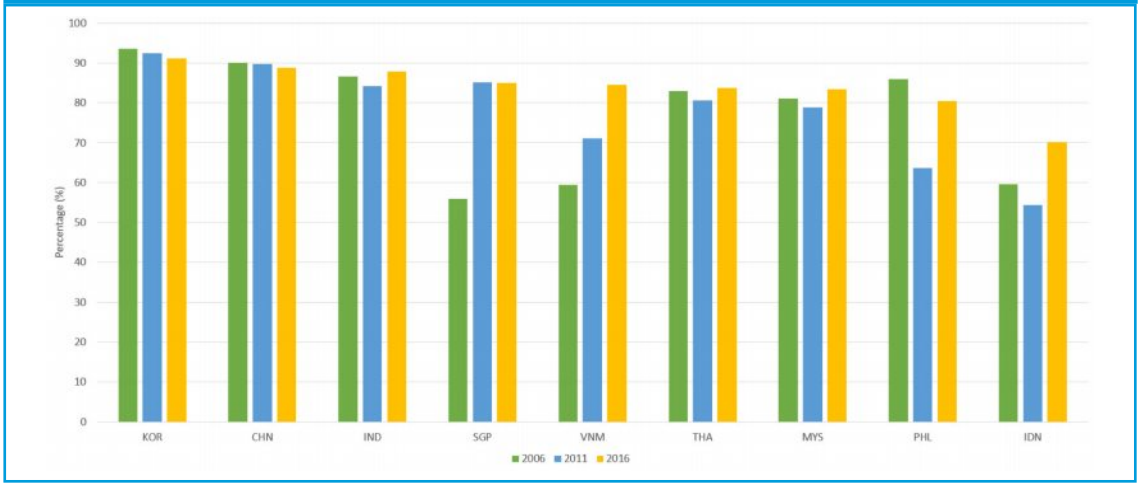
This achievement can easily be attributed to the government's proactive FDI policy and to the rapid integration with the world economy, owing also to the free trade agreements Viet Nam has signed and enforced with major trading partners in recent years.

Table 3.6 Manufactured exports of Viet Nam and comparators						
	Mnf. exports (bil. USD)			CAGR		
	2006	2011	2016	2006-2011	2011-2016	2006-2016
China	873.20	1,704.91	1,863.81	14%	2%	8%
Rep. Korea	304.57	513.17	451.78	11%	-3%	4%
Singapore	152.91	348.50	287.30	18%	-4%	7%
India	104.89	253.85	228.80	19%	-2%	8%
Thailand	108.33	184.36	178.74	11%	-1%	5%
Malaysia	130.29	178.82	157.86	7%	-2%	2%
Viet Nam	23.68	68.95	149.33	24%	17%	20%
Indonesia	60.06	110.69	101.29	13%	-2%	5%
Philippines	40.76	30.62	45.27	-6%	8%	1%

Source: UNCOMTRADE

Viet Nam's export structure has also improved markedly with the rapid increase of the share of exports of processed products in total exports. Figure 3.8 shows that Viet Nam was lagging behind the other countries of the region in 2006, with its share of manufactured exports being less than 60 per cent, but between 2011 and 2016, the share of manufactured exports over total exports increased to 71 per cent and 85 per cent, surpassing regional comparators such as Indonesia, the Philippines, Malaysia and Thailand.

Figure 3.8 Share of manufactured exports over total exports (excluding services)



Source: UNCOMTRADE

Adjusted according to population size, Viet Nam's performance in manufactured exports remains astounding. Between 2006 and 2016, Viet Nam's manufactured exports per capita rose at an average rate of 19 per cent annually, from USD 278 in 2006 to USD 1.579 in 2016, surpassing India, the Philippines, Indonesia and China, but lagging behind Thailand and Malaysia.

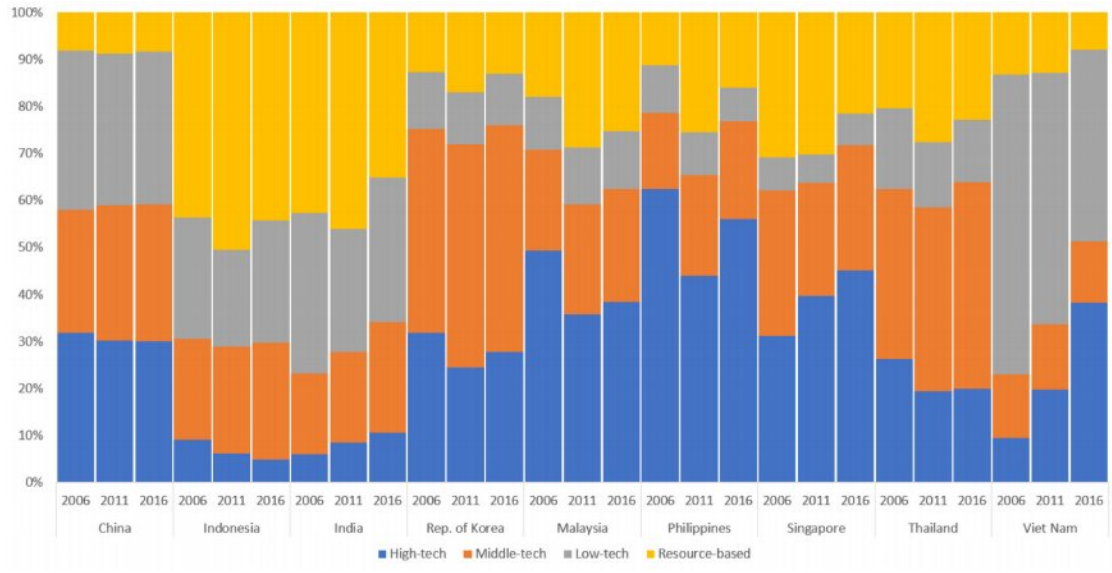
Table 3.7 Manufactured exports per capita of Viet Nam and comparators (2006-2016)

	Mnf export per capita (USD)			CAGR		
	2006	2011	2016	2006-2011	2011-2016	2006-2016
Singapore	34,742	67,231	51,238	14%	-5%	4%
Rep. Korea	6,288	10,277	8,816	10%	-3%	3%
Malaysia	4,984	6,245	5,062	5%	-4%	0%
Thailand	1,646	2,730	2,596	11%	-1%	5%
Viet Nam	278	771	1,579	23%	15%	19%
China	666	1,268	1,352	14%	1%	7%
Indonesia	456	1,033	876	18%	-3%	7%
Philippines	464	321	438	-7%	6%	-1%
India	52	89	76	11%	-3%	4%

Source: UNCOMTRADE

Export quality is reflected in the share of high- and medium-technology goods in total manufactured exports. Viet Nam's share of medium- and high-technology products has increased considerably since 2006. Viet Nam registered a lower share than most comparators in 2006, but by 2016, it had surpassed Indonesia and India and is on a good track to catch up with China.

Figure 3.9 Export structure by technology level – Viet Nam and comparators (2006-2016)



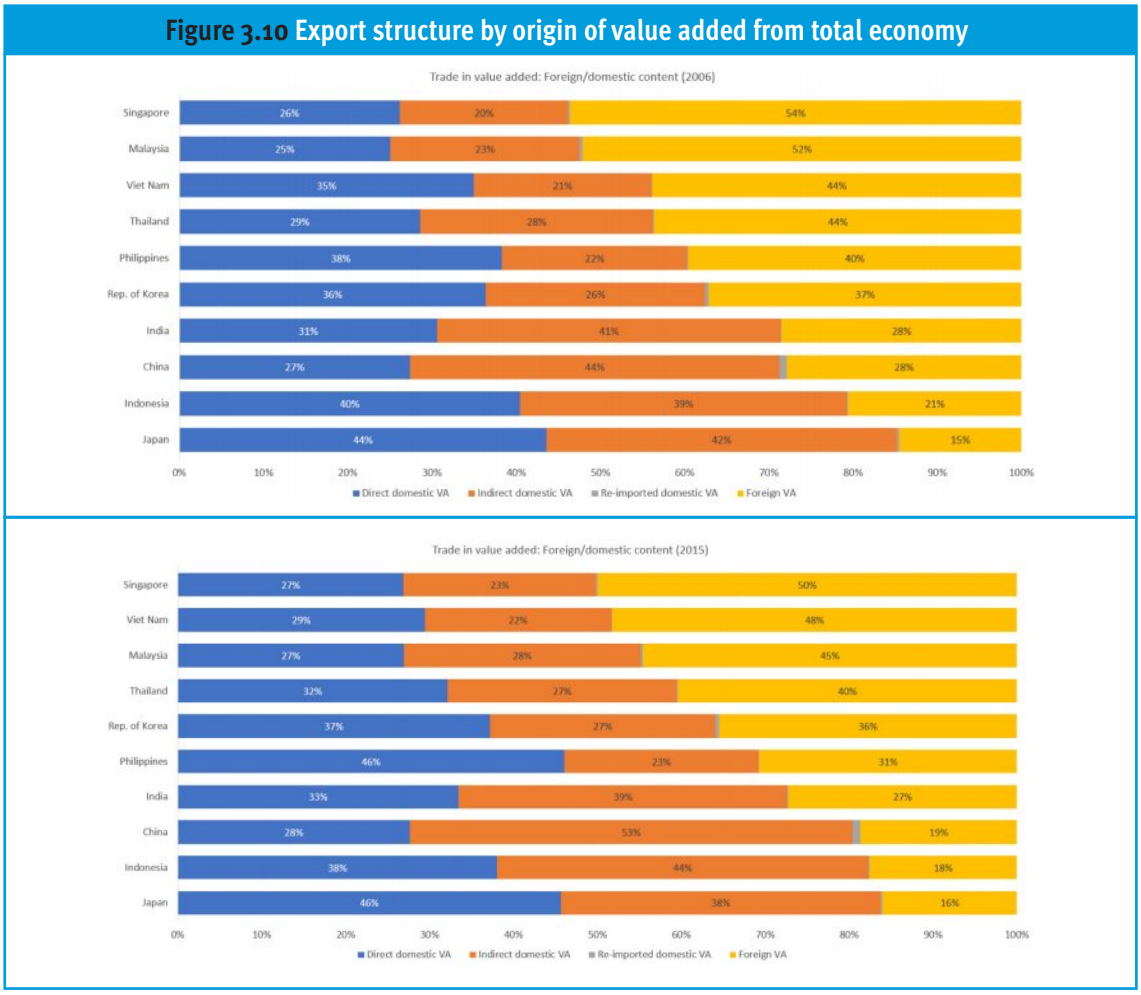
Source: UNCOMTRADE

Trade in value added

To better understand the impact of Viet Nam's impressive export performance on the domestic economy, an effective tool developed by the OECD can be used to assess trade in value added (TiVA), i.e. to what extent Vietnamese exports benefitted from value added created locally, instead of relying on value created elsewhere, mostly through the import of intermediate inputs or through the provision of services (e.g. R&D and marketing) provided by other countries. The fact that the country's MVA performance lagged far behind that of exports suggests that Viet Nam's manufacturing system has not kept pace with its trade performance, driven by FDI.

TiVA data confirm the above assumption that the value created locally and which feeds into exports is very low compared to other ASEAN countries. Figure 3.10 illustrates the value-added of total exports of Viet Nam and selected comparators for 2006 and 2015. During this period, despite an impressive export growth, the share of Viet Nam's domestic value added decreased from 56 per cent to 52 per cent. Viet Nam's exports are increasingly dependent on imports of intermediate inputs and/or raw materials. Comparators' dependence on inputs from foreign countries gradually decreased over the same period, and their domestic value added increased.

Figure 3.10 Export structure by origin of value added from total economy



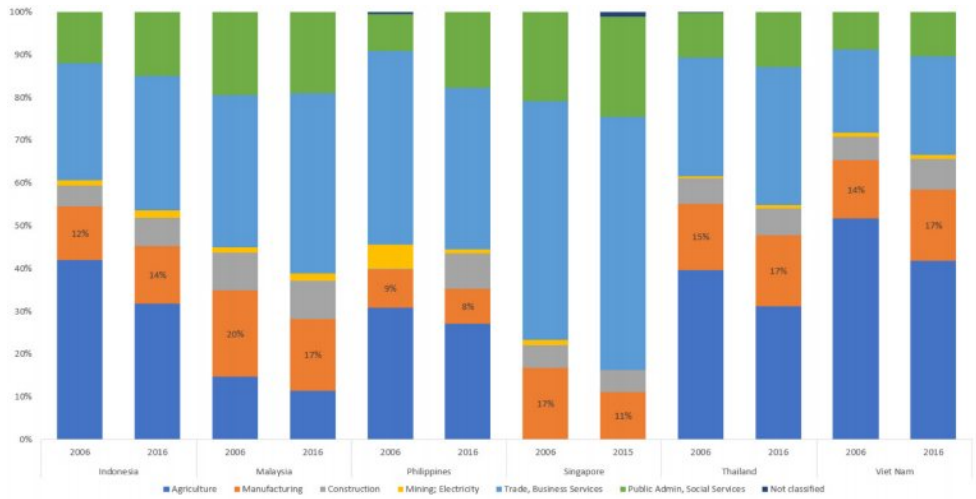
Source: OECD

This is probably the biggest challenge and policy recommendations should focus on addressing this problem, lest it could undermine the notable successes registered by Viet Nam's manufacturing sector and its crucial contribution to sustainable economic development.

In line with the findings of the Product Space analysis, the chemical and metallurgy industries, in particular, do not contribute to manufactured exports to the degree witnessed in advanced industrialized countries or even in the ASEAN comparators.

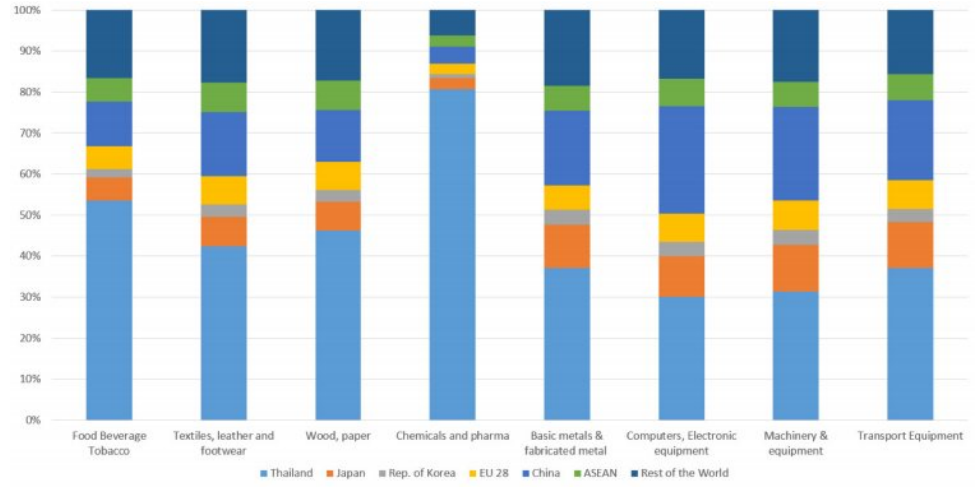
Figure 3.11 shows that the textile and leather industry is not sufficiently supported by the chemical industry, which, however, also affects the food and beverages industry and emerging industries such as electronics and machinery. Thailand shows that this problem is particularly acute in Viet Nam.

Figure 3.11 Export structure by origin of value added from chemicals – Viet Nam (2015)



Source: OECD

Figure 3.12 Export structure by origin of value added from chemicals – Thailand (2015)

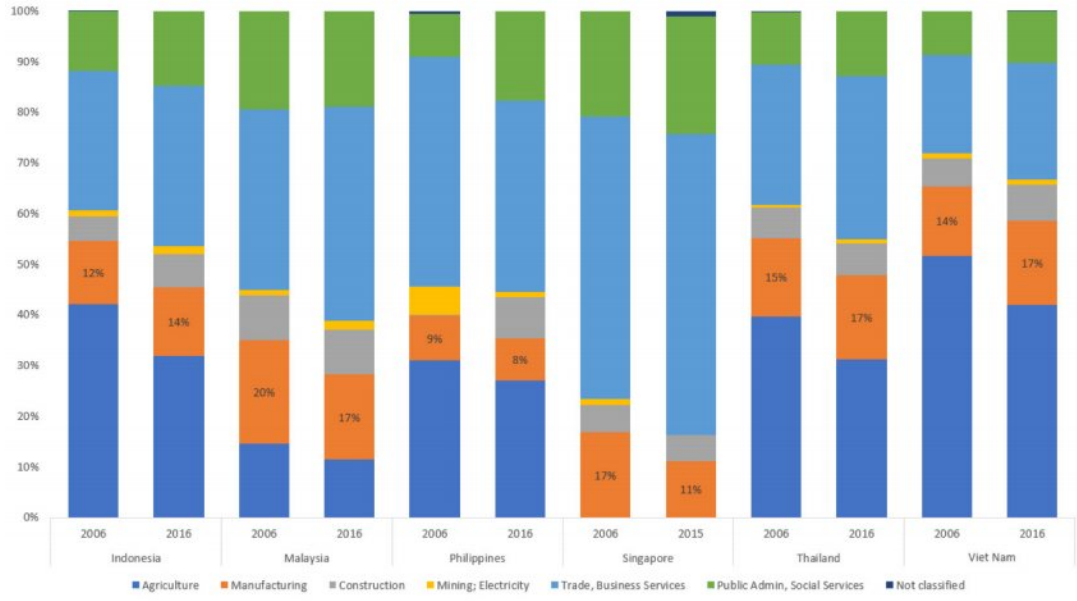


Source: OECD

Creating jobs and increasing labour productivity in manufacturing

In countries that are in the process of industrializing, manufacturing industry is expected to create an increasing number of new jobs to attract the agricultural sector's labour force as well as new workers joining the labour market. From 2006 to 2016, Viet Nam's manufacturing employment doubled from 3.2 million workers to 6.7 million. When considering the total number of employees in the country, the share of manufacturing employment increased by 3 percentage points only, from 14 per cent to 17 per cent, and only absorbed about 1/3 of workers from the agricultural sector. Moreover, the labour density of Viet Nam's agricultural sector is still quite high (42 per cent in 2016), meaning there is plenty of room for shifts in the labour force in the future, thus increasing the pressure to create more jobs in industry and services. Aside from the creation of new jobs, the quality of jobs is also an issue worthy of attention.

Figure 3.13 Employment by economic sector

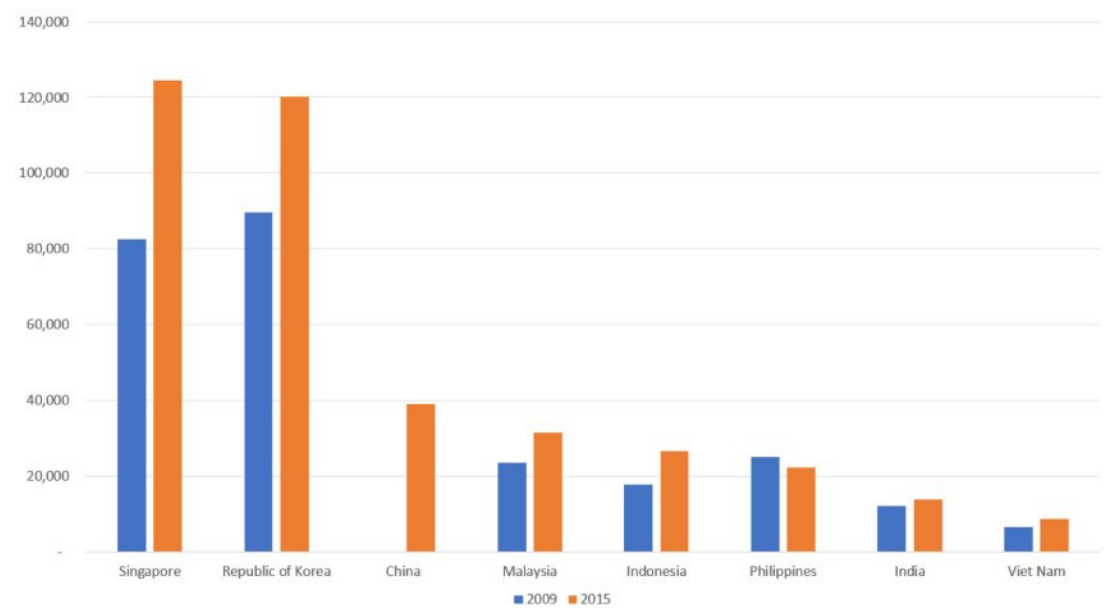


Source: World Development Indicators

Figure 3.14 presents the average productivity of the manufacturing sector, calculated as total MVA divided by the number of total employees in manufacturing. Viet Nam's manufacturing productivity lags far behind most comparators, except for India, Viet Nam's productivity being half of the Philippines', 1/3 of Malaysia and Indonesia's, 1/4 of China's and 1/14 of Singapore and the Republic of Korea's.

Together with the problem of low value added in trade, this is another alarming indicator that requires serious attention. This low level reflects the fact that the majority of Viet Nam's processing industries are labour-intensive ones in the textile and leather industries, which also reap a lower value compared to other industries.

Figure 3.14 Manufacturing productivity (VA/employee) for Viet Nam and comparators



Source: UNIDO Indstat

Reversing incremental capital-output ratio (ICOR)

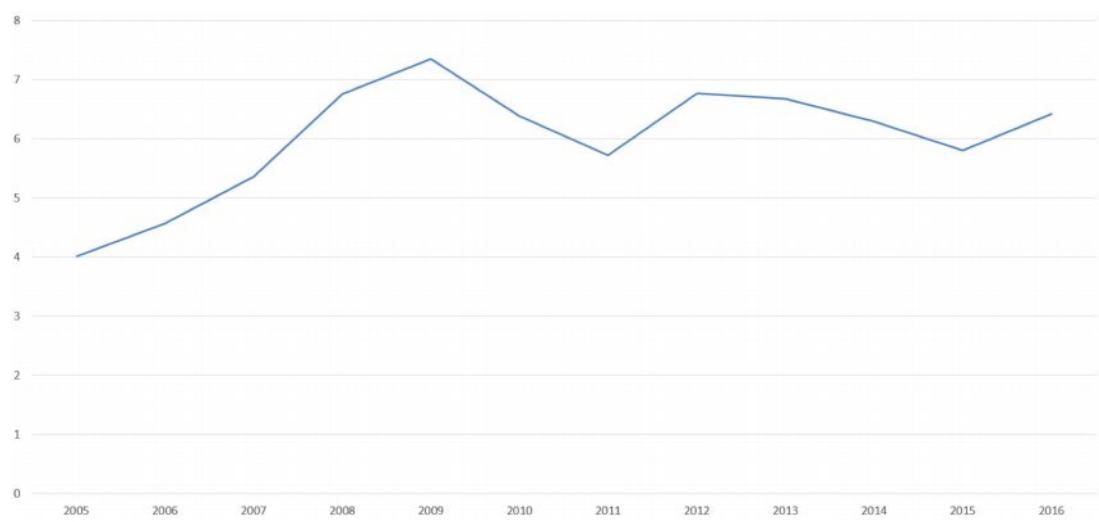
We can gain further insights about Viet Nam's sluggish productivity when disaggregating its main components into capital and labour productivity, and come to better understand its efficiency dynamics.

Many studies have observed a rise in incremental capital-output ratio (ICOR) since the mid-1990s, stabilizing at high levels in recent years, thus indicating excessive dependence on capital (mostly foreign) to drive growth rather than on labour productivity or, better, on total factor productivity as a measure of system efficiency. Excessive reliance on FDI might have exacerbated this problem.

The Government of Viet Nam is taking this issue seriously, pursuing the implementation of the Prime Minister's Decision No. 879/ QD-TTg of 9 June 2014 (approving Viet Nam's industrial development strategy through 2020 with a vision to 2025) to reduce the industrial ICOR to 3.5 per cent - 4.0 per cent in the period 2011-2025; and even further to 3.0 per cent - 3.5 per cent in the period 2026-2035.

The General Statistics Office of Viet Nam publishes updated information on ICOR, thus allowing periodic monitoring of its development.

Figure 3.15 Viet Nam's incremental capital-output ratio (ICOR), 2005-2016 (constant 2010 prices)



Source: GSO Viet Nam

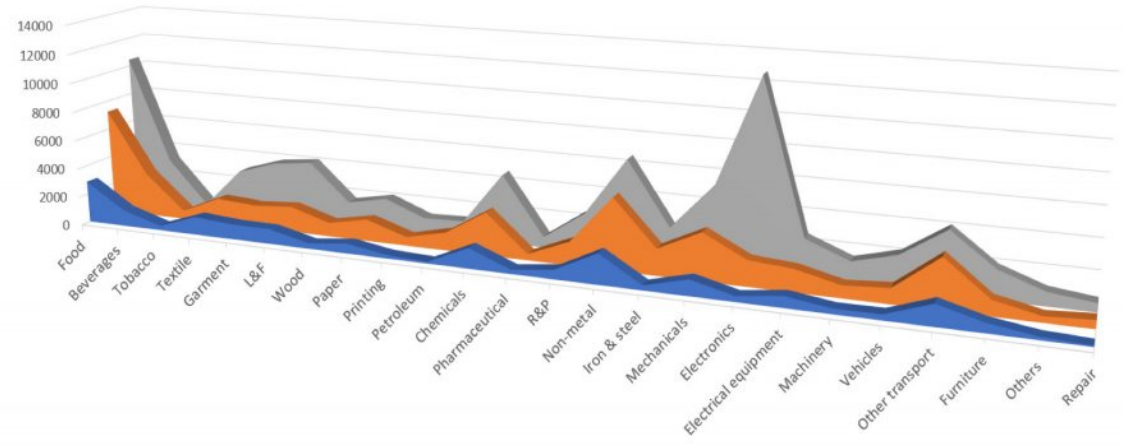
3.3. Cross-sectoral competitiveness analysis

The analysis will now shift from an aggregated macro-economic approach to manufacturing to a disaggregated sectoral analysis. The aggregate picture is drawn from data for each industry on its competitiveness, measured by looking primarily at production (value added), trade (import and export) and social contributions (employment, labour productivity, wages). With limited resources, benchmarking across industries will provide the foundation for resource allocation and to design appropriate industrial development policies to improve the country's competitiveness.

Value added of Viet Nam's manufacturing industries

We start with a cross-sectoral overview of the value added of low-technology industries in 2006, which includes the food and beverages, textile/apparel and leather/footwear industries that dominated Viet Nam's manufacturing sector, contributing nearly 40 per cent to the entire sector's added value. In 2016, low-technology industries still played an important role, but witnessed the rise of other higher value added industries, led by electronics with a growth rate of 42 per cent, and followed by chemicals, non-metallic products and transport equipment. This was in line with the country's export trends and with the expectation to diversify the production structure towards medium- and high-tech industries.

Figure 3.16 Value added of Viet Nam's manufacturing sector by industry (2006-2016) – million USD

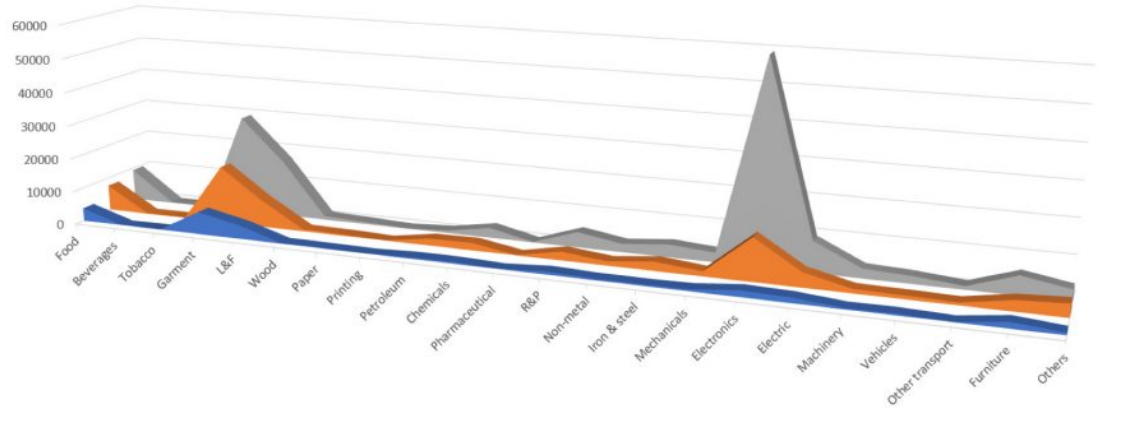


Source: UNIDO INDSTAT

Export

As discussed in the previous sections, Viet Nam's industrial competitiveness index (CIP Index) has been improving largely due to the country's export performance. A cross-sectoral analysis of each industry's contribution reveals that in 2016, export performance was primarily driven by the export of electronics (telecommunications equipment), coupled with textile and apparel, accounting for more than half of Viet Nam's export basket (in export values). This has contributed to an increase in the share of medium- and high-tech industries in the export basket.

Figure 3.17 Viet Nam's manufactured exports values by industry, 2006-2016 (million USD)

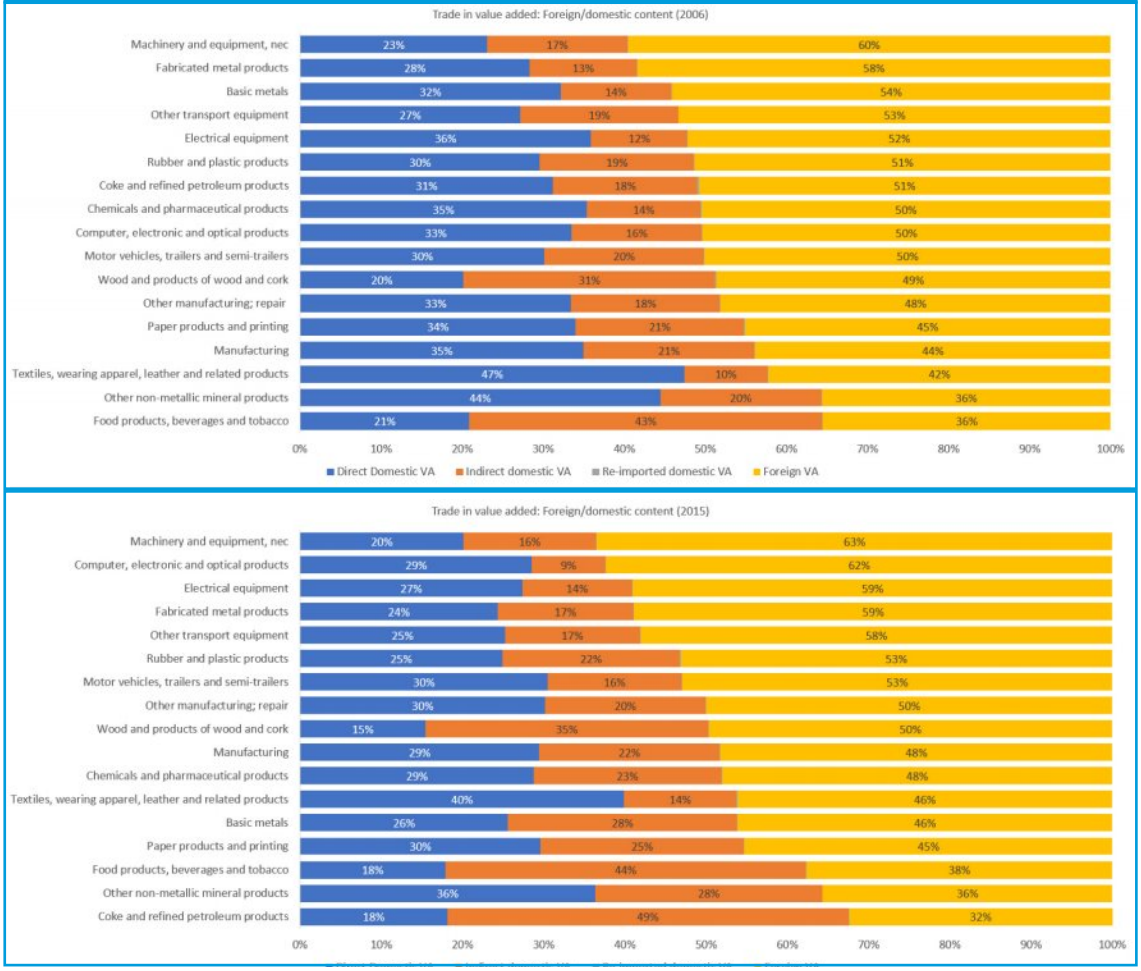


Source: UNCOMTRADE

The macro level has already been explored, but it is also important to look at the origin of the value of exports, i.e. the extent to which it was created locally or abroad.

At the aggregate level, a deterioration of domestic value added in exports was observed. In 2015, the total export value increased five-fold, but the rate of dependence on value added from abroad also increased to 48 per cent. At the sectoral level, the share of foreign value added only decreased in exports of petroleum products and chemicals, while it increased in all other industries. The electronics industry registered the largest increase in foreign value added, from 50 per cent to 62 per cent.

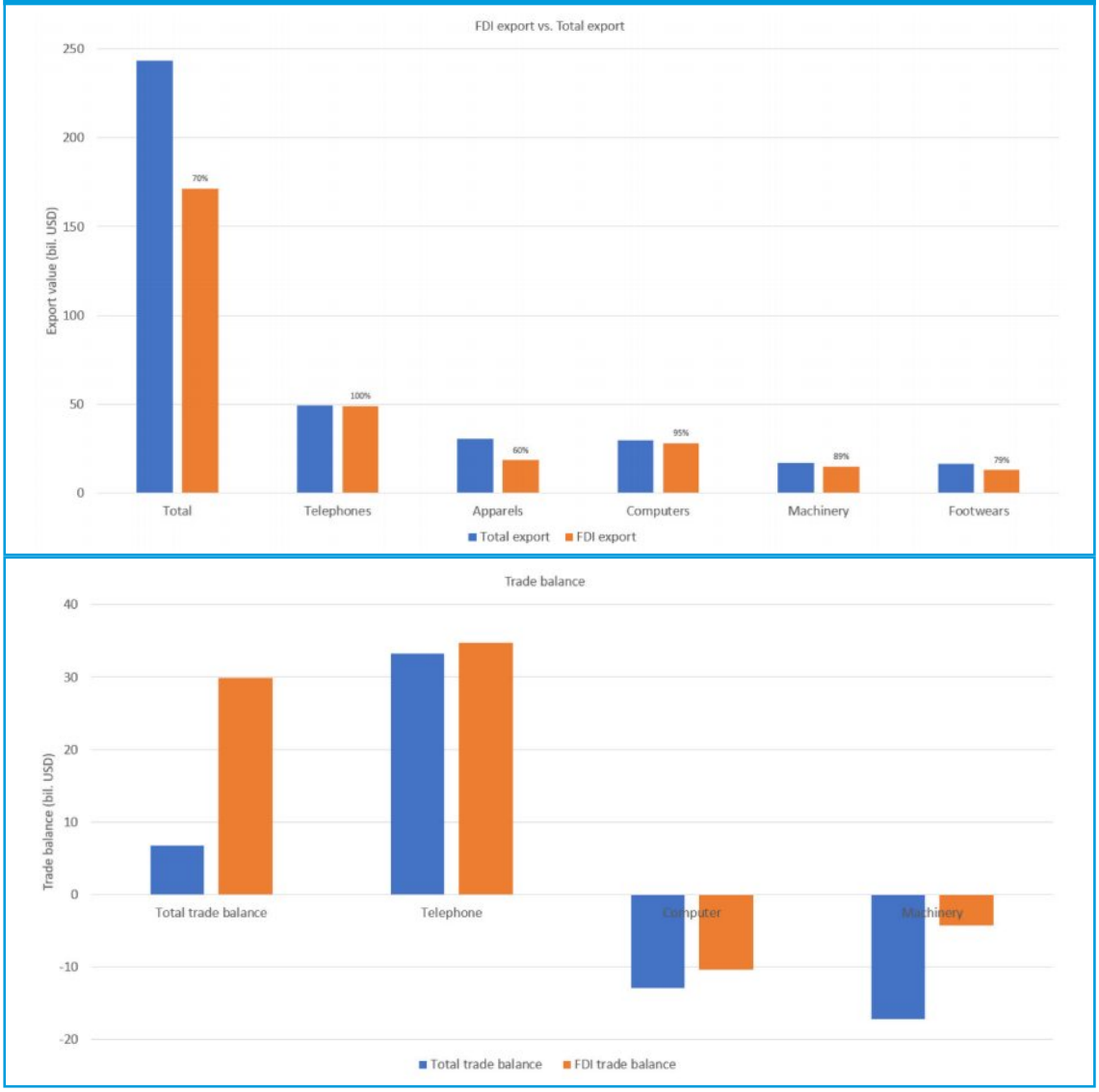
Figure 3.18 Origin of value added of Viet Nam's exports by industry (2006-2015)



Source: OECD

Viet Nam's export achievements in recent years are largely attributable to the role of FDI. In 2018, FDI contributed over 70 per cent of the country's total export turnover, and in particular to those industries that witnessed the largest expansion: 100 per cent in telecommunications equipment, 95 per cent in computers; 89 per cent in machinery and equipment; and even footwear and apparel exports were largely driven by FDI, with shares of 79 per cent and 60 per cent, respectively.

Figure 3.19 FDI export and trade balance (billion USD, 2018)

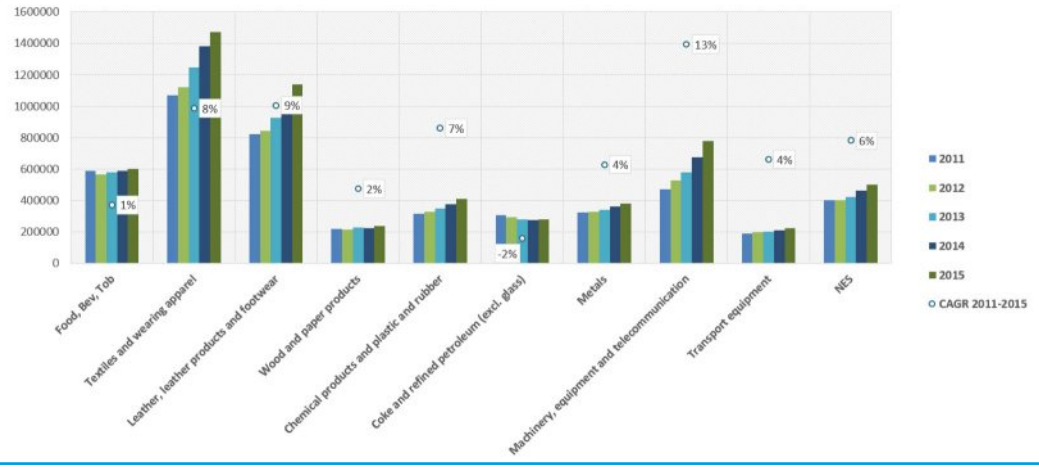


Source: General Department of Customs

Employment and productivity

In terms of population structure, Viet Nam's population is currently in demographic dividend, with the number of working age population accounting for over 50 per cent of the country's total population. This represents both an opportunity for development based on human resources, as well as pressure to create jobs for workers. The quinquennium 2011-2015 witnessed sustained growth of labour-intensive industries such as textile & apparel, leather & footwear, followed by food processing, where employment growth seems to have slowed in recent years. Electronics registered the most impressive employment growth, employing nearly 800,000 workers in 2015. Textile & apparel together with leather & footwear remain the largest employers, and are usually the first employers of workers who shift from the agricultural sector, accounting for over 43 per cent of all formal manufacturing jobs in 2016.

Figure 3.20 Manufacturing employment by industry, Viet Nam (2011-2015)

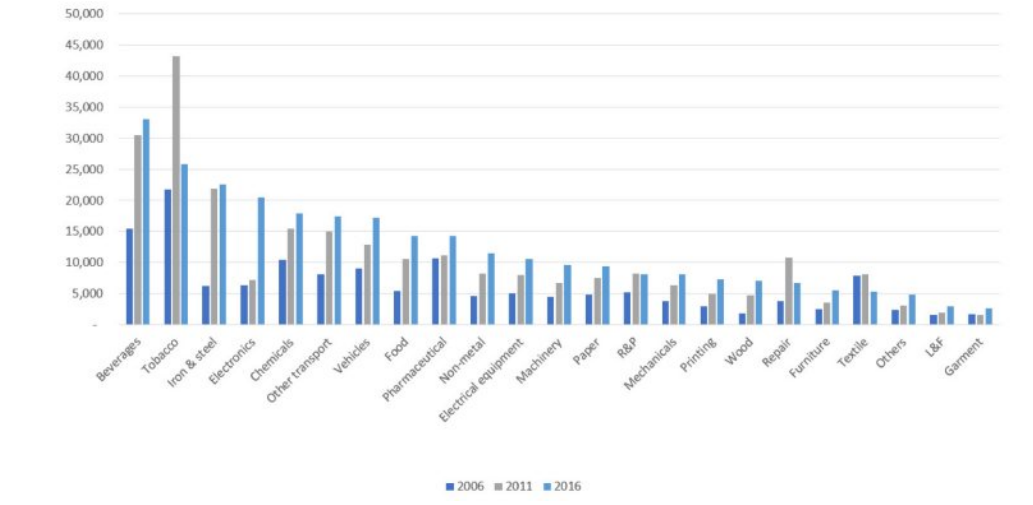


Source: UNIDO INDSTAT

At the aggregate level, the paper has identified low productivity as one of the main challenges Viet Nam faces. Obviously, the sectoral employment structure, i.e. the majority of the work force being concentrated in labour-intensive industries, does not help. Not surprisingly, labour-intensive industries such as textile and footwear have the lowest labour productivity. Specifically, the textile (but not the apparel) industry was the only industry to experience a decline in the period 2006-2016. The problem was likely exacerbated by the following factors: i) Viet Nam's textile industry is highly dependent on FDI, with the high value-added stages of the chain (design, production of raw materials, marketing and distribution) located outside the country; ii) following a new generation of FTAs with stricter rules of origin after 2011, many new textile enterprises were established, attracting workers at a pace higher than the VA being created, hence productivity naturally decreased.

The new emerging industries, such as electronics, metals and chemicals, experienced sustained increases in productivity, surpassed only by beverages and tobacco.

Figure 3.21 Productivity (industry VA/industry no. of employees) by industry, 2006-2016 (USD)



Source: UNIDO INDSTAT

The figure presents employment elasticity, which measures incremental changes in employment with respect to productivity. Most industries generally indicated moderate or low employment generation with respect to productivity (VA growth) during the most recent period examined (2011-2015), confirming in part the alarming picture of increasing ICOR, i.e. excessive reliance on capital productivity and FDI for growth instead of labour productivity. Only chemicals and metals show very positive trends, driving both productivity and employment generation in Viet Nam. The food, beverages and tobacco industry seems to have lost its initial driving force of job creation, with some subsectors even dropping to negative values (e.g. processing/conservation of fruits and vegetables, Table 4.3). Textile, apparel, leather and footwear seem to continue driving employment but with increasing reliance on capital productivity as well.

Table 3.8 Employment elasticity by industry, 2011-2015

	Empl. CAGR	MVA CAGR	Empl. elasticity	Classifications	
FBT	1%	4%	0.15	Low/moderate empl. Generation	Productivity led growth
Textiles and wearing apparel	8%	18%	0.45	Low/moderate empl. Generation	Productivity led growth
Leather, leather products and footwear	9%	20%	0.43	Low/moderate empl. Generation	Productivity led growth
Wood and paper products	2%	9%	0.22	Low/moderate empl. Generation	Productivity led growth
Chemical products, plastic and rubber	7%	10%	0.68	High empl. Generation	Employment led growth
Coke and refined petroleum	-2%	4%	0.46	Jobless Growth	Jobless Growth
Metals	4%	7%	0.59	High empl. Generation	Employment led growth
Machinery, equipment and telecomm	13%	39%	0.35	Low/moderate empl. Generation	Productivity led growth
Transport equipment	4%	9%	0.48	Low/moderate empl. Generation	Productivity led growth
NES	6%	16%	0.34	Low/moderate empl. Generation	Productivity led growth

Source: UNIDO INDSTAT

3.4. Performance of manufacturing versus government objectives

The Vietnamese government has recently introduced a number of ambitious goals to push for Viet Nam's industrialization. In the Prime Minister's Decision No. 879/ QD-TTg of 9 June 2014, approving Viet Nam's industrial development strategy through 2020 with a vision to 2025, Viet Nam has set specific targets including:

1. By 2020, the growth rate of industrial added value shall be 6.5 per cent to 7.0 per cent/ year , 7.0 per cent to 7.5 per cent/ year in the period 2021-2025 and 7.5 per cent to 8.0 per cent/ year in the period 2026-2035.
2. By 2020, the growth rate of industrial production value shall be 12.5 per cent to 13.0 per cent/ year, 11.0 per cent to 12.5 per cent/ year in the period 2021-2025 and 10.5 per cent to 11.0 per cent/ year in the period 2026-2035.
3. By 2020, the ratio of industry and construction shall account for 42 per cent to 43 per cent in the national economic structure, 43 per cent to 44 per cent by 2025 and 40 per cent to 41 per cent by 2035.
4. The share of industrial exports/ total export turnover shall reach 85 per cent to 88 per cent by 2025, and over 90 per cent after 2025.
5. The value of high-tech industrial products shall account for around 45 per cent of total GDP by 2025, and over 50 per cent after 2025.
6. The industrial ICOR index in the period 2011-2025 shall reach 3.5 per cent to 4.0 per cent; in the period 2026-2035 it shall reach 3.0 per cent to 3.5 per cent.
7. The energy elasticity coefficient/ GDP in 2015 reached 1.5; by 2020, it shall reach 1.0 and remain stable at 0.6-0.8 by 2035, approaching that of other countries in the region.
8. The rate of greenhouse gas emissions from industry increased by an average of 4 per cent to 4.5 per cent/ year.

On 22 March 2018, the Central Committee of the Communist Party of Viet Nam issued Resolution No. 23-NQ/ TW on the formulation of a national industrial development policy by 2030 with a vision to 2045, and specific objectives to be realized by 2030.

1. The share of industry in GDP shall account for over 40 per cent. The share of processing and manufacturing industries in GDP shall account for around 30 per cent, of which manufacturing shall comprise over 20 per cent.
2. The share of high-tech industrial products in the processing and manufacturing industries shall account for at least 45 per cent.
3. The growth rate of industrial added value shall reach an average of 8.5 per cent annually, with the processing and manufacturing industries averaging over 10 per cent per year.
4. The growth rate of industrial labour productivity shall attain an average of 7.5 per cent/ year.
5. Viet Nam shall belong to the top 3 ASEAN countries in the Industrial Competitiveness Performance Index (CIP).
6. The rate of employees employed in the industry and services sector shall reach over 70 per cent.
7. A number of clusters shall be built linking domestic industrial enterprises with large scale, multi-national, international competitiveness.

Some specific objectives of Decision 879 and Resolution 23 as well as the status of measurement indicators are summarized in Table 3.9.

Table 3.9 Objectives set out in Decision 879 and Resolution 23

Indicator	Target	Baseline (2016)	Data source
Up to 2025 (Decision 879)			
MVA growth (%)	7-7.5%	8.6% (2006-2016)	WDI
Share of industry-construction in GDP (%)	43-44%	32.72% (2016)	WDI
Share of mnf. exports in total exports (%)	85-88%	85% (2016)	WDI
Share of high-tech industry in GDP	45%	--	--
ICOR	3.5-4.0	6.42	GSO
Up to 2030 (Resolution 23)			
Share of mnf. in GDP (%)	30%	14.27% (2016)	WDI
Share of high-tech industry in mnf.	45%	--	--
MVA growth (%)	10%	8.6% (2006-2016)	
Industrial productivity growth (%)	7.5%	--	--
CIP ranking	Top 3	6th (2016)	UNIDO
Labour force of industry and services (%)	70%	58.1% (2016)	WDI

3.5. Selection of subsectors to be analysed

The targets of Decision 879 to 2025 and Resolution 23 to 2030 focus on three factors that have been analysed above: 1) value added, 2) exports and 3) job creation. Subsectors that can contribute more to manufacturing in terms of value added, export and job creation should be prioritized in coming years. Table 3.10 presents data of these three factors in three dimensions: scale, growth and efficiency. Based on these data, each subsector is ranked from lowest (equivalent to 1) to highest (equivalent to 21). Subsequently, the average ranking for each dimension is calculated. Based on these average rankings, each subsector is given a score in four strategic scenarios: 1) balance (between scale, growth and efficiency), 2) scale-focus, 3) growth-focus and 4) efficiency-focus. In the first scenario, the three dimensions are equal, in the other three scenarios, different dimensions are used, which will be double weighted. Scores for each subsector are presented in Table 3.11, which provides insightful information for policymakers to make decisions on subsector priority.

Table 3.10 Subsector's comparative advantages								
	Scale (1000 person, mil. USD, 2016)			Growth (%, 2011-2016)			Efficiency (USD per employee, 2016)	
	Employ-ment	Value added	Export	Employ-ment	Value added	Export	Value added	Export
Food	734	10,457	9,376	1%	8%	4%	14,243	12,771
Beverages	99	3,259	242	0%	2%	13%	33,083	2,457
Tobacco	11	287	277	-4%	-13%	6%	25,862	24,955
Garment	1,985	6,827	29,175	8%	19%	11%	3,440	14,701
L&F	1,363	4,158	16,948	8%	19%	16%	3,051	12,435
Wood	228	1,610	1,108	3%	11%	15%	7,072	4,869
Paper	229	2,158	586	3%	8%	7%	9,431	2,560
Printing	147	1,076	78	4%	12%	28%	7,338	531
Petroleum	6	1,188	769	3%	-1%	-18%	212,590	137,596
Chemicals	261	4,691	2,961	7%	10%	6%	17,947	11,327
Pharmaceutical	51	731	127	6%	11%	12%	14,240	2,471
R&P	326	2,667	4,542	11%	11%	12%	8,180	13,931
Glass	575	6,586	2,492	0%	6%	15%	11,446	4,331
Iron & steel	103	2,327	3,761	5%	5%	7%	22,601	36,533
Mechanicals	671	5,426	2,845	6%	11%	15%	8,087	4,240
Electronics	620	12,713	59,164	21%	49%	36%	20,511	95,452
Electrical equipment	243	2,575	9,109	5%	11%	16%	10,587	37,458
Machinery	149	1,433	2,808	4%	12%	18%	9,630	18,864
Vehicles	128	2,200	2,199	10%	17%	16%	17,185	17,181
Other transport	236	4,124	1,049	1%	4%	5%	17,449	4,437
Furniture	355	1,965	5,537	5%	14%	12%	5,542	15,620

Source: UNIDO INDSTAT, UNCOMTRADE

Table 3.11 Comparison score of manufacturing industries				
	Balance	Scale-focused strategy	Growth-focused strategy	Efficiency-focused strategy
Scale:Growth:Efficiency	1:1:1	2:1:1	1:2:1	1:1:2
Food	12	14	10	12
Beverages	8	8	7	9
Tobacco	8	6	6	10
Garment	14	16	14	13
L&F	14	15	15	12
Wood	8	8	9	8
Paper	7	7	7	7
Printing	7	6	9	6
Petroleum	9	8	8	12
Chemicals	12	13	11	12
Pharmaceutical	8	6	9	8
R&P	12	12	12	11
Glass	10	11	10	10
Iron & steel	12	11	11	13
Mechanicals	12	13	12	10
Electronics	20	20	20	19
Electrical equipment	14	14	14	14
Machinery	12	11	12	12
Vehicles	13	12	14	14
Other transport	9	9	7	9
Furniture	11	12	12	11

Source: Authors

Based on the above results, if Viet Nam is to achieve the set targets for 2025 and 2030, the country should focus on developing a number of manufacturing industries, including food processing, textile and garment, leather shoes, electronics and vehicles. In addition, the mechanical industry may also have a positive impact on the processing and manufacturing industry, both in terms of scale, growth and efficiency, and should be further developed in the future. Because the scope of the mechanical industry is so large and limited resources are available, the next section will focus on analysing the food, textile and footwear, electronics and automobile industries.

III. SUBSECTOR ANALYSIS & RECOMMENDATIONS

Chapter 4. Food processing

4.1. Definition and classification

Food processing includes traditional (heat treatment, fermentation, pickling, smoking, drying, curing) and modern processing methods (pasteurization, ultra-heat treatment, high pressure processing and modified atmosphere packaging).

Based on the characteristics of the agro-processing industry, its products are grouped into specific subsectors:

Table 4.1 Food processing subsectors according to ISIC and SITC

Industry & Subsectors	VSIC/ISIC Rev. 4:	SITC Rev. 3 related codes:
	Processing/conservation of meat: 1010	Meat: 011, 012, 016, 017;
	Processing/conservation of fish, etc. 1020	Fish: 034 (excl. 0341), 035, 036, 037;
	Processing/conservation of fruits, vegetables: 1030	Veg: 0546, 0547, 056, 058, 059;
	Vegetable and animal oils and fats: 1040	Oil and fats: 411, 421, 422, 431.
	Dairy products: 1050	Dairy products: 022, 023, 024;
	Grain mill products: 1061	Grain (cereal and coffee): Cereal: 046, 047, 048; Coffee-tea: 0712, 0713, 072 (excl. 0721), 073;
	Sugar: 1072	Sugar: 061, 062

4.2. Development of agro-processing industry

The agro-processing industry was built on the foundations of previous handicraft industries with the aim of using locally available raw materials, low-cost labour and of creating first-class products. There are a number of milling and beverage industries located mainly in the Hanoi and Saigon areas.

- Form factor: depends primarily on local raw materials and the local consumer market. For example, raw materials of agriculture and fisheries.
- Formation and development: from 1945 to 1975, the food industry developed differently in two regions, with the products of some industries becoming more diverse than previously. In the northern region, especially in the North Delta/ North Central, the milling industry was based on rice cultivation. In addition, there was a growing area of industrial crops in Ha Tay, Nam Ha and Vinh Phu. In the southern region, a series of sugar, canned foods and fruit processing firms were established. Although these industries are under development, they mostly serve the needs of thousands of American expeditionary troops. The livestock, poultry and seafood industries have expanded considerably since 1975.

They are a solid source of raw materials for the food and agro-processing industry. Currently, along with the diversification and improvement of the quality of goods, the network of agro-processing factories from the products of the cultivation and husbandry industry has been evolving.

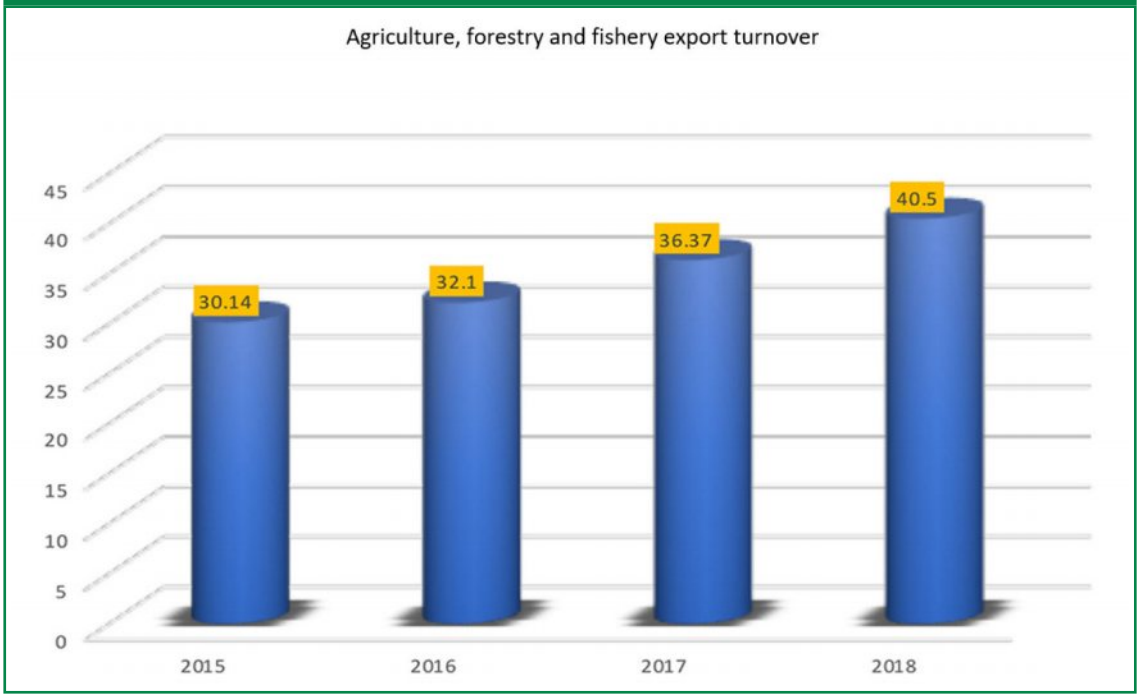
< Additional analysis: The achievements of the agro-processing industry > [9]

1) The growth rate is quite solid, contributing to the rise in export turnover

From 2013-2017, the agro-processing industry developed strongly in terms of both scale and modernization compared to the previous 5 years (2007-2012), the annual value-added growth rate reached around 5 per cent to 7 per cent.

Due to the strong growth rate of the agro-processing industry, the export of agricultural products has increased by an average of 8 per cent to 10 per cent/ year in the last 2 years. The export turnover of agriculture, forestry and fisheries in 2015 was USD 30.5 billion, in 2016 it was USD 32.1, and was estimated in 2017 to be over USD 36.2 billion, accounting for 16 per cent to 20 per cent of the share of total export turnover. There are ten items with an export value of over USD 1 billion, including seven items with an export value of over USD 2 billion: rice, coffee, cashews, wood, rubber, shrimp and vegetables. A very high increase in the processing and export of vegetables and fruits was registered, reaching an average of 34.6 per cent/ year. In 2017, there was a big breakthrough, with a turnover of USD 3.45 billion, an increase of 42.5 per cent compared to 2016.

Figure 4.1 Exports of agro-forestry-fishery products (unit: USD billion)



Source: The Voice of Viet Nam (VOV)

[9] Additional explanation by Mr. Ngo Quang Tu, Director of the Agro-Processing Division of the Ministry of Agriculture and Rural Development (MARD)

2) Establishment of a system of agro-processing industries with relatively modern technology and equipment

Quantity: establishment and development of a system of agro- processing and conservation industries with a designed capacity to ensure processing of around 100 million tonnes of agricultural products per year, with over 6,500 industrial-scale enterprises involved in export, over 2,200 establishments engaged in agro- processing and conservation, over 760 establishments engaged in the processing of aquatic products and about 3,600 establishments involved in wood processing. In addition, there are tens of thousands of small, retail and household agricultural processing facilities scattered throughout the country involved in preliminary processing and processing for domestic consumption.

Processing technology and product quality: Viet Nam's agricultural product processing technology reached the average world level, a number of commodity lines and a number of products in a commodity industry with similar modern processing technologies and equipment used in the region and the world. These were used in the processing of cashews, rice, shrimp, pangasius, vegetables, etc.

Initially, a number of industries and firms in all economic sectors invested in technological innovation, focusing on applying advanced standards, technical regulations, ISO and HACCP. Some industries have met the requirements of quality and food safety for more fastidious markets such as the United States, EU, Japan, etc., typically seafood, cashews, pepper, furniture, etc.

3) Contribution to agricultural restructuring and promotion of the development of agricultural raw materials

The development of the agro-processing industry has contributed to a strong transformation of the structure of agricultural production, from self-sufficiency to modern agriculture and large commodity production for export.

Agricultural products development has promoted production development to provide input materials for processing; it has contributed to the establishment of large sample fields and of concentrated farming areas such as rice, sugarcane, fruit trees, vegetables, coffee, pangasius, shrimp, etc., facilitating the application of advanced farming techniques, high technology, introducing mechanics into production and effectively controlling epidemics, and producing materials in large quantities, good quality, safety, stability and low cost to meet the requirements of consumers.

4) Contribution to economic development in rural areas and new rural development

The majority of agro-processing factories are built in rural areas, remote areas and underdeveloped regions, positively contributing to the improvement of the rural economy and its population; this in turn attracted and promoted the internal forces of all economic

sectors, escaping the subsidies trap arising from the sense of self-reliance; establishment of towns and townships in the areas of the factories.
The entire agro-processing industry employs about 1.5 million workers, most of them are farmers' children, with an average income of VND 5,000,000 to VND 6,000,000/ month and producing large amounts of raw materials and providing services, thus greatly contributing to poverty reduction.

5) Successful integration of Viet Nam's agriculture into the world market

Many agro-processing firms were integrated in the world economy very early on. When Viet Nam joined the WTO in 2007, new opportunities opened up: the majority of agricultural products grew strongly and were geared primarily for export.

The position of Viet Nam's agricultural sector improved in the international arena; according to FAO, Viet Nam's agricultural sector is one of the fastest growing in the world and it is one of the world's leading exporters of agro-forestry products. Viet Nam's agricultural products are exported to over 160 countries and territories around the globe, including the EU, the United States and Japan. Some products have a high export position globally, such as cashews and pepper (ranked first); coffee items (ranked second); rice products (ranked third) and seafood products (ranked fourth). The total value of export turnover has increased significantly (in 2017, it reached over USD 36.3 billion, increasing by over 30 per cent compared to 2013).

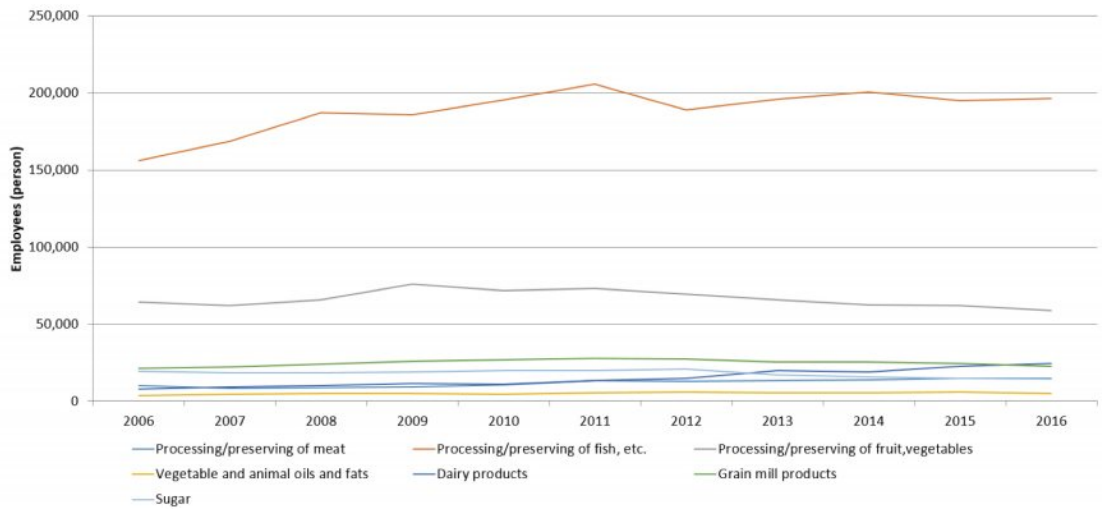
In parallel with promoting the export of key agricultural products to the international markets, many legal documents in the agricultural sector (law on goods quality, food safety, standards and technical regulations) have been harmonized with international regulations to facilitate two-way trade exchange between Viet Nam and the global market and has continued to grow in recent years.

4.3. Production and employment

In the previous chapter, the food processing industry was aggregated with beverages and tobacco. The industry stopped playing a significant role in employment generation, shifting towards productivity-led growth. Focusing on food processing as defined in Section 4.1 only, total formal employment and VA (INDSTAT) for the listed subsectors in Table 4.1 grew from 282,405 employees and USD 1.128 billion in 2006 to 337,132 employees and USD 4.465 billion in 2016. Value added grew much faster than the average productivity per employee, increasing threefold in the decade 2006-2016.

Fish processing engages the largest number of employees with nearly 60 per cent of the total formal workforce (337,132 employees) employed in the food processing in 2016, followed by processing/conservation of fruit and vegetables, accounting for 17.5 per cent in 2016, far outpacing other subsectors.

Figure 4.2 No. of employees per subsector in food processing, 2006-2016 (units)



Source: UNIDO INDSTAT

When looking at CAGR trends, the dairy subsector witnessed the most important increase in the number of employees during this period (CAGR 12.4 per cent), while the majority of other subsectors did not register a CAGR above 4 per cent (meat, fish processing and vegetable/animal oils) or remained stagnant (grain milling products) or even contracted (processing of fruits/vegetables and sugar).

This performance translated into a contraction in productivity for dairy only; the other subsectors that were restructured by reducing the number of employees per establishment (the size of firms are presented in Table 4.2) are also those with the highest increase in productivity throughout 2006-2016. Only the grain milling subsector managed to increase both the size of its firms and its value added with a high increase in productivity.

Overall, the trajectory of the food processing industry as defined in Table 4.1 has diverged from that of the textile industry, focusing on productivity while still contributing a slight increase in employment but decreasing the average size of its firms, which might be a sign of automation in the industry.

Table 4.2 CAGR per subsector, food processing, 2006-2016 (%)

	No. Employees	Value added	Average size est.	Average productivity
Processing/preserving of meat	4.0%	9.7%	-6.8%	5.5%
Processing/preserving of fish, etc	2.3%	14.7%	-2.5%	12.1%
Processing/preserving of fruit, veg	-0.9%	22.6%	-10.2%	23.6%
Veg/animal oils/fat	3.5%	28.3%	-8.0%	24.0%
Dairy products	12.4%	10.6%	-2.9%	-1.6%
Grain mill products	0.7%	21.2%	3.6%	20.4%
Sugar	-3.2%	1.0%	-4.6%	4.3%
Overall	**1.8%**	**14.7%**	**-2.2%**	**12.7%**

Source: UNIDO INDSTAT

To summarize, using employment elasticity, we obtain the following picture:

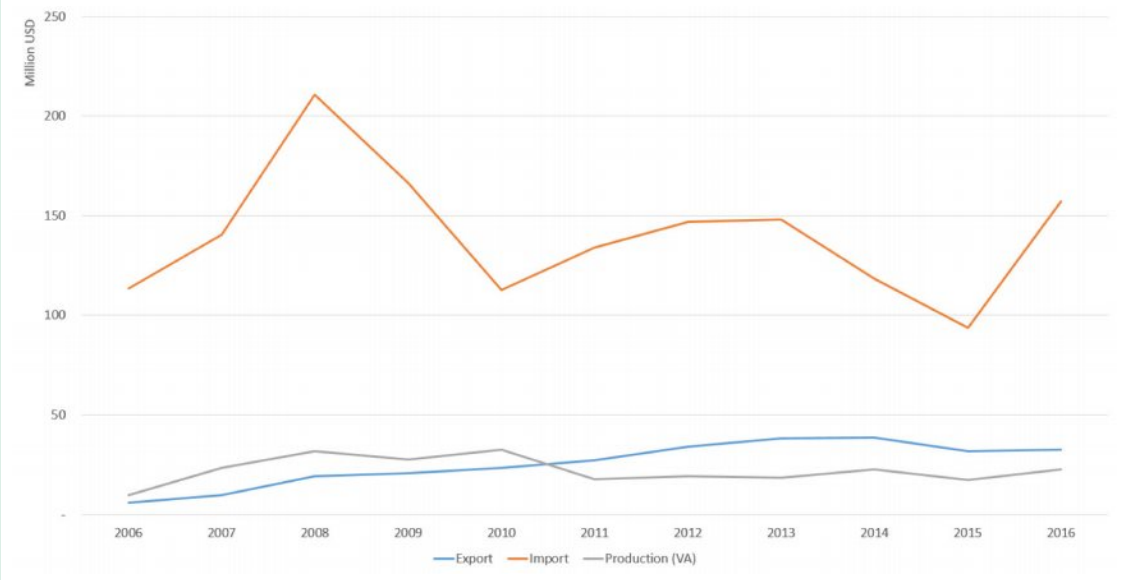
Table 4.3 Employment elasticity per subsector, food processing, 2006-2016

	Employment Elasticity	
Processing/preserving of meat	0.41	Productivity-led growth
Processing/preserving of fish, etc	0.16	Productivity-led growth
Processing/preserving of fruit, veg	-0.04	Jobless growth
Veg/animal oils/fat	0.12	Productivity-led growth
Dairy products	1.17	Unproductive employment growth
Grain mill products	0.03	Productivity-led growth
Sugar	-3.21	Jobless growth
Overall food processing	**0.12**	**Productivity-led growth**

Source: UNIDO INDSTAT

One way to analyse the level of productivity and automation is to examine production and the import of food processing technology over the same period in Viet Nam. There is still a significant reliance on imported equipment, while production dwindled in the period 2006-2016. However, despite fluctuations, the values of production and imports of agro-processing machinery has on average continued to rise at a CAGR of nearly 4 per cent since 2006, which explains the overall trend of Viet Nam's economy to rely on capital productivity and incremental capital-output ratio.

Figure 4.3 Food processing equipment[10] production and trade, 2006-2016 (million USD)



Source: UNIDO INDSTAT and UNCOMTRADE

[10] For production/VA, INDSTAT rev. 4 code 2825 including beverages and tobacco machinery. In UNCOMTRADE, product code 727 of SITC rev. 3 was used, including only food processing machinery.

4.4. Trade

In 2017, Viet Nam's food processing industry was worth more than USD 8.8 billion in terms of export values, the highest figure since 2007. However, the exceptional growth rate of 22.8 per cent in the period 2007-2011 was followed by a significant contraction in the subsequent period (2011-2017), nonetheless avoiding negative figures and remaining positive at 1.73 per cent.

Fish processing has been the fastest growing subsector in all periods, with a growth rate of 13.3 per cent in the period 2007-2011, and 4.66 per cent in the subsequent period. Total export value peaked at USD 6.6 billion in 2017, followed by the processing of vegetables with an export value of roughly USD 1 million in 2017, and growing steadily at 2 per cent in the period 2012-2017.

In terms of import value, fish processing was the leading industry with over USD 1.4 billion in 2017, and this trend has continued to grow sharply. The processing of fruits and vegetables as well as dairy products follow, although the import value for dairy products decreased considerably between 2014 and 2017.

Figure 4.4 Food processing export values, 2007-2017 (million USD)

Source: UNCOMTRADE

< Additional analysis: The exports of agro-processing industries >

1) Rice

There are currently 582 rice processing industrial scale factories: a capacity of less than 10,000 tonnes of rice/ year accounted for 38.5 per cent; a capacity of 10,000 tonnes to less than 100,000 tonnes of paddy/ year accounted for 58.5 per cent; large scale capacity of over 100,000 tonnes of paddy/ year accounted for 3 per cent. There are only 18 factories in the northern area (from Quang Tri and beyond), accounting for 3 per cent of the total number of factories and design capacity; the remaining factories are concentrated in the South (accounting for over 95 per cent of all rice processing factories), Viet Nam's total milling capacity is around 13.5 million tonnes/ year, accounting for about 60 per cent of the country's processing output.

Rice milling equipment is mostly produced locally by mechanical enterprises such as Bui Van Ngo Industrial and Agricultural Machinery Co., Ltd, Long An Mechanical Manufacturing Joint Stock Company and Sinco Mechanical Joint Stock Company. Equipment technology for the processing of rice has recently made much progress compared to other countries in the region. The structure of Viet Nam's rice exports has also witnessed positive changes, reducing the proportion of medium- and low-grade rice and increasing that of high quality rice (approximately 80 per cent). In 2016, 1.39 million tonnes of fragrant rice accounted for 28.5 per cent; 1.058 million tonnes of high-grade white rice accounted for 21.65 per cent; 1.02 million tonnes of sticky rice accounted for 20.87 per cent; 655 thousand tonnes of average white rice accounted for 13.41 per cent; only 355 thousand tonnes of low-grade white rice accounted for 7.27 per cent.

2) Coffee

There are currently 97 coffee factories nationwide with a design capacity of 1.5 million tonnes/ year; 7 instant coffee processing plants with a capacity of 55,000 tonnes of pure instant coffee and 17 firms that produce blended coffee (3/1; 2/1); 620 coffee roaster processing facilities with a capacity of 73,150 tonnes/ year (including 300 small-scale household establishments).

Some domestic enterprises have chosen advanced technology to invest in deep processing, such as Timexco, An Thai, Phuc Sinh, Me Trang, etc. Some companies have diversified products such as coffee 3 in 1 review; 2 in 1; canned coffee; coffee tablets; coffee bag filters, etc. However, FDI enterprises with brands and abundant financial resources still dominate the processing and export of deep-processing coffee such as Nestle, Olam (instant coffee), Neumann Gruppe and Massimo Zanetti Beverage (roasted coffee).

Initially, there was a shift in product structure towards reducing the share of exports of green coffee and increasing the share of processing and exporting instant coffee, roasted and ground coffee. Within 4 years, the processing capacity of instant coffee (including pure coffee and mixed coffee) increased from 2.5 million bags (150,000 tonnes/ year) to over 3 million bags (180,000 tonnes/ year).

Table 4.4 Coffee processing capacity in 2017			
TT	Name of enterprise	Capacity (tonnes/year)	Remarks
1	Vinacafe Bien Hoa	4.000	2 branches
2	Olam	9.000	Both spray drying and cool drying
3	Trung Nguyen	3.000	
4	Nestle	18.000	Both spray drying and cool drying
5	Ca phe Ngon	15.000	Both spray drying and cool drying
6	Tin Nghia (Timexco)	5.000	Both spray drying and cool drying
7	An Thai	1.000	Continue to invest in factory with the capacity of 4000 tonnes/year
	Total instant coffee	55,000 tonnes/year	
	Blended coffee 3/1; 2/1	184,400 tonnes/year	6 instant coffee factories and 17 instant & blended coffee factories

3) Fruits and vegetables

Fresh fruit exports still account for a large share of exports, namely 80 per cent. At present, there are units, cooperatives, high-tech vegetable production enterprises such as Da Lat (Lam Dong), safe fruit areas (Viet GAP, Global GAP) associated with geographical indications such as Thieu Luc litchi. Ngan, green skin grapefruit, rambutan, mango, breast milk fruit, mangosteen, etc. are produced in the Southeast and Mekong Delta.

Fresh fruit and vegetable conservation technology is implemented by enterprises that have linkages with farmers and cooperatives, there are fruit and vegetable food safety controls in the value chain, investments in modern conservation and preliminary processing technologies in accordance with the requirements of each market. Some technologies of fresh fruit conservation by irradiation, hot water and CAS were researched and transferred, contributing to fresh export of fabric, labels, dragon fruit, breast milk fruit, etc. to the United States, Japan and Australia.

In addition to exporting fresh fruits and vegetables, some firms continue to invest in deep processing, diversifying products such as condensed fruit juice processing technology, cold freezing technology IQF, pure technology diversifying processed fruit and vegetable products for export to high quality markets. These enterprises include Dong Giao Food Export Joint Stock Company (DOVECO), Nafood Group Company and other businesses.

4) Cashews

Within 4 years (2013-2017), the processing industry grew steadily and at a high level, averaging 21.2 per cent annually. Currently, Viet Nam has over 465 cashew processing enterprises with a total designed capacity of over 1.5 million tonnes/ year, which are produced in the Southeast and Central Highlands provinces. Enterprises with a large capacity account for 30 per cent of all establishments (151/ 465DN), and their processing output accounted for over 70 per cent of total processed products.

Deep processing: currently, only around 20 large enterprises invest in the deep processing of value added products (salted roasted cashews, fried cashew nuts, spices, mixed cashews, confectionery, etc.) with a capacity of 15.4 thousand tonnes of products/ year;

the rest are small establishments, supplying about 20,000 tonnes of products/ year to the domestic market.

Twenty-six firms are engaged in oil processing of nut shells with a capacity of 80,000 tonnes of products/ year and 5 establishments involved in husk oil refining with a capacity of 6,000 tonnes of products/ year. Machines and equipment for processing cashew nuts are mainly researched and produced by Vietnamese firms, and are considered to be the leading technology in the world.

As regards the quality of exported cashew nuts, it had improved in 2017 compared to 2016 according to the evaluation of quality inspection organizations, though there were a few cases in which goods were returned. However, due to the large number of processing facilities and 435 export clues, quality control is difficult.

5) Sugar

There are currently 41 sugar factories in Viet Nam with a total designed capacity of nearly 150,000 TMN, producing 1.2-1.4 million tonnes of sugar/ year, with 600-700 thousand tonnes of refined sugar.

In terms of processing equipment, Viet Nam's sugar factories are divided into four groups: 11 small sugar factories (1,000 - 2,000 TMN) accounting for 8.6 per cent of the total number of factories; 17 medium capacity sugar mills (from 2,000 to 3,000 TMN) accounting for 30.1 per cent of the total number of factories; 8 sugar factories with an average capacity (> 3,000 - 6,000 TMN) accounting for 26.8 per cent; 5 high capacity sugar factories (> 6,000 - 10,000 TMN) accounting for 33.5 per cent of the total number of sugar factories. The majority of factories (33/41 factories) use equipment and production lines that originate from China and India with a low degree of automation.

The products are sugar (yellow, RS, RE) and by-products of sugar and sugar such as alcohol, electricity and microbiological fertilizer.

6) Fisheries

According to statistics from 2016, Viet Nam has 760 seafood processing firms, of which 636 comply with food safety requirements in global markets (EU market: 472 firms; Republic of Korea: 624 firms; China: 607 firms, markets of the Asia-Europe economic union: 25 firms, Brazil: 142 firms; Argentina: 202 firms; other markets: 621 firms). For 4 years (2013-2016), the number of seafood processing firms increased by 4.2 per cent, with the number of enterprises meeting global export requirements increasing by 5.2 per cent. There are also over 3,000 small-scale seafood processing firms in the country, processing products for domestic markets, tourist and export needs. Industry-wide processing capacity accounts for 3 million tonnes of products/ year.

Of the 636 processing firms with food safety certifications and export eligibility, there are 500 frozen goods enterprises, 18 canned food processing firms; 67 dry goods processing

firms; 20 fish sauce processing enterprises and 31 other seafood processing firms. The Mekong Delta region has 300 factories concentrated on shrimp, pangasius and seafood. The amount of seafood materials being processed is 70 per cent.

Quality and quality control of fishery products: the fisheries industry is one of the few international industries to which high quality assurance and quality control play a crucial role. Consequently, Vietnamese seafood products always meet the requirements of strict markets such as those of the EU, Japan, the United States, Australia, etc.

Enterprises have invested in technology to diversify processed seafood products, focusing on producing value-added products suitable for the tastes of each market. If previously exported seafood consisted mainly of raw products, the current rate of high value added products has reached about 50 per cent of output, and products are diversified with nearly 1,000 species. Many new VAT products have met the market requirements such as ready-made products, pharmaceutical products and cosmetic products made from seafood materials.

The main Vietnamese seafood products are shrimp, pangasius, tuna and mollusk in frozen form accounting for around 70 per cent. The main form of frozen products accounts for over 80 per cent of product volume, followed by dry products, fish sauce, canned food, fishmeal, etc. accounting for about 20 per cent.

Table 4.5 Seafood products (2013-2017)

TT	Name	2013		2015		2017	
		Value (mil. USD)	Structure (%)	Value (mil. USD)	Structure (%)	Value (mil. USD)	Structure (%)
1	Shrimp	3.110	46	2.952	45	3.863	46,0
	Tiger prawn	1.329	20	963	15	880	10,5
	White shrimp	1.579	23	1.742	27	2.535	30,2
	Others	206	3	247	4	448	5,3
2	Pangasius	1.761	26	1.565	24	1.785	21,3
3	Tuna	527	8	455	7	597	7,1
4	Squid and octopus	448	7	429	7	620	7,4
5	Others	879	13	1.171	18	1.534	18,3
	Total	**6.725**	**100**	**6.573**	**100**	**8.399**	**100**

Source: General Department of Fishery

4.5. Value chain analysis

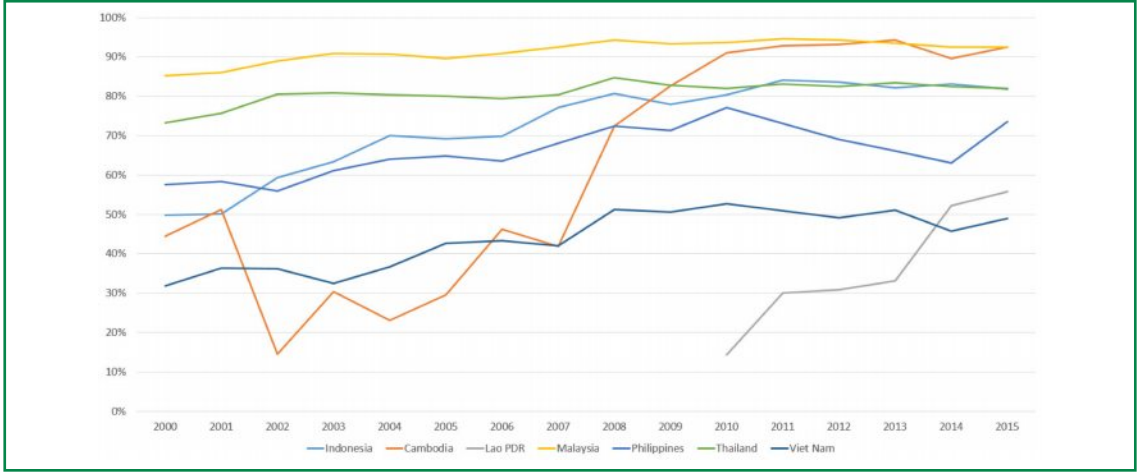
The PM decision No. 879/QD-TTg provides the following guidelines for food and beverages: From now to 2025, to prioritize the increase of the processing ratio of key agricultural, fishery and aquatic products and of timber products in step with the process of agricultural restructuring. To apply international standards to the production and processing of

agricultural products, build trademarks and raise competitiveness of Vietnamese agricultural products.

The focus is on increasing the amount of processed agricultural raw material. The World Integrated Trade Solution (WITS) allows us to carry out this type of analysis, using some nomenclatures, such as BEC (Broad Economic Categories) that groups agricultural products into primary (unprocessed) and processed goods.

Using BEC groupings, we obtain the following picture:

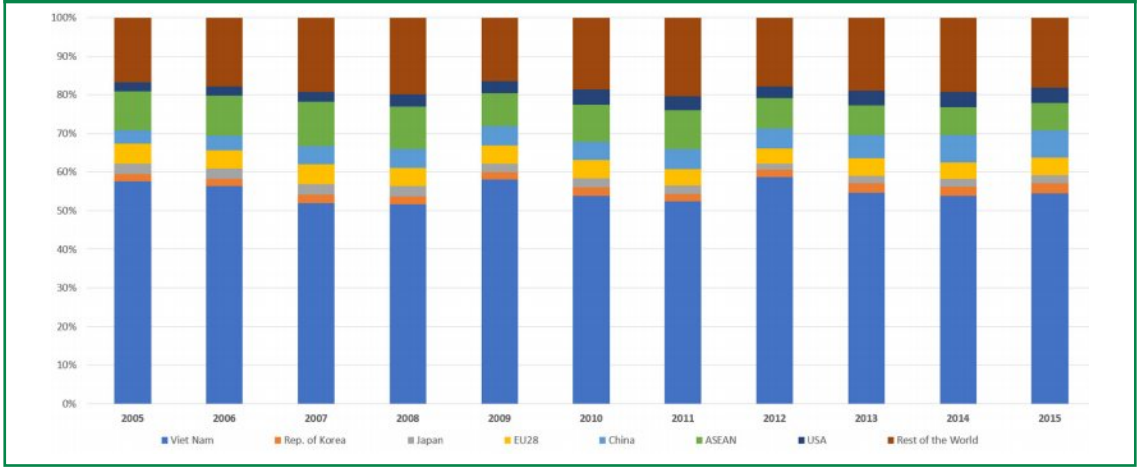
Figure 4.5 Processing ratio of Viet Nam's agricultural exports (2000-2015)



Source: BEC

Among the ASEAN comparators, Viet Nam is the only country that had not reached a processing ratio of above 50 per cent in 2015, while 4 of the 7 comparators remained above 80 per cent. Food, beverages and tobacco as a whole has one of the most integrated value chains when looking at the origin of value added in exports, with the share of raw materials provided domestically just below 80 per cent in 2015, though a worrying decreasing trend has been observed since 2005, in line with that of other industries.

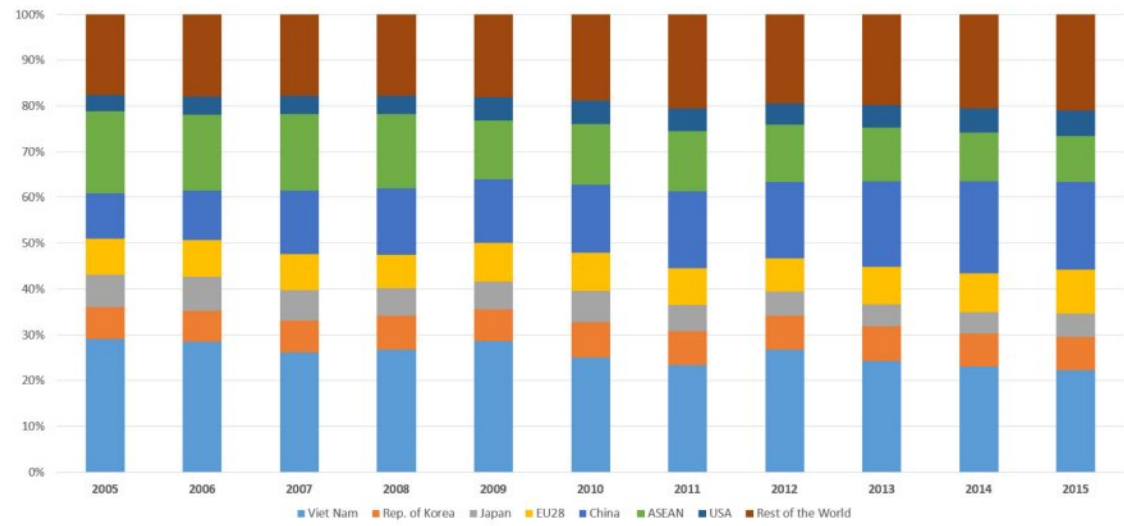
Figure 4.6 Origin of value added of Viet Nam's exports of FBT (from primary)



Source: OECD

The picture turns bleak when we look at chemicals as a strategic input material into agro-processing. Domestic contribution to the value added of exports declined from an already low share of below 30 per cent in 2005 to around 22 per cent in 2015, driven by increasing dependence on input materials from China.

Figure 4.7 Origin of value added of Viet Nam's exports of FBT (from chemical)



Source: OECD

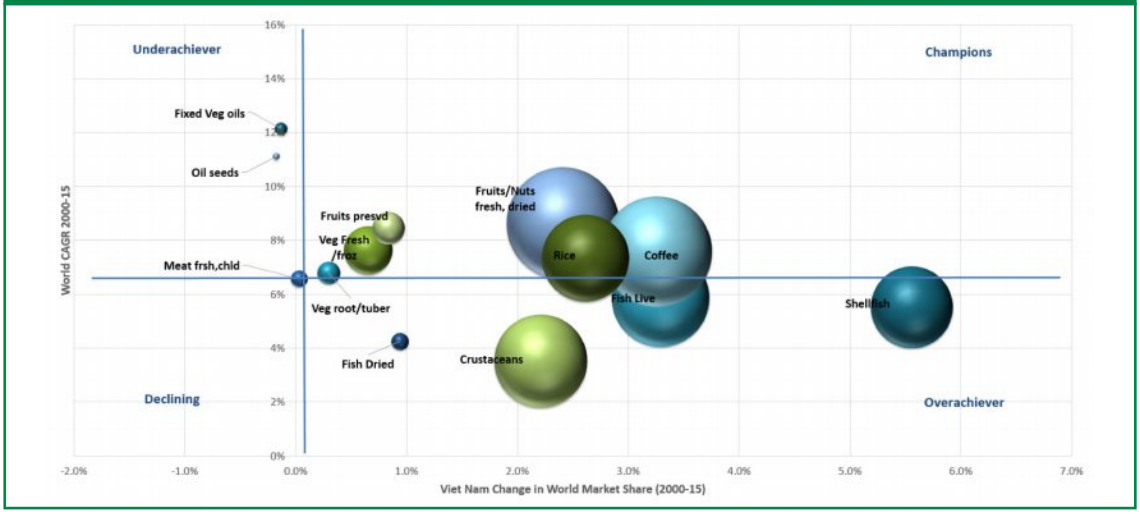
4.6. Market structure, dynamics and diversification

In 2015, Viet Nam boasted a very high revealed comparative advantage, particularly in the export of fish and shellfish (however processed or not) and in coffee and tea. The Product Space, however, revealed the isolation of the fish value chain in terms of its potential to link to other industries.

Market analysis can help policymakers add an additional important piece of information: whether global demand is dynamic for certain exported products so a country can determine whether risks of contraction are evident in the near future. A sectoral market matrix visualizes three important components of market analysis: 1) above average growth of global demand; 2) a country's export performance in terms of change in its market shares (globally or for certain markets); and 3) export values.

The following figure combines all of this information for selected food processing subsectors and cautions about the slowing dynamism of global demand for fish processing products compared to other successful agro-processing products such as fruits/nuts (dried), coffee, fresh/chilled vegetables and rice. The industry of processed vegetable oils provides a global opportunity that Viet Nam is currently not exploiting sufficiently.

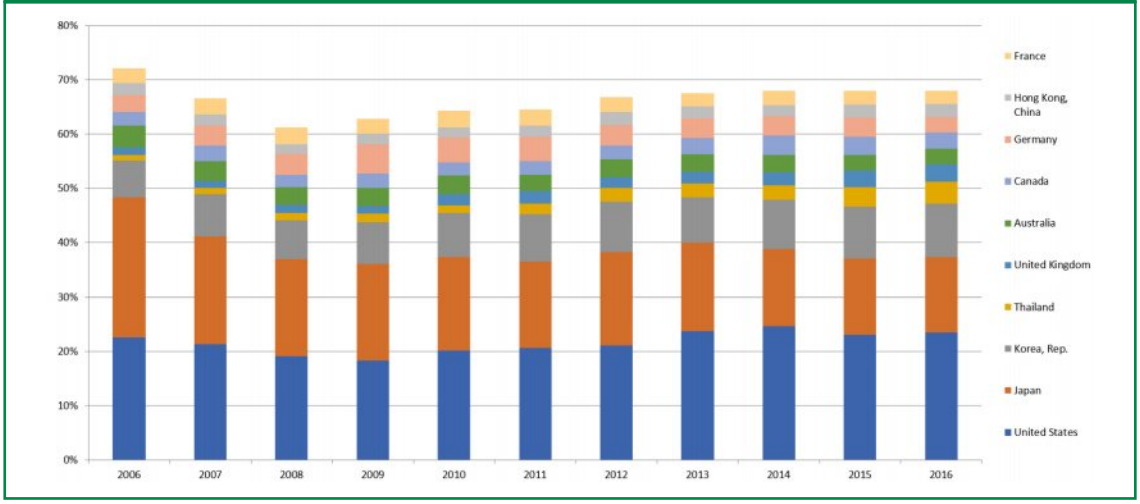
Figure 4.8 Sectoral market competitiveness matrix for Viet Nam (2000-2015) - food processing[11]



Source: UNCOMTRADE

Looking more closely at fish processing products, and considering their significance for Viet Nam's economy, the United States and Japan have traditionally imported a large share of Viet Nam's fish exports.

Figure 4.9 Top 10 Vietnamese import partners for fish (2006-2016)



Source: UNCOMTRADE

This share has continued to decrease since 2006 from nearly 50 per cent to below 40 per cent in 2016, signalling diversification. Thailand and the United Kingdom are emerging as dynamic new markets for Viet Nam's fish products; however, market diversification can still be improved further. If there are any political changes or any other negative unpredictable developments in major importers, the entire industry could be negatively impacted. This risk could be reduced if new FTAs with Japan and the Republic of Korea are negotiated and implemented smoothly.

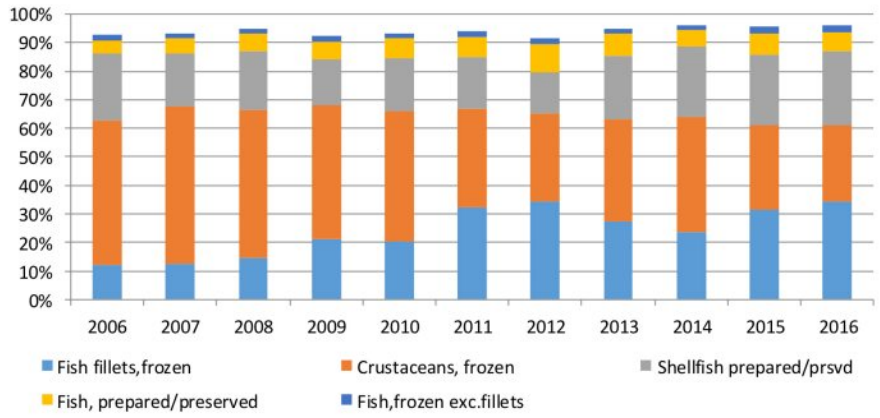
The analysis concentrates on the U.S. market which could represent a risk to the expan-

[11] Bubble size refers to export values in 2015.

sion of Viet Nam's fish processing industry in the future. Viet Nam's processed fish exports to the U.S. market reached USD 1.45 billion in 2017. The market continues to grow, though not at the same pace as in other countries. The compound annual growth rate of Viet Nam's fish exports to the United States was 6.84 per cent in the period 2012-2017.

The United States has a fairly concentrated market in terms of variety of imported fish. Five types of fish products account for over 90 per cent of the import market. Fish fillet has become the product with the highest demand in 2016, accounting for 30 per cent of the total share of imports, surpassing crustaceans, which dropped from 50 per cent to just over 25 per cent in 2016.

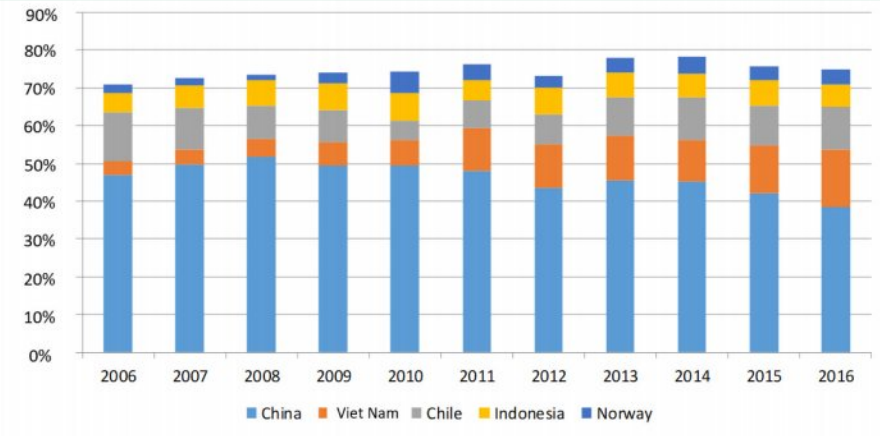
Figure 4.10 Top 10 exported fish products to U.S. (2006-2016)



Source: UNCOMTRADE

Viet Nam took advantage of this market opportunity, penetrating the expanding U.S. market for fish fillet and gaining increasing market shares against two main competitors, China and Chile. Current tensions between the United States and China might have a positive impact on the export of Vietnamese fish fillet to the U.S. market. However, Viet Nam should also continue diversifying towards other markets to reduce potential shocks from further protectionist measures of the United States government.

Figure 4.11 Top exporters of fish products to the U.S. (2006-2016)



Source: UNCOMTRADE

< Additional analysis: The market status of some agricultural and fishery industries >

1) Rice

In 2017, Viet Nam's rice exports increased again, reaching nearly 6 million tonnes. Export turnover reached USD 2.66 billion, up 20.4 per cent in volume and 22.4 per cent in value in 2016. The export price of rice has increased since 2017 and in the first months of 2018, reaching nearly USD 420/ T, and is now higher than the export price of Thai rice. The growth rate of rice export turnover tended to decrease (-1.9 per cent) between 2013 and 2017.

Viet Nam primarily exports rice to Asia and Africa. In 2016, 65.32 per cent of total rice exports went to Asia (36.97 per cent to China, 8.18 per cent to the Philippines, 8.48 per cent to Indonesia, 5.10 per cent to Malaysia), 16.82 per cent of total rice exports went to Africa, 9.66 per cent to the U.S, 1.69 per cent to Europe, 1.99 per cent to the Middle East and 4.51 per cent to Australia.

2) Coffee

Vietnamese coffee is exported to over 80 countries and territories around the world, accounting for 14 per cent of total market share and 10.4 per cent of the value of global green coffee exports, ranking second behind Brazil. The top 14 markets accounted for 80 per cent of Viet Nam's total coffee export turnover. In 2013/2014, Germany surpassed the United States to become Viet Nam's largest coffee importer. The share of exported coffee beans accounted for 90 per cent of the total production of green coffee annually; FDI enterprises have a strong export market share of between 20 per cent to 38 per cent of total export volume of coffee annually.

The total output of Viet Nam's coffee exports in the 2016/17 crop year reached 26.55 million bags, with a turnover of over USD 3.3 billion; the 2017/18 crop year was estimated to reach 26.65 million bags, with a turnover of around USD 3.5 billion. Although the commodity has a high export turnover, its growth rate in the period 2013-2017 was only 6.57 per cent per year on average.

The export volume of instant coffee has been continuously increasing since 2014: in the 2014/15 crop year, 1.28 million bags, up by 42 per cent compared to the crop year 2013/2014 were exported; in the 2015/16 crop year, 2 million bags were exported, an increase of around 17 per cent compared to the previous crop year; in 2016/2017, exports of instant coffee was estimated to increase by 100,000 bags to reach a total of 2.1 million bags. The United States, Japan, China, Russia and the ASEAN countries are the largest import markets for Viet Nam's instant coffee.

Roasted coffee mainly serves the domestic market, but the output of roasted coffee has tended to increase since 2014/15. In the 2014/15 crop year, coffee production for export increased from 120,000 bags to 457,000 bags (up 280 per cent compared to the crop year 2013/14). In the 2015/16 crop year, 550,000 bags of roasted coffee were exported.

3) Fruits and vegetables

The fruits and vegetable industry registered an impressive growth rate, reaching an average of 34.6 per cent/ year. A huge breakthrough was made in 2017, in particular, with a turnover of USD 3.45 billion, an increase of 42.5 per cent compared to 2016.

Table 4.6 Ten main export markets in 2016/2017

TT	Country	Year 2016 (USD 1.000)	Year 2017 (USD 1.000)	% 2017/2016	Market Share %	
					2016	2017
1	China	1.738.907	2.650.000	145,5	70.8	75,6
2	USA	85.602	103.000	120,9	3.4	2,94
3	Rep. of Korea	82.637	90.600	109,6	3.4	2,59
4	Japan	75.122	127.000	169,3	3.1	3,64
5	Netherlands	54.722	63.300	115,7	2.2	1,81
6	Malaysia	48.054	50.050	104,0	2.0	1,43
7	Taiwan ROC	45.437	46.550	122,5	1.8	1,33
8	Thailand	40.031	36.194	90,4	1.6	1,03
9	Singapore	28.546		6.573	1.2	
10	Australia	26.045			1.1	

Source: Statistic Center of MARD

The major export markets of Vietnamese vegetables and fruits are China, Japan, the Republic of Korea, the United States, the Netherlands, Taiwan ROC, etc. China is the largest market for vegetable and fruit exports. At the end of May 2017, China was the leading market for fruit and vegetable imports from Viet Nam with UDS 1.06 billion, up by 51 per cent YoY and accounting for 75 per cent of the total value of vegetable exports. China was still the largest market for vegetable and fruit imports in 2017, accounting for over 75.6 per cent market share, growing by 45.5 per cent. Exports to fastidious markets continued to grow: Japan accounted for 3.64 per cent of total market share and a growth value of 69.3 per cent; the United States accounted for 2.94 per cent of total market share and a growth value of 20.9 per cent; Taiwan ROC's increased by 22.5 per cent and the Netherlands' by 15.7 per cent.

4) Cashew nuts

In 2017, Viet Nam processed and exported 1.56 million tonnes of raw cashew nuts and 362.7 thousand tonnes of cashew nuts, gaining an export turnover of USD 3.62 billion. When combined with deep processing products and by-products (cashew nut oil, cardanol, etc.), the industry's export turnover in 2017 was approximately USD 4.0 billion, the highest figure to date.

Vietnamese cashew nuts are exported to 95 countries and territories worldwide, and continue to occupy the world's No. 1 position, maintaining a market share of over 60 per cent of the total global cashew export value (about USD 5.5 billion). The largest importers were the United States (USD 1.16 billion, accounting for 31.24 per cent of total market share), the Netherlands (USD 542 million, 14.56 per cent); China (USD 464.2 million, 13.19 per cent); Singapore (USD 150.1 million, 3.94 per cent); United Kingdom (USD 149.2 million, 4.31 per cent).

According to VINACAS's estimation, domestic consumption of cashew nuts in 2017 was approximately 8.0 per cent of the total processed export volume. Cashew nuts are promoted and consumed in large amounts on the occasion of the Lunar New Year and important family events and anniversaries.

5) Sugar

Sugar cane produced in Viet Nam mainly serves the domestic market, with nearly 100 million people consuming around 20 kg/ person annually. The total sugar volume of Vietnamese consumes is nearly 2 million tonnes/ year. While the production capacity of sugar mills is stable at 1.5 million tonnes/ year, demand for sugar products is high, thus creating opportunities for sugar factories and the expansion of production. However, because Viet Nam does not have many advantages in sugar production, its sugar industry faces fierce competition from rivals in the region and the world.

The amount of sugar exports remains fairly low due to the high cost, and mostly small single shipments and small export goods are exported across the borders.

6) Fisheries

In 2017, the export turnover of seafood reached USD 8.3 billion, with shrimp exports accounting for the largest proportion with a turnover of USD 3.8 billion. Recently, importing countries have been building technical barriers that have caused difficulties for Vietnamese seafood imports, but thanks to the efforts of processing enterprises and management agencies, the fisheries industry continues to stand firm and is gradually expanding into the consumer market.

Export market:

- In the period 2013-2017, Viet Nam's seafood products were exported to 160 countries and territories, with key products such as shrimp, pangasius and some other important product groups/ products such as squid, octopus, sea fish, frozen clams and dry goods.

The main markets of seafood exports are still the EU, the United States, Japan and China, but they are expanding to other markets such as the Republic of Korea, the ASEAN countries and Australia. In terms of market structure, the United States and Japan have shown negative growth rates, but in terms of value, they are still the two dominant markets.

Table 4.7 Export markets in 2013-2017

TT	Market	2013		2015		2017		Change (%/year)
		Value (mil.USD)	Structure (%)	Value (mil.USD)	Structure (%)	Value (mil.USD)	Structure (%)	
1	U.S.	1.518	22,57	1322	20,11	1.360	16,2	-1,43
2	EU	1182	17,58	1175	17,88	1411	16,8	1,03
3	Japan	1152	17,13	1043	15,87	1.248	14,9	-1,38
4	China	573	8,52	615	9,36	1.228	14,6	14,49
5	Rep. of Korea	521	7,75	585	8,9	747	8,9	5,80
6	ASEAN	390	5,8	499	7,59	587	7,0	10,49
7	Australia	206	3,06	180	2,74	174	2,1	-2,49
8	Others	1183	17,59	1154	17,56	1.644	19,6	-2,96
Total		**6.725**	**100**	**6.573**	**100**	**8.399**	**100**	**1,60**

Source: Custom and VASEP period 2013-2017

- Domestic market:

With a population of nearly 100 million people and consumption of seafood increasing to around 30 kg/ person annually, the domestic market has started playing an important role (between 2.5-3.0 million tonnes of seafood/ year are consumed in Viet Nam). Many seafood and commercial processing enterprises are engaged in the processing and distribution of seafood, which has contributed to changing consumption behaviour of unprocessed fresh seafood. Ready-made, processed and ready-to-eat products meet the trend of urbanization and the needs of today's young people.

4.7. SWOT analysis

Strengths	Weaknesses
+ The food processing industry accounts for a significant share of output in manufacturing value added and gross domestic product (GDP), it has attracted a lot of foreign investment in recent years, with some important multi-national companies such as Unilever, Nestlé and San Miguel gaining foothold in Viet Nam. + Vietnamese consumers, especially the younger and wealthier class, can drive domestic demand. + The industry is being restructured towards higher productivity.	+ There is a great disparity in consumer incomes between urban and rural areas. + The size of establishments has recently increased across all sectors, but the food processing industry is generally still very fragmented. + The focus on productivity is reducing employment generation; more reliance on capital productivity and FDI. + There is still a heavy reliance on imports of agro-processing technology equipment from abroad.

+ It has provided a stable supply of raw materials for domestic manufacturers, creating integrated additive value chains – an important advantage in the current period of global instability.	+ In recent years, reliance on imports of raw materials from abroad has increased and is significantly dependent on chemicals inputs from abroad. + Viet Nam's infrastructure is still too weak to match the pace of the country's economic growth.
Opportunity	**Challenges/ Risks**
+ Increased income and lifestyle changes, especially in urban areas, accompanied by consumer demand for all types of food items open up more opportunities for the food processing industry. + Large domestic market, increased export opportunities, low labour costs, along with successful privatization of food companies opens more investment opportunities in Viet Nam. + There could be mutual benefits in the expansion of the chemical industry accompanying the development of the agro-industry. + The tourism industry could create additional forward linkages for the food processing industry.	+ Viet Nam's WTO membership brings challenges for small companies against international competitors. + The increase in the cost of agricultural commodities may undermine profits for manufacturers of processed foods. + Viet Nam should further expand market diversification to reduce the risk of shocks in the face of increasing global protectionism.

< Additional analysis: The weakness and shortcomings of the agro-processing industry >

1) The contribution of the agro-processing industry in terms of increasing the added value of products remains limited, and the push for changes to the structure of crops and livestock are not strong.

Agro-processing is not keeping pace with the requirements of agricultural production, many industries face bottlenecks: in the value chain, the processing stage only uses 5 per cent to 10 per cent of output of agricultural production, which is particularly evident in the meat and vegetable industry. Products involving processing stages are relatively developed such as: cashews, seafood, furniture, sugar cane, rice, coffee, etc. The major processed products are raw materials, accounting for 70 per cent to 80 per cent, which do not notably increase the added value for agricultural products.

Some unprocessed agricultural products are available as well. Consumption is still in the form of fresh, raw or primary processing, i.e. the processing stage does not have much impact on changing the structure of livestock and crops and the seasons have little impact; there is no orientation or guidance for raw material production.

2) The quality of raw materials is still low, the price is high, there is always a risk of not ensuring food safety

The more integrated production and business activities are, the clearer the conflict between small-scale production and high demand for large scale commodity production. The application of technical advances in seed and cultivation is still weak in Viet Nam, hence many types of agricultural products are produced in lower quantities and quality compared to other countries in the region, production costs are still high, the rate of loss after harvest is still high, the quantity and quality of the processing industry (vegetables, fruits, tea, sugarcane, etc.) is insufficient.

The production cost of certain agricultural products is still high compared to other countries in the region and the world, so it is difficult to export processed foods such as sugarcane, oranges, cashews, shrimp, pigsetc.

Current production is unsustainable, and food insecurity is a constant threat. Contamination of raw materials, pesticide misuse, misuse of antibiotics, use of banned chemicals in the conservation of post-harvest products still pose a risk and if they are not prevented, markets could be lost. Many products may be ranked first or second in the world in terms of export quantity, but the selling price of these products is often lower than that of other countries in the region.

3) The level of agro-food processing technology is not high, the rate of high value-added products is still low, the product category is not diversified.

Investment in the agro-processing industry is not proportionate to the growth rate of agriculture. The renovation of equipment in recent years has only been 7 per cent / year (equal to 1/2 to 1/3 of the minimum level of other countries). The level of processing technology for many agricultural products accounts for over 90 per cent of the average and backward level.

Investments in the agro-processing industry are not proportionate to the growth rate of agriculture. The renovation of equipment in recent years has only been 7 per cent /year (equal to 1/2 to 1/3 of the minimum level of other countries). The level of processing technology of over 90 per cent of agricultural products is average or underdeveloped. This applies in particular to the following product lines:

- The coffee processing industry uses outdated technology (this applies to over 70 per cent of the industry's factories).

- Tea processing industry: many factories still use outdated equipment from the Soviet Union and China, and the majority of tea products are in a preliminary form, the value of goods is very low compared to commercial tea products of other countries.

- The cashew processing industry, despite its many achievements, is still using simple production techniques. In coming years, the reduction of manual labour will pose a big challenge.

- The wood processing industry has not yet been effectively organized, a specialization process has been established, many businesses import wood materials for preliminary processing, there is some processing and distribution of wood products.

Low value-added products still account for a large share of exports: rice exports are mainly of low quality; black tea (lower price than green tea) accounts for 60 per cent of output; coffee processing under wet processing technology accounts for only about 15 per cent of the total coffee export volume; value-added wood chips for export are very low (19.4 per cent) but account for 35 per cent of total exported wood products.

The structure of processed products is unviable, products are unvaried, investments in deep processing and the production of high value-added products are also low. In terms of total product output, coffee accounts for only 10 per cent, cashews for 5 per cent, tea for 5 per cent, pangasius for 10 per cent and shrimp for about 40 per cent.

4) **The organization of linking production with processing and consumption is still loose, and no close connection has been created ye between the processing industry, raw material production and the consumption market.**

The processing facilities are not linked to the production of raw materials, and thus do not support farmers' access to advanced technologies and best practices to produce larger quantities of goods, with better quality, thus limiting development and the production of sustainable goods:

- Sugar and cashews: the factories have their own raw material resources areas, but the level of investment is limited, meaning materials need to always be bought and sold which creates bad practices for farmers in producing and harvesting raw materials, reduces production efficiency and product competitiveness.

- Large tea plants have raw material resources areas, but over the years, local authorities have allowed the building of smaller production units, which are occasionally

built in the middle of the plants' large raw material resources areas, leading to conflicts in terms of buying/procuring raw materials, resulting in low quality raw materials which affect the quality of products and the Vietnamese tea brand.

- Rice processing plants, coffee, cashews, seafood, etc. Primarily purchase raw materials, most factories are not linked to raw material resources areas, hence the quality of raw materials is unbalanced.

The markets of AFF products has not been efficiently exploited, there is a lack of long-term orientation, many barriers and low stability, especially in the domestic market.
The quality assurance system for agricultural products and trademark registration is poor.

5) The use of by-products to produce by-products, improve production efficiency and limit processing, supporting industries have not yet developed.

The organization of production and utilization of waste products is very limited, and is not fully exploited. For example, in rice production, with an output of over 40 million tonnes of rice/ year, about 40 million tonnes of straw, 8 million tonnes of rice husk and 4 million tonnes of rice bran could be produced each year as oil, bran, animal feed, rice husk firewood, fertilizer, fungus, etc. In sugar production, about 1.0 million tonnes of bagasse could be used annually to generate electricity and 600,000 tonnes of molasses could be produced as biofuel; the processing of around 400,000 tonnes of raw shells annually could be used to process cashew shell oil, etc., but this is rarely the case.

Supporting industries in wood processing are underdeveloped, most auxiliary products are imported and the rest is produced by metal craft artisan villages of a low quality, and no quality assurance exists for high quality wood products. According to preliminary statistics, Viet Nam currently only has 26 enterprises that produce auxiliary products for the wood processing industry. This is one of the limitations and there is potential to increase the value of Viet Nam's wood processing industry.

6) Trade and trade promotion, the removal of barriers are still limited

Insufficient research, analysis and market forecasts (especially with reference to export markets) have has been carried out. Market forecasts are not specific, not timely, not really oriented towards production development and product processing based on market signals, and Viet Nam's AFF products therefore continue to remain in the low value segment in the world market.

Most of Viet Nam's agricultural, forestry and fishery products have not yet established a reputable brand in the global market, despite strong products and simple packaging designs.

Trade promotion and product promotion organizations have been able to achieve some results, but they are not professional and methodical. The main marketing tool are intermediary importers, customers' brand names are used, but consumers lack access and firms have only little access to large distribution channels of other countries. No market development strategy exists for key products and there are no big and reputable brands.
The barriers to export markets remain high: there are technical barriers to trade (TBT) that Viet Nam's agricultural products face, including antibiotic residues in fisheries, plant protection products and residues, biocides, fungi in products such as rice, pepper, vegetables, etc. Barriers to anti-dumping taxes, anti-subsidy duties, labour conditions, environmental standards, traceability, etc. are increasing.

7) Policies are still inadequate, limited investment in agro-processing

The government has issued many tools and policies to initiate major changes in agricultural production in general and in agro-processing of agricultural, forestry and fishery products, in particular. However, the existing tools and policies are still inadequate and considerably limit processing capacity. In recent years, a number of large corporations such as TH, VINGRUOP, NAFOOD, DOVECO, T&T, MASAN, etc. that have invested in the agricultural production chain, thus partially improving the shortage of capital, but businesses generally always face a number of difficulties, do not have sufficient capital for production and for business expansion.

Some major shortcomings include:

- The system of legal documents is inadequate to effectively adjust each commodity sector's production activities; the system of standards and technical regulations is insufficient and inconsistent.

- The management mechanisms of the state and the coordination of state management agencies overlap and are inconsistent. The granting of investment licenses is not in accordance with the actual planning, resulting in an imbalance between raw material production and processing, thereby reducing the competitiveness of domestic production.

- Some policies such as land, credit finance, science - technology, human resource training, etc. are inadequate.

- The implementation, inspection and supervision of policies is still limited.

8) Human resources do not meet the necessary requirements

The level of management and professional skills is low, the number of SMEs processing

agricultural products that provide training is very low, i.e. almost no professional training is available. According to statistics, up to 55.63 per cent of business owners have completed secondary education or lower, of which 43.3 per cent have completed the primary level of education.

Up to 75 per cent of the labour force in small and medium enterprises have not received any technical or professional training; the implementation of social insurance policies, such as health insurance, is inadequate, which reduces the quality of work in small and medium enterprises. The application of modern advanced technology is therefore also difficult.

4.8. The food processing industry's strategic objectives

In the Prime Minister's Decision No. 879/QD-TTg approving Viet Nam's industrial development strategy through 2025 with a vision to 2035, the agricultural sector has been identified as a priority sector, with the aim of restructuring the agricultural sector by 2025, increasing the processing ratio of key agricultural, fishery and aquatic products, applying international standards to the production and processing of agricultural products, branding and building trademarks and strengthening the competitiveness of Vietnamese agricultural products.

The sector's development objectives were initially identified in the Prime Minister's Decision 124/QD-TTg of 2 February 2012, which approved the master plan for production development of agriculture through 2020 with a vision to 2030, but were replaced in August 2019 by new regulations on sectoral master plans under the Master Plan Law and Resolution 63/NQ-CP of 26 August 2019.

To date, only the objectives of the fishery industry have been set out in Viet Nam's Fisheries Development Strategy through 2020, approved by the Prime Minister's Decision 1690/QD-TTg of 16 September 2010. These are as follows:

- To industrialize and modernize the fishery industry and to continue to comprehensively and sustainably develop it into a large commodity production industry with rational structures and forms of production, high productivity, quality, efficiency, prestigious brands, competitiveness and steady integration into the world economy. The aim is further to gradually increase fishermen's skills and improve their quality of life in general while protecting the environment and ensure the security of the seas and island areas.

- The fishery industry shall aim to account for 30 per cent to 35 per cent of GDP of the agriculture-forestry-fishery sector, with its production value rising by 8 per cent to 10 per cent annually. The export turnover of seafood shall reach USD 8-9 billion. Total fishery output shall reach 6.5-7 million tonnes, of which aquaculture shall account for 65 per cent to 70 per cent.

Five million jobs shall be created for fishermen with an average per-capita income tripling the current level. Moreover, over 40 per cent of fishermen shall receive training.

4.9. Policy recommendations

Viet Nam is an emerging market economy in South East Asia. Like many countries in the region, it has adopted a strategy of export-led growth. Recently, Viet Nam became a middle-income country, but its objective is to join the group of high-income countries. Despite the current global economic downturn, Viet Nam continues to grow. It has a population of 95 million and a steadily growing economy, making for a sizable domestic market. Sixty per cent of the population is below the age of 30 years, and this younger generation is expected to form an important consumer base in the next 10 years. People in Viet Nam are spending a significant portion of their income on food items (at a 6:4 ratio of food to non-food items) and are increasingly looking to purchase ready-to-eat foods and high-end food products due to the increase in disposable income for families living in cities and the implementation of a five-day work week policy.

According to various sources, both Viet Nam's food and beverage processing industries have witnessed strong growth over the past 5 years, and the industries are expected to continue to grow significantly. Of Viet Nam's industries, agro-processing and manufacturing attract the highest global investment. The food industry accounts for around 20 per cent of the manufacturing sector and the high level of investment will further promote its development and market competitiveness. In addition, Vietnamese consumers, especially the younger and wealthy class, can drive domestic demand. The country moreover has a dense retail distribution network. The increase in population and investments are additional drivers that support the growth of the food industry.

With the exception of confectionery and dairy products, most food processing firms are small, meaning the capital equipment ratio is low, as is their capacity for research and development. In addition, there is a lack of well-developed food industry clusters and a wide income gap between urban and rural areas is evident. Based on the above SWOT analysis, the following recommendations can be made:

A. Support for research and development

It is virtually impossible for small food processing firms to develop new products on their own and improve their product quality. Research and development of their products must therefore be promoted by the government or public agencies representing the government.

As the examples of the Republic of Korea show, the government can apply two methods to support research and development in the food industry clusters. First, the government can develop and share food ingredient varieties and cultivation techniques. Once

the government agency has developed and improved the quality of food products, high yield varieties with shortened cultivation periods for crops, fruit, vegetables, livestock and aquatic products can be established, and the cultivation methods can be shared with the farming, livestock and fishery communities. Second, the government can develop new final products and processing technology using the local ingredients and share and popularize these. For example, various packaging technologies for finished products can be offered to relevant enterprises. The Republic of Korea, for instance, established specialized food industry research centres in each region, such as RIS, to provide corporate support which in turn attracts other enterprises into the area. These centres provide R&D and corporate support to improve processes and the development of new products, as well as assistance with marketing and mass distribution.

B. Equipment/facility lending programme

The majority of food processing SMEs relies on nature rather than the utilization of equipment. For example, they dry their products using traditional methods such as sunlight and wind rather than deploying expensive equipment. It is therefore difficult to meet international food standards/ product safety standards or to maintain standard product quality, which ensures the product's value as a brand. This negatively influences its pricing as well. Traditional methods of drying food are very labour intensive, thus decreasing the price of the product, which results in a decrease in profitability and production. This is true for all production processes such as cleaning, cutting, aging and packaging.

The government or public sector could purchase the equipment the majority of SMEs that cannot afford expensive food processing machines need and make it available for them to use. To this end, the government must survey SMEs in the food industry clusters to compile a list of essential processing machines and equipment for each stage of food processing. The government should then conduct a demand survey of SMEs to categorize machines as more or less essential. Understanding which equipment is most needed by SMEs is the key to success of equipment rental projects.

C. Fostering and supporting skilled labour

The technical skill level of the SMEs' workforce is bound to be inferior to that of workers employed by large enterprises. The government and public sector can play a part in narrowing this gap.

(1) Training in operating and managing food processing machines and equipment

The most urgent need of SMEs within the scope of food processing machine and equipment rental projects is the training of SMEs' workforce in operating and managing the machinery and equipment put in place to support SMEs within the local food industry cluster. The majority of SME workers use traditional food processing methods and often do not know how to use food processing machines provided by the public sector.

In the early stages of an equipment rental project, an expert operates the equipment necessary for each production process. As this process is repeated, the operation of the equipment is gradually handed over to the SME's workers, who have been trained to use the equipment on their own. Throughout this process, SME staff must be trained to properly operate the use of each food processing machine.

(2) Skills development through linkages between education institutions and SMEs

This programme is designed to connect SMEs with students in education institutions such as technical and engineering schools in acquiring specialized skills through practical experiences in SMEs. For example, a student who has completed the regular curriculum and is ready to graduate is offered the opportunity to apply the theoretical skills he/ she has acquired in school in a small enterprise that uses these skills. In turn, the enterprise has skilled manpower at its disposal.

D. Establishing food industry clusters in extremely underdeveloped production areas of agricultural, livestock and fishery products

The government can establish food industry clusters and create mutually beneficial economic effects between different players in the economy by establishing food processing enterprises (secondary industries) located in major production areas of agricultural, livestock and fishery products scattered across the country and by supporting these companies through the means mentioned above. If food processing firms are located in close proximity of farming and fishery communities and can process their products, their sales will increase and their revenue will stabilize.

Standardized, fresh raw ingredients can be directly delivered to the food processing firms in the food industry clusters without substantial transport costs and can hire cheap labour from the region. As production increases, local residents are able to find employment in farming communities and in food processing enterprises, which leads to a virtuous circle for the local economy where the income of local residents rises, consumption increases and the population grows, leading to an increase in the local economy's production and income. In other words, the central government can promote local economies across the entire country, thereby increasing local farm production, local incomes, local consumption and production of food.

Not only the food industry as a whole would benefit from such measures, it would also result in balanced regional development. The food industry clusters could use agricultural and fishery products to revitalize the local economy in underdeveloped, non-urban areas and address the economic gap between urban and rural areas. Policies promoting food processing clusters and regional agricultural clusters are the Republic of Koreas two 'leading policies. Policies aimed at promoting food processing clusters should seek to eliminate industrial and economic disparities between metropolitan and non-metropolitan areas and achieve a more balanced development. The regional strategy promotion project

in particular aims to promote industry in non-metropolitan areas by designating regionally specialized industries as strategic industries in the region.

E. Standardization of local produce by utilizing a common brand

A co-brand system similar to that implemented by local governments in the Republic of Korea should be established. It allows local governments/ the public sector create a common brand for similar regions and agricultural products and to increase the marketability of their products through quality management and certification.

A similar strategy to stimulate the food industry is to introduce joint production and shipment systems for local fisheries that produce raw ingredients and process food, using the local brand initiated and promoted by the local government. If the local government introduces standards for joint production and shipment for producers of agricultural, livestock, and aquatic products a stable supply and better quality of food ingredients can be achieved. A stable supply of food ingredients of uniform quality produced under the supervision of the local government can be delivered to food processing enterprises in the same region. Co-branding of finished food products allows engaging in joint marketing and shipment of products and leads to quality improvements.

Local food processing enterprises using joint brands supervised by local governments will enhance consumer trust in those enterprises' products and enhance their market shares, which is not possible for individual enterprises. Food industry clusters in underserved areas and local brand management promoted by regional municipalities can be used to revitalize underdeveloped local economies.

Food industry policies in the Republic of Korea

The Republic of Korea's food industry policies can be divided into food industry development, safety and policy to encourage cooperation with primary enterprises to produce raw materials. Food industry development policies were introduced in 2007 and are the foundation of the Food Industry Promotion Act supervised by the Ministry of Food, Agriculture and Rural Affairs. This Act aims to contribute to improvements in the quality of life and national economic development by promoting the healthy development of the food industry through improved collaboration between food processing enterprises, agricultural enterprises and fisheries and enhancing competitiveness by providing a stable supply of a variety of high-quality foods.

The Act requires the establishment and implementation of basic plans to promote the food industry and strengthen its competitiveness. These basic plans detail the direction of food industry promotion and includes the following: 1) basic directions

for the development of the food industry; 2) strengthened cooperation between food processing, agriculture and fisheries; 3) means to support the food service industry; 3b) development, distribution and globalization of traditional Korean foods; 4) improvement of food quality, supply and demand, and certification; 5) development and dissemination of food industry-related technology; 6) statistics, information and training of professional skilled workforce; 7) promotion of consumption of healthy food ingredients; 8a) provision and protection of quality information for the consumer; 8b) development of national food clusters; 9) all other issues necessary for the promotion of the food industry.

Food safety policy is based on the Food Sanitation Act, which was enacted in 1962 to define and regulate food sanitation and food safety hazards. Article 1 defines the Act's purpose: to contribute to the enhancement of public health by preventing sanitary hazards, providing appropriate food information and improving nutrition. In addition, the Basic Food Safety Act, enacted in 2008, aims to provide the public with safe and healthy diets by clarifying their rights and the responsibilities of national and local governments, and defining basic issues related to the introduction and adjustment of food safety policy.
The Ministry of Agriculture, Food and Rural Affairs established and enforced the Food Industry Development Master Plan based on the above two laws in 2008. This Master Plan comprises development policies for food clusters and for research and development, the expansion of exports, food quality management and safety, including quality certification for agricultural and aquatic food products and the establishment of safety management systems.

In 2011, the Framework Act on Agriculture, Rural Community and Food Industry was implemented and plans for promoting the food industry are being established. According to Article 14 of this Act, a Plan to Develop Agriculture, Rural Communities and the Food Industry is being created, with the first round of planning for 2014-2018 already having been released, followed by the 2018-2022 Basic Plan to Promote the Food Industry released and implemented in February 2018. These Plans include development goals for agriculture, rural communities and the food industry, government measures and plans for financing as well as measures to promote self-sufficiency in major food and food items and to expand their consumption.

The 2018-2022 Basic Plan to Promote the Food Industry presents plans to promote the development of the food industry in light of the population decrease (due to low birth rates), low economic growth, and the gap between urban and rural communities. The Plan also suggests ways to link the food industry with the Fourth Industrial Revolution through "smart farms" to foster a cutting-edge agricultural industry.

Chapter 5. Textile apparel and leather – footwear (TALF)

5.1. Definition and classification

For the purposes of this analysis, the textile and garment industry has been grouped together with leather and footwear (hereafter TALF). The industry statistics have been collected from the system of categories of international goods used in the import and export statistics of goods: SITC Rev 3/ 4), ISIC Rev.4, VSIC 2018.

Based on the characteristics of the supply chain of textile products, footwear and the similarity between the product codes in the list of the international commodity classification mentioned above, the products of the industry are arranged into six specific groups.

Table 5.1 TALF subsector groupings according to ISIC and SITC

	Subsector description	VSIC 2018, ISIC Rev.4 (3/4 digits)	SITC Rev. 4	SITC Rev. 3
1	Fibre	1311, 2030	2634, 264, 265, 266, 267, 2687, 651	Except product code 2672
2	Fabric	1312, 1313, 1391, 1392, 1393, 1394, 1399.	652-5, 656-8, 659	Except product code 65911
3	Clothing apparel	1410, 1420, 1430	613, 841-5, 846, 8481-4	
4	Animal fur & leather	1511	611, 612	
5	Luggage, bags, etc.	1512	831	
6	Footwear	1520	851	

5.2. Development of the TALF industry

Viet Nam's textile industry has existed in Viet Nam for at least a century, while the footwear industry has existed since the 15th century. In 1889, the first textile factory was built by the French in Nam Dinh, followed by the establishment of textile factories in Hanoi in 1894 and later in Hai Phong. Following the country's independence, the textile and footwear industry grew rapidly, with production output increasing fast due to the establishment of many new factories. In the South, European textile machinery firms were established while the North witnessed the creation of state-owned enterprises using equipment from China, the former Soviet Union and Eastern Europe.

1976 marked a new development in the textile and garment industry, when the industry concluded subcontracting agreements and began exporting (processing cotton and exporting finished products). Viet Nam's textile and garment industry rapidly developed its production capacity, supplying raw materials for production, fabrics, clothes, blankets, etc. for consumption and became a major driver of imports and exports.

Prior to the 1990s, footwear was primarily exported to the Soviet Union but was of low quality and characterized by low product diversification. The precursor of today's Viet Nam Leather and Footwear Corporation, the Viet Nam Union of Leather and Footwear Enterprises, was founded on 11 October 1986.

In the early 1990s, businesses invested in upgrading and buying new equipment and technologies to meet market demands. The Law on Foreign Investment Promotion contributed to the creation of joint ventures and 100 per cent foreign-invested enterprises, initiating important changes from technological equipment to product quality. Throughout history, Viet Nam's textile and footwear industry has continuously undertaken efforts to compete in the context of international economic integration.

5.3. Production and employment

The added value of Viet Nam's textile and footwear industry in 2016 was USD 9.018 billion and recorded a growth rate of 18 per cent in the period 2011-2016 and 13 per cent in the period 2006-2010, with the industry's total export value amounting to USD 46.123 billion in 2016; the share of the textile and garment industry accounted for 64 per cent. The textile and footwear industries still have low added value. The main reasons for this include: (i) high dependence on FDI, particularly from multi-national corporations, through subcontracting with income mostly deriving from processing and assembling; (ii) high dependence on imported materials for production such as fibres, fabrics, natural leather and artificial leather; (iii) lack of capital, technology and high technical staff in domestic SMEs.

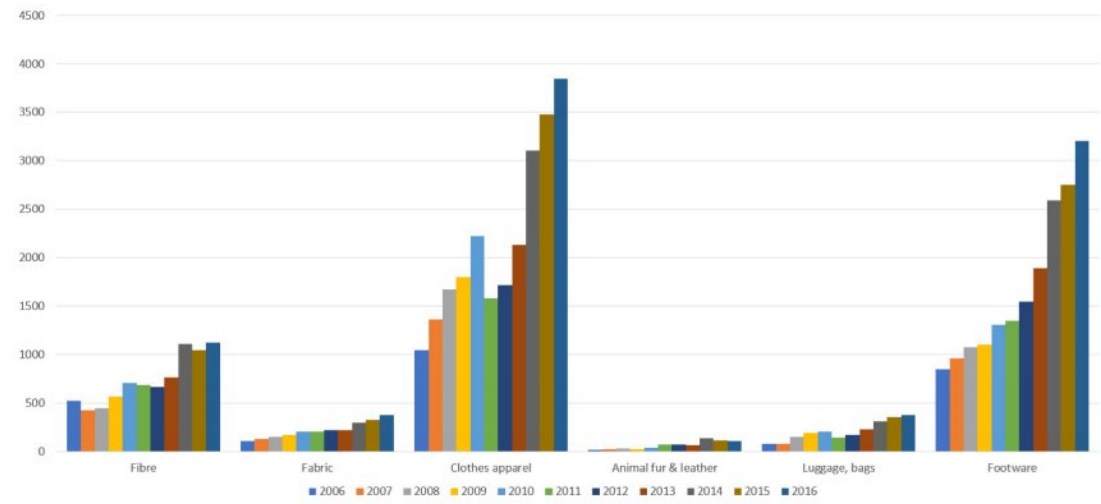
In 2006, 2011 and 2016, garments and clothing items produced the highest value added among the listed subsectors, with figures jumping from USD 1.047 billion in 2006 to USD 3.844 billion in 2016, and accounting for 39 per cent to 43 per cent of the entire industry's value added. The average growth rate of this group of products reached 19 per cent in the period 2011-2016. The global financial crisis affected the industry in the period 2011-2013, but recovered well thereafter.

The footwear industry, which contributed USD 3.201 billion of value added in 2016, up by 16 per cent compared to 2015 and accounting for around 35 per cent of the entire industry ranked second in terms of value added. It registered the same growth rate as the apparel industry in the two periods.

The footwear industry suffers from the same weaknesses as the apparel industry: high dependence on exports and subcontracting schemes, import of intermediate inputs, limited contribution from the domestic chemical industry, and a predominant focus on assembly, with sewing stages accounting for 60 per cent and 70 per cent for leather and shoes, respectively. Self-design, production, branding and distribution still account for a very small share and need to be increased.

Fibre products ranked third in terms of value added; however, their share tended to decrease gradually, from 20 per cent in 2006 to 12 per cent in 2016. The added value of the remaining three groups, fabrics, leather and handbags did not exceed 10 per cent in total[12]. Except for fabrics, which did not report data for certain subsectors, the added value figures are in line with the exception that higher value added subsectors, such as apparel and footwear, reap more added value for the economy as a whole.

Figure 5.1 Value added from different textile/leather subsectors, 2006-2016 (billion USD)



Source: UNIDO INDSTAT

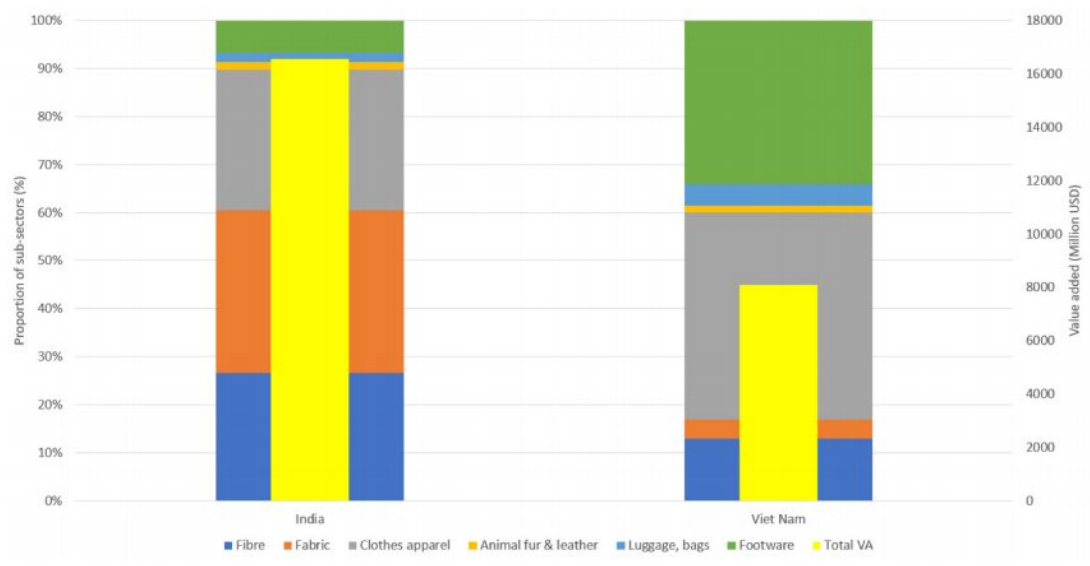
It is worth noting that the leather industry experienced a contraction between 2014 and 2016, following the introduction of new strict regulations on pollutants, which led to the rejection of investment projects for the establishment of new tanning factories.

The value added of luggage and handbags recorded the highest growth rate of the entire industry in the period 2011-2016, reaching 21 per cent, driven primarily by foreign investment, and growing exponentially in the last ten years. This is in line with the very dynamic global demand and solid international prices for this product group.

An interesting comparator in textile/apparel is India, which is traditionally endowed with raw materials and with a longstanding history of producing textile and apparel. The total value added of Viet Nam's textile/apparel/leather industry was around half of that of India in 2015, but given the difference in population size, the per capita values are much higher for Viet Nam. The stark difference is the much higher share (nearly 60 per cent) of raw material and fabric production in India compared to Viet Nam (just above 15 per cent). This suggests a higher vertical integration of the textile/apparel value chain in India compared to Viet Nam. When considering trade in value added (see next chapter), India has a domestic value added content of over 95 per cent in the period 2006-2015 whereas Viet Nam's value added was below 50 per cent.

[12] Figures for the fabric industry would be higher but subsectors 1391, 1392, 1393, 1394, 1399 did not, unfortunately, report data for this period.

Figure 5.2 Value added from different textile/leather subsectors, 2006-2016 (billion USD)



Source: UNIDO INDSTAT

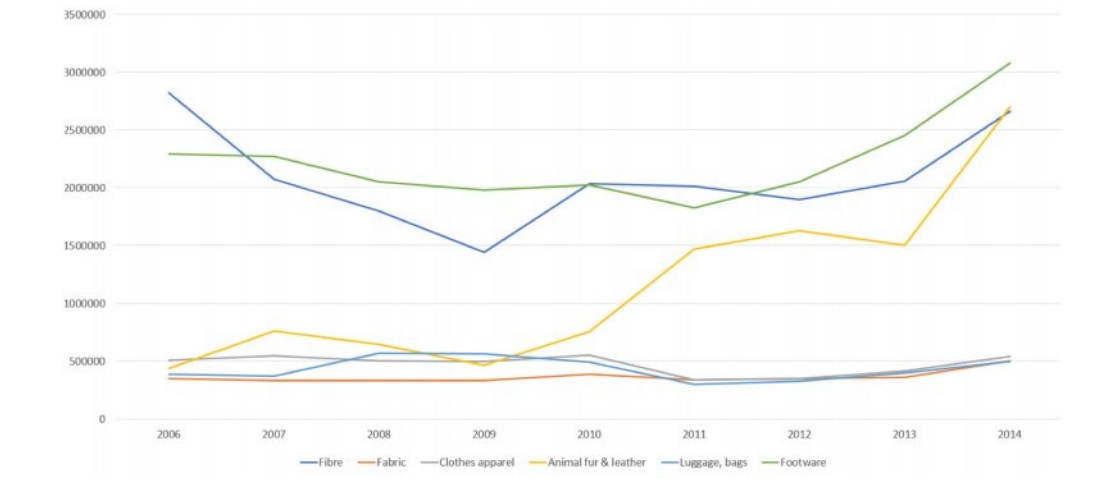
In the 2006-2016 period, the number of garment manufacturing firms increased from more than 2,000 production facilities in 2006 to over 6,000 in 2016, accounting for 57 per cent of the entire TALF industry. However, as observed in food processing, the shift to productivity-led growth in the period 2011-2016 meant that the average number of employees per establishment increased from 206 in 2011 to 223 in 2016, with productivity growing at 12 per cent (CAGR) during the same period.

The average establishment size in the footwear industry exceeded other TALF subsectors by far, becoming more fragmented with the average number of employees per production facility decreasing from almost 1,500 in 2006 to around 1,000 in 2016. However, this fragmentation did not affect the ratio value added per establishment which in fact increased at a CAGR of above 10 per cent in the period 2011-2016. Leather production facilities experienced the slowest increase in their number and productivity in the period 2011-2016, perhaps due to stricter pollution regulations for tanneries.

While the productivity per establishment in the footwear industry was higher was mostly attributable to the larger average establishment size, the increasing trend of the same indicator for fibres was mainly driven by higher labour productivity due also to the subsector's higher capital intensity.

The data on enterprise ownership since 2015 confirm the prevalence of FDI enterprises over non-state domestic enterprises with a likelihood of increasing in the future. In this period, many state-owned enterprises were equitized, so that in 2016, there were only 203 enterprises left, accounting for only 2.24 per cent of the entire industry in terms of number of enterprises. The leather and footwear industries have been fully equitized.

Figure 5.3 Value added per establishment, TALF (USD)



Source: UNIDO INDSTAT

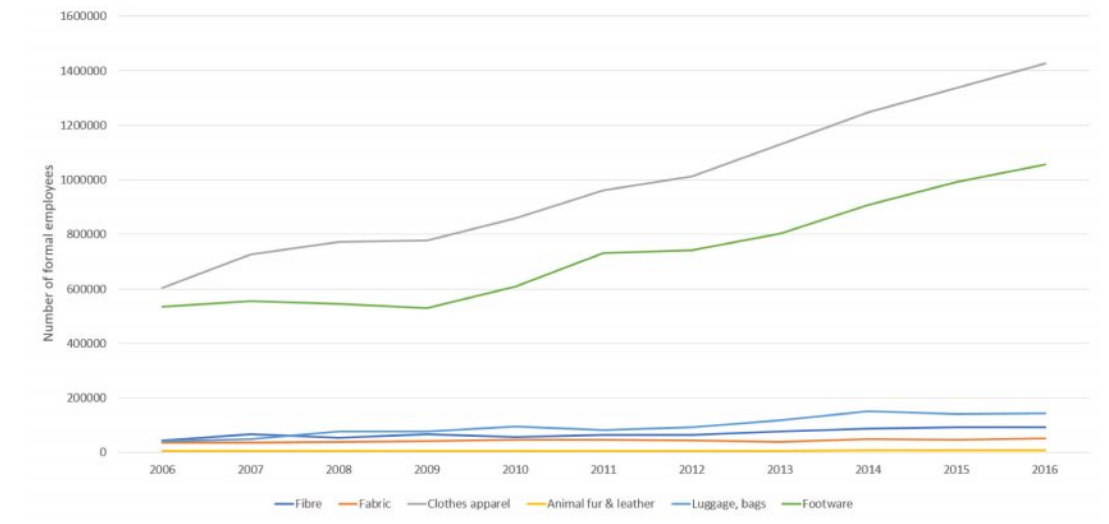
Table 5.2 Number of enterprises in the textile and footwear industry by ownership type

No.	Type of business	2011	2012	2013	2014	2015	2016	CAGR 2011-2016
	Textile and footwear	**6,575**	**6,829**	**7,304**	**7,906**	**8,578**	**9,032**	**7%**
1	State enterprises	245	231	226	215	217	203	-4%
2	Non-state enterprises	3,478	3,547	3,680	3,894	4,056	4,265	4%
3	Enterprises with FDI	2,852	3,051	3,398	3,797	4,305	4,604	10%

Source: GSO

The TALF industries are known for their high labour intensity and represent the first stage of industrialization, absorbing a large share of the workforce from the agricultural sector. The total number of employees in the TALF industries increased from over 1.265 million in 2006 to about 1.892 million in 2011 and exceeded 2.782 million in 2016, with the CAGR reaching 8 per cent.

Figure 5.4 Number of formal employees by TALF subsector (2006-2016)



Source: UNIDO INDSTAT

The labour force participation in the textile and apparel industry was higher than in the leather and footwear industries, maintaining high growth rates of around 9 per cent throughout the period 2006-2016, while the footwear industry's CAGR was 7 per cent. Handbags and luggage had the highest CAGR at 13 per cent during the 2006-2016 period, confirming this subsector's high potential to drive both employment and productivity. In total, apparel and footwear accounted for nearly 90 per cent of the total number of employees in the entire TALF industry in 2016, with apparel representing more than 50 per cent of that total. Apparel, footwear and handbags, however, registered the lowest labour productivity. Labour productivity in Viet Nam's textile and garment industry is generally only 2/3 of that of other countries in the region.

In terms of formal employment absorption, leather only accounted for 0.3 per cent of total TALF, and its employment growth rate has decreased to 4 per cent in the last 5 years, following the closure of many small tanneries located in the middle of residential areas and forced to relocate into industrial zones, or closed altogether due to environmental pollution. This was accompanied by a decrease in the leather industry's productivity growth rate, which in absolute terms remains the highest together with fibres (both at around USD 12,000 value added per employee).

Table 5.3 CAGR per subsector, selected indicators, TALF, 2006-2016 (%)

	N. Employees	Value added	Average size est.	Average productivity	V/A Establishment
Fibers	7.6%	7.9%	-1.3%	0.2%	-1.1%
Fabrics	3.7%	13.2%	-4.4%	9.2%	4.4%
Apparel	9.0%	13.9%	-2.7%	4.5%	1.7%
Leather, furs	5.0%	22.1%	-0.2%	16.3%	16.0%
Bags, luggage	13.0%	17.3%	-1.9%	3.8%	1.9%
Footwear	7.1%	14.2%	-3.6%	6.7%	2.8%
Overall TALF	**8.2%**	**13.2%**	**-3.0%**	**4.6%**	**1.4%**

Source: UNIDO INDSTAT

Summarizing the information collected so far, the increasing presence of FDI in the ownership of several TALF industries has led to a restructuring of the sector from employment-led growth in the period 2006-2011 to productivity-led growth in the following quinquennium. This shift was particularly apparent for apparel, driving the average employment elasticity of TALF industries down from 0.93 in 2006-2011 to 0.46 in 2011-2016.

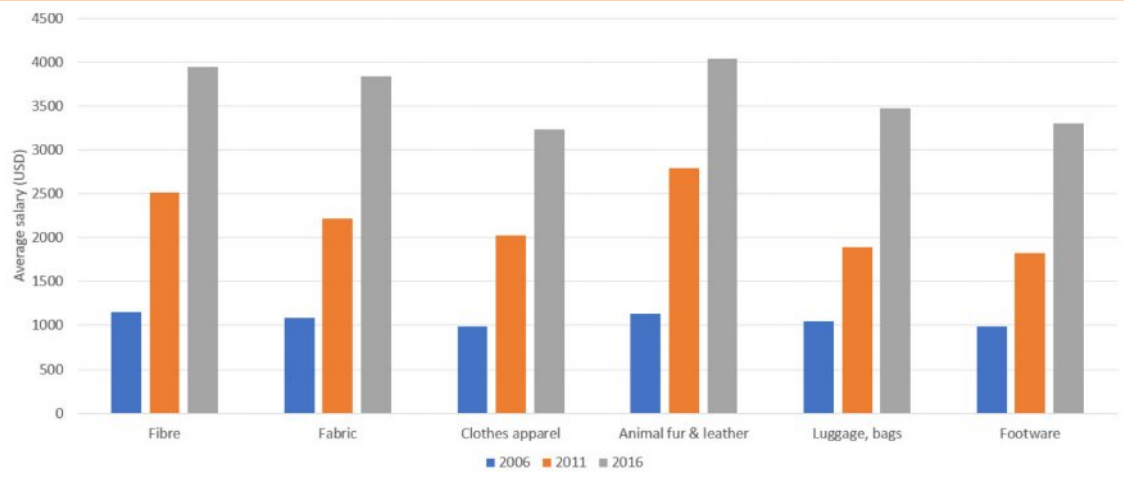
Table 5.4 Employment elasticity per subsector, TALF, 2006-2011 and 2011-2016

	2006-2011		2011-2016	
Fibers	1.34	Unproductive employment growth	0.77	Employment-led growth
Fabrics	0.36	Productivity-ked growth	0.20	Productivity-ked growth
Apparel	1.15	Unproductive employment growth	0.42	Productivity-ked growth
Leather, furs	0.15	Productivity-ked growth	0.55	Employment-led growth
Bags, luggage	1.05	Unproductive employment growth	0.56	Employment-led growth
Footwear	0.67	Productivity-ked growth	0.40	Productivity-ked growth
Overall TALF	**0.93**	Employment-led growth	**0.46**	Productivity-ked growth

Source: UNIDO INDSTAT

Average labour productivity was generally associated with higher average salaries. In the period 2006-2016, workers in the leather and fibre industries earned the highest average salaries (USD 4,044 and USD 3,940 per employee, respectively), slightly above that in the fabric industry, averaging USD 3,835 / employee. The lowest average salary per employee was paid in the footwear and apparel industries at only USD 3,231 and USD 3,303 but considering the industries' relatively lower labour productivity, these values seem comparatively higher per unit of output produced.

Figure 5.5 Average salary per TALF subsector, 2006-2011-2016 (USD)



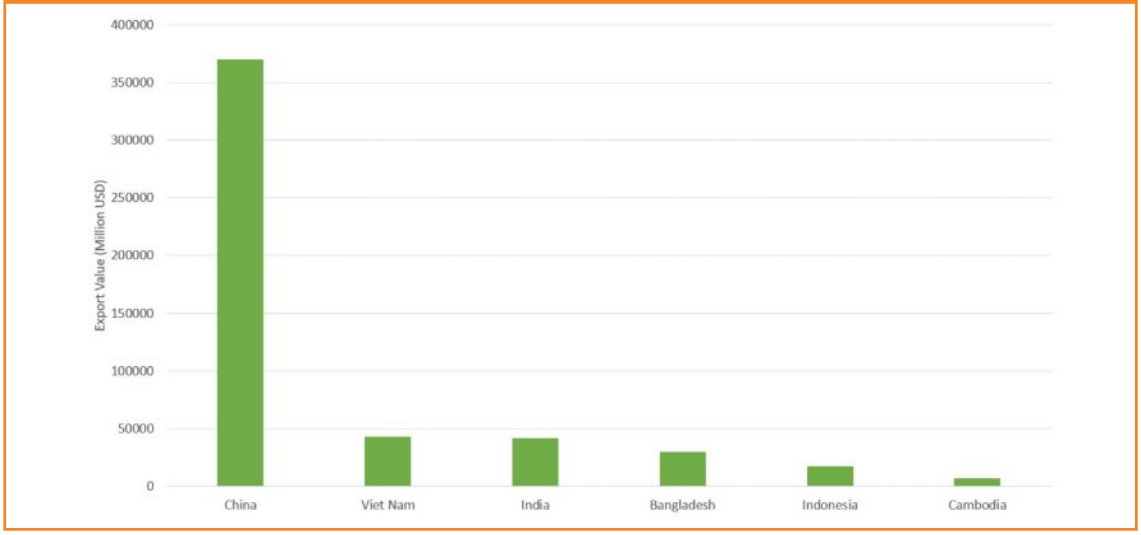
Source: UNIDO INDSTAT

5.4. Trade

The role of Viet Nam's textile and footwear industry in driving the country's competitive industrial performance is indisputable, as are the aforementioned underlying weaknesses. Viet Nam has become the second most important global player on account of its textile/apparel and leather/footwear exports within a few years, with a total export value of USD 43.342 billion in 2015, rising by an average growth rate of 16.9 per cent from 2010 to 2015. No other comparator even comes close to this performance. China is still the world's largest exporter of textile and footwear with a value of nearly USD 370 billion, but in recent years, the growth rate has tended to decrease due to a shift in production to neighbouring countries. India, Bangladesh, Indonesia and Cambodia follow Viet Nam. Cambodia has had the lowest export value but the highest average growth rate in recent years, reaching 16.6 per cent. Bangladesh also had a notable export growth rate of 11.4 per cent.

The challenge for Viet Nam will clearly be to build on its successes, gradually shifting production to higher value products and building its own global brands. At present, this success rests on fragile foundations, as FDI could shift quickly to Cambodia and Bangladesh based on volatile factors, such as labour costs and other uncontrollable global dynamics.

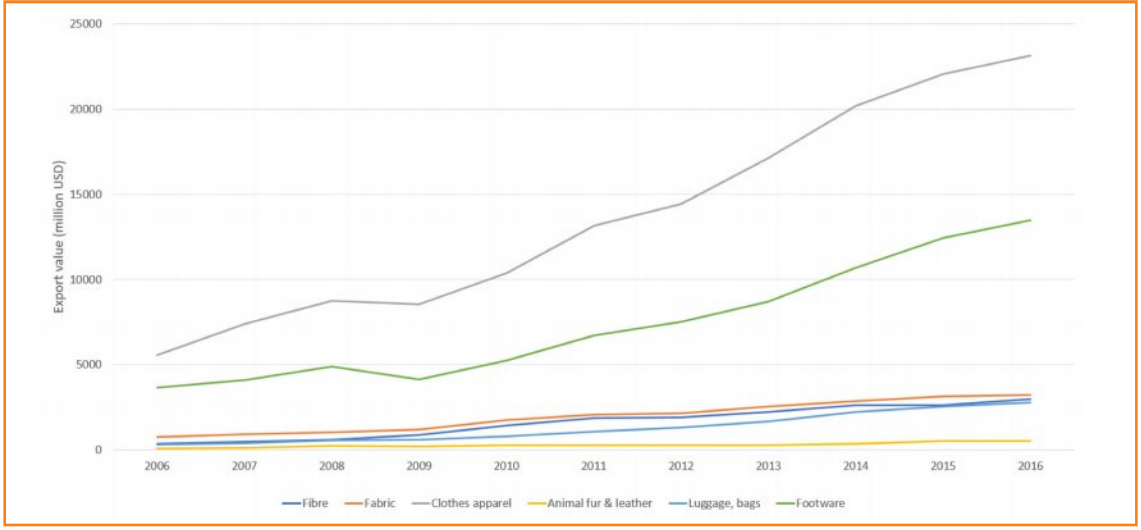
Figure 5.6 Total TALF export values, 2015, for Viet Nam and top global exporters (million USD)



Source: UNCOMTRADE

Taking the entire TALF industry (textile/apparel and leather/footwear) into account, Viet Nam recorded an export turnover of USD 46.123 billion and had reached a trade surplus of USD 28.921 billion by 2016. Apparel and footwear products headed the group, with total export values of USD 23.142 billion and USD 13.476 billion, respectively, coupled with growth rates of 16 per cent and 14 per cent, respectively, for the period 2006-2016. Both industries achieved trade surpluses amounting to USD 22.19 billion and USD 12.745 billion, respectively.

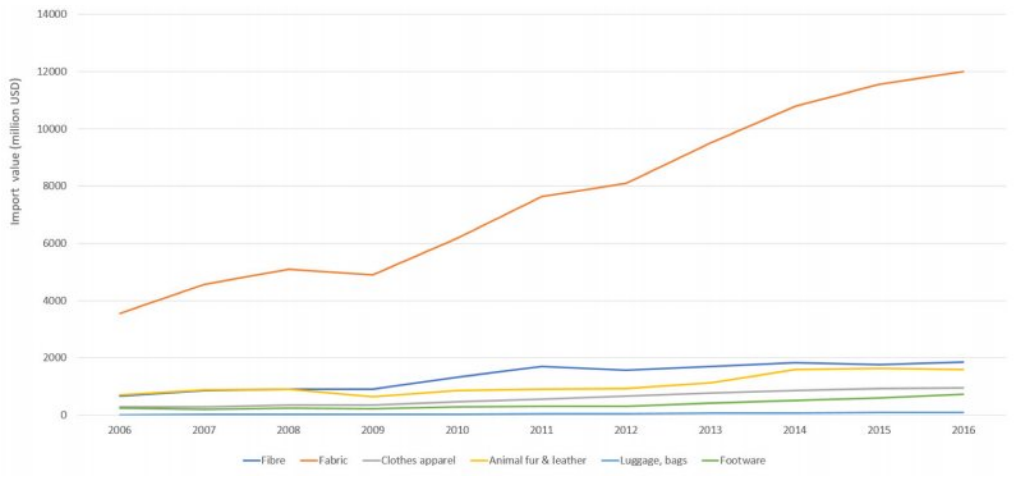
Figure 5.7 Export values for textile/apparel, leather/footwear, 2006-2016 (million USD)



Source: UNCOMTRADE

Along the apparel value chain, Viet Nam still shows too much dependence on import of fabrics, rather than fibres, thus limiting vertical integration. Fabric imports skyrocketed from USD 3.554 billion in 2006 to nearly USD 12 billion in 2016, resulting in a trade deficit of USD 8.786 billion. Similarly, the leather industry registered a trade deficit of USD 1.079 billion in 2016.

Figure 5.8 Import values for textile/apparel, leather/footwear, 2006-2016 (million USD)

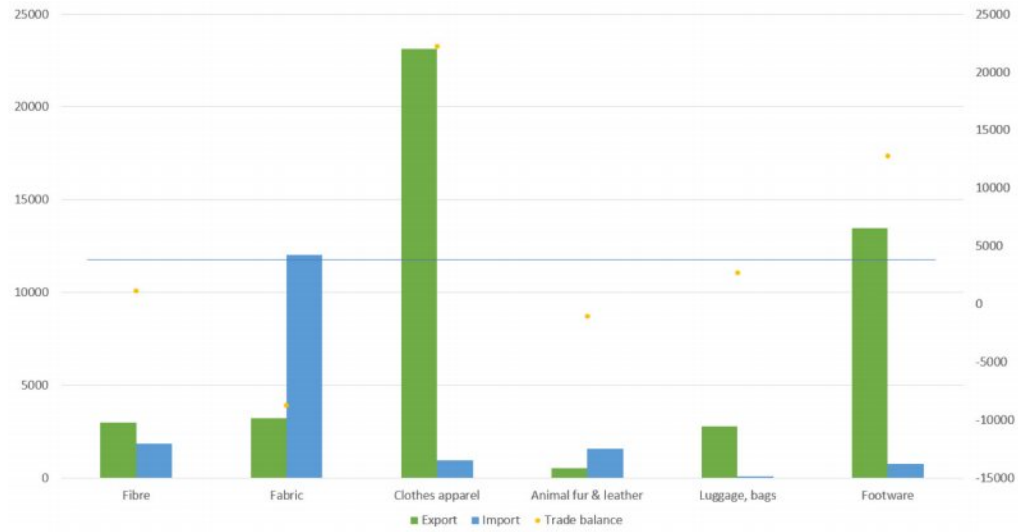


Source: UNCOMTRADE

Fibres and handbags had a trade surplus, with the latter boasting the highest growth rate in the entire industry throughout the two quinquennia (24 per cent and 21 per cent). The export growth of the fibre subsector tended to gradually decrease from 23 per cent in the period 2006-2011 to 10 per cent in the period 2011-2016.

Fibres also attained the second highest import value after fabric, followed by leather, which reflects the current status of input materials in the textile and garment industry. Viet Nam's footwear industry depends heavily on foreign imports. Domestic cotton production, for example, only meets 1 per cent of domestic demand.

Figure 5.9 Trade balances for textile/apparel, leather/footwear, 2006-2016 (million USD)



Left y axis values refer to exports/imports.
Right y axis values refer to trade balance (exports-imports)

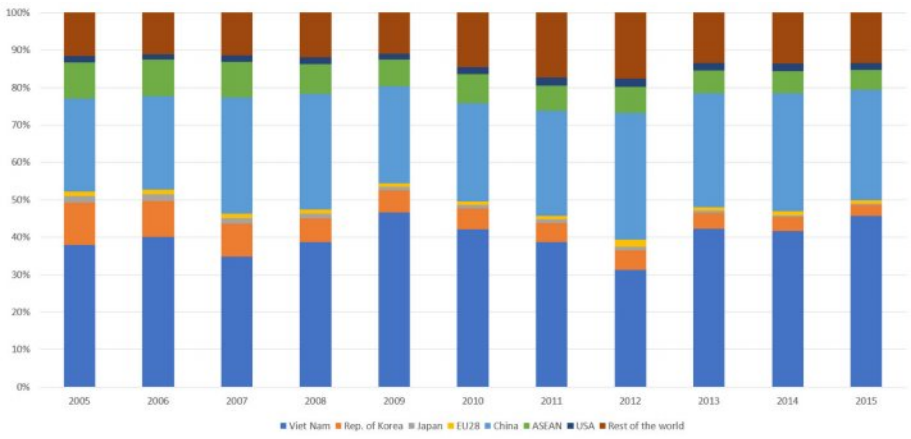
Source: UNCOMTRADE

5.5. Value chain analysis

Origin of value added of Viet Nam's TALF exports

Primary raw materials play a fundamental role in producing upstream input materials for the textile/ garment and leather/ footwear (TALF) industry, such as cotton and hides. TALF, however, follow the same pattern as the agro-processing industry, with increasing reliance on foreign value added, especially from China (accounting for 29 per cent) and from the Republic of Korea (3 per cent), whereas the share of ASEAN countries dropped from 10 per cent in 2005 to 5 per cent in 2015.

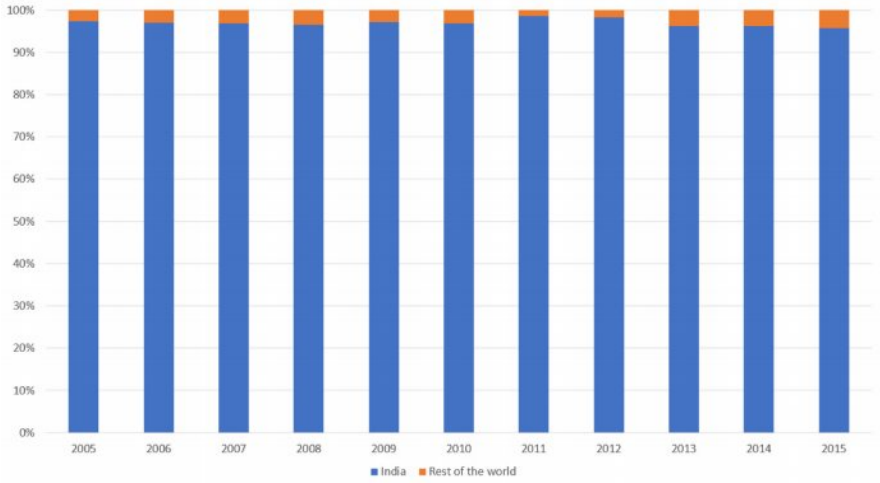
Figure 5.10 Origin of value added of Viet Nam's exports of textile/garment and leather/footwear (from primary)



Source: OECD

Taking India as a comparator, the deep integration of the value chain is confirmed in its export structure, demonstrating that there is room for improvement for Viet Nam in this regard.

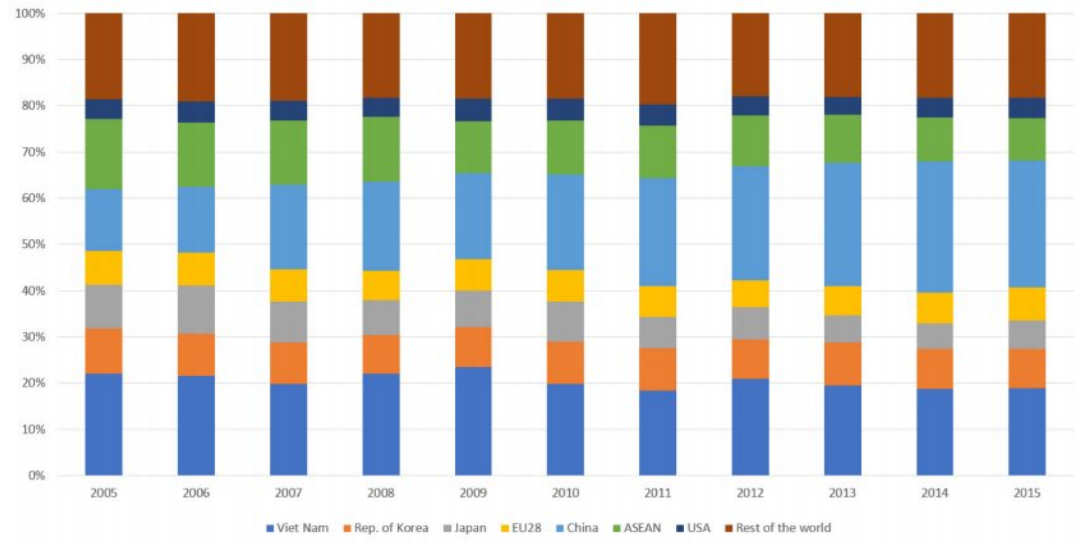
Figure 5.11 Origin of value added of India's exports of textile/garment and leather/footwear (from primary)



Source: OECD

As expected, the situation worsens if chemicals/pharmaceuticals is taken as the origin industry. This is a crucial industry for both the leather and textile/apparel subsectors, as their products require dyeing, tanning or other forms of processing that are dependent on chemicals. TiVA data confirm that the contribution of Viet Nam's domestic chemical industry to the textile and leather subsectors is very limited, hovering at around 20 per cent only of the total value added of exports. The remaining 70 per cent plus originate from abroad, with China taking the largest pie and increasing the value added of exports from 14 per cent to 27 per cent in the period 2005-2015, followed by the ASEAN countries and the Republic of Korea (accounting for around 9 per cent).

Figure 5.12 Origin of value added of Viet Nam's exports of TALF (from chemical)



Source: OECD

Value chain upgrading

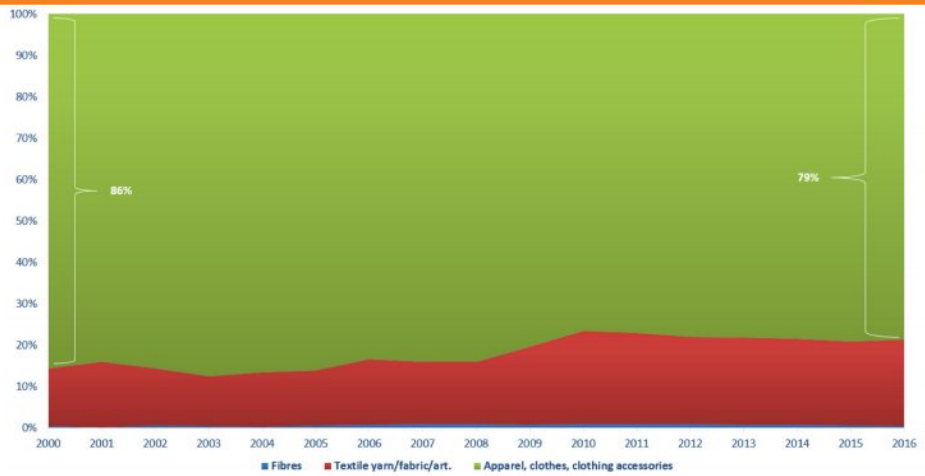
The strategy for value chain upgrading of the textile and apparel subsectors is elaborated in the Industrial Development Strategy through 2025, with a vision toward 2035 (PM Decision No. 879/QD-TTg):

Textile, garments, leather and footwear: from now to 2025, to prioritize the production of raw materials and auxiliary materials for domestic production and export. Beyond 2025, to prioritize the production of fashion clothing products and high-grade shoes.

Resolution No. 23: in the period up to 2030, to continue to develop the textile/ garment and leather/ footwear industries, but focus on high value-added products associated with smart manufacturing processes.

As a first step, we look at the processing ratio of textile/apparel value chain exports.

Figure 5.13 Viet Nam's export of textile by broad processing level, 2000-2016 (%)



Source: UNCOMTRADE

As in the case of food products, the processing ratio of apparel saw a decrease in the period 2000-2016 from 86 per cent to 79 per cent. In a next step, textile and apparel products at the disaggregated level were divided into low and high value groups according to their export unit values, calculated by dividing export values by quantity.

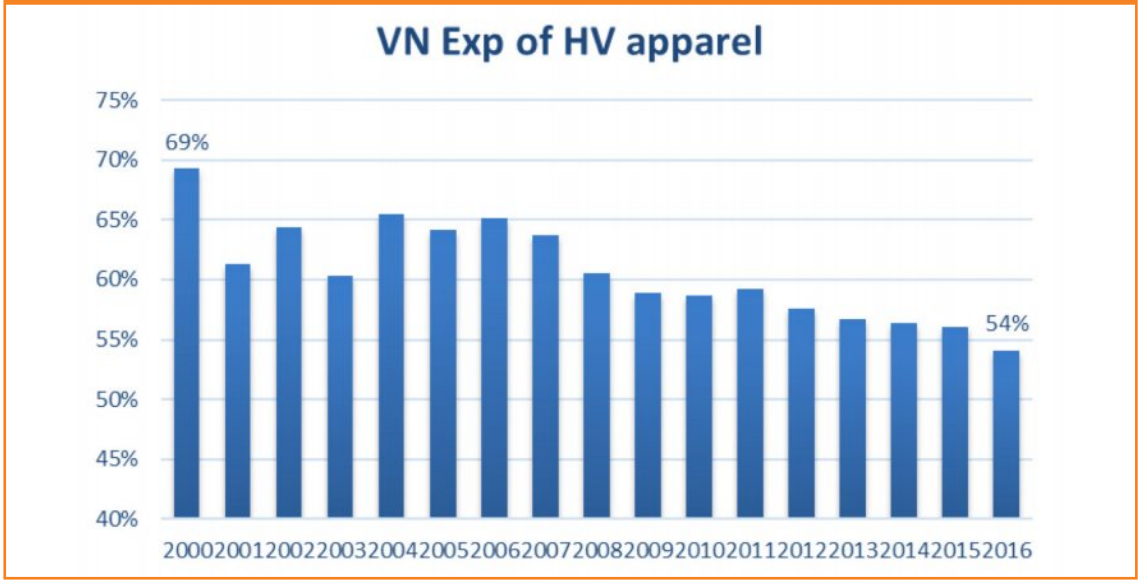
Table 5.5 Textile/apparel by unit values, 2015 (USD)

	Item	Quantity	2015 in 1000	UV
8421	Women/girls coats woven	619,069,890	15,613,487	25.22
8411	Men/boys coats woven	438,350,852	9,180,473	20.94
8412	Men/boys suits/etc. woven	168,837,651	3,477,415	20.60
8431	Men/boys coats knit/crochet	123,873,678	2,011,580	16.24
8413	Men/boys jackers/blazers woven	573,720,578	8,021,071	13.98
8422	Women/girls suits/ensemble woven	129,201,412	1,512,823	11.71
8424	Women/girls dresses woven	954,531,308	10,778,570	11.29
8414	Men/boys trousers/etc. woven	3.369.874.001	33,995,343	10.09
8415	Men/boys shirts woven	1,433,543,996	14,379,008	10.03
8423	Women/girls jackets woven	1,185,735,562	11,443,149	9.65
8426	Women/girls trousers woven	3,062,565,549	28,567,098	9.33
8453	Jerseys/pullovers/etc.	4,953,915,996	43,247,680	8.73
8441	Women/girls coats/etc. knit/crochet	198,785,519	1,685,488	8.48
8427	Women/girls blouses woven	1,079,419,792	8,747,665	8.10
8425	Women/girls skirts wouven	437,649,122	3,342,083	7,64
8437	Men/boys shirts knit/crochet	817,712,469	5,397,462	6.60
8447	Women/girls blouses knit/crochet	719,083,192	4,619,819	6.42
8432	Men/boys suits/etc. knit/crochet	1,892,572,314	11,123,110	5.88
8442	Women/girls outerwear knit/crochet	4,994,007,769	27,848,797	5.58
8454	T-shirts/singlets knit/crochet	9,779,181,243	42,259,670	4.32
8456	Swimwears	627,263,976	2,656,424	4.23
8416	Men/boys under/night wears woven	943,769	2,999	3.18
84612	Shawl/scarf/etc. not knit/crochet	1,574,663,002	3,987,281	2.53
8428	Women/girls under/night wears woven	381,482	838	2.20
84693	Shawls/scarves/etc.	743,893,899	1,431,607	1.92
8438	Men/boys underwears/etc. knit/crochet	3,076,558,934	5,098,569	1.66
8448	Women/girls under/night wears knit/crochet	6,486,436,943	9,606,043	1.48

Source: UNCOMTRADE

Then the ratio of high value products exported in comparison to the low value ones was calculated and the following picture was obtained:

Figure 5.14 Viet Nam's export share of high value apparel over total exports, 2000-2016 (%)

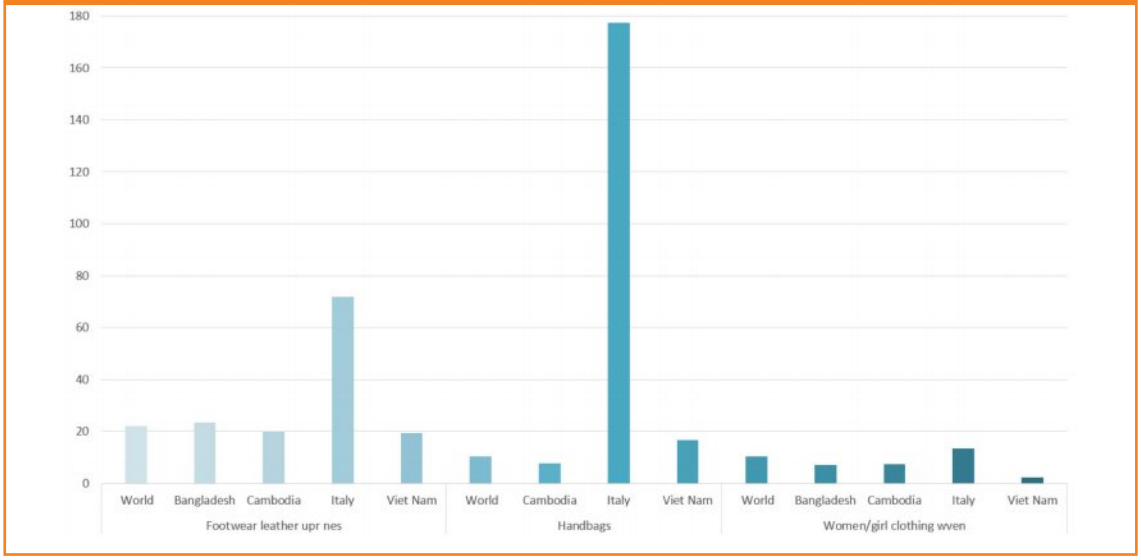


Source: UNCOMTRADE

Viet Nam's exports again seem to be more concentrated in low value products. However, the products that fetch the highest value are not always necessarily those with the highest demand. The following market analysis will shed some light on this issue.

One final aspect is the unit values of selected apparel and leather products, which are compared with those of competitors such as Bangladesh and Cambodia, but also role models such as Italy.

Figure 5.15 Viet Nam and comparators' unit values for selected items, 2016 (USD)



Source: UNCOMTRADE

Except for handbags, Viet Nam exhibits the lowest unit values per item among the selected comparators. This is particularly concerning for the apparel item women/girl clothing woven, fetching an average export unit value for Viet Nam, which is less than one-third of that of Cambodia and Bangladesh.

5.6. Market structure, dynamics and diversification

The following analysis attempts to add a final element to the overall picture, namely that of market dynamism, both from the domestic and the international viewpoint. More specifically, the focus is on understanding to what extent Viet Nam's textile/apparel exports match domestic and international demand, thus also identifying potentially missed opportunities.

In 2016, jersey shirt items/ woollen tops/ etc. (SITC code 8453) is ranked the product that is highest in demand worldwide among textile/apparel and leather/footwear, with a total value of nearly USD 50 billion. This reflects Viet Nam's exports, as jersey shirt items/ woollen tops/ etc. is Viet Nam's third most exported to the world, with a value of USD 2.6 billion and accounting for 5 per cent of world market share in 2016.

The second most demanded product globally is "upper nes leather shoes" (SITC code 8514) accounting for almost USD 47 billion in 2016. Viet Nam increased its related world market share from 2 per cent to 9 per cent over 10 years. It does not suffice to only look at changes in the market share and the ranking of exported products. The dynamism of exports in terms of growth rates (CAGRs) must be assessed as well.

The two products that ranked at the top of global import values displayed an average growth rate that was well below the global average, thus indicating that they are less dynamic than, women's weaved/ knitted jackets (SITC 8442), for example, or UPR textile nes shoes (SITC 8515). However, even in that case, Viet Nam seems well positioned to increase its share of world demand, with average growth rates that are well above the global ones (in some cases, even doubling the global growth rates).

This initial market analysis bears good news; however, as the previous sections have shown, this is not necessarily surprising, as a large part of the industry is in the hands of FDI and multi-nationals, which are driving these trends.

Table 5.6 Top 20 imported textile and footwear products in the world in 2016

No	Product Code	Product Description	World import in 2006 (USD 1,000)	World import in 2016 (USD 1,000)	CAGR (2006-2016)
1	8453	Jersey shirt/ pullovers/ etc.	43,878,632	49,469,400	1,21%
2	8514	upr nes leather shoes	41,317,022	46,828,658	1,26%
3	8454	Weaved/ knitted T-shirts/ shirts	26,695,243	36,043,163	3,05%
4	8414	Men's woven trousers	24,725,348	31,262,092	2,37%
5	8319	Special containers	16,400,505	27,807,287	5,42%
6	8426	Women's woven trousers	28,157,388	27,116,842	-0,38%
7	8513	Rubber/ plastic nes shoes	15,272,132	24,994,776	5,05%
8	8442	Women's weaved/ knitted jacket	9,301,902	24,593,793	10,21%
9	6552	Nes knitted/ weaved fabric	14,155,681	22,273,963	4,64%
10	8311	Handbag	11,096,128	21,495,755	6,84%
11	8512	Sneakers	8,154,064	19,922,995	9,34%
12	8515	UPR textile nes shoes	6,906,045	19,698,941	11,05%
13	6584	Table/ bed/ toilet linen	13,232,923	17,079,737	2,58%
14	6114	Nes cowhide/ leather horse	16,874,207	16,401,080	-0,28%
15	8421	Women's woven blouse	9,812,349	15,904,829	4,95%
16	6531	Synthetic textile yarn	12,981,895	15,742,479	1,95%
17	8427	Women's woven blouses	10,541,128	14,893,579	3,52%
18	8415	Men's and woven shirts	11,744,884	13,899,381	1,70%
19	6589	Nes art artificial textile	7,715,499	13,354,232	5,64%
20	8424	Women's woven clothes	5,521,373	13,223,807	9,13%
		Total all textile, leather shoes	609,944,367,905	786,876,389,629	2,58%

Source: UNCOMTRADE

Table 5.7 Top 20 Vietnamese textile and footwear products exported to the world in 2016

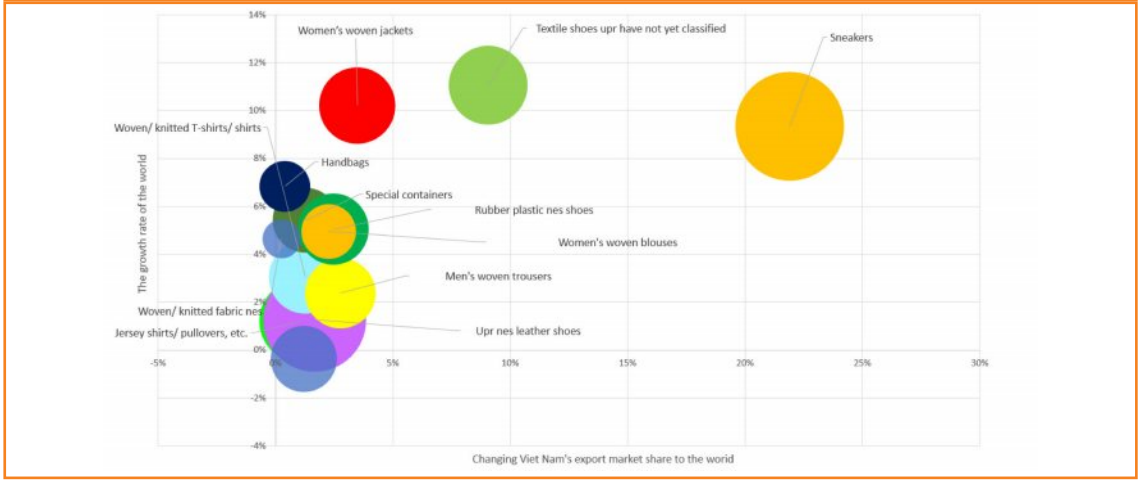
No	Product Code	Product Description	Viet Nam export in 2006 (USD 1,000)	Viet Nam export in 2016 (USD 1,000)	CAGR (2006-2016)
1	8512	Sneakers	1,785,873	4,495,802	9,67%
2	8514	Upr nes leather shoes	692,327	4,016,539	19,22%
3	8453	Jersey shirt/ pullovers/etc.	475,873	2,605,834	18,53%
4	8515	UPR textile nes shoes	626,088	2,365,994	14,22%
5	8442	Women's weaved/ knitted jacket	323,846	2,190,605	21,07%
6	8454	Weaved/ knitted T-shirts/shirts	341,487	2,036,848	19,55%
7	6513	Nes cotton yarn	56,158	1,978,857	42,79%
8	8513	Rubber/plastic nes shoes	376,676	1,903,326	17,59%
9	8414	Men's woven trousers	683,331	1,868,533	10,58%
10	8426	Women's woven trousers	340,431	1,679,993	17,31%
11	8319	Special containers	208,142	1,608,427	22,69%
12	8421	Women's woven blouse	221,764	1,131,793	17,70%
13	8311	Hand bag	43,987	982,477	36,43%
14	8415	Men's woven shirts	358,604	897,204	9,60%
15	8427	Women's woven blouses	108,551	660,523	19,79%
16	8452	Covered/girdle clothes	83,095	654,428	22,92%
17	8432	Men's weaved/knitted comple	168,788	598,655	13,50%
18	6589	Nes art artificial textile	45,143	574,369	28,96%
19	8423	Women's/girl's woven jacket	139,973	570,339	15,08%
20	6552	Nes weaved/ knitted fabric	36,072	563,957	31,65%

Source: UNCOMTRADE

All this information can be merged into a bubble chart, illustrating both the changes in Viet Nam's global market shares and global market dynamism of selected products.

The snapshot reveals that sneakers, textile shoes and women's woven jackets are products with a demand growth rate that is higher than the global average and for which Viet Nam has managed to increase its market shares.

Figure 5.16 Sectoral market competitiveness matrix for Viet Nam, 2006-2016[13]



Source: UNCOMTRADE

Sneaker market - Code 8512

Sneaker products (Code 8512) are one of Viet Nam's main export products inform the textile and footwear industry. The total export turnover of these products in 2016 reached over USD 5.859 billion, with a growth rate of 19 per cent. The main markets for Viet Nam's sneakers are the EU, the United States, Japan, Mexico, the Republic of Korea, etc. The EU market accounted for 51 per cent of Viet Nam's total export value in 2010. This figure dropped to 36 per cent by 2016. The U.S. market ranked second after the EU for Viet Nam's exports of sneakers, but is becoming increasingly important. These two markets make up nearly 70 per cent of Viet Nam's total export values, indicating limited market diversification and thus exposing Viet Nam to potential market shocks.

Table 5.8 Major export markets for Viet Nam's sneakers, 2010-2016

No.		Viet Nam's export value (USD 1,000)		CAGR	Market share		
	Nations	2010	2016		2010	2016	Change
1	EU-28	519,015,412	2,081,854,280	15%	51%	36%	-16%
2	USA	108,009,261	1,792,740,662	32%	11%	31%	20%
3	Japan	29,167,459	292,918,672	26%	3%	5%	2%
4	Mexico	65,501,057	204,973,447	12%	6%	3%	-3%
5	Rep. of Korea	40,757,983	181,429,714	16%	4%	3%	-1%
6	Canada	12,707,010	122,943,955	25%	1%	2%	1%
7	Panama	51,515,742	115,857,433	8%	5%	2%	-3%
8	Australia	16,340,493	111,270,922	21%	2%	2%	0%
9	Brazil	9,281,960	75,271,282	23%	1%	1%	0%
10	South Africa	19,871,630	61,065,924	12%	2%	1%	-1%
	Total exports	1,016,616,298	5,859,624,323	19%			

Source: UNCOMTRADE

[13] Bubble size refers to Viet Nam's export values in 2016.

Zooming in on the U.S. market, the value of imports of sneakers quadrupled from USD 1 billion in 2010 to over USD 4 billion in 2016. In terms of export value, Viet Nam ranks first, replacing China as the leading exporter of sneakers to the US market (in 2010, China exported six times more sneakers to the United States than Viet Nam). Indonesia, Italy and Cambodia are currently not major competitors in the sneaker market.

Table 5.9 Major exporters of sneakers to U.S., 2010-2016

No.		Exports to the United States (USD)		CAGR	Market share		
	Exporting nations	2010	2016		2010	2016	Change
1	Viet Nam	108,009,261	1,792,740,662	32%	11%	42%	31%
2	China	676,711,792	1,682,754,247	10%	68%	40%	-28%
3	Indonesia	37,200,860	518,465,327	30%	4%	12%	8%
4	India	188,070	72,431,429	81%	0%	2%	2%
5	Italy	46,057,673	33,268,760	-3%	5%	1%	-4%
6	Cambodia		31,583,595			1%	1%
7	Romania	18,738,336	27,199,358	4%	2%	1%	-1%
8	Other Asian countries	1,772,685	16,305,138	25%	0%	0%	0%
9	Dominican Rep.	111,770	11,263,422	59%	0%	0%	0%
10	Thailand	64,526,174	10,724,811	-16%	6%	0%	-6%
	Total exports	1,002,409,449	4,253,470,527	16%			

Source: UNCOMTRADE

A similar picture is obtained when looking at the Japanese market. Viet Nam replaced China as the leading exporter of sneakers in the period 2010-2016. Even in this case Indonesia does not represent a viable threat.

Table 5.10 Major exporters of sneakers to Japan, 2010-2016

No.		Exports to the United States (USD)		CAGR	Market share		
	Exporting nations	2010	2016		2010	2016	Change
1	Viet Nam	29,167,459	292,918,672	26%	8%	38%	29%
2	China	247,365,962	247,672,948	0%	69%	32%	-38%
3	Indonesia	28,308,128	179,395,262	20%	8%	23%	15%
4	Cambodia		27,710,158			4%	4%
5	Myanmar	490,298	8,896,055	34%	0%	1%	1%
6	Italy	9,360,229	5,472,946		3%	1%	-2%
7	Romania	6,965,238	5,075,585	-3%	2%	1%	-1%
8	India	8,366	2,269,057	75%	0%	0%	0%
9	Czechia	2,921,782	2,206,193	-3%	1%	0%	-1%
10	Hungary	1,631,259	2,070,924	2%	0%	0%	0%
	Total exports	356,340,613	778,453,509	8%			

Source: UNCOMTRADE

5.7. SWOT analysis

Strengths (S)	Weaknesses (W)
+ Abundance of young skilled labour for apparel + Viet Nam ranks third in the world in terms of exports + Some domestic enterprises have affirmed their position in the domestic market and export markets + Favourable geographic conditions, with shoe processing centres concentrating around large seaports + The production capacity of brand name sneakers, men's and women's leather shoes in the middle and high class market segment has been improved + Source of stable processing of customers in major EU and U.S. markets with a number of global brands + Domestic fashion industry has started developing which combines East-West cultures	+ Heavy reliance on FDI and corporate decisions + Heavy dependence on imported materials + Lack of human resources in the textile and dyeing industry + Lack of capacity in design, material supply, inspection, marketing, distribution and service + Lack of capital, technology, highly qualified labour both in the field of engineering and management + Low labour productivity + Lack of connection between the stages in the value chain, limited ability to meet FTA conditions, not participating more deeply in the global value chain + Level of corporate governance differs between SMEs with FDI and large enterprises
Opportunity (O)	**Threats (T)**
+ Export markets (United States, EU, Japan, Rep. of Korea, China) have grown strongly + Solid development of domestic market + New generation FTA opens up greater export opportunities and attracts investment in upstream products + Innovations and new technology helps increase the industry's value, reduce dependence on labour + Development of high-class market products + China's output is decreasing due to high labour costs and environmental pressure and has begun focusing on developing its high-tech industry	+ Consumer trends are emphasizing trendy designs and high quality products that are healthy and comfortable + Technical barriers, requirements to meet environmental standards, labels, social responsibility of enterprises + Competition from lower cost countries like Cambodia, Myanmar, Bangladesh, etc. + New production technology (3D printing, etc) allows moving production facilities to the consumer market + Competition from other industries in terms of labour, land and capital

5.8. The TALF industry's strategic objectives

The objectives of Resolution No. 23-NQ/ TW on the formulation of national industrial development policies through 2030 with a vision to 2045 include:

- Continue to develop the textile and garment industry, but prioritize the creation of high added value associated with smart and automated production processes.

The objectives of Decision No. 879/ QD-TTg, which approves Viet Nam's industrial development strategy through 2025 with a vision to 2035 include:

- Until 2025, priority shall be given to the production of raw materials and auxiliary materials for domestic production and export; in the period after 2025, priority shall be given to the production of fashionable and high-class shoes;
- Diversify production and actively develop raw materials;
- Promote the exploitation of traditional export markets; maximize Viet Nam's advantages when participating in bilateral and multilateral trade agreements; promote potential markets such as Russia, the Middle East, Eastern Europe, Africa; build retail distribution systems with Vietnamese brand names;

The objectives of Decision No. 68/ QD-TTg, approving the programme of industrial development support from 2016 to 2025 include:

- For industrial products to meet about 45 per cent of domestic production demand by 2020, and by 2025, to meet 65 per cent of domestic production demand;
- Develop materials and accessories for the textile/ footwear industry, for the textile and garment industry's domestic supply rate to reach 65 per cent by 2020 and for the footwear industry to reach 75 per cent to 80 per cent.

The priorities of Decree No. 111/2015/ ND-CP on the development of supporting industries and the list of industrial products are:

- Textile industry: natural fibres: cotton, jute, thorn, silk; synthetic fibres: PE, viscose; knitting yarn, woven yarn; high-strength polyester yarn, spandex, high strength nylon; fabric: technical fabric, non-woven fabric, knitted fabric, woven fabric; sewing thread in the textile industry; chemicals, auxiliaries, dyes for the fabric dyeing industry; garment accessories: chrysanthemum, mex, zippers, elastic tapes.
- Footwear industry: leather; leatherette; shoe soles, shoe tips, shoelaces; tanning chemicals; salt skin; sewing threads; shoe glue, decorative accessories such as buckles, eyelets, hooks, etc.

5.9. Policy recommendations

The following approaches can be applied to persevere in the face of intensified competition and changes in the business environment in the future.

A. Transform the industry into one that generates high value-added products

One way of adjusting to changes in the business environment is to enhance the value of domestic products. The value of textile/apparel/leather/footwear products in the global market can be enhanced through brand power and/or the textile industry can be transformed into a technology and knowledge-intensive material industry.

a) (Business model) Enhancing the presence of domestic brands

One way of transforming an industry into one that generates high value added is to promote the domestic brand that can compete in the global market. In other words, this requires establishing genuine Vietnamese brand names that can compete with global brands, breaking with the export of cheap OEM products of foreign brands. In terms of the global value chain, this means moving the industry's focus on material & trim, cut & sew and export functions to design, distribution and marketing functions.

Unfortunately, the Republic of Korea's TALF industry is not a good reference point, though it has faced the same problems as regards the decrease in profitability of domestic production following a rapid growth period in the 1980s. Upon entering the 1990s, the textile/apparel/footwear/leather industry of the Republic of Korea lost its comparative advantage in labour-intensive functions such as CMT and export. It attempted to shift from CMT processes to more valuable operations. In the late 1990s and early 2000s, the Republic of Korea's government decided to support the promotion and enhancement of the planning and design functions as a method to establish the presence of its own brand in the global market and secure the competitiveness of the domestic TALF industry.

It was difficult for a new domestic brand to earn recognition among the already established names in the global apparel, shoes and gear market. One of the examples of such support from the government is the Daegu Milano Project. Daegu is the third largest metropolitan area in the Republic of Korea, and its primary industry is fabric manufacturing with a specialization in weaving/ knitting and dyeing/ finishing processes that uses labour intensively and nicknamed the centre of textile industries in the Republic of Korea. Upon entering the 1990s, the local fabric industry, which had prospered due to intensive cheap labour inputs and the governmentrn export-oriented policy and the country's rapid economic growth, was jeopardized due to losing competitiveness against emerging industrializing countries such as China, because the wage levels in the Republic of Korea began to rise and labour disputes prevailed. The firms chose to relocate their production facilities abroad and the local industry began to be dismantled. The City of Daegu attempted to transform the local industry from a labour-intensive to a skill-intensive one, pursuing higher value added by emphasizing the enhancement of research and design, distribution and marketing functions. Despite the relatively high amount of funding that was invested into this project between 1999 and 2003, the results have been marginal. The main reason for this is the lack of foundation and experience in high-value activities such as design and marketing in the value chain. No foundation for such activities was built using the accumulated capital during the export boom while the intensive use of cheap labour was being taken advantage of. The industry realized too late that the business environment had changed and the firms had not been prepared in advanced for such a situation. The improvised policy support that was offered after the crisis had already hit the industry could not mitigate the problem and dissuade the firms from moving their operations abroad. The local industry's foundation was severely undermined.

Case of the Republic of Korea #1. Enhancing the presence of domestic brand

Efforts of Busan's shoe industry to establish their own brands: Making our shoes brand name product project

Busan is the second largest city in the Republic of Korea, and was known as the reputed hub of the Korean shoe industry which witnessed rapid growth. From the 1970s to the 1980s, the industry enjoyed the status of the leading OEM producer of big global names such as Nike, Adidas, etc., and exported products under the brand names of such large multinational shoe producers. Their success depended on substantial input of manual labour, with simple skills such as trim, cut and sew. Upon entering the 1990s, those OEM producers began losing competitiveness due to rising wages and production costs, making production in the Republic of Korea unaffordable. This resulted in global names moving their production bases to China, seeking favourable conditions and terminating the OEM production contracts with Korean producers. Since Korean OEM producers had not established their own brands, they could not but enter the low-tier label shoe market once the global brands had left the country. The production facilities and equipment were also moved to China to take advantage of the local cheap labour, only leaving headquarters in the City of Busan. The result was the deindustrialization of Busan's shoe industry, which became a local problem.

Shoe manufacturers moved their production back to Busan in the mid-2000s. The main reason for this was the rising wage of workers in China; shoe manufacturing firms were no longer profiting from producing their goods in China because of their dependence on simple manual skills and selling their products in low-tier markets. They therefore decided to establish their own brand names that could compete in the upper-tier market. The focus shifted towards product development and support for back-up product development processes. The city launched the project "Make Our Shoes Brand Name Products" in 2006. It subsidized support funds and participating firms raised matching funds. The city furthermore took responsibility for market development on behalf of the project's participating firms so they could fully concentrate on the R&D process.

The 10-year project lasted until 2017, with five local shoe manufacturers succeeding in developing upper-tier products with their own brand names. Product innovation covers various components from design, function, production of specialized goods for specific consumers to the application of innovative materials. The city considers the project an example of a successful cooperation between the public and private sector to revive a local industry that had once faced a business outflow and shutdowns caused by changes of the business environment.

b) (R&D) Transform the industry into a knowledge-intensive industry

The second recommendation is encouraging domestic producers to move their focus to research and development functions to create new textile materials and move beyond the production of ordinary thread, fabrics and clothes. The textile/apparel/footwear/leather industry can be a high value industry and instrumentalized to produce high-quality, high-performance materials.

To promote material development as part of textile production, the industry should enhance its R&D capacity to develop new textile materials. Enhancing the R&D capacity of the industry can only be achieved through investment in human capital. Investment in and accumulation of human capital requires resources and capital to be dedicated to training R&D specialists.

Specifically, the industry should be supported by the chemical industry to enhance the materials used by the textile industry to be able to develop high value materials. R&D specialists must be trained in chemical engineering so they have the capacity to develop new textile materials.

Case of the Republic of Korea #2. Transform the industry into knowledge-intensive material industry

Transition from low value products to super-textile products: Enhancement of Connecting Demand for Super-Textile Project

Since the late 1980s and early 1990s, the Republic of Korea has been losing competitiveness in the consumer textile market. The main reason for this was that the main export items were low value products such as fabrics and dyeing that could easily be imitated by emerging developing countries. The Korean textile industry and the City of Daegu, where the majority of Korean textile firms and factories were based, faced a crisis due to reductions in profitability and because their production facilities moved to China and other developing countries in search of cheap labour.

Since the conventional products and methods of production could not offer a solution to the crisis, the Ministry of Trade, Industry and Energy and City of Daegu launched the "Connecting Demand for Super Textile Enhancement Project" in 2015 to address the changes in the business environment of the local textile industry. The main objective of the project was to turn the local industry's products from low-value fabrics and dyed products to high-value industrial textile materials. With the collaborative efforts of firms and research institutes, the industry successfully developed high-value products such as high-tenacity para-aramid fibres that can be used as reinforcing material, conjugated fibres, speaker damper, fibre belts, convey-

er belts for steal products, medical threads, tire fabrics and other products. Those products do not target consumer demands but are used as material input for other cutting-edge industries.

The feedback from the participating firms in the project was positive. The number of firms that produced industrial textile product grew from 230 to 480 and their share of produced goods also increased from 20 per cent to 30 per cent. In addition, as a result of the project, the sales of participating textile producers reached a total of USD 70 million and created 120 new jobs within 3 years.

B. (Productivity) Find ways to improve manufacturing efficiency: innovation in production technology

Another response to changes in the business environment is to improve manufacturing efficiency. If more efficient methods of production are established, the industry's competitiveness can be maintained with the same product and increasing labour prices.

One example of efficient production is smart manufacturing. The case of Adidas Speed Factory shows that the adoption of smart manufacturing can even be applied to CMT (cut, make, trim) without manual inputs, corresponding to the customized requirements for the given product. Smart manufacturing makes CMT and finishing processes, which are considered low value generating production, affordable, profitable and competitive. Smart manufacturing is only one of the many possibilities to improve industries' efficiency.

One thing to keep in mind is to not be concerned about job losses, i.e. reductions of low-skilled manual jobs. The transition to smart manufacturing may imply that there simply is no space in the production process for low-skilled activities, because they can largely be substituted by an automated production factory. Adopting smart manufacturing could result in mass unemployment of workers engaged in CMT processes.

Moving from conventional production methods to smart manufacturing is linked to job losses and such a shift will be face with fierce resistance by workers. Their resistance may pose a major social and political challenge for policymakers and government bodies. It is therefore not surprising if policymakers lean more towards avoiding conflict and to not initiate any changes.

CMT processes carried out manually can easily be copied with lower investment and at less cost. Latecomers can therefore catch up quickly and undermine the market leaders' competitiveness. Unless firms innovate, they will lose jobs either to smart manufacturing or to competitors who will push them out of the market.

To deal with such risks, firms must prepare for future technology, which requires a high-skilled labour force. The government must invest in education and training and increase the share of skilled labour force. In addition, retraining opportunities must be offered to workers so they can adapt to new methods of production and implement innovations in production technologies.

Case of the Republic of Korea #3. Innovation in production technology

Innovation efforts of the textile and apparel industry using digital technology in the Republic of Korea

In 2018, the Korea Federation of Textile Industry (KOFOTI) hosted the "Textile-Fashion Digital Innovation Seminar", where examples of innovation efforts in the textile-apparel industry to raise productivity were presented and discussed. Firms presented the application of cutting-edge technology to every stage in the value chain.

One such example is innovation in the planning and design process. By making use of 3D virtual design software and online virtual fitting technology, firms can design new products. Another example is analysing fashion images using artificial intelligence (AI) based on deep-learning technology. By analysing the image and extracting information on product colour, shape, printed pattern and material, AI can help manufacturers find matching or similar images to develop new products. Yet another example is using internet of things (IoT) technology. Firms can thereby collect and analyse customer data such as moving and purchasing patterns and length of stay in stores. Based on the data analysis, they can evaluate the effectiveness of marketing, devise promotion plans and respond to customer demands. One example of using IoT is the smart mirror technology. By using sensors in the hanger and smart mirrors, vendors provide information on the price and specifications of products to customers, information on the popularity of the customer's choice and a virtual image of the fitting. Another example is using RFID tag and label technology. By attaching an RFID tag or label, firms can collect data on sales volume without directly communicating with the customer and use the data to manage logistics in their shops and storage facilities. One final example is the adoption of a total management platform to manage sales, payment and stocks. Such platform solutions consolidate the management of all sales channels including off-line, online and mobile sales.

The adoption of digital solutions in the textile and apparel industry is at a very early stage, even in the Republic of Korea. Cooperation between countries plays an even more important role to achieve digital innovation, raise productivity and remain competitive.

Chapter 6. Electronics

6.1. Definition and classification

The electronics industry entails the manufacturing of electronic products, including computers and peripherals, electronic communication equipment, consumer electronics and all types of electronic components. The production of electronic products is classified as ISIC 26 and some products as ISIC 27. In the international trade classification system, electronic products are found in SITC groups 75, 76, 77.

Based on the characteristics of the electronic product supply chain and the similarity between the product codes listed in the international classification list, the products of the industry are grouped into five subsectors:

Table 6.1 Electronics subsector groups according to ISIC and SITC classification

Subsector	VSIC/ISIC Rev. 4	SITC Rev. 3
Electronic components	2610	776
Computers and peripherals	2620	751, 752, 759
Communication equipment	2630	761, 762, 763, 764
Consumer electronics	2640, 2750	775
Other electronic equipment	2651, 2652, 2660, 2670, 2680	774, 871, 872, 873, 874, 881, 882, 885, 8984

6.2. Development of the electronics industry

Viet Nam's electronics industry began taking shape in the mid-1960s but really only began developing after 1975, undergoing two major stages of development. The first period from 1975 to 1990 was characterized by the establishment and development of the electronics industry within a centrally planned subsidized economy. In 1975, following the reunification of the country, the government took over several electronics factories in the South. Most of these factories were producing consumer electronic products, and joint ventures were formed with Japanese companies such as Sony, National, Sanyo, etc. These enterprises, together with a number of factories in the northern region became Viet Nam's new electronics industry. Since then, a number of electronic components manufacturing factories have been created: the Z181 factory - semiconductor devices; Binh Hoa electronics - resistors and capacitors; Tan Binh Electronics - speakers, rotating capacitors, printed circuits, etc. These enterprises not only supplied domestic assembly firms but also exported to the former Soviet Union and Eastern European countries. At the end of the 1980s, although operations under the central planning mechanism and state subsidy-based system was very difficult, the Vietnamese electronics industry was established on the shoulders of the Viet Nam Electronics Enterprises Union, and although it was small, it produced some basic parts and assembled products to supply the increasing domestic

demand and to export to foreign countries. In the early 1990s, when the Soviet Union and Eastern bloc disintegrated, Viet Nam's electronics industry took a severe hit due to the loss of supply of raw materials, flexible parts and loss of export markets. Without a market and the lack of capital to modernize and innovate, electronics enterprises faced extreme difficulties. Some enterprises had to temporarily suspend their operations, others shifted to the production of other goods. The fledgling Vietnamese electronics industry faced extremely difficult obstacles and challenges.

The second phase from 1990 to the present can be characterized as a period of establishing and developing in the global market context. By introducing policies of innovation and integration, Viet Nam's economy quickly began to shift towards a market economy. The government encouraged open investment policies, the construction of infrastructure and export processing zones and industrial parks intensified, which attracted many foreign investors to Viet Nam and had a strong impact on the economy's development in general and on the electronics industry in particular. Since 1994, with the participation of state-owned enterprises (SOEs), private enterprises and foreign-invested enterprises, Viet Nam's electronics industry has changed dramatically. SOEs have innovated their operating methods and strengthened their links with foreign firms. Many private enterprises were established and production and business activities became very dynamic and effective. Many renowned global electronic brands entered Viet Nam, formed joint ventures with domestic enterprises or invested 100 per cent capital in building assembly production facilities. The new operating mechanism and environment helped Viet Nam's IT industry recover and prosper. Due to the government's open investment policy, the attractiveness of the domestic market of over 90 million people and abundant human resources, Viet Nam's economy has attracted a lot of foreign investment. After 15 years of development, the Vietnamese IT industry has made a number of achievements, and generally meets domestic demand for consumer electronic products and computers. However, dependence on FDI has also brought some challenges that will be addressed in the following analysis.

6.3. Production and employment

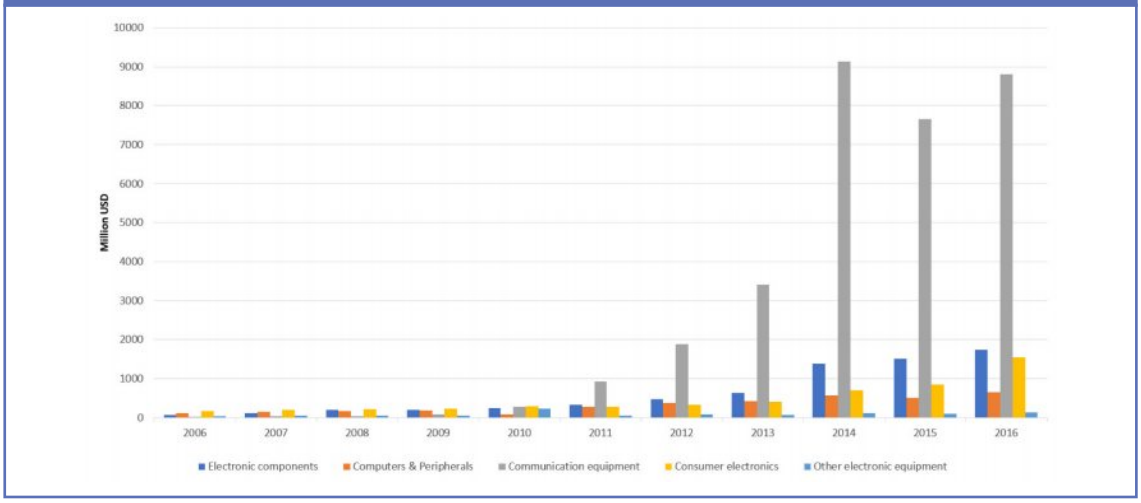
The value added of Viet Nam's electronic industry in 2016 amounted to USD 12.875 billion and witnessed an impressive growth rate of 41 per cent in the 2006-2016 period and 47 per cent in the period 2011-2016. The production of communication equipment registered the highest value added, increasing from USD 25 billion in 2006 to USD 922 billion in 2011 and USD 8.813 billion in 2016, its share of added value progressively increasing from 6 per cent, to 49 per cent and 68 per cent of the entire electronics industry for those years. The average growth rate of communications equipment amounted to 57 per cent in the period 2011-2016 and 79.8 per cent in the 2006-2016 period.

The Electronic components subsector ranked second, with an added value of USD 1.738 billion in 2016, up 14.5 per cent compared to 2015, accounting for around 13 per cent of the entire industry, with the average growth rate exceeding 40 per cent in the period 2011-

2016 and 38 per cent in the period 2006-2016. Consumer electronics ranked third in terms of value added, amounting to USD 1.544 billion in 2016, but its share tended to decrease, from 40 per cent in 2006 to 12 per cent in 2016, with its average growth rate declining from 40.42 per cent in the period 2011-2016 to 25.29 per cent in the period 2006-2016. The other two categories are computers and peripherals and other electronic equipment, which accounted for a lower share of 5 per cent and 1 per cent, respectively, of the total value added of Viet Nam's electronics industry.

The industry's impressive growth is for the most part linked to from the significant inflows of FDI, with large foreign electronics enterprises investing in the establishment of factories in Viet Nam over the last 10 years, including Samsung, which has invested in Viet Nam since 2009. Viet Nam has become one of the world's leading countries in exports of communication equipment.

Figure 6.1 Value added from Viet Nam's electronics subsectors, 2006-2016 (million USD)



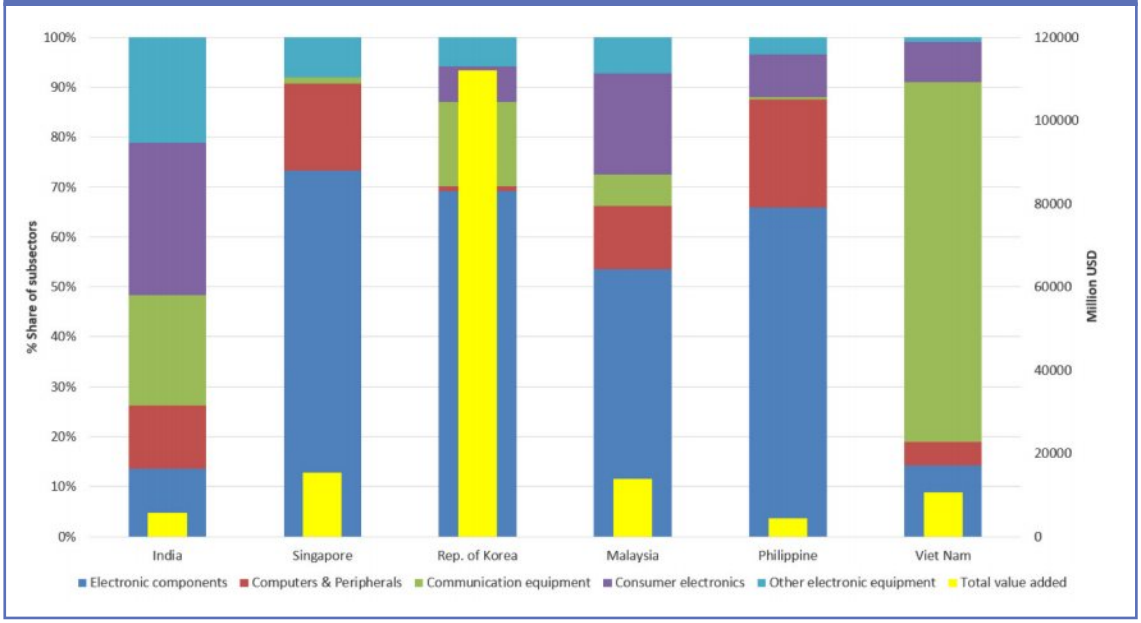
Source: UNIDO INDSTAT

Despite this progress, Viet Nam still lags behind some of the leading producers in the world. In this section, Viet Nam is compared with the Republic of Korea, Malaysia, Singapore, India and the Philippines. In 2015, Viet Nam's electronics industry generated USD 10.6 billion; communication equipment accounted for over 70 per cent of this figure, electronic components for 20 per cent and other electronic equipment for the rest.

The Republic of Korea is the leader with a total value added of its electronics industry in 2015 amounting to USD 112 billion, 11 times higher than the total value of Viet Nam's entire electronics industry. In terms of structural composition within the group, electronic components contribute with the highest share of added value, namely nearly 70 per cent, while communication equipment products contribute less than 20 per cent. The electronics industry in both Singapore and Malaysia are also relatively strong; the electronics industry's total value added in the two countries amounted to USD 15.4 billion and USD 13.8 billion, respectively in 2015. India and the Philippines' electronics industries lag behind with a total value added of USD 5.8 billion and USD 4.5 billion, respectively.

In terms of production structure, the added value of the countries included in this study derives mainly from electronic component manufacturing. The share of computer products and peripheral devices is relatively large in the Philippines and Singapore (over 20 per cent), while the share of consumer electronics is high in Malaysia. The development of all electronic product groups is fairly uniform in India, though the added value of consumer electronic products is higher but not significantly compared to the other product groups.

Figure 6.2 Value added of Viet Nam's and comparators' electronics industry, 2015 (million USD)

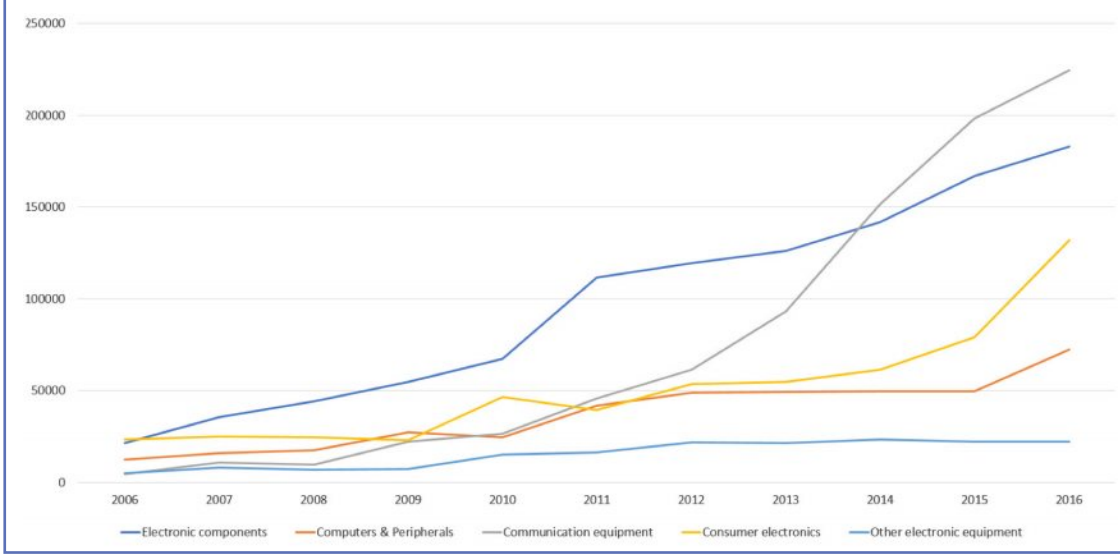


Source: UNIDO INDSTAT

The electronics industry attracts a large workforce. The total number of employees in the electronics industry increased nearly ten-fold in just 10 years, from 66,867 in 2006 to 634,440 in 2016, the average growth rate reaching 25 per cent in the period 2006 -2016. Around 70 per cent of the workforce is female and over 85 per cent of workers are under the age of 35. As already mentioned, the development of Viet Nam's electronics industry is mainly attributable to high FDI inflows to the electronic component manufacturing from multinational corporations, especially from the Republic of Korea and Japan.

At a more disaggregated level, the analysis shows that communication equipment boasts the highest average growth rate at 47 per cent for the period 2006-2016, increasing from 4,656 employees in 2006 to 224,594 in 2016. It is followed by the electronic components industry with 21,256 employees in 2006 and 183,158 employees in 2016, with an average growth rate of 24 per cent. Consumer electronics equipment and computers and peripheral devices registered a growth rate of 19 per cent, and other electronics achieved an average growth rate of 16 per cent.

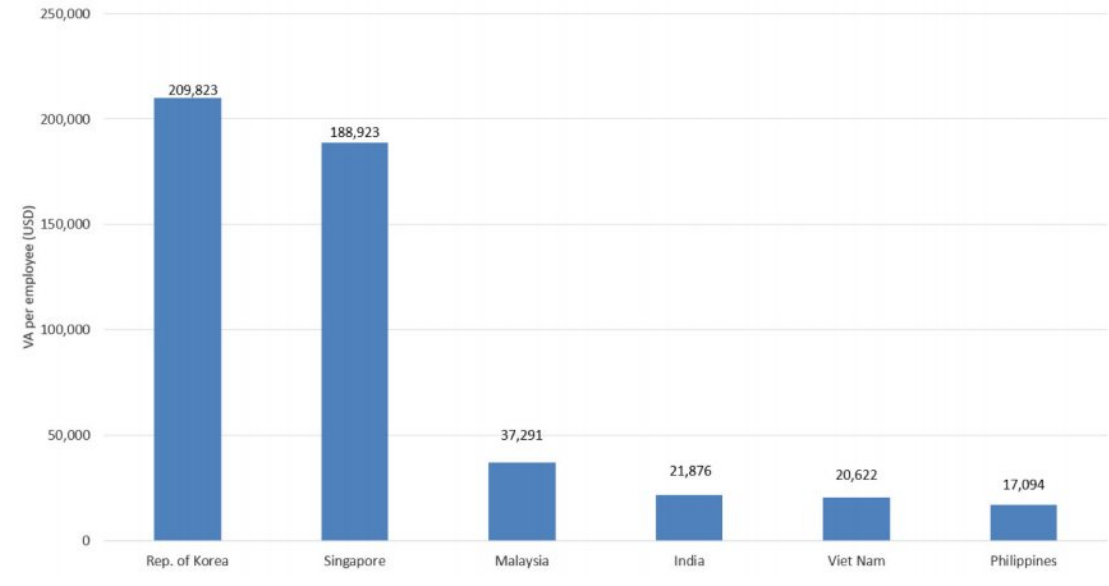
Figure 6.3 No. of employees in Viet Nam's electronics subsectors, 2006-2016



Source: UNIDO INDSTAT

Viet Nam's labour productivity, measured by the average value added per employee, is still low compared to that of other countries in the region, and is only slightly higher than that of the Philippines. In 2015, each worker in Viet Nam's electronics industry generated about USD 20,293 / labour, higher than in the Philippines at USD 17,094, but 10 times lower than in the Republic of Korea, 9 times lower than in Singapore and nearly 2 times lower than in Malaysia.

Figure 6.4 Viet Nam and comparators' labour productivity in electronics, 2015 (USD)



Source: UNIDO INDSTAT

As already observed in the textile industry, a close look at employment elasticity in the two periods 2006-2011 and 2011-2016 indicates a shift from employment-led growth (often unproductive) to productivity-led growth, following the industry's restructuring, driven by FDI. However, unlike textile, the main subsector, communication equipment, did not drive this change; it was instead attributable to electronic components and to a lesser degree to other electronic equipment.

Table 6.2 Employment elasticity in Viet Nam's electronics industry, 2006-2011 and 2011-2016

	2006-2011		2011-2016	
Electronics components	1.09	Unproductive employment	0.26	Productivity-ked growth
Computers and peripherals	1.40	Unproductive employment	0.64	Employment-led growth
Communication equipment	0.55	Employment-led growth	0.66	Employment-led growth
Consumer electronics	0.92	Employment-led growth	0.68	Employment-led growth
Other electronic equipment	2.89	Unproductive employment	0.35	Productivity-ked growth
Overall electronics	**0.86**	**Employment-led growth**	**0.43**	**Productivity-ked growth**

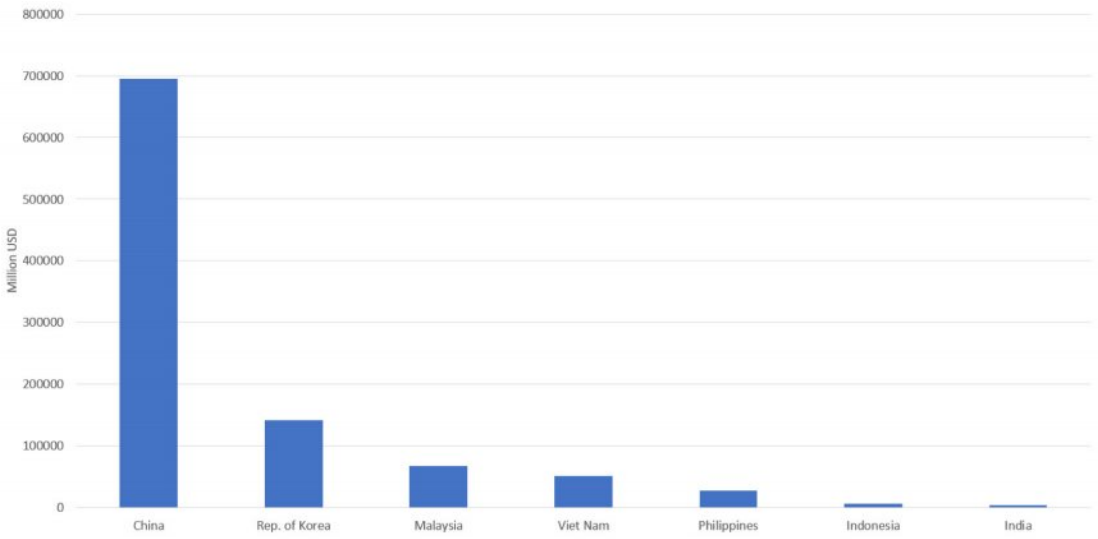
Source: UNIDO INDSTAT

Communication equipment experienced the most profound restructuring, with the average establishment size increasing from 130 employees in 2006 to 700 in 2016, increasing average value added per establishment by nearly 45 per cent in this period, while maintaining an employment CAGR of 37.6 per cent in 2011-2016, yet down from 58 per cent from 2006-2011.

6.4. Trade

The export value generated by Viet Nam's electronics industry in 2015 reached almost USD 51 billion, with an average growth rate of 50.9 per cent within 5 years from 2010 to 2015, the highest in the world. China is still the largest exporter of electronics worldwide with export values close to USD 695 billion, but the average growth rate in the period 2010-2015 was only 6 per cent, due to shifting production to neighbouring countries. Secondly, the Republic of Korea boasts an export value of over USD 142 billion in 2015 and an average growth rate of 1 per cent. Malaysia follows with an export value of nearly USD 68 billion, indicating a recession rate of -6 per cent. The Philippines had an export value of over USD 27 billion and had a relatively high average growth rate of 11 per cent in 2015. Both Indonesia and India had a low export value and their average growth rate declined.

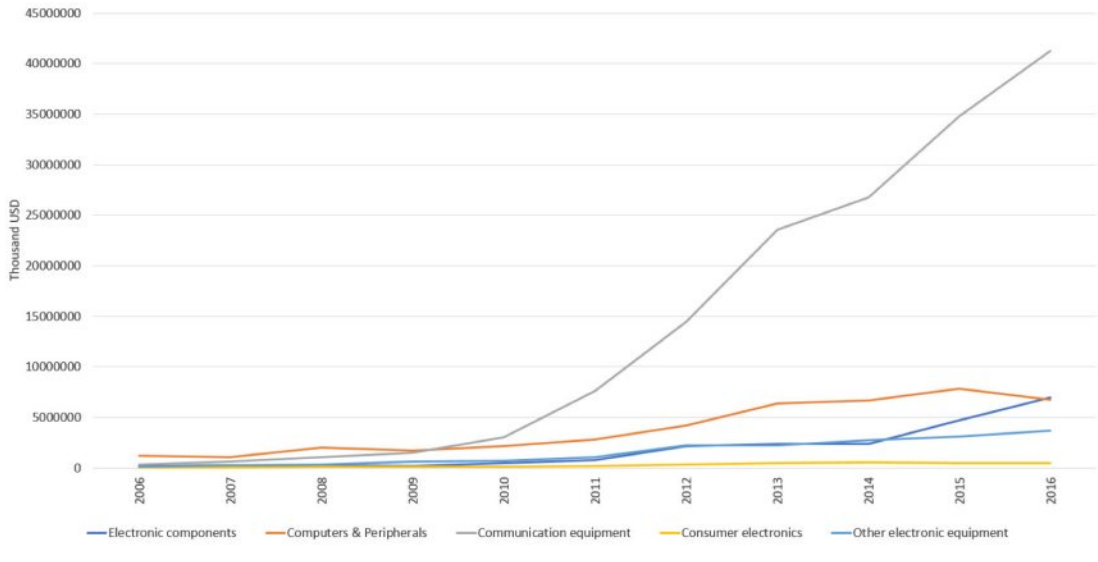
Figure 6.5 Export value of electronics products, Viet Nam and comparators, 2015 (million USD)



Source: UNCOMTRADE

Within the Vietnamese electronics industry, the export value of communication equipment was highest at USD 41.225 billion in 2016, boosted by an average growth rate of 62 per cent in the period 2006-2016, followed by that of electronic components and computer and peripherals with export values in 2016 of USD 6.950 billion and USD 6.775 billion, respectively. These two industry groups also witnessed an average growth rate of 42 per cent and 19 per cent, respectively, in the period 2006-2016. Lastly, other electronic equipment and consumer electronics lagged behind, with export values of USD 3.702 billion and USD 0.511 billion in 2016, but achieved respectable average growth rates of 39 per cent and 35 per cent in this period, respectively.

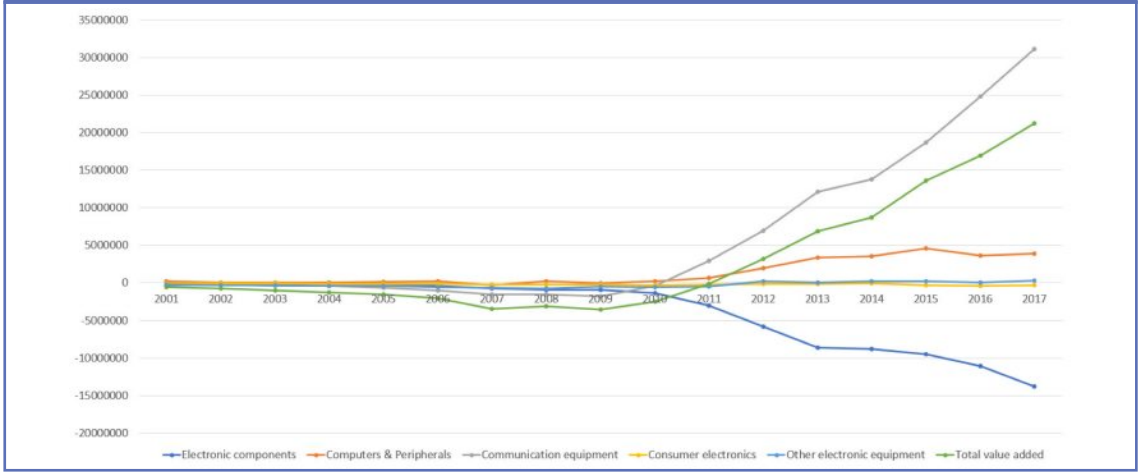
Figure 6.6 Export values of Viet Nam's electronics subsectors, 2006-2016 (thousand USD)



Source: UNCOMTRADE

Looking at trade balances provides analysts with a good indication of global value chain dynamics and might confirm the information from TiVA on the dependence of the industry's success on imports of intermediate inputs. It is not surprising that the electronic components industry suffered its biggest deficit in 2016 of more than USD 11 billion. By contrast, as expected, communication equipment registered a trade surplus of nearly USD 24.8 billion in 2016.

Figure 6.7 Trade balances of Viet Nam's electronics subsectors, 2006-2016 (thousand USD)



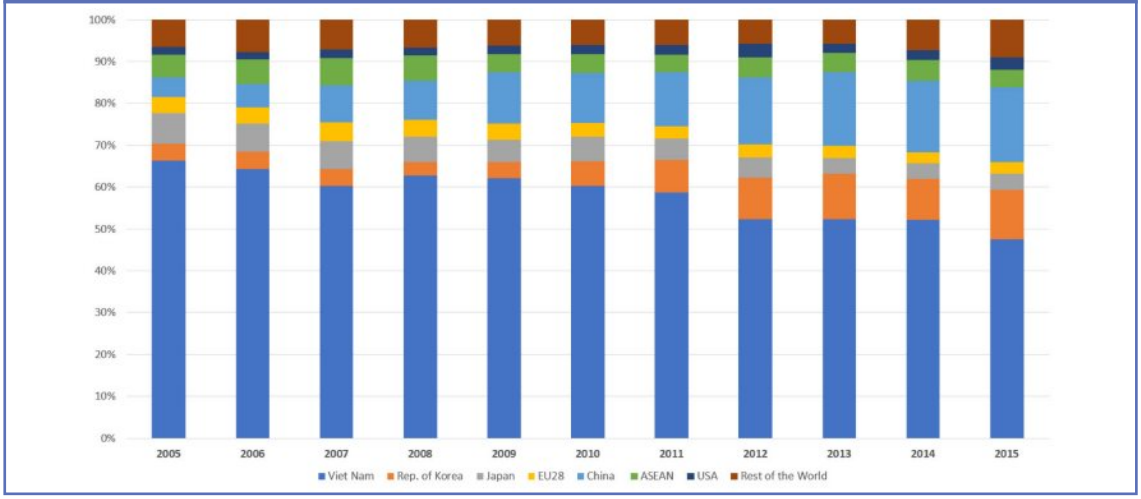
Source: UNCOMTRADE

6.5. Value chain analysis

As already discussed in the previous sections, the remarkable performance of Viet Nam's manufacturing sector was attributable in large part to the impressive performance of telecommunications equipment exports which, in turn, depended almost entirely on FDI.

To assess the extent to which this performance is linked to the domestic economy and draws value added from it, trade in value added data helps to better understand the evolving situation by exploring the origin of value added in gross exports.

Figure 6.8 Origin of value added of Viet Nam's electronics exports (from manufacturing)

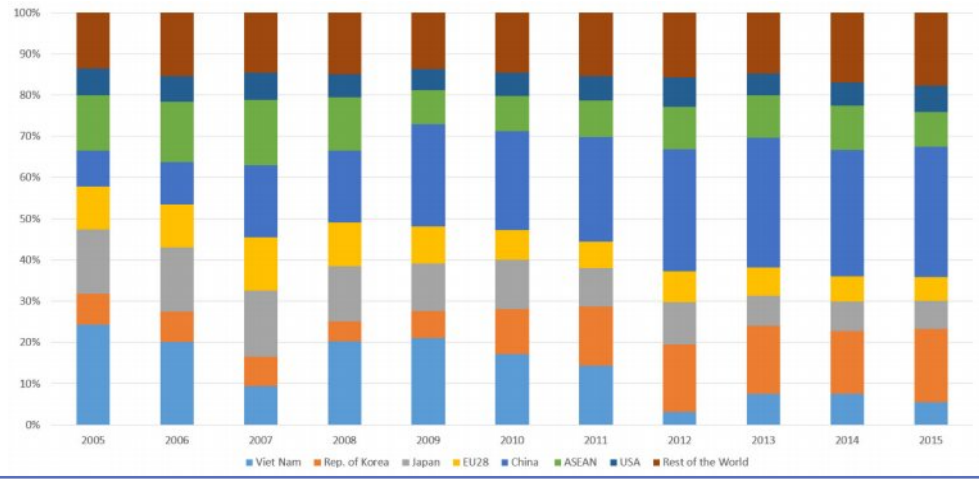


Source: OECD

The share of domestic value added from Viet Nam's manufacturing sector experienced a gradual but relentless decline from over 65 per cent in 2005 to below 50 per cent in 2015, confirming the need to revert the situation through larger investments in support industries.

If we broaden this analysis to include services and determine the origin of value added in the final product rather than in gross exports, the scenario becomes even bleaker, with very limited value addition from domestic industry. Again, the share of value added from domestic industry shrinks from almost 25 per cent in 2006 to 5.5 per cent in 2016, absorbed by China and the Republic of Korea.

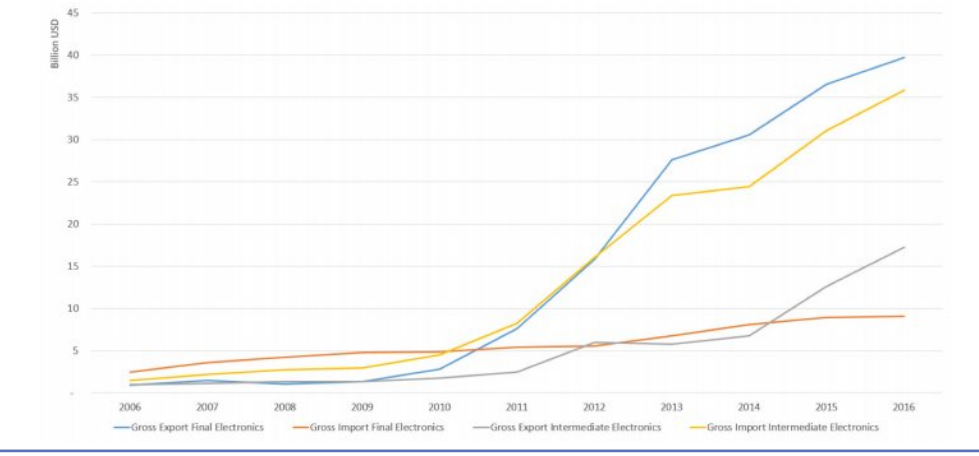
Figure 6.9 Origin of value added of Viet Nam's final electronics products (from total economy)



Source: OECD

Using World Integrated Trade Solutions, we can break down complex global value chains into intermediate and final products[14]. The figure confirms Viet Nam's dependence on imports of intermediate electronics, closely following the trajectory of exports of final electronics.

Figure 6.10 Trends in gross exports and imports of Viet Nam's electronics, 2006-2016 (billion USD)



Source: Based on GVC, WITS (World Bank)

[14] However, it only considers gross exports and imports and not net exports and imports of re-exports.

6.6. Market structure, dynamics and diversification

The following analysis focuses on the market dynamics of Viet Nam's leading electronics subsector, telecommunications equipment, to position Viet Nam in the global scene. Starting from the analysis of top global exporters of telecommunications equipment, China not only remains the leading exporter by far, but was also the country with the biggest increase in market share globally (10 per cent) in the period 2010-2016. Viet Nam followed as the second largest global exporter but its position might be threatened in the future in particular by Taiwan ROC ("unspecified" in UNCOMTRADE), which grew even faster at a CAGR of 82 per cent compared to Viet Nam's 50 per cent in the period 2010-2016.

Table 6.3 Top global exporters of telecommunications equipment, 2010-2016

Source country	CAGR			Market Share		
	2010	2016	2010-2016	MS 2010	MS 2016	Change
China	193,973,619	335,573,818	10%	41%	51%	10%
Viet Nam	4,184,555	47,041,444	50%	1%	7%	6%
Unspecified	884,367	31,779,413	82%	0%	5%	5%
Korea, Rep.	41,101,071	31,448,285	-4%	9%	5%	-4%
United States	25,039,158	25,965,924	1%	5%	4%	-1%
Mexico	23,614,340	22,934,905	0%	5%	3%	-1%
Malaysia	16,544,120	18,145,999	2%	3%	3%	-1%
Netherlands	10,466,127	15,677,011	7%	2%	2%	0%
Other Asia, nes.	21,743,566	15,583,483	-5%	5%	2%	-2%
Japan	17,349,241	14,864,678	-3%	4%	2%	-1%
Germany	11,992,663	12,071,101	0%	3%	2%	-1%
Thailand	8,840,912	11,073,456	4%	2%	2%	0%
Hong Kong, China	7,008,008	6,657,549	-1%	1%	1%	0%
World	477,999,715	660,164,186	5,5			0

Source: UNCOMTRADE

Viet Nam's largest import markets for telecommunications equipment are the United States, the United Arab Emirates and the Republic of Korea (which is also a major investor with Samsung). Austria was the most dynamic market in terms of import growth from Viet Nam, followed by the Netherlands and the Republic of Korea.

Table 6.4 Major markets of Viet Nam's telecomm equipment exports, 2010-2016

Viet Nam telecomms equipment exports to destination			CAGR
Country	2010	2016	2010-2016
United States	231,607	5,266,690	68%
United Arab Emirates	124,185	3,879,976	77%
Korea, Rep.	65,522	3,117,644	90%
Austria	16,694	2,179,146	125%
China	216,074	2,008,436	45%
United Kingdom	84,684	1,914,166	68%
Hong Kon, China	119,891	1,828,261	57%
Germany	110,479	1,808,132	59%
Italy	58,656	1,439,312	70%
Netherlands	17,989	1,224,751	102%

Source: UNCOMTRADE

An example of a market threat analysis is provided, using the case of the Austrian market to analyse competitors.

Table 6.5 Major exporters of telecomm equipment to Austria, 2010-2016

Global imports (in 1000 USD)			CAGR		Market share	
Source country	2010	2016	2010-2016	MS 2010	MS 2016	Change
China	754,562	1,234,061	9%	29%	40%	11%
Germany	443,832	343,045	-4%	17%	11%	-6%
Slovak Republic	35,479	291,872	42%	1%	10%	8%
Viet Nam	11,276	223,792	65%	0%	7%	7%
Czech Republic	17,392	104,808	35%	1%	3%	3%
Netherlands	47,354	92,642	12%	2%	3%	1%
United States	81,018	85,749	1%	3%	3%	0%
Korea, Rep.	102,527	84,767	-3%	4%	3%	-1%
United Kingdom	89,698	80,195	-2%	3%	3%	-1%
Ireland	148,301	60,055	-14%	6%	2%	-4%
Hungary	109,736	41,652	-15%	4%	1%	-3%
Finland	61,296	40,092	-7%	2%	1%	-1%
Poland	2,293	36,435	59%	0%	1%	1%
All countries	2,562,961	3,068,853	3%			

Source: UNCOMTRADE

The Viet Nam's export values of telecommunications equipment to Austria are lower than those from the Slovak Republic and China, in particular, but also in terms of increases in their market shares. The projection is that Viet Nam will become the third largest exporter of telecommunications equipment to Austria, surpassing Germany in a few years if current trends are maintained.

6.7. SWOT analysis

Strengths	Weaknesses
+ Viet Nam has a young population, 60 per cent are of working age (between 17 and 60 years of age), and 94 per cent of the population is literate. + Viet Nam's abundant labour force is considered skilful in the assembly of electronic devices, including modern electronic devices. + The relatively low cost of labour in Viet Nam gives auxiliary products and electronics assembly firms a competitive advantage over the region. + Important mineral resources necessary to develop the electronic materials industry such as iron ore, rare earth, titanium, rutin, barite, ilmenite, etc. are available.	+ Viet Nam is still highly dependent on imports of intermediate electronics, impeding the integration of the value chain with linkages to SMEs. + The electronics industry is heavily reliant on FDI, and very few domestic enterprises operate as suppliers. + There is limited value addition from domestic enterprises to Viet Nam's electronics exports, reducing potential benefits to society. + The industry's production capacity is still limited; for a long time, Viet Nam lacked important parts for the development of the electronics industry such circuit board manufacturing plants

+ With a population of over 90 million people, Viet Nam is a potential consumer market. The Government of Viet Nam encourages and supports foreign companies to invest and cooperate with Vietnamese enterprises in the field of IT industry. + Many top electronics firms invest in Viet Nam. + The export turnover of electronic products has increased rapidly.	and printed circuit board assembly plants; chipset design; chipset factories; logic design on programmable logic devices; design and manufacture of electronic products. Enterprises mainly assemble products based on specific designs and imported components, so the added value of the products is low, estimated at around 5 per cent to 10 per cent. + The competitiveness of the products is not high: product quality is considered low, and dependence on imported intermediate inputs raises the cost of final products. + Lack of highly qualified human resources for the development of local R&D, design of products and branding, logistics, etc. + Lack of a system of synchronized product quality standards.
Opportunities	**Challenges**
+ Viet Nam's ability to export IT and electronic components is increasing. + Viet Nam successfully attracts FDI from large corporations from around the world. + The price of electronic and telecommunication products will decrease significantly when tariff barriers are removed; such products are the driving force for the development of e-commerce. + The increasing interest of leading IT countries such as the United States, Japan and the Republic of Korea to invest in Viet Nam will create momentum to attract many other investors to participate in the country's development. + The U.S.-China trade dispute might offer more opportunities to penetrate the U.S. market. + Global demand for electrical/ electronic information technology products is very high.	+ The competitiveness of domestic companies is still low, which is evident in the low capital, lack of experience in business management, technology, low staff qualifications and labour productivity. + Talent attraction: the grey matter of Vietnamese enterprises, the pressure on high-quality human resources is increasingly weighing on Viet Nam's university system. + Scope and scale of the business: to meet customers with very high requirements for quality, time, price and scale. + There are no available well-qualified human resources teams to adapt to the requirements of technological developments towards 4IR: meeting the trend of electronic products integrated with smart software and services and saving energy is a tremendous challenge for manufacturing enterprises in the investment industry. + The removal of protectionist barriers will expose domestic manufacturing enterprises to international competition with imported goods, when the import tax on equipment is equal or lower than importing components. + Dependence on FDI without building local capacities makes Viet Nam's industry vulnerable to volatility of FDI in the future + Competition between countries in the region is increasing.

6.8. The electronics industry's strategic objectives

The development objective of Viet Nam's electronics industry is mentioned in a number of government documents. The recent resolution of the Central Committee of the Communist Party of Viet Nam, Resolution 23-NQ/ TW on the formulation of a national industrial development policy through 2030, with a vision to 2045 identifies electronics as a priority industry to be further developed in the period leading up to 2030.

The Prime Minister's Decision No. 879/QD-TTg approving Viet Nam's industrial development strategy through 2025, with a vision to 2035 gives priority to the development of machine equipment, computers, phones and components up to 2025, and to software development, digital content, information technology services and medical electronics after 2025.

Decision No. 68/QD-TTg, approving the support for the industrial development programme from 2016 to 2025 also identifies the development of electronic components together with mechanical and plastic-rubber components, the objective by 2020 being to supply 35 per cent of the demand for parts and accessories by industries prioritized for development and to supply 55 per cent of domestic demand and boost the production of goods that serve high-tech industries by 2025.

Decree No. 111/2015/ND-CP on the development of supporting industries provides the list of industrial products to support development priorities and a number of electronic products prioritized for development. It includes:

- Basic electronic components - solar electronics: transistor, integrated circuit, sensors, resistors, capacitors, diodes, antennas, thyristors;
- Electronic circuits;
- Materials for manufacturing electronic components: semiconductors, hard magnetic materials, soft magnetic materials, active insulators;
- Electronic product components: plastic components, rubber components, mechanical/ electronic parts, glass components;
- Batteries for laptops and mobile phones;
- Electric wires and cables, LED lights, telephone headsets and speakers;
- Phone battery chargers;
- Types of screens.

6.9. Policy recommendations

In response to the challenges Viet Nam's electronics industry is facing, some recommendations can be made.

A. Focus on IT software and R&D system

Viet Nam must expand its research on basic technology. In the Republic of Korea, research and development has attracted more attention than basic research, which has resulted in the country's rapid growth and has fostered sustainability. Viet Nam must focus on promoting a software and hardware fusion development strategy. The combination of software and hardware often generates a platform upon which innovations can be subsequently built. The Republic of Korea has predominantly focused on the development of hardware and still depends on developed countries for software, which in turn makes it difficult to leave the viscous circle due to its relatively weaker capabilities in software technology. Viet Nam should therefore fuse the electronics industry's development with a strategy that prioritizes software from the outset.

In short, Viet Nam should focus on the establishment of an R&D system, but not only on hardware, but also on software, i.e. the two should be converged. The supporting R&D policy could be implemented through a software-focused research development policy, supporting corporate joint research development and research development cooperation between large enterprises and SMEs. In addition, SMEs specializing in these programmes can create an innovative network ecosystem through software education, network activation, the expansion of professional forums, etc. This can be initiated by various government bodies either independently or in collaboration with other entities. Thereby, a sustainable venture ecosystem activated by spontaneous innovations can be created. The government can play an important role in stimulating idea generation and offering technology or management consulting with assistance from academics and more experienced industry experts.

B. Creating a start-up ecosystem in the electronics industry

Amid a rapidly changing IT paradigm emphasizing both economic growth and sustainable development, IT powerhouses including the Republic of Korea, the United States, China and Japan are making tremendous efforts to create a sound start-up ecosystem. The creation of an IT start-up ecosystem and its culture in addition to the commercialization of a variety of new ideas are necessary strategies to prepare for the fourth industrial revolution.

In with the context of the fourth industrial revolution, IT start-ups are flourishing in Viet Nam as well, where the number of smart phones and internet users has been increasing.

Viet Nam's IT industry is not heavily regulated, hence it is worthwhile to develop and invest in mobile applications. The majority of start-ups in Viet Nam are typically related to food or Fin technologies, i.e. the scope of business needs to gradually expand. In Viet Nam, the number of smart phone users exceeds 30 million, and there are a great number of IT developers and designers due to strong IT outsourcing to the country. Viet Nam has abundant potential to develop IT start-ups in fields such as AI, IoT, big data and machine learning.

Recently, the Vietnamese government is investing efforts into start-up cultivation and is demonstrating a strong intent to turn start-ups into new engines of growth. Start-up support policies, however, are still in their early stages, and detailed support plans have not yet been specified. Accordingly, the Vietnamese government needs to prepare a detailed strategy to build a start-up ecosystem, including comprehensive objectives.

Firstly, a physical space for start-ups needs to be created and support for IT start-ups expanded. The Vietnamese government should establish a start-up centre to cultivate hardware start-ups in manufacturing-based cities like Hanoi and Ho Chi Minh City. China announced a start-up policy in 2015, training around 100 million entrepreneurs and establishing approximately 1,500 start-up support centres across the country. Accordingly, the Vietnamese government needs to implement policies for the systematic promotion of start-ups through start-up centres.

Secondly, the Vietnamese government must expand its manufacturing-based start-up support. It could follow the example of Shenzhen in China, which has been a hub of electronic production with a manufacturing infrastructure and major processing trade centre since the Chinese economic reforms of 1978. Shenzhen has been called 'the factory of the world' in the past. It took the lead role as a manufacturing centre due to the creation of a factory cluster, providing infrastructure for the manufacturing of ICT products based on developed front-back supply networks and accumulated manufacturing know-how. Building on this foundation, IT manufacturing start-ups have flourished in Shenzhen. Once a low-cost centre of simple manufacturing, the city has now become a hub of innovative manufacturing start-ups. Shenzen is also known as the Silicon Valley of hardware, deemed a multipurpose supplier for hardware start-ups and arranging for service resources.

As Hanoi and Ho Chi Minh City are home to global IT companies, manufacturing infrastructure for hardware products is already available, so it will be easy to attract start-up investors. Viet Nam's government must develop a start-up policy to make the most of its manufacturing base and transform the cities into hubs for hardware start-ups.

C. Policy to promote the mobile software industry in line with the rise of mobile communication

ICT is the most rapidly changing field, and the best industry for leapfrogging in a catch-up country like Viet Nam. Accordingly, the focus must be on corporate and industrial support policies taking account of changes in the global environment, demand from the Vietnamese market and its supply capacity, in addition to other factors, such as the onset of the fourth industrial revolution.

Viet Nam has a high supply rate of mobile phones and has registered a rapid growth in digital economies. The Vietnamese government aims to commercialize 5G communication by 2020, the high-bandwidth communications protocol being a core piece of infrastructure of the fourth industrial revolution. Thus far it only has a promotion plan for commercialized 5G infrastructure, lacking a detailed and practical plan for ICT convergence industries that can be promoted following 5G commercialization.

Figure 6.11 The Republic of Korea's 5G plus strategy

Source: The Republic of Korea's Ministry of Science and ICT(2019)

In April 2019, the Korean government unveiled its 5G Plus Strategy for creating new 5G-based industries and services, which was developed jointly with ten ministries, including the Ministry of Science and Technology, the Ministry of Science and ICT, the Ministry of Economy and Finance and the Ministry of Trade, Industry and Energy. 5G infrastructure is part of a medium- to long-term strategy (based on 7-year 5G growth plans) for the promotion of 5G-based new industries and market revitalization, comprising five strategic fields and ten key industries. In addition, the government presented detailed objectives to be achieved by 2026, with an output of USD 180 trillion won and an export value of USD 73 billion.

4G focuses on personal use including smartphones, whereas 5G is being applied to manufacturing, energy and utility industries from the outset, and is expected to be utilized in fields ranging from autonomous driving to remote patient monitoring. In Viet Nam, the mobile communication market and the relevant platform corporations have shown rapid development and growth. In line with those development trends, new businesses need to be established and mobile software industries promoted to connect the communications and manufacturing sectors.

Ericsson, for example, signed a partnership pact on 4IR and IoT with state-run VNPT, a telecommunications service provider in Viet Nam in May 2019. A new cooperation scheme was developed by connecting Viet Nam's 5G communication ecosystem and Ericsson's IoT technology; Viet Nam's communication infrastructure is well equipped and multinational corporations are building supply chains in Viet Nam. The state-run communications industry in Viet Nam is based on national infrastructure, where Vietnamese communications firms can develop the mobile software industry by collaborating with global corporations.

D. Planning for the establishment of a high value-added electronics industry

Viet Nam's electronics industry only specializes in the simple assembly of parts and processing; specialized parts and equipment industry have not yet achieved any progress. Most Vietnamese companies depend on imports of key parts and equipment, and no research institutes or expertise in the parts and equipment industries or in critical technology are available in Viet Nam.

The country needs a strategy to transform the existing IT industry into a high value-added industry. In other words, the IT industry must transform from simple processing and assembly to high value-added manufacturing with a focus on key parts and equipment and on brands and marketing, and invest efforts into the technical development of critical parts and materials. The development of such a strategy requires a number of actions.

First, the promotion of high value-added industries such as displays, semiconductors and electronic parts must be bolstered. The capital equipment necessary to produce such goods has a long life cycle, requires huge investments and takes ten to 20 years to take off, but contributes to the creation of high value-added jobs and economic growth. Continuous investment is necessary to improve scientific technology and competence. A high value-added electronic industry must be promoted in the long run.

Second, productivity must be improved through technical innovation. Certain conditions must be met for venture businesses and small and medium-sized enterprises to be able to engage in technical innovation, and they must build ties with large corporations that possess an advantageous foundation for technical innovation and further growth. Policies to strengthen cooperation between conglomerates and small and medium-sized enterprises must therefore be strengthened.

E. Opportunities due to the U.S.-China trade conflict

Finally, the current trade war between the United States and China may be an opportunity for Viet Nam. With China facing escalating retaliation from the United States, Viet Nam could serve as an alternative supplier of several commodities to its northern neighbour. Any disruption to supply and distribution chains due to the U.S.-China tariff battle could have a lasting impact. In the worst-case scenario, companies currently operating in China may have to relocate their factories or distribution centres to reduce the impact of the U.S. tariffs on China. This is an opportunity for Viet Nam as an export-oriented economy to strive to attract investors and emerge as an appealing alternative destination for manufacturers who want to restructure their supply chains.

While the trade frictions between the United States and China have only recently escalated, the dispute between the two countries has been ongoing for quite some time. The conflict is in fact the result of a long-term battle for technological hegemony disguised as a trade war. Consequently, foreign companies located in China are considering moving their export base to Viet Nam to bypass obstacles that have arisen in relation to exports to the United States.

These companies' main products would consist of technological goods that can no longer be imported to the U.S. market from China. Viet Nam must carefully consider the option of grabbing this opportunity with both hands to transform the country into a global manufacturing base that attracts technology companies and provides competitive products and services.

<The development stages of the Republic of Korea's electronics industry >

Based on changes in government policy and corporate strategy, the development of the Republic of Korea's electronics industry can be divided into four stages, presented in Table 6.6: the early years (1959 to 1965), the formative years (1966 to 1979), the rapid rise (1980 to 1992), and the maturation stage (1993 to present). Qualitative changes in government policy and corporate strategy are used to classify the development of the Korean electronics industry into distinct periods, because it takes time for quantitative indicators to reflect qualitative changes in government policy and corporate strategy, and there are no objective time delimiters for quantitative indicators. As such, quantitative indicators are used in a supplementary way.

For several years after Goldstar (today's LG Electronics) produced the Republic of Korea's first radio in 1959, the Korean electronics industry was primarily based on inward-oriented import substitution, and the government had neither a dedicated agency nor a comprehensive set of policy measures devoted to the promotion of the electronics industry. However, after designating radios and electrical devices as

one of 13 industries specialized for exports in July 1965, the government drafted a comprehensive plan in December 1966 to promote the electronics industry as an export-oriented strategic industry. At the time, the Republic of Korea was searching for new promising industries, encouraged by its initial success with export-oriented industrialization based on labour-intensive manufacturing (especially of garments). While the electronics industry was labour-intensive in the assembly segment of the value chain, it was also considered a fast-growing industry characterized by a rapid pace of technological innovation, with large spillover effects for the economy. As such, it was designated as one of the Republic of Korea's promising future industries.

Table 6.6 Development of the Republic of Korea's electronics industry

Area	1960s	1970s	1980s	1990s	2000~
Level of technology	Simple assembly	Production of actual goods	Production of semiconductors, design of goods, and development of process technology	Design of digital circuit boards, development of semiconductor process technology, advancement of miniaturization/ accumulation tech.	Convergence design tech. semiconductor VLSI tech.
Major products	Radio, black & white TV, electronic tube, manual parts	Colour TV, radio, cassette, electronic exchanger, manual parts	Colour TV, VCR microwave, refrigerator, monitor, audio	Large colour TV, VCR, microwave, monitor, CDP, DVDP, PC, CD-ROM, memory chip	Mobile phone, digital TV, MP3 player TFT-LCD, PDP, Flash Memory, DRAM
Production & marketing strategy	Mass production	Diversifying goods, mass production	Qualitative enhancement	Development of world's leading tech.	Leading tech. development & next generation growth engine

Source: KIET

The government enacted a special law aimed at promoting the electronics industry (1969), the shipbuilding (1967), machinery (1967), petrochemicals (1969), steel (1970) and non-ferrous metals (1971) industries, and provided various financial benefits and tax advantages to firms during the Republic of Korea's drive to develop the heavy chemical industries (HCI) as well. During the formative years of the electronics industry (1966 to 1979), the government strategically protected the domestic market, and provided incentives for private-sector firms to develop, produce and export electronic products designated for promotion. In 1966, the Ministry of

Commerce and Industry ordered its Communications Sub-Division for the Electrical Industry to promote consumer electronics. Subsequently, in 1971, the Ministry created a division-level unit for promoting the electronics industry and then elevated it to the bureau-level in 1978. During these formative years, the government also built an electronics industrial complex and established an education and R&D system to promote the electronics industry.

During the same period, many Korean firms entered the electronics industry, developing core competencies while engaging in vigorous competition. During its formative years, the Republic of Korea's electronics industry went from assembling relatively basic products such as radios to producing more sophisticated products such as colour TVs, refining its collective technological capacity to such a degree that businesses could realistically consider fabricating core components such as semiconductors.

Following its formative years, the Republic of Korea's electronics industry entered a period of rapid growth (1980 to 1992), during which the government shifted its focus from consumer electronics to information and communications technology (ICT), and Korean firms diversified their product lines accordingly and began to manufacture core components and materials by considerably expanding R&D. The government lifted the anti-consumption bias of the formative years and tried to generate synergies between domestic consumption and exports, starting with its decision to allow colour TV broadcasting in 1980. During this period of rapid expansion of the Republic of Korea's electronics industry, the government promoted ICT at the ministerial level headed by the Ministry of Post and Communications, whereas these duties had ben delegated to sub-division level units within the Ministry of Commerce and Industry during the formative years. Moreover, the government raised the innovative capacity for ICT considerably by investing 3 per cent of Korea Telecom's revenue in R&D. During that same period, private sector firms also greatly expanded their R&D, realizing that their continued dependence on imports of core components and materials would limit their potential for success. As a result, the Republic of Korea developed a digital switching system in 1982, and 64K DRAM in 1983 (third in the world after the United States and Japan).

Although the Republic of Korea's electronics industry achieved a measure of success in product diversification and core component development, it was still regarded as second-rate compared to the United States and Japan in the early 1990s. In the ensuing period, however, owing to coordinated efforts by the government and the private sector and specifically aggressive investments in core competence and quality improvement, the Korean electronics industry became second to none. The government provided key infrastructure for informatization and e-government and worked with the private sector to identify and promote new engines of growth.

For over 10 years, the Ministry of Information and Communications, created in 1994, played a leading role in promoting ICT. For their part, Korean firms pursued a fast follower-innovator strategy and aggressively invested in R&D and volume production. Although American or Japanese firms were the first to launch mobile phones, flat-panel displays and smartphones, Korean firms developed indigenous versions thereof in short order and were soon on par with the first movers due to aggressive investments and quality improvement. Furthermore, some Korean firms even launched innovative products before incumbent leaders, as demonstrated by the success of the so-called "phablet."

Chapter 7. Automotive

7.1. Definition and classification

In the international and Vietnamese industrial classification system, automobile products, assembly, manufacture and basic components are classified under ISIC 29 group, including motor vehicles and automobile motors (ISIC 2910), car bodies, trailers (ISIC 2920) and automotive parts (ISIC 2930), whereas motorcycles are classified under ISIC 3091. Under the commercial classification SITC, automobiles and motorcycles are classified under Code 78, with motor vehicles classified under Codes SITC 781, 782, 783; automotive bodies and trailers under SITC 786, automobile spare parts under SITC 784 and motorcycles under SITC 785. In addition, automobile engines belong to the ISIC 2910 code group with original automobiles, but not under SITC 78, which categorizes them under 7132 and 7783.

Table 7.1 Automotive subsectors and corresponding ISIC and SITC codes

ISIC		SITC	
2910	Manufacture of motor vehicles	781, 782, 783	Motor vehicles
		7132, 7783	Vehicles' engines
2920	Manufacture of bodies for motor vehicles; manufacture of trailers and semi-trailers	786	Trailers & semi-trailers
2930	Manufacture of parts and accessories for motor vehicles	784	Parts & accessories of vehicles of 722, 781, 782, 783
3091	Manufacture of motorcycles	785	Motorcycles

7.2. Development of the automotive industry

Immediately after the economic embargo policy was lifted in 1995, large international automobile and motorcycle groups established factories in Viet Nam. At the time, automobile and motorcycle manufacturers had high expectations of the Vietnamese market with its population of over 70 million and its per capita income of about USD 300. With over 20 years of experience, Viet Nam's motorcycle industry has developed rapidly, leading to the creation and strong development of an interlinked system of motorcycle spare parts and accessories. Currently, motorcycle assembly and manufacturing enterprises have achieved a localization rate of over 80 per cent, with some models achieving a rate over 90 per cent. In the past 20 years, the Vietnamese automobile industry has undergone various stages of development. From 1995 to 1999, foreign automobile manufacturers were allowed to invest in Viet Nam. The period 2000-2005 was characterized by continuous development, a stable macroeconomic environment and a policy of maintaining domestic production. The period from 2006 to today can be referred to as the post-WTO period, with many fluctuations in the macroeconomic and policy environment.

7.3. Production and employment

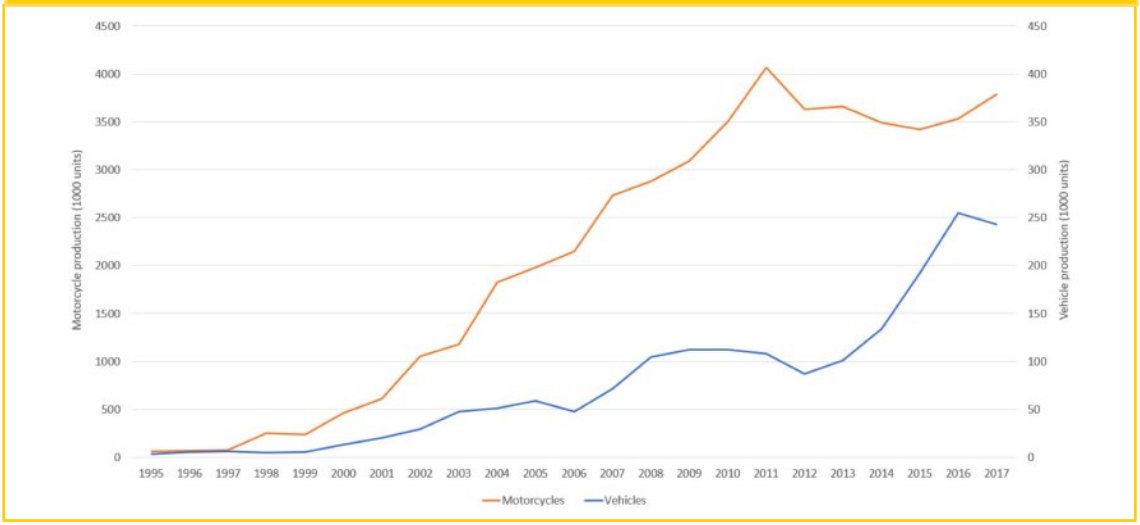
Over the past 20 years, Viet Nam has become both a production base and a large market for motorbikes, a popular means of transport that is suitable in light of the country's infrastructure conditions and people's income. Viet Nam is the fourth largest producer of motorcycles in the world with a scale of 3.7 million motorbikes / year (2017), just behind China, India and Indonesia.
Domestic production reached the highest level in 2011, with the number of assembled motorcycles reaching over 4 million, but Viet Nam witnessed a downturn thereafter until 2015. From 2015 until now, motorcycle production has tended to increase again. Currently, the production of motorcycles is mainly in the hands of FDI enterprises, including Honda, Yamaha, SYM, Piaggio and Suzuki; a number of domestic private assembly firms are also involved in assembling domestic motorbikes and mainly serve the rural market.

Since 1995, when foreign automobile assembly enterprises began investing in Viet Nam, the number of locally assembled vehicles increased rapidly, from 3,500 in 1995 to over 240,000 vehicles in 2017. The Association of Automobile Assembly Manufacturers (VAMA) was established in 2000 with more than 10 members, and today includes up to 20 members, both domestic and foreign manufacturers.

Automobile manufacturers committed to achieving a localization rate of 40 per cent 10 to 15 years after establishing their firms in Viet Nam. To date, automobile manufacturers have not yet achieved the desired localization rate of automobile models. Output is still low but there are so many assembly manufacturers that do not reach the optimal scale.

With the main purpose being to serve the domestic market, the market scope is growing slower than expected, mainly due to the very slow improvement of infrastructure, which has not yet reached an optimal level, and because the average household income level is not yet high enough for mass-scale purchase and maintenance of new passenger vehicles.

Figure 7.1 Production of cars and motorcycles in Viet Nam, 1995-2017 (units)



Source: GSO (2017)

In terms of production, the output of automobiles was 10 times lower than that of motorcycles in 2017, but since the value of an automobile is much higher than that of a motorcycle, the gap between the two industries in terms of value added is shrinking.

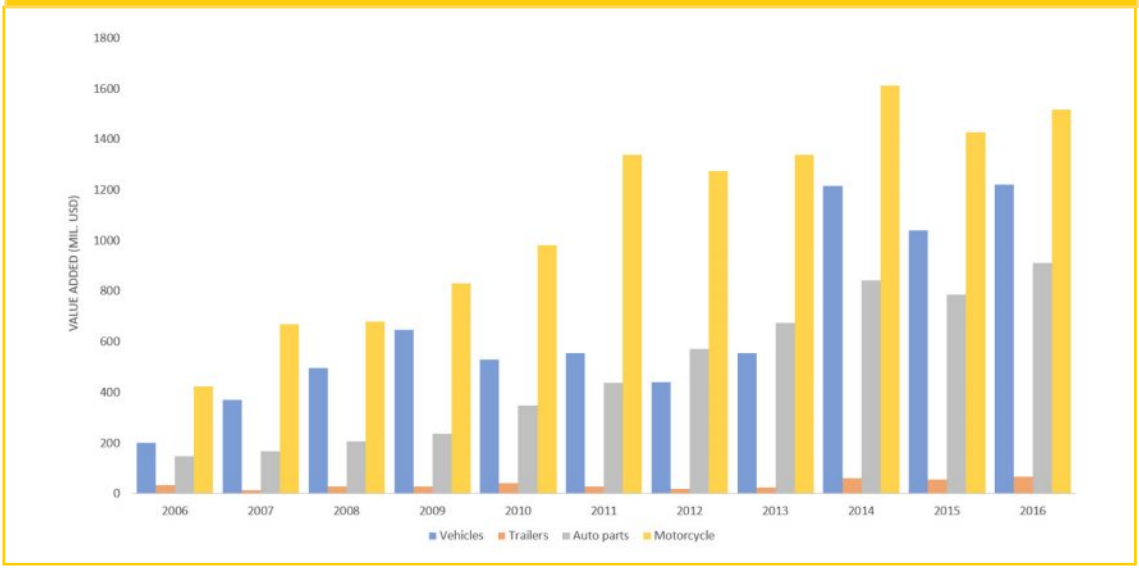
Motorcycles and motorcycle parts still contribute the greatest share of automotive value added with USD 422 million in 2006, which increased to over USD 1.5 billion in 2016, but with a CAGR that decreased from 26 per cent in 2006-2011 to 2.5 per cent in 2011-2016.

Secondly, automobile assembly and production started from a value added of USD 199 million in 2006 to reach USD 1.2 billion in 2016. The CAGR between the two periods decreased from 22.6 per cent to 17.1 per cent in 2011-2016.

Auto parts also contribute a significant share to the industry's value added. This share increased from USD 148 million to USD 913 million in 2016, with a CAGR of nearly 20 per cent in the period 2006-2016.

The automotive industry's share accounts for around 6 per cent of total MVA, pushing up the share of medium high-tech industries in total MVA.

Figure 7.2 Value added of Viet Nam's automotive subsectors, 2006-2016 (million USD)

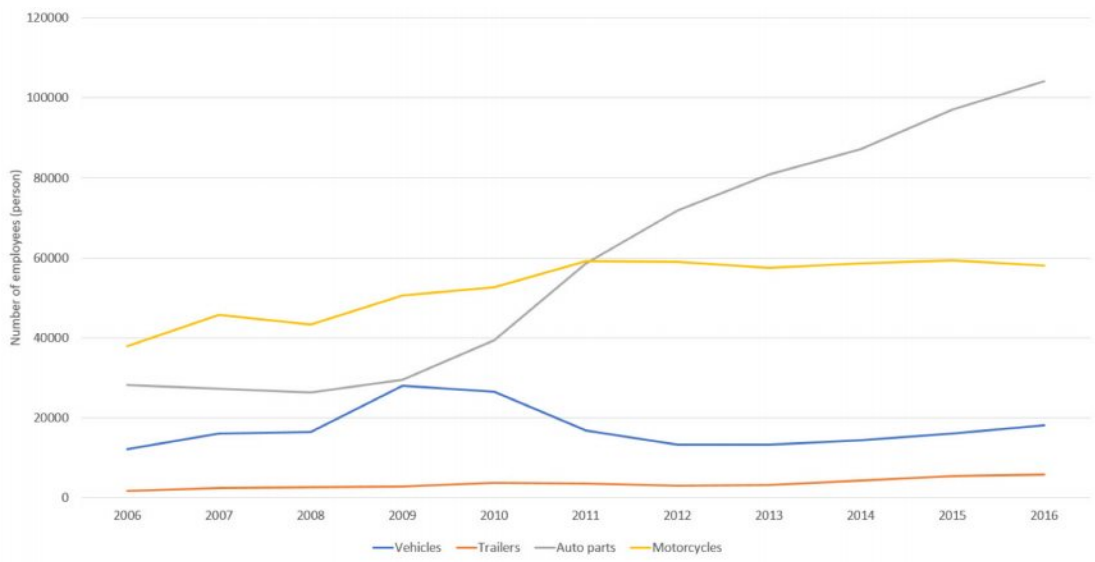


Source: UNIDO INDSTAT

The automotive industry is not one of the most labour-intensive industries, i.e. although the number of employees has more than doubled in recent years, from 79,000 workers in 2006 to 186,000 in 2016, the industry's share in total employment still only accounts for less than 5 per cent of workers in manufacturing.

In the past 10 years, employment increased mostly in the manufacturing of automotive parts and accessories.

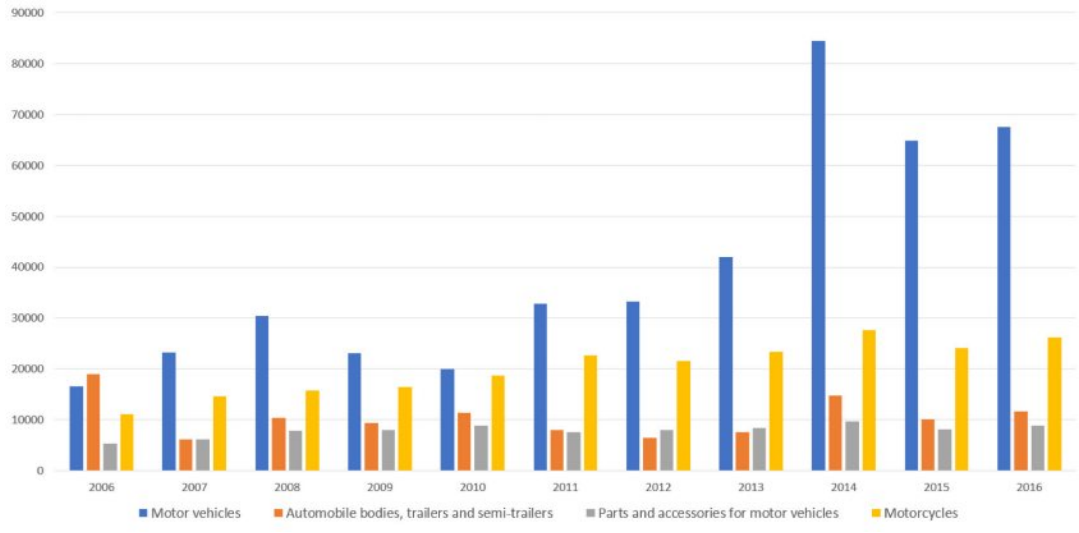
Figure 7.3 No. of employees in the automotive industry, 2006-2016



Source: UNCOMTRADE

In terms of labour productivity expressed by the average value added of a worker from 2006 to 2016, automobile production witnessed the largest improvement in productivity, from less than USD 17,000 of value added per employee in 2006 to nearly USD 68,000 per employee in 2016, four times higher. The production of motorcycles boasts an even higher added value, but productivity per employee is much lower than for automobiles. The gap in productivity between the two subsectors continued to increase throughout the period, mainly due to a slowdown of CAGR in motorcycle production after 2010.

Figure 7.4 Average productivity in the automotive industry, 2006-2016 (MVA/employees)



Source: UNIDO INDSTAT

Employment elasticity in the automotive industry provides quite a different picture from that of the textile and electronics industries, where the shift occurred from employment-led growth to productivity-led growth. In the case of the automotive industry, the shift moved in the opposite direction, driven primarily by car parts and (semi)trailers rather than by the two main subsectors that pushed towards productivity growth.

Table 7.2 Employment elasticity of Viet Nam's automotive subsectors, 2006-2011 and 2011-2016

	2006-2011		2011-2016	
Motor vehicles	1.31	Productivity-led growth	0.08	Productivity-led growth
Automobile bodies, (semi)trailers	-5.07	Unproductive employment	0.55	Employment-led growth
Parts/access. for motor vehicles	0.65	Employment-led growth	0.77	Employment-led growth
Motorcycles	0.36	Productivity-led growth	-0.15	Jobless growth
Overall Automotive	**0.48**	Productivity-led growth	**0.65**	Employment-led growth

Source: Calculated based on UNIDO INDSTAT database

7.4. Trade

Overall, the total trade deficit for vehicles, motorcycles, engines and auto parts deteriorated throughout the period 2006-2016, from over USD 650 million in 2006 to over USD 3 billion in 2016, mainly driven by the performance of the vehicles subsector. This again reflects the fragmented situation of Viet Nam's manufacturing sector with a few domestic SMEs supplying large vehicle-assembly FDI.

The export of motorcycles together with auto parts drove Viet Nam's export performance but while the vehicle parts industry registered a trade deficit (USD 1 billion in 2016), motorcycle exports managed to revert the 2006 deficit into a surplus of over half a billion USD, including the spare parts.

Unfortunately, the trade deficit for vehicles and engines deteriorated significantly in the decade 2006-2016, reaching almost USD 3 billion in 2016 and driving the automotive industry's negative overall performance.

To serve domestic automobile assembly, Viet Nam imports various spare parts and components with an average import value of artound USD 2 billion annually from Japan (23 per cent), China (23 per cent), the Republic of Korea (16 per cent) and Thailand (16 per cent). Although not yet developed, the export of spare parts for automobiles has recently also grown considerably, with an export value increasing from around USD 250 million in 2006 to nearly USD 1 billion in 2016. The main export parts are wire and cable (HS8544), accounting for over 50 per cent and the main export market is Japan (50 per cent) and the United States (13 per cent). The second largest automotive part export are gearbox components (HS870840) which account for 10 per cent of the total export of automotive parts, and the main destinations are Japan, Mexico and China.

Figure 7.5 Export and import value of automotive equipment

Source: UNCOMTRADE

The export turnover of motorbikes and motorcycle parts has increased rapidly since 2012, having reached a certain saturation of the domestic market, compelling motorcycle and motorbike manufacturers to look for export markets. The export turnover of whole-piece motorcycles increased much faster than that of spare parts and components. Viet Nam has reached a trade surplus for complete motorcycles and spare parts for motorcycles since 2012.

Comparative analysis with other ASEAN countries

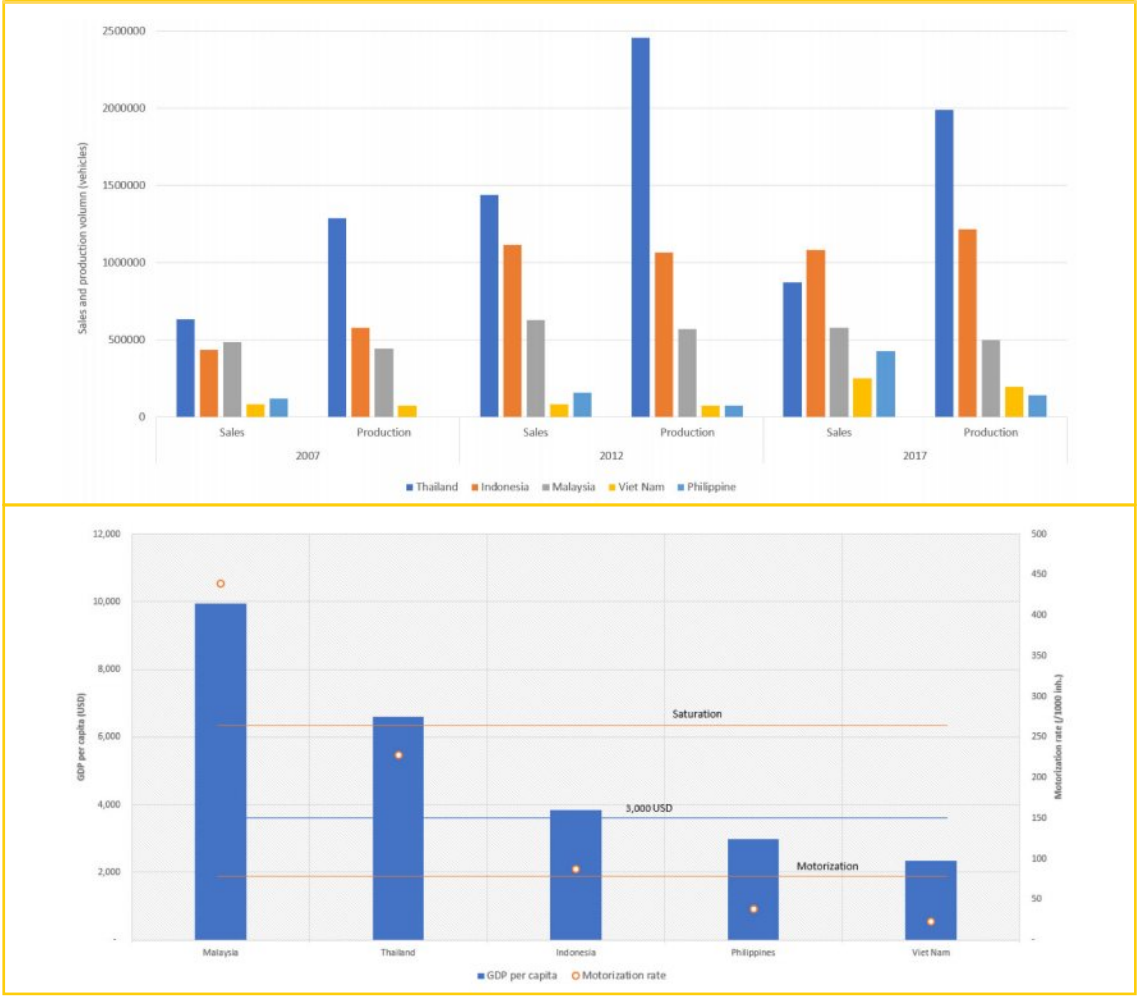
Automobiles are manufactured and assembled in five of the ASEAN countries, namely Thailand, Malaysia, Indonesia, the Philippines and Viet Nam. Figure 7.6 illustrates the production and consumption of automobiles in these countries.

From 2007 to 2012, both domestic consumption and production in Thailand grew significantly, followed, to a lesser degree, by Indonesia and Malaysia. The Philippines and Viet Nam had a much lower production scale and smaller market volume compared to the other three countries.

Thailand witnessed a sharp decline in both production and sales in the 2012-2017 period, while Indonesia and Malaysia stagnated. In the same period, the Philippines and Viet Nam showed signs of rapid growth, in both terms of production and sales. Figure 7.7 links GDP per capita with motorization rate on the right side (expressed in number of cars per 1,000 people). The motorization rates can be compared at different levels of GDP per capita.

Malaysia, for instance, has reached the highest motorization rate of 400 cars/ 1,000 people and has entered a period of saturation. Thailand is close to reaching 250 cars/ 1,000 people, which means that it is reaching the final stage of the motorization process. Indonesia follows with around 100 cars/ 1,000 people, and can therefore be considered to be

Figure 7.6 Automobile production and sales in selected ASEAN countries



Source: ASEAN Automotive Federation (AAF), International Organization of Motor Vehicle Manufacturers(OICA)

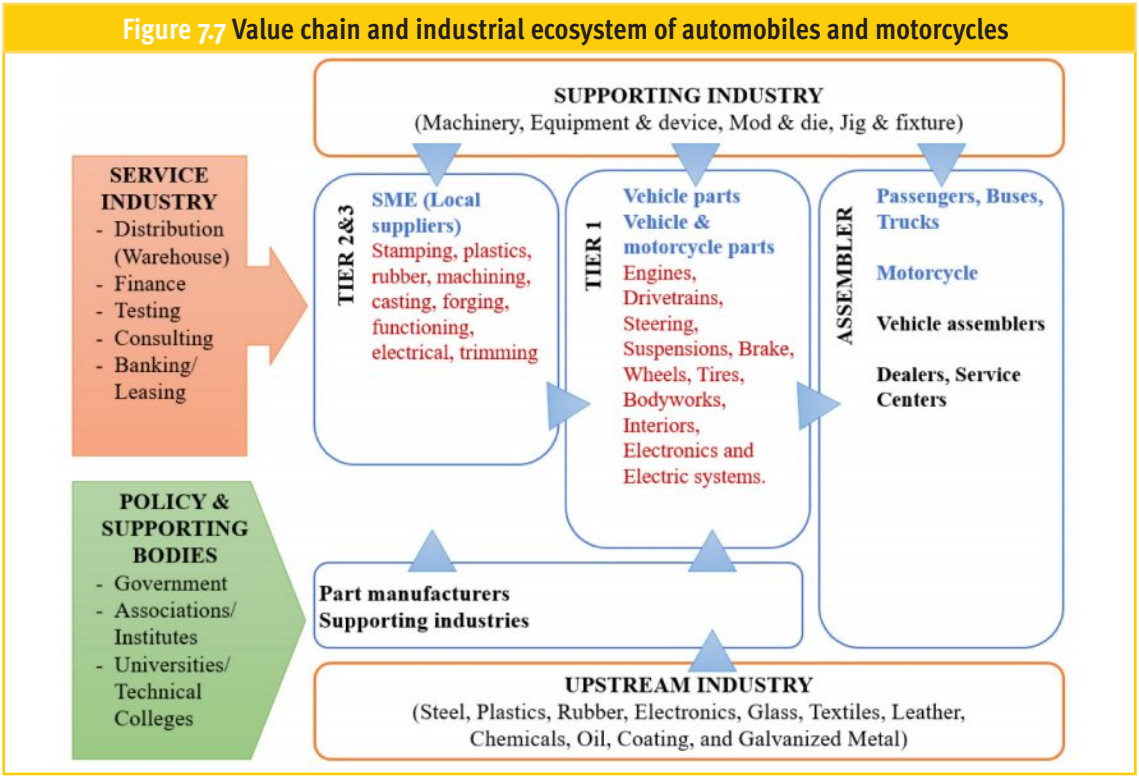
at the beginning of the motorization stage. There are nearly 50 cars/ 1,000 people in both Viet Nam and the Philippines, i.e. the two countries are about to enter the motorization stage. This indicator clearly implies that in the near future, the automobile markets of Indonesia, the Philippines and Viet Nam are expected to develop significantly.

It is therefore crucial for Viet Nam to elaborate a strategy for the development of the automotive industry, while relying on FDI and trying to build SMEs' domestic capacities to link them to the automotive value chain.

7.5. Value chain analysis

Automobiles and even motorcycles consist of more than 30,000 parts and accessories of all kinds, meaning that this is a key industry for the product space in terms of its potential to develop linkages in an economy through a complex system of supply chains, involving many different professions and fields. Figure 7.7 illustrates the value chain structure and overall ecosystem of the motor vehicle industry. The value chain consists of part or all of the components in the ecosystem depending on the level of the industry's development in the given country.

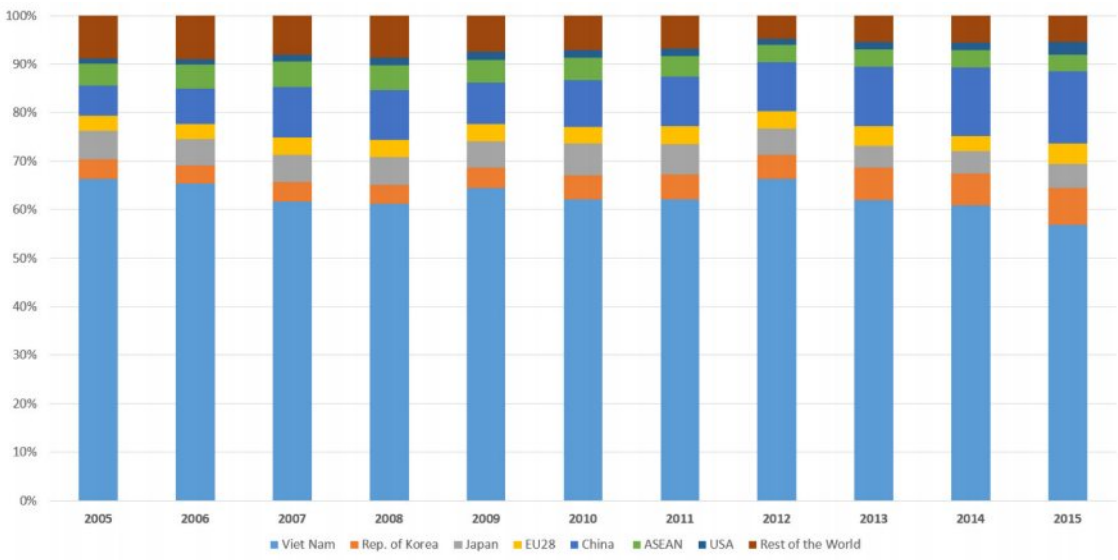
Figure 7.7 Value chain and industrial ecosystem of automobiles and motorcycles



Source: Modification from Kaewsang (2015)

A good way to visualize the situation is to use TiVA data to determine the extent to which the domestic manufacturing system has integrated into the automotive value chain.

Figure 7.8 Origin of value added of Viet Nam's exports of automotive equipment (from manufacturing)



Source: OECD data

Compared to the telecommunications industry, the automotive products' value chain is integrated deeper into the domestic system. This probably holds truer in the case of motorbikes than for passenger cars, however, TiVA does not provide further disaggregation of data. Nonetheless, a gradual and almost relentless decrease is again observable from over 65 per cent of domestic value content in 2005 to around 55 per cent in 2015.

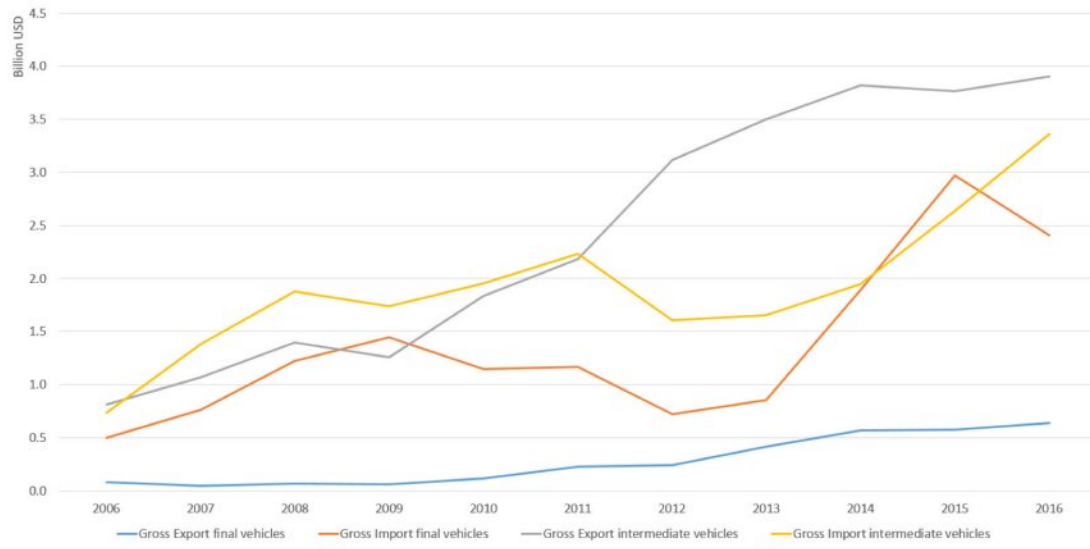
Motorbike manufacturing and assembly firms have built a wide network of tier 1, 2 and 3 suppliers, and many domestic enterprises have become tier 1 suppliers for Honda, Piaggio, Yamaha, Suzuki and SYM. The number of auto parts suppliers is still quite limited; only a few domestic suppliers participate in the supply chains of automobile manufacturers and assemblers in Viet Nam. Compared to Thailand, the number of Vietnamese suppliers in the automotive industry is still very low. Thailand has nearly 700 tier 1 suppliers, while Viet Nam has less than 100. Likewise, Thailand has around 1,700 tier 2 and 3 suppliers, while Viet Nam has less than 150[15].

Moreover, Viet Nam's supplier network is more fragmented. Despite its market size being only one-tenth of Thailand's, Viet Nam has over 20 automobile assemblers, i.e. more than Thailand, which has 17 manufacturers and assemblers. A higher number of smaller and more dispersed assemblers make it more difficult to develop a supplier network.

Using the Global Value Chain (World Bank) classification for intermediate and final vehicles, the former make up most of the gross imports and exports, around USD 4 billion after 2016.

[15] The existing hierarchy of suppliers among the 404 providers identified by JETRO and JICA, includes 83 level 1 suppliers; 138 level 2 and 3 suppliers; 5 manufacturers of spare parts and 178 other suppliers. According to the industry, 61 enterprises specialize in supplying motorbike parts, 50 businesses supply both motorbike and auto parts, 18 supply auto parts and 275 other enterprises are also associated with the automotive industry. There are 177 Japanese enterprises, 136 Vietnamese enterprises, 57 Taiwanese ones, 14 Korean ones and the rest are German, Malaysian and American, etc.

Figure 7.9 Trends in import and export of final and intermediate vehicles



Source: Elaborations from GVC, WITS (World Bank)

The automotive components currently manufactured in Viet Nam are mostly labour-intensive, require simple technology, and include products such as seats, glass, tires, wheels, etc. To supply the domestic automobile assembly firms, Viet Nam must import various spare parts and components with an average import value of about USD 2 billion per year, mainly from Japan (23 per cent), China (23 per cent), the Republic of Korea (16 per cent) and Thailand (16 per cent).

7.6. Market structure, dynamics and diversification

Domestic market

Viet Nam's consumer market for motorcycles reached its saturation stage of 3.3 million motorcycles in 2011, thus decreasing to 2.7 million in 2014. From 2015 onwards, however, consumption increased again, reaching the same number of sales as in 2011.

In contrast to motorcycles, Viet Nam's automobile market is still quite small, and sales in recent years have only reached around 300,000 units/year. Whereas domestic production meets domestic demand in the case of motorcycles, there was an increasing gap between production and sales in the case of automobiles, which could further widen with the projected gradual increase in GDP per capita and Viet Nam fully entering the motorization stage with expected sales of passenger vehicles reaching 1 million/ year for the period 2020-2025.

Figure 7.10 Output and sales of motorcycles and automobiles

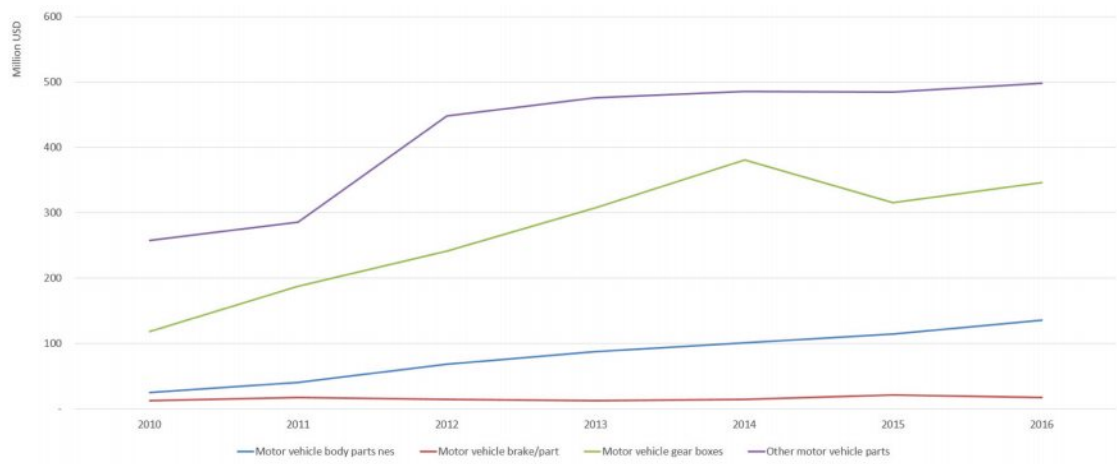
Source: General Statistics Office of Viet Nam (GSO), Viet Nam Association of Motorcycle Manufacturers (VAMM), Viet Nam Automobile Manufacturer's Association (VAMA)

Export market

This analysis focuses on the emerging driving force of Viet Nam's exports in the automotive industry, namely motor vehicle parts and accessories (SITC 784), to identify major markets and assess the competition.

Among spare parts, gear boxes (SITC 78434) and other motor vehicle parts (78439) account for the largest share of Viet Nam's increasing exports to the world, with a total export value of around USD 850 million in 2016, around 85 per cent of total exports of automotive parts. The export of motor vehicle body parts (SITC 78432) registered the largest CAGR of nearly 32 per cent between 2010 and 2016.

Figure 7.11 Export of motor vehicle parts (SITC 784) from Viet Nam, 2010-2016 (million USD)



Source: UNCOMTRADE

Major export destinations for automotive parts include Japan (34 per cent of Viet Nam's export value), followed by China (15 per cent) and the United States (12 per cent). However, when looking at the CAGR in the period 2010-2017, Germany was more dynamic, growing at nearly 86 per cent, followed by the Netherlands with a CAGR of above 50 per cent. Overall, China seems to be on the path to becoming the largest market for automotive parts exports from Viet Nam, at least in the medium term.

Table 7.3 Major export destinations of Viet Nam's automotive parts (SITC 784), 2010-2017

Importers	Export values 2010	Export values 2017	Share of total export	CAGR 2010-2017
Japan	213,371	380,328	33.8%	8.6%
China	43,465	166,767	14.8%	21.2%
United States	61,889	131,570	11.7%	11.4%
Thailand	14,643	103,372	9.2%	32.2%
Korea, Rep.	5,896	54,724	4.9%	37.5%
Mexico	4,076	38,710	3.4%	37.9%
India	8,757	38,140	3.4%	23.4%
Germany	416	31,884	2.8%	85.9%
Netherlands	1,621	29,430	2,6%	51.3%
Indonesia	22,776	27,363	2.4%	2.7%

Source: UNCOMTRADE

A quick look at the Japanese market shows how fierce the competition is in this particular industry, with several emerging and consolidated competitors. Viet Nam rose to seventh position with a CAGR of 8.1 per cent between 2010 and 2017[16]. However, the leading exporting country, China, is growing at an even higher CAGR than Viet Nam, projecting an increasing gap in the future. Emerging economies such as India also pose a threat in the near future.

[16] Note that export and import values do not correspond in this case (e.g. mirror data) for several reasons, including different reporting systems used by importing and exporting countries' customs authorities.

Table 7.4 Major exporters of automotive parts to Japan, 2010-2017 (import values)				
Exporter	Import values 2010	Import values 2017	CAGR 2010-2017	Shr 2017
China	1,602,612.23	3,006,100.92	9.4%	36.2%
Thailand	574,779.60	790,549.14	4.7%	9.0%
Korea, Rep.	456,822.51	744,895.77	7.2%	9.0%
Germany	488,910.31	656,831.28	4.3%	7.9%
Mexico	96,414.42	516,523.23	27.1%	6.2%
United States	436,883.60	516,212.45	2.4%	6.2%
Viet Nam	261,672.52	452,688.32	8.1%	5.4%
Indonesia	232,138.52	286,950.80	3.1%	3.5%
Philippines	184,355.13	209,602.57	1.9%	2.5%
Other Asia, nes.	147,412.82	201,487.98	4.6%	2.4%
Spain	78,797.82	112,829.59	5.3%	1.4%
India	29,472.48	111,661.04	21.0%	1.3%

Source: UNCOMTRADE

This is, therefore, an industry that will require particular coordination between the public and the private sector to ensure that it becomes as competitive as telecommunications equipment.

The free trade agreements Viet Nam has signed will open additional opportunities for enterprises to produce spare auto parts for automobiles and motorcycles in the country to increase export turnover to other member countries.

Clustering status

Automobiles and motorcycles have diverse ecosystems and value chains, involving many different industries and fields. The streamlined production management method and the "just in time" requirement are commonly used by enterprises that manufacture and assemble automobiles, motorcycles and spare parts, requiring tier 1 and tiers 2, 3 suppliers to place a factory near the assembly house that gradually creates industry-linked business clusters that operate in the field of automobiles and motorcycles.

Enterprises in the motorcycle industry are mainly located at the two ends of the country, while automobile assembly enterprises are concentrated in the northern, central and southern regions. At the provincial level, assembly enterprises are mainly concentrated in Vinh Phuc, Hai Duong, Hung Yen in the northern region, Quang Nam in the central region, and Dong Nai in the southern region. Suppliers are scattered in the northern provinces of Hai Phong, Hung Yen, Ha Nam, Vinh Phuc and Hai Duong; in the central region are the Quang Nam and Da Nang provinces and in the southern region are the Dong Nai and Ben Tre provinces.

Figure 7.12 Enterprises assembling motor vehicles according to geographical location

Source: Authors

7.7. SWOT analysis

Strengths (S)	Weaknesses (W)
+ The presence of large automakers + Potential market (large population, low motorization rate) + Abundant labour force and low cost + Favourable geographical position to join the ASEAN and Asian supply chains + Located in the ASEAN region as the main automobile production centre in the world	+ Small market scope + High production costs, high automobile prices + Many assemblers; many different types of vehicles + Manufacturers only stop at simple assembly levels + Supporting industry has not yet developed
Opportunities (O)	**Threats (T)**
+ The trend of shifting automobile production from the Americas and Europe to Asia + Participating more deeply in the supply chain in ASEAN and Asia + Production division with Thailand and Indonesia, which are two countries that manufacture reverse steering + The period of motorization in Viet Nam began after 2020 + Recent movements show the government's determination to develop the automotive industry	+ Competitive pressure of CBU imported cars from ASEAN + Indonesia and Thailand are attractive destinations of major automobile manufacturers in the worlds and are fierce competitors of Viet Nam + Policies related to the industry are not stable and synergetic

7.8. The automotive industry's strategic objectives

The development strategy of Viet Nam's automobile industry through 2025 with a vision to 2035 was approved by the Vietnamese government in Decision No. 1168/ QD-TTg of 2014, with the overall objective of promoting the industry, which has come to play an important role, to meet domestic market demand for vehicles with competitive advantages, participate in export, create a driving force for the development of other industries and improve competitiveness to become a supplier of automotive components and spare parts worldwide.

To further elaborate the general objectives, the Strategy sets specific targets for production, supporting industries and exports, summarized in Table 7.5.

Table 7.5 Objectives of the development of the automotive industry to 2035

Target	Unit	2020	2025	2035
Production	Vehicles	227.500	466.400	1.531.400
Passenger	Vehicles	114.000	237.900	852.600
Bus	Vehicles	14.200	29.100	84.400
Truck	Vehicles	97.960	197.000	587.900
Special vehicles	Vehicles	1.340	2.400	6.500
Share in total sales	Per cent	67	70	78
Passenger	Per cent	60	65	75
Bus	Per cent	90	92	94
Truck	Per cent	78	78	82
Special vehicles	Per cent	15	18	23
Localization ratio				
Passenger	Per cent	30-40	40-45	55-60
Bus	Per cent	35-45	50-60	75-80
Truck	Per cent	30-40	45-55	70-75
Special vehicles	Per cent	25-35	40-45	60-70
Export, of which	Vehicles	20.000	37.000	90.000
Passenger	Vehicles	5.000	15.000	50.000
Bus	Vehicles	5.000	7.000	15.000
Truck	Vehicles	10.000	15.000	25.000
Parts	Bil. USD	4	5	10

Source: Strategy for development of Viet Nam's automotive industry through 2025 with a vision to 2035

7.9. Policy recommendations

Viet Nam offers a number of advantages for the automotive industry. It has a large domestic market which is continuously expanding. In addition, its geographic location in terms of global logistics along with its labour force make Viet Nam an attractive candidate as a future automotive production base. Viet Nam, unlike Malaysia, Thailand and Indonesia, is the only country where left-side steering vehicles are actually driven, which is a non-negligible factor in production layout and cost. Moreover, recent actions also demonstrate the government's determination to develop the automotive industry.

Despite these general advantages, some major hurdles need to be overcome. Viet Nam's manufacturing cost is still not competitive. Many CBU cars imported from ASEAN countries (even from other regions) are cheaper than the manufacturing cost in Viet Nam. The country's high manufacturing cost seems to be strongly connected to the fact that 'supporting industries' have not yet fully developed and that procurement is more complex than in other competitors. Another factor may be the current phase of future mobility. There is evidence that Viet Nam will pursue policies in favour of electric vehicles in the future. This seems logical considering global market trends. However, even plugged-in hybrid cars (let alone electric vehicles and hydrogen fuel cell vehicles) have certain limits in terms of market expansion, since the supporting infrastructure is not fully in place even in developed countries. Therefore, there are still many controversies whether this is the right time for investment in the automotive industry, since it is uncertain when and how current combustion engines will be fully replaced. Establishing automotive production factories requires huge amounts of capital, which need a long period of guaranteed operation time. Such requirements and conditions do not give major automobile manufacturers much motivation to invest in Viet Nam.

In short, the general prospect for Viet Nam's automotive industry is as follows: (1) The automotive market is deemed to have significant growth potential due to Viet Nam's large population and low vehicle stock. (2) However, the market has not yet met automakers' expectations and the sales volume of individual brands is fairly limited by international comparison.

In light of the current situation and comparing Viet Nam to competitors in the region, the following argument needs to be kept in mind. Without tariff protection, production in Viet Nam is currently more expensive than imports of finished vehicles, i.e. manufacturers with multiple production sites in the ASEAN region have strong financial incentives to restructure their production capacities within the region. Besides import tariffs on parts and components, one reason for the high production cost in Viet Nam is that the scale of its production plants is limited in comparison to those in other ASEAN countries. In addition, Viet Nam's current position in the ASEAN region does not look strong. In terms of production capacity, nearly every automaker in the region is concentrated in Indonesia and Thailand. While Malaysia occupies a mid-level position, the Philippines and Viet Nam have low capacities and generally only conduct completely knocked-down (CKD) assembly.

Although the Vietnamese government has recently issued various measures to improve the business environment and national competitiveness, and supports enterprise development in general, as exemplified in Resolution No.19/2016/NQ-CP and Resolution 35/2016/NQ-CP, many stakeholders in the Vietnamese automotive industry acknowledge that Viet Nam's completely knocked down (CKD) vehicles cannot compete with imported completely built-up (CBU) vehicles from ASEAN countries, considering the current market size and the industry's level of development.

A typical characteristic of the automotive industry is that it consists of complex and multi-layered supply chains (tiers 1, 2 and 3, and raw material suppliers) with numerous suppliers in each tier. As regards suppliers' quality-cost-delivery (QCD) capability, tier 2-3 suppliers must strictly adhere to production requirements, while tier 1 suppliers must comply with strict research and development (R&D) requirements such as parts development and proposal capabilities. This has the following implications: (1) the development of suppliers requires much effort, time and investment, but even so, (2) such a supply chain structure should be established regardless in order to guarantee a self-sustaining ecosystem.

Based on the characteristics of Viet Nam's automotive industry and its current situation, certain policy measures and action plans are recommended to promote the automotive industry and ensure it has a sustainable future in Viet Nam.

To link the above statements on the current situation of Viet Nam's automotive industry to policy implementation, the following actions are recommended prior to implementing policy measures. The establishment of foresight, not just forecasting based on statistical data[17], for each industry is important because it provides appropriate and consistent justifications for long-term future visions and provides strategic direction. Such a foresight process should also be applied to the automotive industry, and should be performed on the following prerequisites:

- Updates in forecasting for expected total automotive demands by year and segment

- Composition of EV and other environmentally-friendly vehicles with respect to total demand

- GVC and trade balance analysis for each major component as well as for the automotive industry as a whole

- Status of supporting industries and feasibility of the automotive industry domestically with a cost breakdown

- Scenario planning with/without policy support such as tariff support.

Some other factors that contribute to the complexity of the automotive industry's ecosystem should not be neglected. The first factor is related to environmental issues. There have been several attempts to forecast automotive targets in Viet Nam. Although the output target estimated by the updated Master Plan looks much more realistic, the estimation does not consider recent developments such as environmental concerns and market-associated trade. The second factor is related to other industries that support the automotive industry. The coupling of domestic demand with the available infrastructure (such as road construction plans for total vehicle production, charging station plans for electric vehicles) is crucial if realistic forecasting exercises are to be carried out.

[17] The foresight process entails a 'normative' approach, while forecasting is mainly based on 'exploration'.

(1) Automotive industry development plans should accompany plans for supporting industries, supply plans for other infrastructure, human resources and R&D plans for core technologies. Core technologies need to be explored in terms of technology differentiation as well as technology advancement (the competitiveness of the Korean automotive industry would not have been possible without supporting industries).

(2) Viet Nam must develop an R&D roadmap including a technology commercialization scheme. To improve the policy's tangibility, milestones need to be determined. Until recently, not many local suppliers met the required QCD standards to participate in global supply chains[18]. Copywriting permits and/ or technology transfers or licensing agreements from genuine parts suppliers and local suppliers must be introduced. Viet Nam still lacks many fundamental policies in this regard. This includes the position of the motorcycle industry, the prospect for low emission vehicles in both the motorcycle and automotive industries, the transportation infrastructure such as roads and emission control issues in line with global trends. By considering the integral effects of these factors, more systematic and feasible policy measures can be introduced for Viet Nam' automotive industry.

(3) In terms of its overall manufacturing system, Viet Nam must consider adopting integral manufacturing rather than imitate China's modular manufacturing to establish the country's own sustainable technologies and industries in the long term. Integral manufacturing requires parts to be uniquely designed for each product, which are adjusted continuously for high performance. Modular manufacturing is easier to implement in developing countries but has drawbacks such as oversupply, depressed prices, low profitability and the lack of incentives for technological improvement.

(4) There are several other issues which should be considered. These include SME promotion, the development of an R&D and technology commercialization framework, technology financing and evaluation process, human capital enhancement, knowledge based capital (KBC) management, etc. Although these issues are not discussed in this section because they are not specific to the automotive industry only, all of them are crucial for the automotive industry to become a success story in the future.

<Development of the Korean automotive industry>

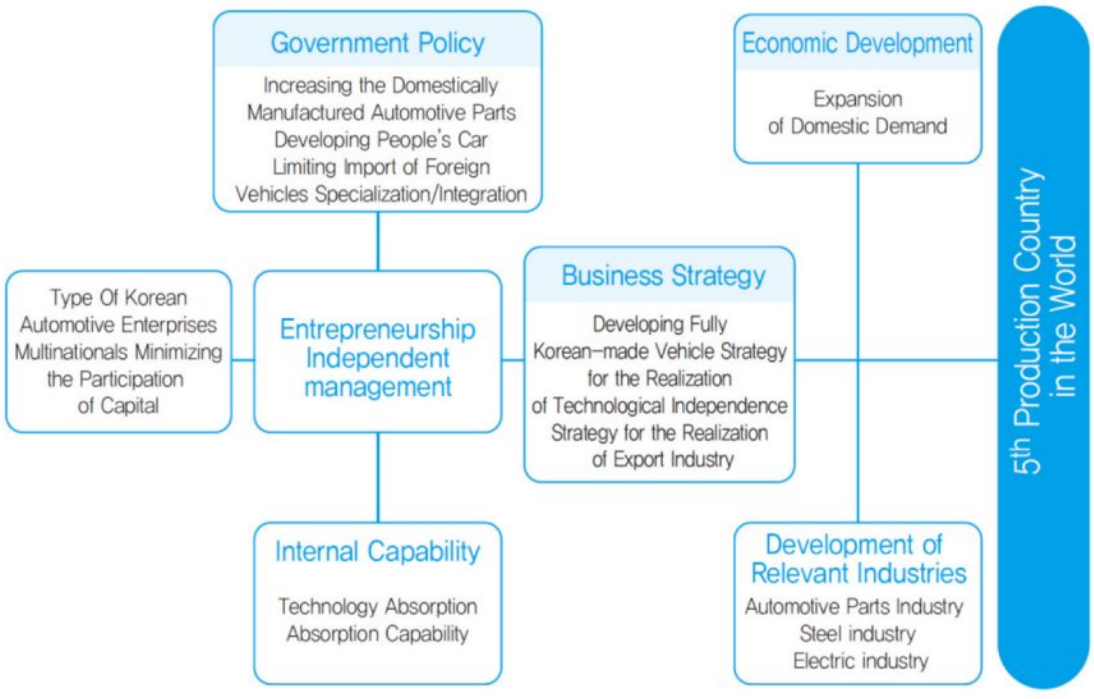
When the Korean automotive industry developed its own model, neither the level of the industry's technological development nor the market conditions were sufficiently mature. The typical development stages of the automotive assembly industries took the following path to achieve the goal of mass production of Korean-developed vehicles:

[18] In 2017, the government issued several business conditions for CBU vehicles with Decree No. 116/2017/ND-CP and others, but still limited the enhancement of core competitiveness of the CKD segment in the long term. It seems that the market's response to the policy has not been particularly positive since it cannot resolve the structural issue of low production volume.

knockdown assembly → domestic manufacturing of parts
→ development of a fully Korean-made model → realization of export industry

During this sequential process, the development of an independent model generally occurs when independently developed technology and market conditions mature. In addition, the bodies that led such a unique, man-made development were a venturous entrepreneur, positive visions, the Korean government's momentum and passionate engineers. The success of the development mechanism of the Korean automotive industry was possible via virtuous circles among these factors. In addition, diverse and well-balanced policy measures by the government were linked with each other organically and thus contributed a pivotal role in promoting the industry. These policies covered (1) heavy chemical industrialization and the promotion of the Korean automotive industry, (2) domestic automobile market protection policies, (3) internal competition policy, and (4) automotive parts localization policy along with stable labour management relationships based on the government's strong vision.

Figure 7.13 Development mechanism of the Korean automotive industry



Source: Hyun Youngsu, "Speed Management of Hyundai Motor", Korea Lean Management Research Institute, 2013

In line with technology independence, the Republic of Korea has pursued strategies to promote ca pacity development. These strategies were not only staged through timeline, but also segmented and diversified throughout various key parts.

Table 7.6 Acquisition strategy for capacity development of phased independent technology

Separation		1992~94	1995~97	1998~2000	2001~
Technology Development Stage		Acquisition of core technology	Individual technology development	Application of technology development	New technology development
Independent Model Automotive Development		Small & medium cars and jeeps	Full-size cars Commercialization	Electric cars	Future cars
Parts Development	Engine	Establishment of planning & testing technology (lean-burn engines)	Low-pollution engines (alternative engines)	High performance engine (ceramic engines)	Future engines (stirling engines)
	T/M	Low noise T/M	A/T	Continuously variable transmission	New technology application of electric control
	Chassis	Establishment of system planning technology	Chassis system of electric control	High performance chassis system of electric control	Comprehensive control of chassis system
	Car body	See above	Optimization of car body planning	Use of new materials for car body Car body group service technology	Car body with highest safety
	Electronic Devices	Sensors & ECU	Complex wire devices Solid type instruments Warning information systems	External information systems	High level of information systems
	Safety Devices	Passive seat belts	Air bags	Collision avoidance systems System for keeping distance between cars	Automatic operation systems

Source: Private Development Association of Motor Vehicle Manufacturers, "Medium & long term plan for automotive industry", p. 10. 1992.

The automotive industry is favoured by many countries as a means to boost the national economy. For example, Spain and Brazil prioritized the automotive industry and had manufactured over one million vehicles by 1980, which was 10 times more than the number of vehicles manufactured in the Republic of Korea at the time. But in the 2010s, the Korean automotive industry surpassed these countries, largely because Korean automotive manufacturers have independent management, independently develop core technologies and compete in the global market without limitations, while the manufacturers in Spain and Brazil are affiliated with multinational firms from developed countries. The development of the automotive industry in the Republic of Korea shows marked differences in terms of government policies, corporate management structure, corporate strategies, technological strategies and even corporate performance compared to Mexico, Brazil or Spain, where foreign firms take the lead.

Table 7.7 Comparison of automotive industries in newly industrialized countries

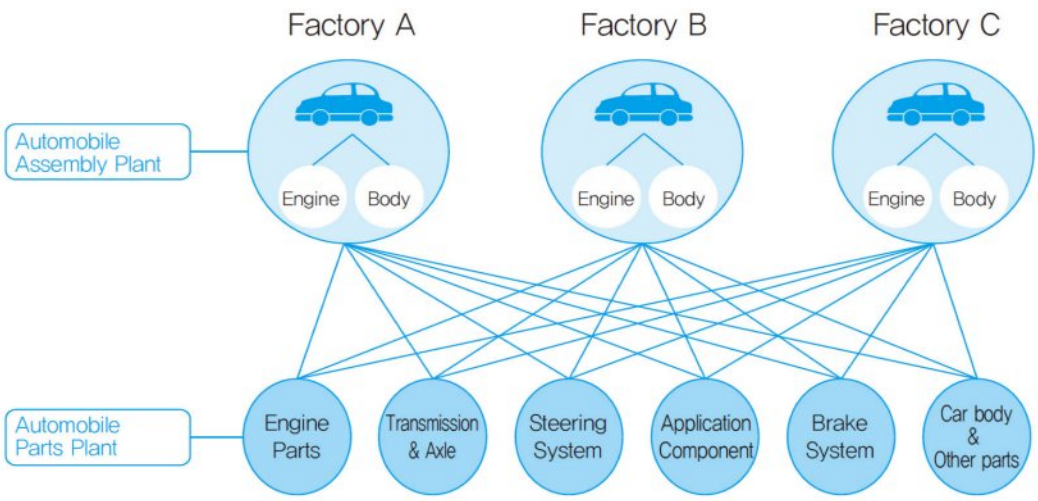
	Mexico, Brazil, Spain	Republic of Korea
Government Policy	Laissez-faire	Intervention
Supply Policy	Laissez-faire	Developing national models
Demand Policy	Laissez-faire, tariffs	Import ban, market protection, tariffs
Management Right	Foreign capital	Domestic capital
Company Strategy	Dependence strategy Domination foreign capital Auto production Supply base	Independence strategy
Means of Technology Acquisition	Joint ventures (50~100% share)	Introduction of technology, Joint ventures (under 50% share)
Investment of Technology Development	Weak	Relatively strong
Peculiar Model	None	Main auto model for export
Export	Foreign sales network	Independent sales network

Source: Yong–Suk, Hyun, "Hyundai Automotive Speed Management", Korea Institute for Management, 2013

The government of the Republic of Korea implemented several integration measures to foster cooperative relationships between parts manufacturers (largely SMEs) and final product manufacturers such as automakers (mainly LEs). Several measures encouraging close collaboration between these global companies and local auto suppliers were introduced when foreign automakers entered the domestic market. The Korean government enacted the 'Long-term Automotive Industry Promotion Plan' in May 1974, mandating individual parts manufacturers to establish a mass production system specializing in one automotive part and push forward horizontal integration with automobile assembly firms. This horizontal integration plan cat-

egorized automotive parts (engine, transmissions and car wheels, steering systems, electronics, braking systems, car bodies and other parts) into specific items and designated a production plant for each product so it could be produced by one factory. The Plan aimed at ensuring that automotive parts manufacturers secure global competitiveness in terms of quality and price by producing more than 50,000 units of automotive parts annually. The government also actively promoted foreign joint ventures while establishing special industrial complexes and providing financial benefits and tax advantages.

Figure 7.14 Horizontal integration system of the automotive parts industry



Source: Oh Won-Chol, 'Korean Economic Construction Model Vol. 4', Kia Economic Research Institute, 20 May 1996.

Table 7.8 Global OEM parts suppliers (2016)

Rank	Company	Country	2016 Turnover (OEM only)	2015 Turnover (OEM only)	2015 Rank
1	Bosch	Germany	46,500	44,825	1
2	ZF	Germany	38,465	29,518	5
3	Magna	Canada	36,445	32,134	3
4	Denso	Japan	36,184	36,030	2
5	Continental	Germany	32,680	31,480	4
6	Aisin	Japan	31,369	25,904	7
7	Hyundai Mobis	Korea, Rep.	27,207	26,262	6
8	Faurecia	France	20,700	22,967	8
9	Lear Corp.	United States	18,558	18,211	10
10	Valeo SA	France	17,384	15,842	11
34	Hyundai Wia	Korea, Rep.	7,043	7,480	29
46	Mando	Korea, Rep.	5,057	5,560	45
48	Hyundai Powertech	Korea, Rep.	4,920	4,554	50
49	Hanon Systems	Korea, Rep.	4,915	4,912	-
56	Hyundai Dymos	Korea, Rep.	3,958	3,202	65

Unit: Million US$

Source: Automotive News (2018)

This horizontal integration strategy transformed into a vertical integration strategy from the mid-1970s to overcome the limitations to strengthening cooperative relationships between automobile assembly firms and automotive parts suppliers. Vertical integration was aimed at encouraging automobile manufacturers to actively support auto parts companies to establish affiliations. Based on these strategies, the Republic of Korea now boasts diverse types of global auto parts suppliers who are the backbone not only of the automotive industry, but of the entire manufacturing industry in general. Currently, each automaker in the Republic of Korea has a diverse source of auto parts suppliers, only a few hundred tier 1 suppliers of which approximately 60 per cent are SMEs.

Table 7.9 Number of tier 1 suppliers (2016)

Year	Large	Medium/small*	Total
2016	242	616	858
2015	241	642	883

Year	Hyundai	Kia	GM Korea	Ssangyong	Renault Samsung	Total
2016	346	334	318	236	190	858
2015	348	333	317	237	213	883

	Specialized Company	*Non-Specialized Company	Total
No. of Companies	819	39	858
No. of Employees	186,006	107,140	293,146

* Non-specialized companies include companies for electronics, batteries, tires, textiles, chemicals, etc.

Source: Automotive News (2018)

Systematic and continuous policies to support industries and spillovers

The Government of the Republic of Korea focused on the domestication of automotive parts by continuously revising its policies and legislation, starting with the 'Automotive Industry 5-Year Plan' in 1962, to find reasonable solutions to the many challenges the industry faced. Since a finished car typically consists of more than 30,000 parts, the development of the auto parts industry cannot be achieved at once. Given the characteristics of the industry, auto parts manufacturers are bound to be SMEs that need consistent government support, and this is another reason why continuous and various policy measures need to be introduced for the auto parts industry even after achieving full domestic localization. It is noteworthy that

this supporting industry provided a foundation not only for the automotive industry, but also for many other manufacturing and other related service industries, such as machinery, plant, shipbuilding, aerospace, etc. In the Republic of Korea, this supporting industry expanded to the so-called 'root industry', i.e. the "root" of the entire manufacturing sector.

<Root industry in the Republic of Korea as a supporting industry to the automotive industry>

Although the "root industry" is a supporting industry for the entire manufacturing sector, it is closely linked to the Korean automotive industry. The main concept behind the 'root industry (or technology)' can be explained as follows:

- The Government of the Republic of Korea and the Ministry of Trade, Industry and Energy (MoTIE) introduced a term called 'root ('Ppuri' in Korean) technologies', which refers to the fundamental processes or relevant equipment technologies that are essential for producing virtually anything through manufacturing processes.

- These technologies can be subdivided into 6 technologies: (1) Casting, (2) Moulding, (3) Plastic working, and (4) Welding, which are related to changing an item's form, as well as (5) Heat treatment and (6) Surface treatment, which are related to changing an item's characteristics.

- A root industry uses root technologies for its core/main production processes or main products. A root industry can be defined as the basic underlying processing industry that is not visible at the surface, just like the root of a tree, but remains embedded in the finished product, thus forming the foundation of the product's competitiveness.

- The root industry can be understood as representing the full integration of each supporting industry of various manufacturing industries, such as the automotive industry, the machinery industry, etc.

- Despite its significance, however, the root industry has been recognized as a so-called 3D (Dangerous, Dirty and Difficult) industry, i.e. its competitiveness has been gradually weakening. Now, a root industry has to be promoted as an ACE (Automatic, Clean and Easy) industry.

- In 2011, the MoTIE enacted 'The Law on Root Industry Promotion and Modernization' and has been promoting various projects to support industries.

- The Korea National Ppuri Industry Center (KPIC) has selected approx. 900 companies (2019) as root technology specialty companies, and provides exclusive support schemes for them. According to KPIC's statistics (2017), companies with an R&D centre account for an impressive 36 per cent of higher added value per capita compared to companies without such a centre, which implies that a root industry is no longer a 3D industry as previously assumed and can generate high VA as well.

- The root industry has attracted much attention recently, since it is closely related to overall manufacturing.

Figure 7.15 Root technologies in the automotive industry (illustrative)

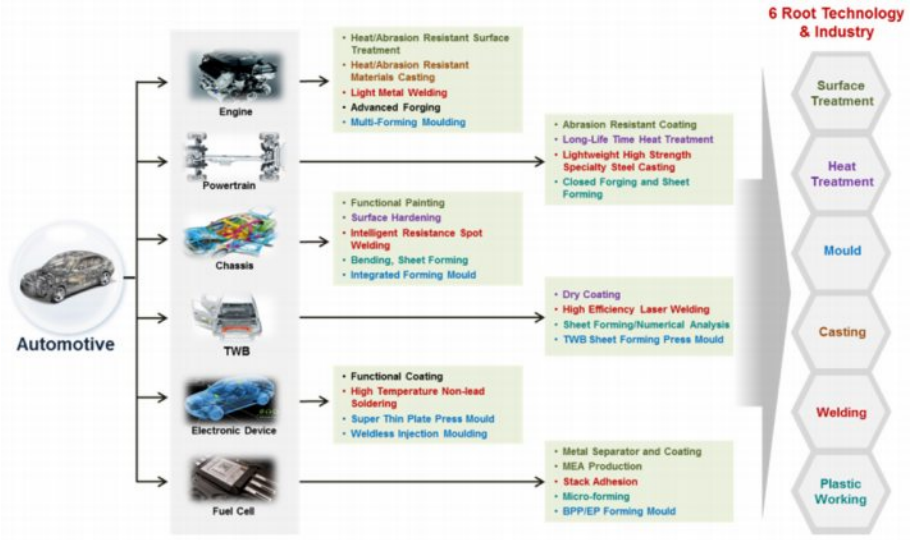
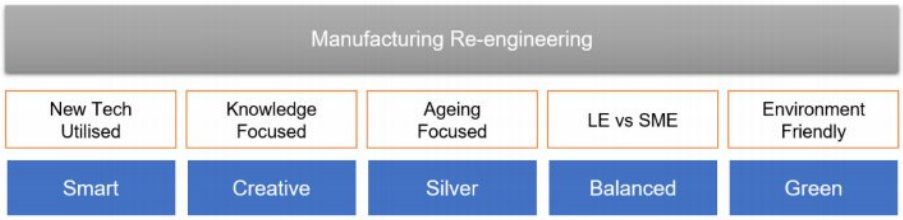
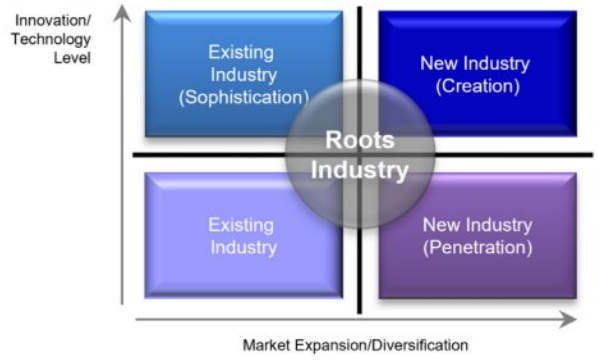


Figure 7.16 Re-engineering overall manufacturing



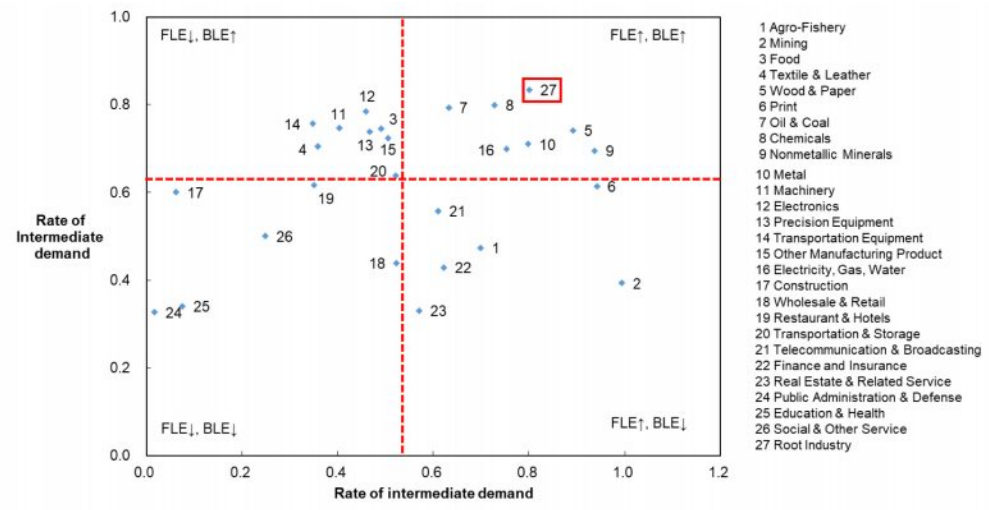
- Although the root industry was initially perceived as a simple supply industry for specific demand industries such as the automotive industry, it is now recognized that its potential impact for creating new industries as well as modernizing existing industries is much more complex and larger than initially assumed. This implies that there is a lot of opportunities for new business model creation which needs to be explored in the future.

Figure 7.17 Root industry and business model creation with respect to various industries



Therefore, policy measures to support the auto parts industry (i.e. the current 'root industry') have played a particularly important role in terms of creating a sustainable environment among the various policies implemented by the Korean government to foster the automotive industry. The government has more room to support the auto parts industry than the finished automotive industry in a wide range of ways including the formulation of efficient transaction relationships with automakers and supporting SME parts manufacturers. This is gaining in importance considering the recent free trade regime. It should also be noted that many other advanced countries' automotive industries have strong supporting industries. The government must—regardless whether the industry is a forerunner or latecomer—prioritize the development of the automotive parts industry.

Figure 7.18 Linkage effects of the root industry to the Korean economy



Industries	Root	Chemical	Electronics	Machinery	Precision Equipment
Index of the Sensitivity Dispersion	2.55	2.28	1.27	0.76	0.49
Index of the Power Dispersion	1.38	1.24	1.26	1.23	1.15
Relative Amount of FLE & BLE	Forward Linkage Effect Relatively Large ⟷ Backward Linkage Effect Relatively Large				

Source: Sanghoon KIM, "Key to Future Industries – Root Industry", E-KIET, KIET, 2014

In the Republic of Korea, both the forward and backward linkage effects of the root industry are substantial when compared to those of other industries. Although the root industry's sensitivity dispersion index is much larger than the power dispersion index due to its intrinsic characteristics, the absolute value of both indexes is larger than for some of the Republic of Korea's core industries. This indicates that the root industry, even if its gross output and/ or value added is lower than that of other industries, is more crucial than other industries from the perspective of the national economy's sustainability and dynamism.

Chapter 8. Conclusion

8.1. Overview of horizontal issues

The comparative and in-depth analysis presented in this paper clearly illustrates the Vietnamese manufacturing sector's impressive performance in the period 2006-2016, both in absolute and in relative terms. Only when taking a closer look are clear weaknesses identified that could undermine the stable and promising progress Viet Nam's manufacturing sector.

Despite the remarkable achievements the manufacturing sector has made so far, Viet Nam is moving closer to a stage at which it will not be able to postpone the need to restructure its industrial system any longer, away from excessive dependence on FDI and on low value, low-technology industries and to focus on the production of higher value technological products and industries by strengthening the domestic manufacturing system and its linkages to FDI, thereby moving away from dependence on external capital for productivity and refocusing on the enhancement of labour and total factor productivity. The alternative is to remain stuck in a low-technology, low-income trap.

Several policy decisions indicate awareness of the abovementioned problems, and set the frame for concerted public-private sector actions to address the identified challenges. The contribution of this paper is that it provides more evidence, further insights and recommendations, while also establishing the framework for an industrial performance monitoring system.

This paper proposes ways to build on the country's current strengths while at the same time addressing these challenges, paving the way to avoid the low-middle income trap and to help Viet Nam climb up the ladder and join more advanced economies, learning also from the experiences of other countries that managed to successfully overcome this perilous transitional phase.

Manufacturing export performance largely exceeds production

To evaluate Viet Nam's industrial performance in a comparative way, the paper relies on international databases and methodologies. UNIDO's specialized Competitive Industrial Performance (CIP) Index provides a synthetic way to track Viet Nam's performance at global level, indicating a remarkable jump from the 69th position in 2006 to 42nd in 2016, on its way to surpassing other ASEAN countries that were once competitors who were out of reach, such as the Philippines, and with the concrete possibility of reducing the gap with Thailand and Malaysia, if current trends are maintained.

What emerges clearly is the pivotal role played by the performance of manufacturing trade, growing at a CAGR of 19 per cent in the period 2006-2016. Even in terms of com-

position, the medium high-tech share of exports has increased remarkably from below one quarter (23 per cent) of total manufacturing exports to more than half (51 per cent). This impressive performance has not been matched by a similar growth in manufacturing production, which raises some concerns considering Viet Nam's large and ever expanding domestic market. In fact, manufacturing exports per capita were almost six times the size of manufacturing value added per capita produced domestically. Its growth in the period 2006-2016 was almost triple that of MVA per capita (19 per cent compared to 7 per cent).

This suggests that Viet Nam's export capacity has not been accompanied by similar growth in domestic capabilities and that the export system does not adequately link to the domestic production patterns. ASEAN comparators with a higher MVA per capita than Viet Nam do not exhibit such a gap: the largest gap recorded by Thailand in 2016 is only one-third of Viet Nam's (in terms of the difference between MVA and manufacturing exports per capita). The Philippines, Indonesia and even tiny Singapore show a larger capacity to produce than to export.

The encouraging news is that in the 2006-2016 period, Viet Nam's absolute MVA per capita has been growing faster than that of ASEAN comparators, though China and India's performance was stronger. More importantly, the acceleration in MVA growth was reflected in the recent quinquennium 2011-2016 (of more than 9 per cent), suggesting that the country's export performance has started bearing some fruits. Nonetheless, even if Viet Nam manages to keep its current pace, it would take the country 20 years to catch up with the closest ASEAN competitors (the Philippines and Indonesia).

MVA growth has translated into positive structural change (e.g. the contribution of manufacturing to GDP), exceeding 15 per cent in 2017, and into a rising GDP per capita, though still lagging behind most ASEAN comparators.

Enhancing FDI linkages to the domestic production system

Viet Nam's remarkable export performance has primarily been driven by FDI, which increased more than five-fold between 2006 and 2016, and which explains the 100 per cent value exported, as in the case of the telecommunications industry.

The OECD's Trade in Value Added (TiVA) allows us to track the extent to which Viet Nam's manufactured exports have benefitted from value added created domestically; it denotes to some degree the extent of backward linkages from domestic industries.

TiVA data paint a bleak picture: the share of domestic value added from manufacturing gradually decreased in the period 2005-2015, with a large share taken by China, indicating that a lot of intermediate inputs being used for the production and export of medium and high-tech products in particular were manufactured elsewhere and that most of Viet Nam's manufacturing consists of assembly.

As expected, it is the exports of telecommunications equipment, machinery and electronics that are mostly affected by this, with locally created value not exceeding 50 per cent if we consider manufacturing only and not services. ASEAN competitors such as Thailand achieved better results in this respect, exhibiting a higher share of domestic value added.

Boosting manufacturing productivity

Manufacturing labour productivity is another fundamental challenge for Viet Nam's manufacturing system, and continues to lag far behind ASEAN comparators, with large fluctuations and no sign of steady progress since 2011. This relatively weak performance is mostly attributable to the considerable dependence on the textile and leather industries for employment, which are experiencing the most sluggish growth in productivity, if not even recession.

The problem might in part also be related to the reliance on FDI. This has been observed in a number of studies[19]. The incremental capital-output ratio (ICOR) has risen since the mid-1990s, stabilizing at high levels in recent years, thus indicating excessive dependence on capital (mostly foreign) to drive growth rather than on labour productivity or, better yet, on total factor productivity as a measure of the manufacturing system's efficiency.

The government takes this issue seriously, as verified in the Prime Minister's Decision No. 879 / QD-TTg of 9 June 2014 approving Viet Nam's industrial development strategy through 2020 with a vision to 2025 to reduce the industrial ICOR down to 3.5 per cent to 4.0 per cent in the period 2011–2025, and even further to 3.0 per cent to 3.5 per cent in the period 2026-2035.

8.2. Monitoring and evaluation (M&E) framework for industrial policy in Viet Nam

Introduction of M&E system

Good governance is key for inclusive economic development, and accountability is key for good governance. Monitoring and evaluation (M&E) programmes and systems are designed to identify what works and what does not in policy design and implementation. Monitoring takes place during programme implementation and evaluation takes place at the end of a project. They help us build "evidence-based policy." Based on the results of the monitoring and evaluation exercises, policy is updated and modified to achieve the desired objectives in the most efficient and effective way.

M&E is particularly useful in the context of industrial policy (IP). In a broad sense, IP can be defined as a set of government measures targeted at specific industries or firms and implemented with the objective of supporting industrial development and upgrading industrial output[20].

[19] See, for instance, "Avoiding the Middle Income Trap: Renovating Industrial Policy Formulation in Vietnam", p. 4, Kenichi Ono (26 Feb 2010).

[20] Michele Di Maio (2009). Industrial Policies in Developing Countries. History and Perspectives. In: The Political Economy of Capabilities Accumulation: The Past and Future of Policies for Industrial Development, edited by Cimoli, M., Dosi G. and Stiglitz, J. E., Ch.5, Oxford University Press.

This section addresses the monitoring and evaluation of industrial policy. The terms monitoring and evaluation are often used interchangeably. However, they refer to activities that are quite different. Monitoring tracks the implementation and progress of a policy or intervention to support policy administration. Evaluation assesses the design, implementation or results of a policy or intervention to support new policy planning. Ideally, both monitoring and evaluation should be carried out as an integral part of the policy from the outset rather than as an afterthought or a way to showcase its success.

Industrial policy-focused interventions are inherently complex. Because we are dealing with a dynamic target group in transition both socially and legally, the interventions that are implemented will be highly diverse in nature and will have outcomes across a range of sectors. Properly evaluating these interventions, albeit challenging, is a crucial ingredient in the recipe for success.

Establishing a monitoring system

Good evaluation is impossible without a good monitoring system. Moreover, designing a good monitoring system will likely have an impact on the overall quality of policy design. The minimum requirement is for the following monitoring tools to be in place:

- A result chain,
- A logical framework,
- A process to collect and analyse the information and inform decision-making.

Monitoring provides internal and external information continuously to inform policy-makers about planned and actual developments. When irregularities or inefficiencies are detected, they can be corrected in a timely manner. Monitoring involves collecting and analysing data to verify that resources are being used as initially intended, that activities are implemented according to plan, that the expected products and services are delivered and that the intended beneficiaries are being reached (Savedoff, Lvine, and Birdsall 2006). Monitoring also provides the foundation for evaluating an intervention. In fact, good evaluation is difficult to conduct without proper information about actual implementation. If no reliable information about the progress and quality of implementation is available, then any evaluation will run the risk of misinterpreting the reasons for success or failure of the policy.

The challenges in monitoring an intervention are:

- Define the logic of the intervention, which includes setting goals beyond the project development objective on all levels of implementation ;
- Identify key indicators, data collection mechanisms and assumptions that can be used to monitor progress against these goals;

- Establish a monitoring and reporting system to track progress towards achieving the established targets and to inform policymakers.

Defining the logic of the intervention

Any policy design is built on a theory of change. There is an expectation that a policy will help improve the target group's living conditions by addressing a specific set of barriers and constraints that business faces. That is, we have a set of assumptions about how and why particular resources and policy activities will bring about changes for the better.

In practice, a theory of change can be modelled in a variety of ways, for example, by using logic models, logical frameworks, outcome models or result chains. All of these can help us understand the link between a policy and its expected outcomes. Their purpose is to provide stakeholders with a logical and plausible outline of how a sequence of events for which a policy is directly responsible can lead to the desired results. They establish the causal logic from the initiation of the policy (available resources), over a transmission mechanism (policy activities) to the end (higher-level outcomes).

Identifying key indicators, data collection tools and assumptions

One of the biggest challenges in developing a monitoring system is choosing what kind of information best reflects that we are indeed meeting our objectives. To put our results chain into practice, we can now try to identify appropriate indicators, data collection tools and assumptions for each level of objectives, from inputs to higher-level outcomes. A logical framework provides a useful matrix to capture all of these elements (see Table 8.1).

Table 8.1 Example of a logical framework (results chain) for industrial policy

Category	Sample Target
Input	Develop industrial policy
Activity	Implement the policy
Output	Policies are adopted and adhered to
Outcome	Increased diversification of industry, changes in business environment, quality of jobs
Higher-level Outcomes	Increased output and income

Step 1: Identifying indicators

Indicators are a crucial element of a monitoring system since they drive all subsequent data collection practices, analysis and reporting. Without a clear set of indicators, monitoring or evaluation activities lose their capacity to compare a policy's actual achievements with the policy's agreed upon and expected outcomes (Gosparini et al. 2004).

Even when the focus is on the results of the intervention, it is important to track implementation indicators so we can determine whether the policy has reached its intended beneficiaries and whether it has been carried out as intended. Without these indicators all along the results chain, an evaluation will only identify whether the predicted outcomes were achieved, but it will not be able to make a connection between the level of success and the quality of policy execution. Table 8.2 illustrates examples of such indicators along the results chain.

Table 8.2 Examples of indicators

Category	Sample Target	Example of Indicators
Input	Develop industrial policy	• Policy drafted • Cost of policy in U.S. dollars within desired budget
Activity	Implement the policy	• Passed all approvals • Date by which adoption was achieved
Output	Policies are adopted and adhered to	• Number of firms taking advantage of a specific policy • Adoption of certain rules
Outcome	Increased diversification of industry, changes in business environment, quality of jobs	• Number of industries • Size of each industry • Agglomeration • Ease of doing business • Safety of jobs (injuries)
Higher-level Outcomes	Increased output and income	• Total output • Household income and employment

Step 2: Data collection

The selection of indicators to be used for the monitoring system depends not only on the policy structure and objectives, but also on the availability of data and on the time and skills needed for their collection. Data refers to information of all types, not just quantifiable information.

There are two broad methods of data collection: quantitative and qualitative.

- Quantitative methods aim to provide an objectively measurable picture of a situation in some strictly predetermined ways. They provide information about the population of interest in closed-form and quantitative dimensions, including demographic, socioeconomic or other characteristics.

- Qualitative methods aim to provide an understanding of how and why people think and behave the way they do. Qualitative methods seek to understand events from stakeholder perspectives, to analysing the meaning of events for people in particular situations, and to understand how they interpret their experiences and construct reality.

Quantitative methods usually have higher standards of reliability and validity compared with qualitative methods. Qualitative methods are more difficult to generalize. Given the advantages and limitations of both categories, a combination of quantitative and qualitative methods (mixed-methods approach) is often recommended to obtain a comprehensive view of the policy's implementation and effectiveness.

Step 3: Articulating risks and assumptions

In any policy, there are factors that we cannot control and that will affect the success of our intervention. These could include such factors as weather, political stability, the local security situation and support from local stakeholders. A good understanding of these factors is essential for policy design as well as for M&E.

We can identify assumptions by thinking about factors that are crucial for reaching our objectives on each level of the results chain and what might affect these factors (see Table 8.3). A first set of assumptions may already have been formulated in the risk section of our policy proposal. Assumptions that are beyond our control should be inserted in the results matrix depending on their level of influence.

Table 8.3 Examples of assumptions in the results chain

Category	Sample Target	Potential Assumption
Input	Develop industrial policy	• Policies can be adjusted • Appropriate solutions to problems can be found
Activity	Implement the policy	• Policy is implementable • There is no (or little) resistance to change
Output	Policies are adopted and adhered to	• Businesses respond to new policy • Investments can be moved
Outcome	Increased diversification of industry, changes in business environment, quality of jobs	• Businesses and people respond as expected • No (few) unexpected outcomes
Higher-level Outcomes	Increased output and income	• Local economy (including market prices and wages) remains stable

To provide an early warning system on potential constraints as well as on possible solutions, assumptions should be closely followed. Monitoring assumptions allows us to know how they may affect policy implementation and results, and can therefore help us explain deviations from our objectives and to take corrective measures.

Monitoring and reporting system

Planning

Assuming that a full logical framework with indicators, data collection tools and assumptions has been developed, the following tasks should be undertaken to prepare for monitoring, namely: a) design necessary instruments, b) develop procedures to protect people, c) collect the data according to the chosen methods, and d) develop the database.

Aggregating and analysing information

The methods for aggregating and analysing the findings are highly dependent on the methods used to monitor a policy or intervention. Therefore, decisions on how to use monitoring data should be determined very early in the design process. The policy department must decide on the best ways to organise these data and conduct effective and efficient analysis.

- For qualitative data: it is often ideal (albeit logistically challenging) to employ computer-based qualitative analysis software. Software for qualitative analysis allows the user to import all relevant documents and then apply a set of predetermined codes. The codes can function as an organizing tool (grouping topics from various sources together) or allow sophisticated analysis that examines relationships within these topics.
- For quantitative data: when resources allow, it is often best to use several systems. One of these should be a relational database. Relational databases allow for an easy investigation and display of data along a number of different variables. Typically, however, the analyses performed in relational databases are fairly descriptive in nature, providing measures of central tendency (e.g. means, modes, medians, standard deviations).

Learning and decision-making

Monitoring has little value if we do not learn from and act on the data that result from the analysis. Being in a constant cycle of action and reflection helps remind us that situations change, that the needs of policy beneficiaries may change and that strategies and policy activities need to be reconsidered and revised.

Reporting

It is important to always report monitoring data in comparison with their baseline and target values, and to present the information in a simple, clear and easily understandable format. Visual tools, such a graphs, charts and mpas can be very useful in highlighting key data and messages.

Resources

Monitoring systems can be expensive. In addition to fixed costs (e.g. computing hardware and software, staff) there are also variable costs that include training of local staff, contacting outside consultants and publication costs. Given that such expenses may be quite high, it is important for a policy monitoring and evaluation system to be accounted for in any strategic plan and properly budgeted.

Choosing the right type of evaluation method

Although a good monitoring system is critical for determining whether our policy is moving in the intended direction, it does not necessarily answer the question how or why changes are coming about, nor does it prove that any observed changes in outcomes are the result of our intervention. To complement the information we have obtained from our monitoring system, we need to analyse the data. This analysis, which we will call "evaluation", entails periodic assessments of the relevance, efficiency, effectiveness, impact and sustainability of our intervention. The type of evaluation best suited for our policy depends primarily on our information needs. Therefore, the first step to any evaluation is to define what we want to learn. These learning objectives as well as our operational context will, in turn, determine which type of evaluation is suitable for our policy.

The purpose of evaluation

As a first step to decide whether an evaluation is necessary and which design should be chosen, it is crucial to clearly define what we want to glean from the evaluation. As policy designers and evaluators, we must first establish the questions that we would like to answer and then examine the most appropriate tool to answer them.

Broadly speaking, evaluations address different types of questions. For our purposes, we focus on two:

Descriptive questions seek to describe processes, conditions, organizational relationships and stakeholder views (What is the situation of our policy?).

Normative questions compare what is taking place to what should be taking place. Such questions compare the current situation with the specific objectives and targets that have been defined (Has our policy been implemented and performed as intended?).

Which of the above questions we should ask (or what combination thereof) is ultimately up to us based on the specific policy.

Linking evaluation questions to evaluation design

There is no "one size fits all" evaluation template. The choice of evaluation should depend on the preceding questions.

Performance evaluation

Performance evaluations assess the quality of a policy's objectives and its progress in achieving these. They also ask whether the established results framework is suitable, that is, whether there are inconsistencies between resources, activities and objectives, and whether priorities or timelines should be adapted to better achieve the agreed objectives. Performance evaluations can be implemented relatively quickly and at moderate costs as they rely heavily on desk research and selected interviews.

Process evaluation

Unlike performance evaluations, process evaluations are geared to fully understand how a policy works and seek to assess how well a policy is being implemented. They determine whether there are gaps between planned and realized activities and outputs, and identify ways to improve the quality of services being offered. A process evaluation may be conducted when problems such as delays or beneficiary dissatisfaction have been detected by the monitoring system or may be carried out regularly as an early-warning system.

Cost-effectiveness and cost-benefit analysis

Cost-effectiveness and cost-benefit evaluations assess monetary or non-monetary costs, in particular their relation to (1) alternative uses of the same resources, and (2) the benefits produced by the policy. A cost-effectiveness analysis (CEA) measures the cost per output or outcome and compares this cost to similar policies. A cost-benefit analysis (CBA), in turn, weighs the total expected costs against the total expected benefits (outcomes) of a policy.

Resources

Some otherwise desirable evaluation methods may not be feasible if we do not have the human and financial resources to carry them out. It is important to assess the skills and funding available to ensure that they are in line with the needs of the evaluation we envision.

Skills

Conducting quality evaluations requires special skills that may not always exist in an organization. In that case, and to ensure neutrality, it is often useful to hire external evaluators.

Funding

The differences in scope and varying forms of data collection and analysis create a wide range of evaluation cost. Relying on desk research and key informant interviews is naturally much cheaper than designing and running new surveys with many firms or people.

M&E system for industrial policy in Viet Nam

Viet Nam's manufacturing sector has recorded an impressive performance in the period 2006-2016, both in absolute and in relative terms. Yet some weaknesses could undermine the steady and promising progress Viet Nam's manufacturing sector has achieved so far.

The Vietnamese growth pattern faces limitations in terms of productivity and long-term sustainability. The main reasons include: (1) high dependence on FDI and on multi-national corporations; (2) high dependence on imported materials for production; (3) lack of capital, technology and high technical staff in domestic SMEs.

Recently, the Central Committee of the Communist Party of Viet Nam issued Resolution No. 23-NQ/TW on the formulation of a national industrial development policy by 2030, with a vision to 2045. As argued by the White Paper (UNIDO, 2019), to achieve the objectives indicated in the Resolution, Viet Nam must restructure its industrial system to "re-engineer it towards the production of higher value, technological products and sectors, by strengthening the domestic manufacturing system and its linkages to FDI, shifting away from dependence on external capital for productivity".

The Government of Viet Nam has taken several policy decisions to achieve these objectives. These policy measures include:

- PM Decision No. 879/QD-TTg – Implementation solutions: to enhance alignment between domestic and foreign enterprises to cooperate on joint participation in the global production value chain.

- PM Decision No. 879/QD-TTg – Orientations by 2025: to focus on the development of supporting industries, especially mechanical, chemical, electronic and telecommunications products, to serve industrial production and concurrently participate in the global production network.

- PM Decision No. 879/QD-TTg – Orientations by 2025: to adjust the industrial growth model step-by-step from being based mainly on quantity to being based on productivity, quality and efficiency.

- PM Decision No. 879/QD-TTg – Orientations by 2025: to step up the development of industries and industrial products with a high added value and export value.

The achievement of these objectives requires a data collection effort to measure Viet Nam's industrial performance and its evolution in a very detailed way[21]. At the same time, this evidence-based industrial policy effort needs to be coupled with the design of an M&E system to monitor and evaluate the implementation of the various measures that are part of the industrial polic y. The previous sections of this White Paper describe how this can be achieved. In the following, we present an application of this methodology to two specific examples for the case of Viet Nam taken from the policy measures discussed in this paper.

Examples of a results chain for industrial policy in Viet Nam

Examples of a draft results chain for the development of industrial policy in specific sub-sectors in Viet Nam are presented.

- **Food industry**

According to the White Paper, Viet Nam's food and beverages industry (agro-processing) has experienced strong growth over the past 5 years and is expected to grow further. Figure 8.1 presents a draft results chain for the development of industrial policy in this industry.

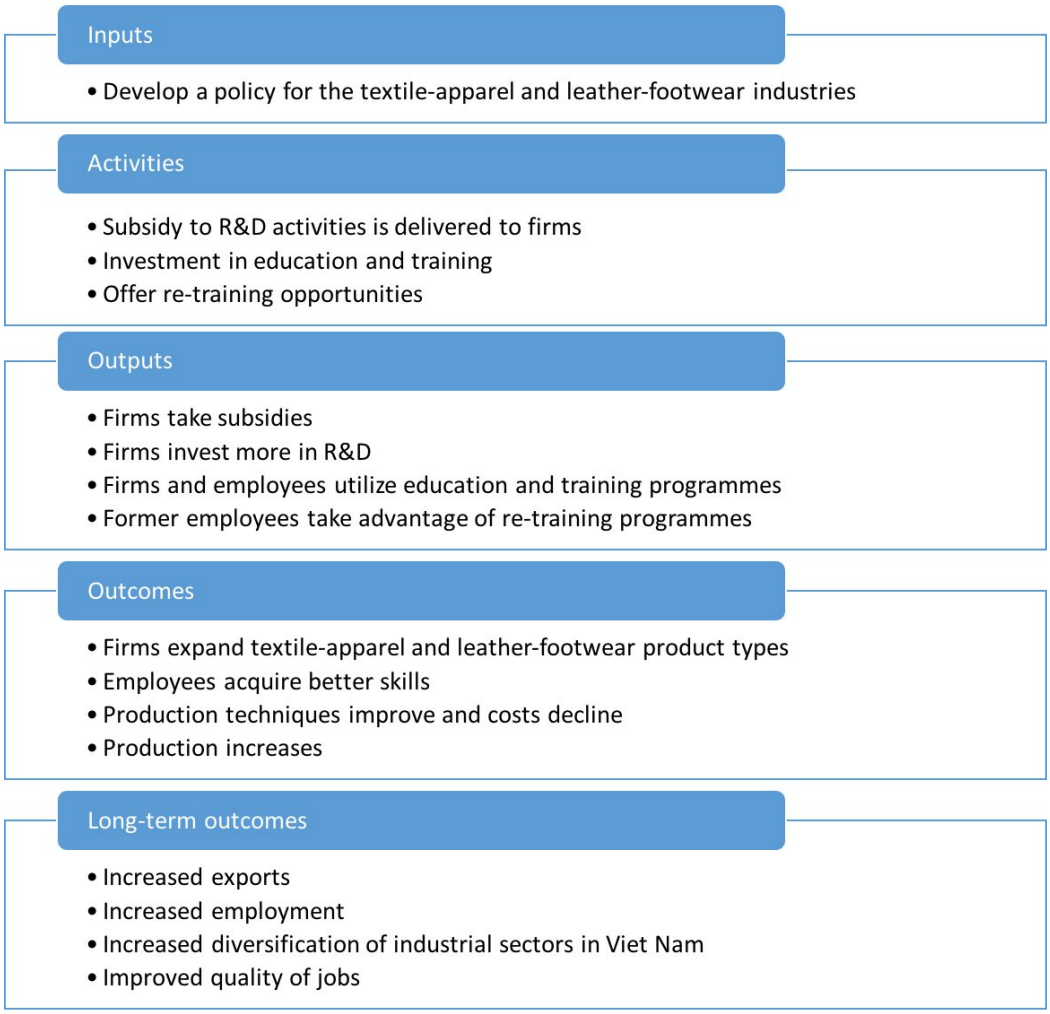
Figure 8.1 Draft results chain for the development of industrial policy in the food industry

[21] This has been the main objective of the UNIDO Enhancing the Quality of Industrial Policies (EQuIP) Training (January 2018). For more details on the motivation, content and results of the training, see Annex 1.

- **Textile-apparel, leather-footwear**

A stated goal of Viet Nam's industrial policy is to transform the textile-apparel and leather-footwear industries into industries that generate high value-added products. Figure 8.2 presents a draft results chain for the development of industrial policy in these industries.

Figure 8.2 Draft results chain for the development of industrial policy in the textile-apparel, leather-footwear industries



8.3. Limitations

The analysis in this paper aims to provide comprehensive coverage; however, it is important to mention the limitations of the White Paper and areas that are beyond the scope of this analysis.

The paper is based on a quantitative analysis to ensure an unbiased assessment of the industrial sector and hence, to provide a fair comparison across economies and over time. However, quantitative analysis should be supported and complemented by qualitative information. The findings of this research provide a robust and reliable overview of the key trends and issues of industrial development in Viet Nam, and guide the analyst in identifying areas where additional qualitative research would be useful, depending on the policymaker's interests.

UNIDO's technology classification is based on several assumptions that do not always accurately reflect the technological content of specific activities. Technologically sophisticated processes can occur in so-called lower-technology industries, while some activities in high-tech industries can be fairly unsophisticated. The use of computer-aided design in the clothing industry (low-tech) and the basic assembly operations in the manufacture of semiconductors (high-tech industry) are good examples. UNIDO's methodology aggregates sectors and consequently categorizes industries, disregarding these anomalies.

International statistics used in the analysis of statistical data from various angles do not reflect much from 2017 onwards. Data produced and analysed locally by organizations in Viet Nam should have been actively used for sectoral analysis, but the latest local data were not available or utilized, except in some areas.

Finally, the purpose of this paper is to derive policy recommendations from changes in the policy environment through subsector analysis following the Viet Nam Industrial Competitiveness Report 2011. Accordingly, horizontal and holistic industrial policy suggestions were not re-addressed in detail.

Annexes

Annex 1. A series of training workshops for Vietnamese policymakers

1. Enhancing the Quality of Industrial Policies (EQuIP) Training (January 2018)

Context and purpose

The workshop took place from 16-19 January 2018 in the Hoa Binh province and was entitled "Enhancing the Quality of Industrial Policy in Viet Nam" and was based on a set of training modules developed by UNIDO in collaboration with the German Federal Enterprise for International Cooperation (GIZ). The approach, known as the Enhancing the Quality of Industrial Policy (EQuIP) Toolkit, provides a comprehensive set of instruments to analyse industrial data, interpret these and develop dynamic industrial policies.

It was a 3.5 day working-level training conducted with working-level officials on evidence-based policy design. The main aim of this training programme was to introduce core concepts related to evidence-based industrial policy design.

The training focused on calculating baseline indicators of Viet Nam's current economic and social performance at the subsector level. It covered indicators that measure the scale and structure of industrial production, export, import, employment and wages to better understand how industrial subsectors currently contribute to the "expansion of industrial production" and the "domestic benefits from production".

In compliance with Viet Nam's priorities (as stated in the Decision of the Prime Minister approving the strategy on Viet Nam's industrial development through 2025, with a vision to 2035, No. 879), the focus was on three industries, namely: food, textile and machinery.

Main content of the sessions

Session I: Introduction to EQuIP and the objectives of this training course

- Introduction of participants and trainers
- The importance of evidence-based industrial policy
- Overview of the EQuIP toolbox for industrial policy making
- The application of EQuIP in Viet Nam for sectoral analysis
- Structure and objectives of this course

Session II: Principles and methods for data analysis for industrial policy

- Using data for industrial policy making
- Data classifications (ISCI, SITC) and data disaggregation for sectoral analysis
- Key sectoral indicators in the EQuIP toolbox
- Meaning and calculation methods for the key indicators

- Analysing industrial performance levels and trends
- Calculating growth rates

Session III: Introduction to industrial production and employment data from UNIDO's INDSTAT database

- Industrial production and employment data: what is it and where does it come from
- Downloading data from UNIDO's INDSTAT database
- Calculation of indicators

Session IV: Group work exercise on the calculation of sectoral value added data

- Participants independently downloaded sectoral value added data from INDSTAT
- Participants calculated indicators and created data tables or graphs

Session V: Group work exercise on the calculation of sectoral employment data

- Participants independently downloaded sectoral employment data from INDSTAT
- Participants calculated indicators and created data tables or graphs

Session VI: Introduction to industrial export data from UNCOMTRADE and the WITS platform

- Industrial export and import data: what is it and where does it come from
- Downloading data from the WITS platform
- Calculation of indicators

Session VII: Group work exercise on the calculation of sectoral export data

- Participants independently downloaded sectoral export data from WITS
- Participants calculated indicators and created data tables or graphs

Session VIII: Principles of data illustration and interpretation for industrial policy

- How to illustrate data with graphs
- Process for analysing and interpreting data graphs

Session IX: Group work exercise on data presentation for industrial policy

- Participants independently created graphs
- Participants interpreted their graphs from an industrial strategy perspective

Session X: Additional indicators for sectoral analysis for industrial policy

- Introduction of additional sectoral indicators that can be calculated with INDSTAT and WITS
- Additional options for sectoral analysis (beyond INDSTAT and WITS)

Session XI: Additional analytical tools for industrial policy formulation

- Introduction of additional analytical methods for sectoral analysis
- Benchmarking Viet Nam against other countries
- Crossing two or more indicators for a multidimensional analysis

- Calculating and interpreting elasticities
- Setting future performance targets for industrial policy

Session XII: Final group presentations and feedback
- Participants gave their final presentations of analysed and interpreted data
- Feedback on data analysis and the interpretation process was provided

Wrap up session & roundtable discussion
- Discussion of future applications of sectoral analysis in Viet Nam
- Discussion of potential next steps (e.g. development of sectoral strategies and action plans, etc.)
- Evaluation of course
- Wrap-up of course.

Summary of the training course

The course was a 3.5 day working-level training which was conducted with working-level officials on evidence-based industrial policy design. The main objective of this session was to introduce the relevant quantitative EQuIP methodologies for subsector analysis of industrial performance.

At the request of the Government of Viet Nam, the training programme lasted 4 days with participants from a variety of relevant government institutions (e.g. the Ministry Industry & Trade, Ministry Agriculture and Rural Development, General Statistics Office, Institute of Policy and Strategy for Agriculture and Rural Development, International Policy and Strategy Institute and the National Institute for Science and Technology Policy and Strategy Studies). The programme gathered over 15 policymakers and introduced participants to some of the basic principles and methodologies of evidence-based industrial policy-making, particularly with regard to subsector analysis.

The first day focused on conceptual introductions to the importance of analysing industrial performance in a holistic manner and principles of data analysis. The second day introduced participants to UNIDO's INDSTAT database and supported them in downloading, graphing and interpreting employment data. Most participants were also able to compare Viet Nam's employment performance with relevant benchmarks. Participants also began downloading and graphing MVA data to analyse industrial production. Each participant conducted data analysis independently but worked in three groups to interpret their findings and consider policy implications after each exercise. Each group chose one representative to present the group's initial findings and were provided with feedback.

On the third day, participants continued to analyse MVA and compared growth rates and the structure of production (e.g. share of industries in total production) with the employment analysis they had conducted a day earlier. They were then introduced to the WITS/UNCOMTRADE database and downloaded export data for industries and created graphs

for interpretation. On the final day of the training, each group finalized their presentation which told a particular "story" about industrial performance in Viet Nam.

- One group analysed industry as a whole and compared industrial production, employment, exports and wages of Viet Nam with strategic ASEAN "role-models"
- Another group explored the question "What should Viet Nam's priority industries be?" and compared sectoral performance across economic, social and export dimensions and concluded that industries should be prioritized according to specific policy objectives.
- The final group examined the machinery industry in more depth and found that it is a major driver of production, employment and trade but raised concerns that its large share could translate into vulnerability for the country and that policymakers should therefore consider this issue in the future.

2. Capacity development for Industry 4.0 in Viet Nam (June 2018)

Context and purpose

As part of the ongoing project "Support to the Government of Viet Nam in the formulation of a subsector industrial strategy and of the related implementation policy through institutional capacity-building" and upon request from the Central Economic Committee and the Industry Agency at the Ministry of Industry and Trade (MOIT), an executive seminar for high-level policymakers and a workshop for mid-level policymakers from all relevant ministries and departments (MOIT, MOST, MARD, MIP, etc.) was organized on the topic of Industry 4.0.

The workshop took place from 5-9 June in Hanoi and Vin Phuc.

The executive seminar gathered over 15 high-level policymakers from different ministries and departments who were engaged in drafting Viet Nam's response to the opportunities and challenges posed by Industry 4.0. It provided a brief overview of current policy options and strategies vis-à-vis Industry 4.0 and featured case studies from a range of countries, zooming in on current initiatives in the Republic of Korea and South Africa, in particular.

The workshop was followed by a three-day workshop which allowed mid-level officials from different ministries and departments to further elaborate on the topic and added exercises to initiate a policy dialogue involving all relevant stakeholders.

Summary of lectures

Industry 4.0 - Strategies and policies

Fernando Santiago-Rodriguez, UNIDO

Fernando Santiago shared the findings of UNIDO's preliminary exploration of policy

responses to Industry 4.0 in a selected sample of middle-income countries. The session proposed a framework to understand I4.0 combining technology, development and policy aspects. Based on such a framework, the presentation addressed the following overarching questions: Are developing countries getting ready for Industry 4.0? How are they preparing? Can any lessons be gleaned from existing policy efforts around Industry 4.0? The discussion showed that while policy responses generally remain at the trial stage and need to be better articulated with long-term national development strategies, there is already something to learn from efforts around the development of national I4.0 in other peer developing countries.

The 4th Industrial Revolution and manufacturing innovation in South Korea

Sanghoon Kim, KIET

Sanghoon Kim provided an overview of 4IR strategies and polices in the Republic of Korea. This included (1) a general introduction to concepts and backgrounds, but also some misunderstandings related to 4IR, (2) 4IR policy approaches of different countries including Germany, the United States, China and some ASEAN countries, (3) policy responses and other 4IR activities in the Republic of Korea. The presentation emphasized what the Republic of Korea's President Moon Jae-in labelled as the country's "people-centred approach (jobs and income growth, innovative growth and a fair economy)" for the Fourth Industrial Revolution. The presentation also provided a brief overview of policy implications for Viet Nam at industry level with more micro-perspectives (such as Viet Nam's manufacturing industry) in comparison with the Korean case.

The new digital industrial revolution in South Africa

Simon Roberts, Center for Competition, Regulation and Economic Development (CCRED), South Africa

Simon Roberts provided a critical overview of the development of industrial policies in South Africa to address the challenges of I4.0. This included a brief review of the patterns of structural transformation and diversification in South Africa with reference to case studies from value chains and industry groupings in machinery and equipment and plastic products. The role of different institutions was considered. The presentation also addressed issues relating to e-commerce and the growth of international platforms led by Amazon and Alibaba, drawing out the implications for developing countries such as South Africa and Viet Nam.

Industry 4.0 – A private sector's view

This panel discussion hosted representatives of large multinational companies active in Viet Nam and among the propagators of Industry 4.0. It shed some light on how these companies cope with the requirements of Industry 4.0 and how they view their role in the country in an interactive discussion with an open floor.

Group work exercise

The exercise ran throughout the entire duration of the workshop. It included three working sessions and one session reserved for the presentation of results. Participants worked in small groups with representatives from different ministries and agencies to facilitate cross-divisional dialogue.

The exercise enabled participants to discuss the implications for Viet Nam of the content conveyed throughout the course. Furthermore, it provided them with an opportunity to contribute their own experiences and exchange them with colleagues from different departments/entities.
The exercise developed over the following working sessions:

1. Strategic context
2. International cooperation
3. Measuring progress.

The course faculty facilitated group discussions and presentations and acted as resource persons for questions that might arise. On the last day, participants presented their findings to the class and faculty. It was followed by a collective discussion about the results.

3. EQuIP: Sector Competitiveness Analysis and Selection (August 2018)

Context and purpose

This training workshop was organized to train mid-level policymakers from relevant ministries and departments (MOIT, MOST, MARD, MIP, etc.) as part of the ongoing project "Support to the Government of Viet Nam in the formulation of a subsector industrial strategy and of the related implementation policy through institutional capacity-building". The training workshop was entitled "Enhancing the quality of industrial policy in Viet Nam: Sector competitiveness analysis and selection". It took place from 13-17 August 2018 in Ninh Binh province.

The training programme was the third capacity development intervention in Viet Nam within this project in 2018. It was meant to inform a process by which a task team of selected individuals from different ministries would develop a series of sectoral studies and issues relevant to the country's industrial development, eventually to be integrated into a white paper. The white paper was to inform the drafting of Viet Nam's new industrial strategy.

The course trained 15 individuals on tools and instruments for industrial sector benchmarking and selection. It relied on UNIDO's well-tested Competitive Industrial Performance (CIP) and Enhancing the Quality of Industrial Policy (EQuIP) methodologies.

The training examined sector competitiveness in terms of productive and market performance, their revealed comparative advantage, growth compared with competitors, threats and dynamism. It also considered Viet Nam's advantage and the potential of individual manufactured products.

The course was highly interactive, tasking participants to work in small groups on data analysis and strategy formulation. On the last day, participants presented their findings to the plenary with an ensuing discussion on the future outlook of the Vietnamese manufacturing sector, the work of the task force and the new industrial strategy.

Summary of lectures

Introduction to training
After a round of introductions, this first session provided, among other things, a clear overview of the material to be covered during the week, explaining how the tools acquired were instrumental for the sector selection process.

Disentangling competitive industrial performance into manufacturing (sub) sectors
UNIDO's Competitive Industrial Performance methodology was briefly discussed with the trainees, focusing on how different manufacturing subsectors contribute to the country's overall industrial performance, through the different indicators.

Sector CIP
This very practical session allowed trainees to calculate sector competitiveness using UNIDO's methodology, looking at both production and exports. The findings were discussed as a group.

Employment, productivity and wages
Trainees explored different aspects related to employment, productivity and wages per sector using relevant tools from the EQuIP toolbox.

Sector market performance analysis
Trainees learned how to calculate demand growth and changes in market shares for selected product groups and markets, starting from a global overview, to then zoom in on particular markets, as a tool to assess sector performance vis-à-vis demand growth.

Competitiveness threat analysis
For selected sectors and markets, trainees were able to assess how Viet Nam is faring against other competitors, using various indicators such as changes in market shares. Other issues of competition were also discussed.

Revealed comparative advantage and other methodologies
Trainees learned how to calculate Viet Nam's global RCA and were introduced to product space analysis.

Product competitiveness analysis
For selected priority sectors, trainees learned how to identify related main products using databases (along value chains) and analyse unit values and the competitiveness of Viet Nam in selected dynamic markets.

Presentations by participants
The participants were requested to present some of the analysis undertaken during the week and discuss their key findings relevant for the sector selection exercise.

Discussion on sector selection criteria: Which ones to pick? At which level?
This session dedicated time to openly discuss sector selection criteria, reflecting on what had been learnt and on the findings, providing an opportunity for participants to ask for any clarifications.

Wrap up session & roundtable discussion
Key concepts, tools and discussion points were summarized and the way forward discussed.

4. White Paper on Viet Nam's New Industrial Development Strategy (November 2018)

Context and purpose

As part of the ongoing project "Support to the Government of Viet Nam in the formulation of a subsector industrial strategy and of the related implementation policy through institutional capacity-building", a workshop for mid-level policymakers from relevant ministries and departments (MOIT, MOST, MARD, MIP, etc.) in Viet Nam was organized entitled "Enhancing the Quality of Industrial Policy in Viet Nam: White Paper on Viet Nam's New Industry Policy". It took place from 12-16 November in Hanoi.

The workshop was the fourth capacity development intervention in Viet Nam within this project in 2018. It was meant to inform a process by which a task team of selected individuals from different ministries would be developing a series of sector studies relevant to the country's industrial development, eventually to be integrated into a white paper meant to inform the drafting of Viet Nam's new industrial strategy.

Previous workshops, organized throughout the year, conveyed some of the basic principles and tools and outlined the benefits of evidence-based industrial policymaking. This training showcased studies on horizontal factors (population ageing, Industry 4.0, Made in China) and their impact on selected industries (textile & apparel, leather, automotive, electronics and food processing). Input from this event was helpful in terms of providing input to a White Paper that is meant to inform Viet Nam's New Industrial Strategy.

Summary of lectures

On the first day, participants were provided with an overview of three horizontal factors

that have an impact on the development of manufacturing in Viet Nam. Members of the Task Team presented their preliminary findings from the sector studies.

The first lecture looked at ageing populations and their implications for developing / transforming health/care/pension sectors in Viet Nam. It further elaborated the industries with an immediate and urgent need to serve the ageing population.

The second lecture looked at the impact of the current China-U.S. trade relations on the Vietnamese manufacturing sector. China is an important actor in GVCs and sources heavily from within the Asia region. Therefore, tariffs on Chinese goods are likely to have negative repercussions on suppliers to Chinese value chains. An input-output analysis helps identify the significance of this for Viet Nam (and ASEAN countries more generally).

There is also a possibility for opportunities for Viet Nam (and the ASEAN) as China may seek alternative suppliers over the United States, thus increasing the intensity of intra-Asia value chains.

The third presentation provided a brief overview of the implications of Industry 4.0 for the manufacturing sector at large before zooming in on the perspective of a multinational company. It showed Lafarge Holcim's long path to integrate some of the core principles and methods of Industry 4.0, explore lessons learnt from the company's digital strategy and trace how it was developed and implemented.

On the second and third day, lectures were given by experts from the Korea Institute for Industrial Economics and Trade (KIET). They were complemented by presentations from representatives from sector-specific institutions in Viet Nam. These lectures considered the following industries:

1. Food processing;
2. Textile/leather/footwear;
3. Electronics;
4. Automotive.

All industries were explored from a global perspective with a particular focus on the Republic of Korea's experience. Then, taking into consideration the situation of the respective industries in Viet Nam, lessons learnt were explored collectively.

The days were rounded up by working sessions with the Task Team sector groups.

On the last day, all members of the Task Team presented their respective findings from the workshop. It was ensued by a general discussion on the way forward with regard to the White Paper.

Annex 2. Launching the White Paper

The Viet Nam Industry White Paper 2019 (White Paper) was launched at a workshop in Hanoi, Viet Nam, as the final output of the project. The White Paper presents new industrial strategies and priority sectors in Viet Nam, and provides analyses and recommendations for sub-sector industrial strategies and policy instruments.

The workshop was attended by approximately 100 participants from ministries, universities, enterprises and the media. The summary of the White Paper was distributed to participants, including the Ministry of Industry and Trade (MOIT) of Viet Nam and other related ministries, as well as other stakeholders for feedback.

The workshop's opening remarks were made by representatives of MOIT, of the Embassy of the Republic of Korea, and of UNIDO. It consisted of three main sessions: a presentation on the Viet Nam Industry White Paper 2019 – Manufacturing and Subsector Competitiveness describing the White Paper's background and purpose and the progress achieved by the task team and experts; a keynote presentation on the new wave of global manufacturing innovations in the era of the 4th Industrial Revolution focussing on Viet Nam's next steps in terms of trade, industry and strategy and the vision for a new strategic partnership, and finally, a panel discussion on the position and challenges for Viet Nam in the global economy, especially in terms of industrial development.

The Government of Viet Nam was very pleased with the project's results, i.e. the White Paper 2019 on Viet Nam's new industrial strategies. As a representative of MOIT of Viet Nam, Vice Minister Do Thang Hai delivered a speech on the current economic position of Viet Nam and the country's move to the next stage as below.

> Viet Nam's manufacturing sector has affirmed the crucial role it plays in the country's economy, with its share of GDP increasing from 12 per cent in 2010 to 16 per cent in 2018, generating 9.7 million jobs, and maintaining a share of over 8 per cent of Viet Nam's total exports in the past decade. Due to these developments, Viet Nam has been able to rapidly improve its position in the global industrial competitive industrial performance (CIP) ranking published annually by UNIDO, thus significantly narrowing the gap between Viet Nam and other countries in the region.
>
> Despite these impressive results, if Viet Nam's manufacturing sector is to maintain its growth rate in the near future and further improve its position in the global CIP ranking and catch up with other countries in the world and in the region, a number of big challenges will need to be addressed, especially those related to the fourth industrial revolution, the instability of the global economy in the face of protectionist trends and the trade war between the two largest economies in the world. These challenges require Viet Nam's manufacturing sector to maintain and ameliorate the results it has achieved in recent years, with a strong focus on indicators reflecting the scale and quality of manufacturing value added (MVA).

In the past two years, UNIDO has collaborated with the Viet Nam Industry Agency (VIA) and the Ministry of Industry and Trade to organize training workshops for officials of the Ministry of Industry and Trade as well as other ministries and branches to train them in using EQuIP toolkits, to determine and understand the policy implications of industrial competitiveness indicators to be able to apply these tools in the policymaking process and to ensure that Viet Nam's industrial policy is based on a more practical and scientific foundation. These indicators will allow Viet Nam to benchmark its progress against that of other countries in the region and to identify strengths and weaknesses in order to develop appropriate policies and exploit the country's competitive advantage.

Following the training workshops, officials of the Ministry of Industry and Trade and other ministries collaborated with UNIDO experts to draft the Viet Nam Industry White Paper. It is a continuation of previous cooperation between the Ministry of Industry and Trade and UNIDO, namely of the 2011 Industrial Competitiveness Report, which was very well-received by stakeholders. I would like to congratulate the drafting team on completing the work, which provides readers, policymakers, researchers and the business community with useful information about Viet Nam's industry in general and the specific sub-sectors analysed in the White Paper. I recommend the VIA to promote the project's results and to support the trained officials in further applying the toolkits to analysis and industrial policymaking process.

References

- ASSOCHAM, EY (2018) Connecting farm and industry: Through value chain empowerment, ASSOCHAM, EY
- Bank of Korea, "National Account Data", Economic Statistics System (URL https://ecos.bok.or.kr/, retrieved on 5 November 2018)
- Bank of Korea (2016) Status and Future of National Food Cluster, Korea Bank (in Korean)
- BDG VIETNAM, Vietnam's electronics sector: development, locations and opportunities
- BMBF (Federal Ministry of Education and Research) (2014) "The New High-Tech Strategy Innovations for Germany", Germany
- Brecher, C., et al (2012) 'Integrative Production Technology for High-Wage Countries', Chapter 2, Springer
- Business Sweden (2017) 'Capturing Viet Nam's full potential' Business Sweden in Viet Nam
- CNBC (2018), "Vietnam could be a 'winner' from the US-China trade war", a newspaper article reported on 12 September 2018 (URL https://www.cnbc.com/2018/09/12/vietnam-could-be-a-winner-from-the-us-china-trade-war.html, retrieved on 14 December 2018)
- Criscuolo, C., Martin, R., Overman, H.G, and Van Reenen. J. 2019. "Some Causal Effects of an Industrial Policy." American Economic Review, 109 (1): 48-85.
- DBS Group Research. 2015. Economics VN: Asia's latest electronics spark.
- DEFRA (2006) Food Industry Sustainability Strategy, DEFRA
- Di Maio, M., 2009. Industrial Policies in Developing Countries. History and Perspectives. In: The Political Economy of Capabilities Accumulation: The Past and Future of Policies for Industrial Development, edited by Cimoli, M., Dosi G. and Stiglitz, J. E., Ch.5, Oxford University Press
- Dinh Thi Quynh Van (2017) 'Spotlight on VetNam – The leading emerging market', PwC
- Donor Committee for Enterprise Development. 2010. The DCED Standard for Measuring Achievements in Private Sector Development. Control Points and Compliance

Criteria. Version V. HYPERLINK "http://www.enterprise-development.org/page/measuring-and-reporting-results" www.enterprise-development.org/page/measuring-and-reporting-results

- EC (2016) The Food and Beverage Market Entry Handbook: Vietnam, EC
- EEF (2016) "The 4th Industrial Revolution: A Primer for Manufacturers"
- E-Government Practice at the Information Solutions Group. ICT as a key engine for development: good practices and lessons learned from", Korea
- FORBES, www.forbes.com
- GAIN (2017) White Paper, Vietnam Food Processing Ingredients, GAIN
- Geisberger, E. and Broy M. (2012), "Integrierte Forschungsagenda Cyber-Physical Systems", acatech STUDIE
- Gertler, P., Martinez, S., Premand, P., Rawlings, L., and Vermeersch, C. 2011. Impact Evaluation in Practice. Washington, DC: The World Bank. http://www.worldbank.org/ieinpractice.
- Gosparini, P., Russo, L., Sirtori, M., and Valmarana, C. 2004. The Monitoring and Evaluation Manual of the NGOs of the Forum Solint. Rome, Italy: CISP, COSV, COOPI, Intersos, Movimondo, and DRN.
- Hong, S (2015), "Smart Factory in Steelmaking Industry", POSCO
- House of Commons (2016) "Manufacturing : international comparisons", UK
- Jeon, Ji-Yeon (2016) A Study on Prioritizing Food Policy : Application of AHP, Korean Journal of Agricultural Management and Policy, Volume 43
- Joo, Daeyoung. (2005) The Current State of the Korean Electronics Industry and Options for Cooperation with Taiwan. Kiet Industrial Economic Review. Vol. 10. No.6.
- Kellogg Foundation. 1998. Evaluation Handbook. Battle Creek, MI: W. K. Kellogg Foundation.
- Kellogg Foundation. 2004. Logic Model Development Guide. Battle Creek, MI: W. K. Kellogg Foundation. http://www.wkkf.org/knowledge-center/resources/2006/02/WK-Kellogg-Foundation-Logic-Model-Development-Guide.aspx
- Kim, S. (2017a) "4th Industrial Revolution and Innovation Strategies", Presentation on Seminar, KEPRI (in Korean)

- Kim, S. (2017b) ‘‘4th Industrial Revolution : Definitions and Case Studies’, J. of Industrial Economics, May, KIET (in Korean)
- Kim, S. (2017c) ‘‘4th Industrial Revolution and Development Plans for Root Technologies’, Report for MOTIE, September, KIET (in Korean)
- Kim, S. (2017d) ‘‘4th Industrial Revolution and Competitiveness of Manufacturing Industry’, National Assembly Review, July (in Korean)
- Kim, S. (2018a) ‘‘4th Industrial Revolution and Manufacturing Industries”, Presentation on Seminar, KDB (in Korean)
- Kim, S. (2018b) “The 4th Industrial Revolution and Manufacturing Innovation in South Korea”, Presentation on Workshop for Capacity Development for Industry 4.0 in Vietnam, June, UNIDO
- Kim, S. (2016) “Manufacturing Innovation and Metal Industry”, Issue Paper, June, KIET (in Korean)
- Kim, S. (2016) “KSP report for Keyna: Chaper 2-2 Determining Target Industries” KDI
- Kim, S. (2015) “Issues on Smart Factories for Future Manufacturing Innovation’, e-KIET, October, KIET (in Korean)
- Korea Export-Import Bank, “Overseas Investment Statistics”(URL https://stats.koreaexim.go.kr/odisas.html, retrieved on 8 November 2018)
- Korea Federation of Textile Industries, “History of Textile Industry”, from the institute’s homepage (URL http://www.kofoti.or.kr/textile/history.asp, retrieved on 20 November 2018)
- Koschnick, G., (2015) ‘The Reference Architectural Model Industrie 4.0 (RAMI 4.0), ZVEI
- KOTIS (National Statistics Portal presented by Korea Statistics), www.kotis.net
- KSURE (2018) Trends in domestic and overseas food industry, KSURE (in Korean)
- Kuehn, W., (2006) ‘Digital Factory - Integration of simulation enhancing the product and production process towards operative control and optimization’, I.J. of Simulation Vol. 7 No 7, pp.27-39.
- Kusek, J. Z., and Rist, R. C. 2004. Ten Steps to a Results Based Monitoring and Evaluation System: A Handbook for Development Practitioners. Washington, DC: The World Bank. See chapters 2–6. http://www.oecd.org/dataoecd/23/27/35281194.pdf

- Lim, Wonhyuk and Minha Lee. 2010. Promotion Policy for the Information and Communications Industry (Seoul: Korea Development Institute).
- MAFRA (2018) 2018-2022 Agriculture, Rural and Food Industry Development Plan, IFPRI, MAFRA (in Korean)
- MAFRA, AT&T (2018) Satus of Vietnam convenience store popular foods, MAFRA, AT&T (in Korean)
- Maxwell, S. and Slater, R. (2003) Food Policy Old and New, Development Policy Review, 2003, 21 (5-6): 531-553
- McKinsey (2018) Food Processing & Handling Ripe for disruption?, MacKinsey
- McKinsey (2014) Understanding ASEAN: The manufacturing Opportunity
- MEKONG DEVELOPMENT BANK (2010) Vietnam's Food Sector Prospects and Financing Solutions, Corporate Banking & Financial Institutions
- Merics (Mercator Institute for China Studies), MADE IN CHINA 2025: The making of a high-tech superpower and consequences for industrial countries, December 2016
- METI (2016) "Measures to Promote Manufacturing Technology; Vision of New Industrial Structure", June, Japan
- Ministry of Agriculture, Food and Rural Affairs (2012) "Comprehensive plan for national food cluster", Examination reports conducted by major research institutes in the Netherlands (Delft University of Technology)
- MIST (2017) Production and Consumption in the Fourth Industrial Revolution, Korea
- MSIP (2017) "Mid- to Long-Term Master Plan in Preparation for the Intelligent Information Society - Managing the Fourth Industrial Revolution", Korea
- Nainy, R., (2017) "Industry 4.0 and its implications to SMEs", SME Corp. Malaysia
- Nguyen Cong Ai (2016) ' Investing in Viet Nam', KPMG
- Nguyen Duc Bao Long et al, (2015) Int. J. of Bus. Manag. Studies, 04 (02) pp.191-204
- Nguyen, Hong Tra (2016), "SMEs' Integration in the Textile and Apparel Global Value Chains – Case Study: Vietnam", Presentation Material at the APEC Workshop on Promotion of SME's Integration into Global Value Chains in Major Industry held in Lima, Peru on 20 August 2016

- Nguyen, Thi Lan Huong (2017), "Vietnamese Textile and Apparel Industry In the Context of FTA: The Labour and Social Impacts", Presentation material at the Workshop of the 9th Tranche of the UNESCAP Development Account Project on 15-17 March 2017, FTU, Hanoi

- OECD (Organisation for Economic Co-operation and Development) Data, (URL https://data.oecd.org), data accessed in June 2019

- OECD. 1991. Principles for Evaluation of Development Assistance. Paris: Development Assistance Committee.

- PATSTAT worldwide Patent Statistical Database, 2017 fall

- Phan, Duc Hieu (2018), "Future of CPTPP: A Vietnamese Perspective", Central Institute for Economic Management of Vietnam, Presentation material at the 14th East Asian Institutes Forum, held at Yusof Ishak Institute of South East Asian Studies, National Singapore University, Singapore on 15 October 2018

- Plattform Industrie 4.0, https://www.plattform-i40.de/I40/Redaktion/EN/PressReleases/2016/2016-03-02-blog-iic.html

- Presidential Committee on the Fourth Industrial Revolution, (URL https://www.4th-ir.go.kr/home/en)

- REED ELECTRONICS RESEARCH, Yearbook of World Electronics Data 2016.

- Roland Berger (2016) "The Industrie 4.0 transition quantified"

- Savedoff , W. D., Levine, R., and Birdsall, N. 2006. When Will We Ever Learn? Improving Lives through Impact Evaluation. Washington, DC: Center for Global Development.

- SCHRÖDER, M.,ERIA Discussion Paper, ERIA-DP-2017-05

- Shapiro, J. 2003. "Monitoring and Evaluation." Washington, DC: CIVICUS.

- Shim, M., (2017) "Strategy and Current Status of Smart Factory: Smart POSCO", POSCO

- Smart Factory, https://www.smart-factory.kr/datum/dataWarehouse.do (English version is available from http://www.computermate.co.kr/en/doc/smart1.php)

- Sunddodo, D.D. (2017) 'Viet Nam Automotive Market Report', JATO

- Taylor-Powell, E., Jones, L., and Henert, E. 2003. Enhancing Policy Performance with Logic Models. University of Wisconsin-Extension, Policy Development and Evaluation. http://www1.uwex.edu/ces/lmcourse/

- The Korea Herald (2018)"S. Korea's electronics industry No. 3 by production", a newspaper article reported on 26 Jan, 2018

- The Yearbook of World Electronics Data 2017.

- The Yeongnamilbo (2014), "Keep eyes on another Milano Project", a newspaper article
reported on 16 June 2014 (URL http://m.yeongnam.com/jsp/view.jsp?nkey=20140616.010010716190001, retrieved on 26 November 2018)

- Trung Quang Dinh and Hilmar Þór Hilmarsson., (2014) Food Processing in VIETNAM : Where is the potential for high value export, University of Akureyri

- UBS (2016) White Paper, WEF Annual Meeting

- uLaLa lab (2017) Private communication

- UN COMTRADE (International Trade Statistics Database), (URL https://comtrade.un.org/), data accessed in June 2019

- UNICEF (United Nations Children's Fund). 1991. "A UNICEF Guide for Monitoring and Evaluation: Making a Difference?" New York: UNICEF.

- UNIDO (United Nations Industrial Development Organization), www.unido.org

- UNIDO INDSTAT (UNIDO Statistics Data Portal), (URL https://stat.unido.org), data accessed in June 2019

- UNIDO (2017) Competitive industrial performance report 2016. Volumes I and II, Vienna.

- Valoral (2018) 2018 Global Food & Agriculture Investment Outlook, Valoral

- VIETNAMSUPPLYCHAINS (2013) FOOD SUPPLY CHAINS IN VIETNAM, VIETNAMSUPPLYCHAINS

- Vietnam Textile and Apparel Association (2018), "Vietnam Textile & Apparel at a Glance & Prospect", Presentation Material at the workshop for Enhancing the Quality of Industrial Policy in Vietnam held in Hanoi, Vietnam from 12 to 15 November 2018

- Westkämper, E., Gottwald, B., Fisser, F. (2005) 'Migration of the digital and virtual factory to reality', CIRP Journal of Manufacturing Systems, no 34(5), pp. 391-396
- WITS (World Integrated Trade Solution), (URL https://wits.worldbank.org/), data accessed in June 2019
- World Bank, "World Bank Open Data" (URL https://data.worldbank.org/topic/economy-and-growth, retrieved on 5 November 2018)
- World Bank 2009. Institutionalizing Impact Evaluation within the Framework of a Monitoring and Evaluation System. Washington, DC: The World Bank.
- ZVEI (2009) "Nationale Roadmap Embedded Systems", Germany

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