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Summary of
VIET NAM INDUSTRY WHITE PAPER 2019

Manufacturing and Subsector Competitiveness

INCLUSIVE AND SUSTAINABLE INDUSTRIAL DEVELOPMENT

Contents

I. INTRODUCTION

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, 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, and UNIDO, collaborated to produce 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 manufacturing to GDP to increase to 40 per cent and 30 per cent, respectively, for the high-tech 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 manufacturing industries averaging over 10 per cent per year.

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

- Analysing and evaluating the current status of manufacturing in Viet Nam in the period 2006 – 2016 at the macro-level using international methodologies and evaluating their performance by benchmarking them with relevant comparators (mostly ASEAN members);

- Identifying key bottlenecks and issues that need to be addressed at both the macro and sectoral levels;

- Making recommendations and providing feasible solutions to achieve the objectives established in government policy documents.

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.

2. Policy environment

2.1. Challenge in global context: The 4th Industrial Revolution

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 1 presents the major distinctions of each revolution. These definitions are widely accepted.

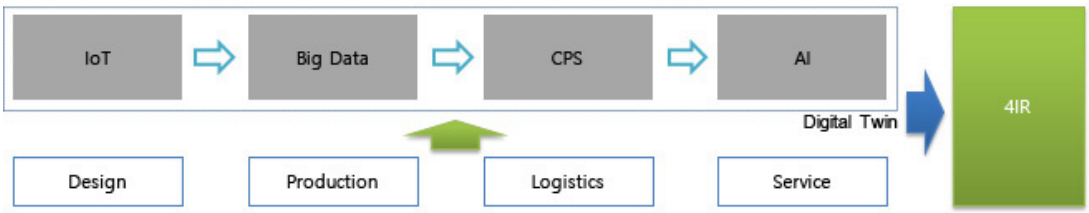
[1] They are the White Paper Task Team and comprise government representatives and government research institutions of Viet Nam.

Table 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 Slaughterhouse (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 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 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 1 Typical example of a general process leading to 4IR



Source: Sanghoon Kim (2017b)

Any response to 4IR should be optimized only after careful consideration of the country's current status. 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). This may also imply that ASEAN countries need to be more vigilant with regard to smart factory issues within relatively shorter periods.

Table 2 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.

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.

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]

(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[3] or are promoted by[4] 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.

[2] OT: Existing operational technologies (Adapter), IT: Emerging information technologies (Enabler)
[3] For example, client-oriented flexible manufacturing systems, factory-less manufacturing, etc.
[4] For example, sensors, 3dp, production design, production technology, IT, etc.

2.2. Overall performance of industry in Viet Nam

Competitive Industrial Performance (CIP) Index of Viet Nam

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 Party Central Committee 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 Industrial competitiveness ranking of Viet Nam and comparative 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 (MXqual), 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 4 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

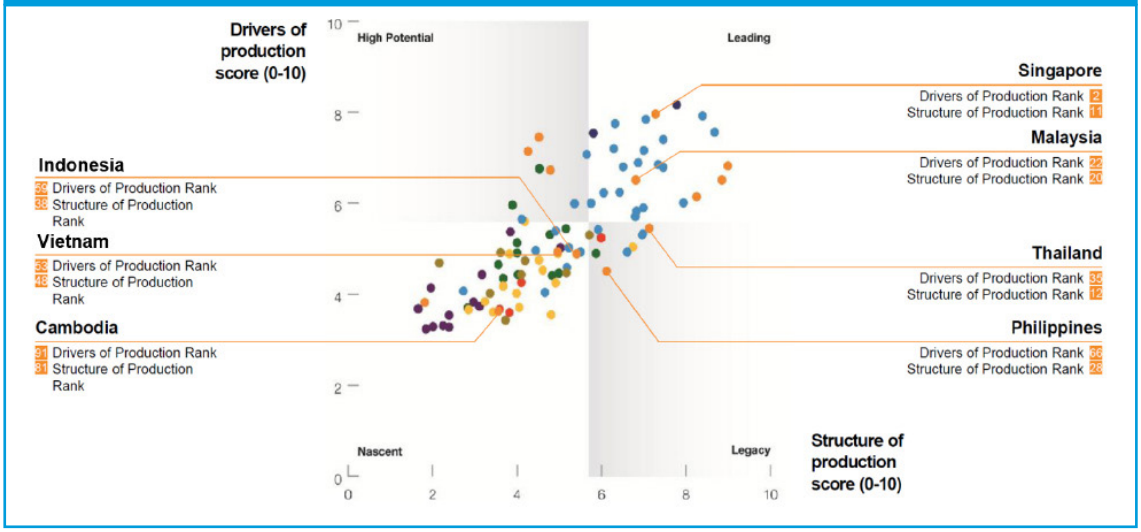
Readiness to produce in the future

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. 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.

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 2 below.

Figure 2 Readiness of ASEAN countries for 4IR



Source: WEF, 2018

Product space scenarios

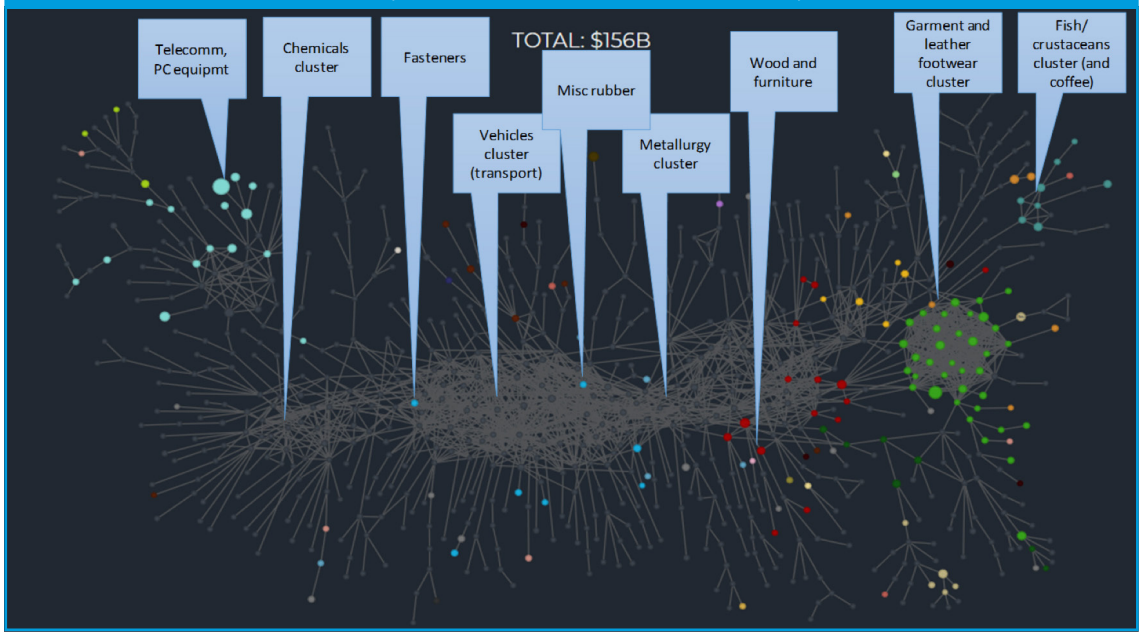
Another methodology that can be used to assess the future trajectory of Viet Nam's manufacturing trade is the Product Space[5]. The Product Space is a network that formalizes the concept of relatedness between products traded on the global market. One of the factors that enhances competitiveness and 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.

The coloured circles in Figure 3 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.

[5] 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.

Figure 3 Product space's visualization of Viet Nam's exports in 2015



Source: Observatory of Economic Complexity

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 5 MVA and growth rates for Viet Nam and comparators (2006-2016)

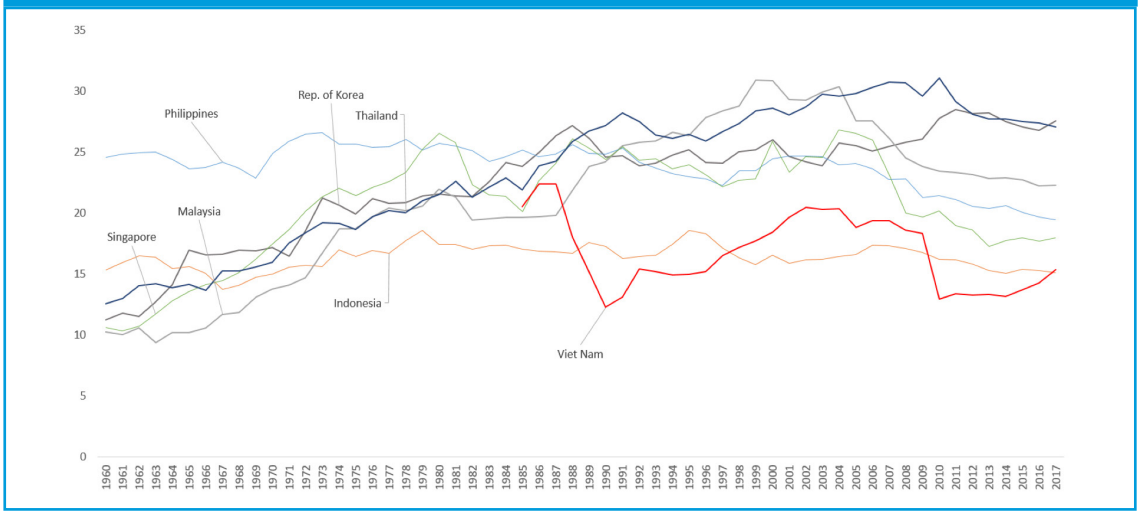
	MVA (constant 2010, bil. USD)			CAGR (%)		
	2006	2011	2016	2006-2011	2011-2016	2006-2016
Japan	1,179.48	1,155.14	1,288.07	-0.4%	2.2%	0.9%
India	192.62	288.39	419.03	8.4%	7.8%	8.1%
Rep. Korea	239.23	324.19	370.75	6.3%	2.7%	4.5%
Indonesia	143.27	176.83	221.87	4.3%	4.6%	4.5%
Thailand	89.65	100.87	114.34	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. 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 4 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 4 Manufacturing value added (% of GDP)



Source: World Development Indicators

Manufactured exports capacity 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.

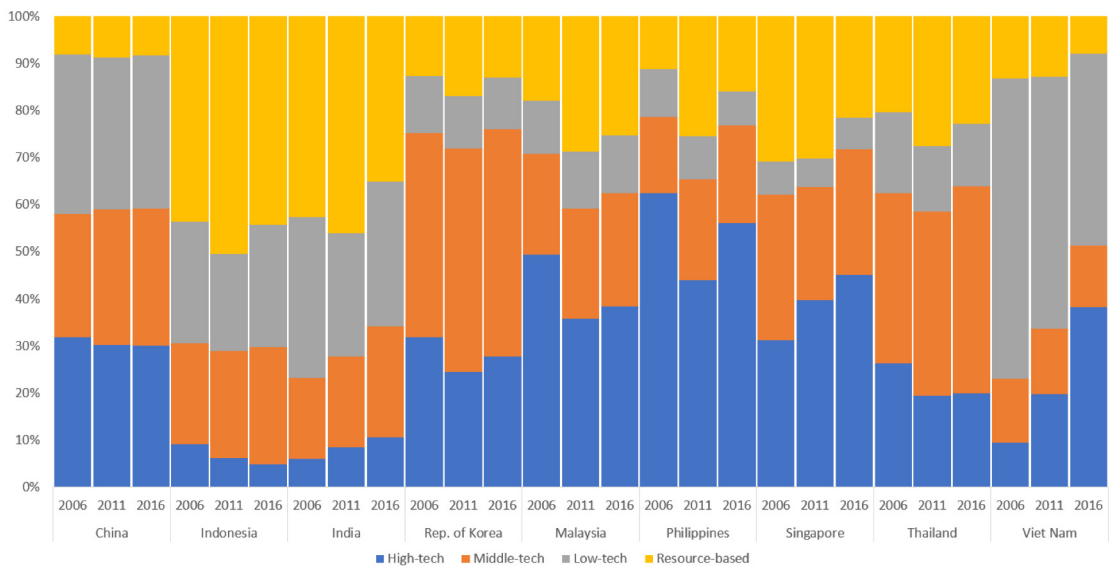
Table 6 Manufactured exports of Viet Nam and comparators

	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

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



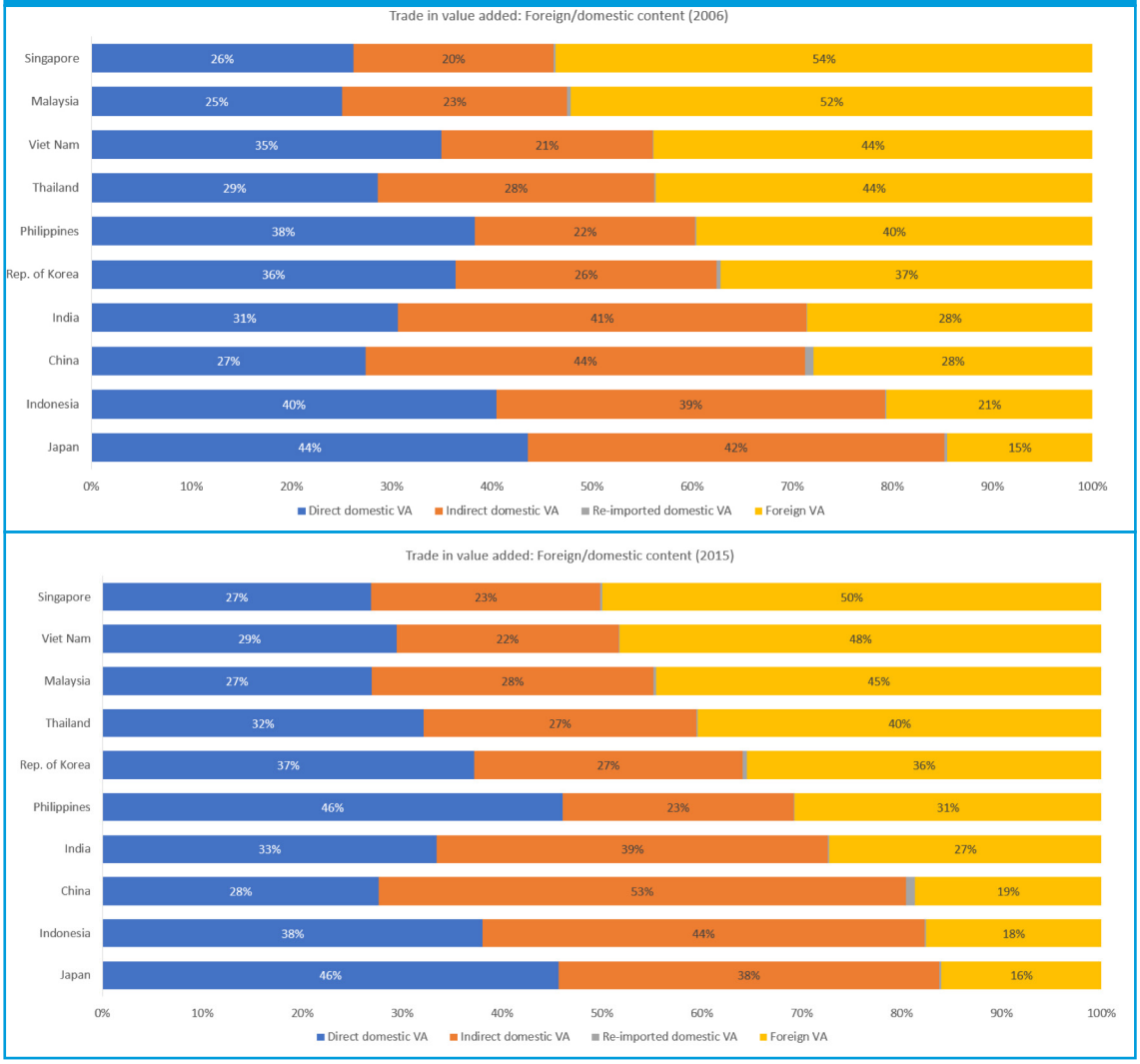
Source: UNCOMTRADE

Trade in value added

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 6 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 6 Export structure by origin of value added from total economy



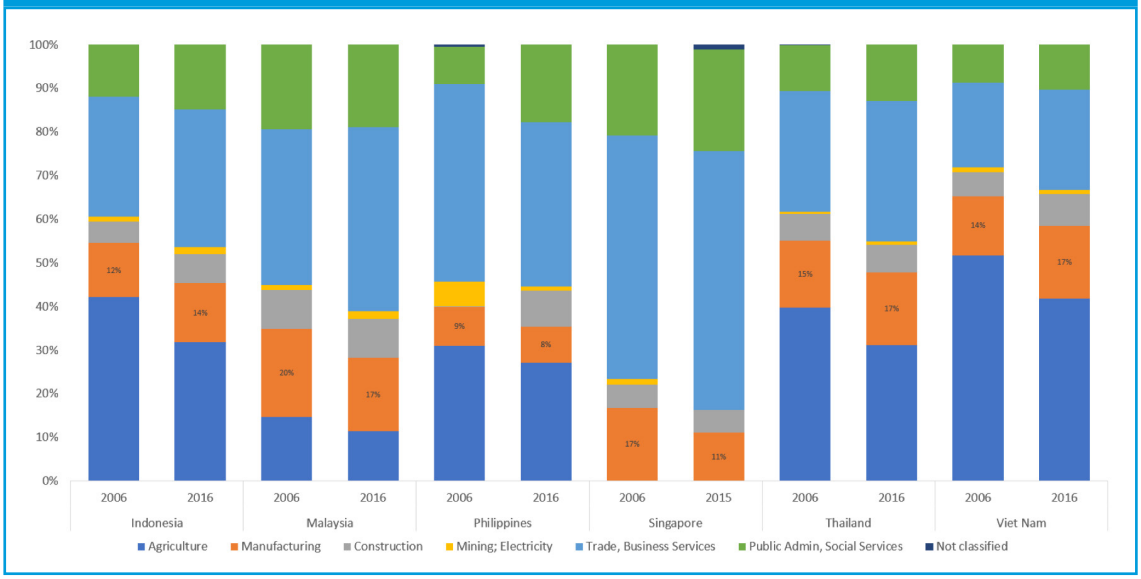
Source: OECD

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.

Creating jobs and enhancing labor productivity in manufacturing

In countries that are in the process of industrializing, manufacturing 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.

Figure 7 Employment by economic sectors



Source: World Development Indicators

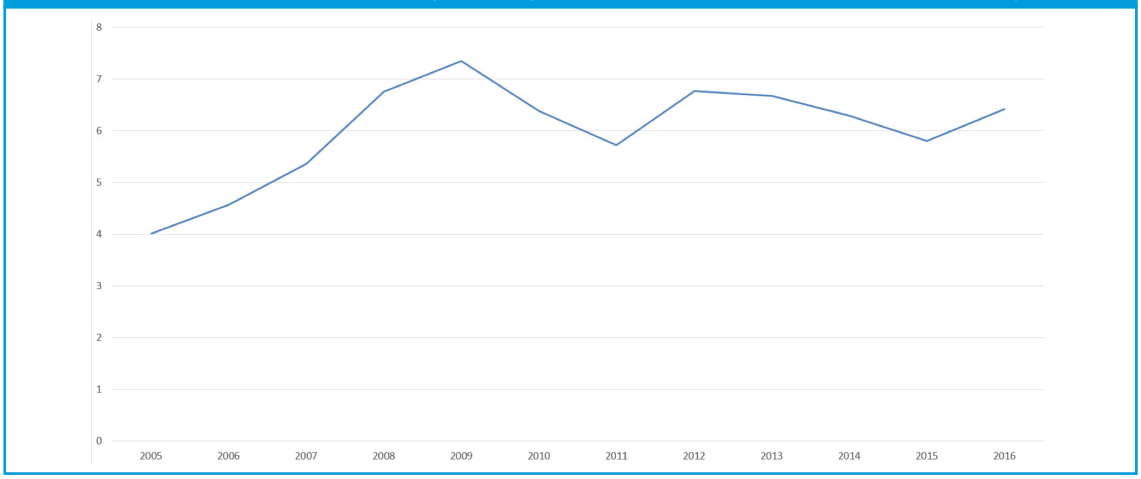
Reversing incremental capital-output ratio (ICOR)

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 captial) 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 took this seriously through the progmugation of the Prime Minister's Decision No. 879/ QD-TTg of 9 June 2014 (approving Viet Nam's industrial development strategy through 2025, with a vision to 2035) 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 8 Viet Nam's incremental capital-output ratio (ICOR), 2005-2016 (constant 2010 prices)



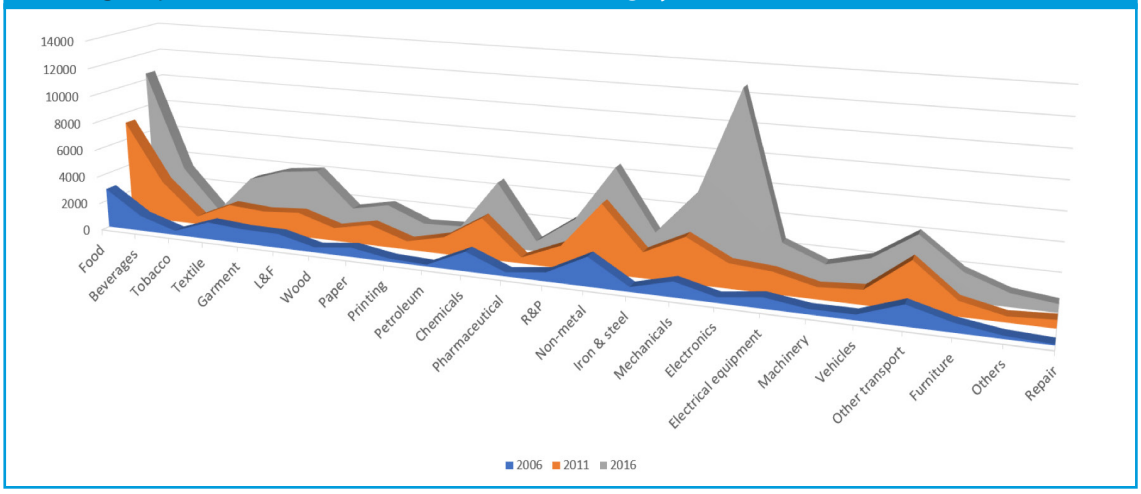
Source: GSO Viet Nam

2.3. Cross-sectoral competitiveness analysis

Value added of Viet Nam manufacturing sectors

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

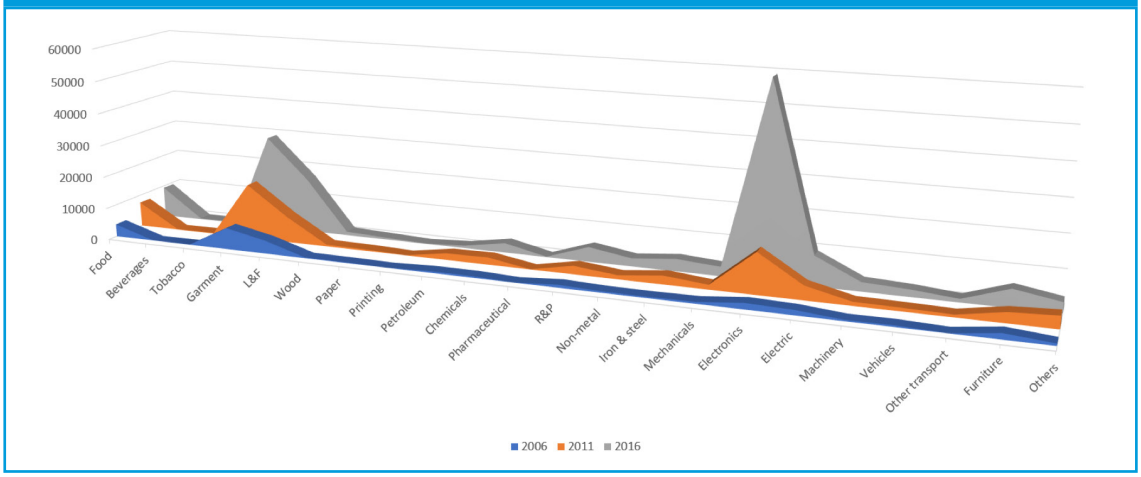


Source: UNIDO INDSTAT

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 2006, 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 10 Viet Nam's manufactured exports values by industry, 2006-2016 (million USD)



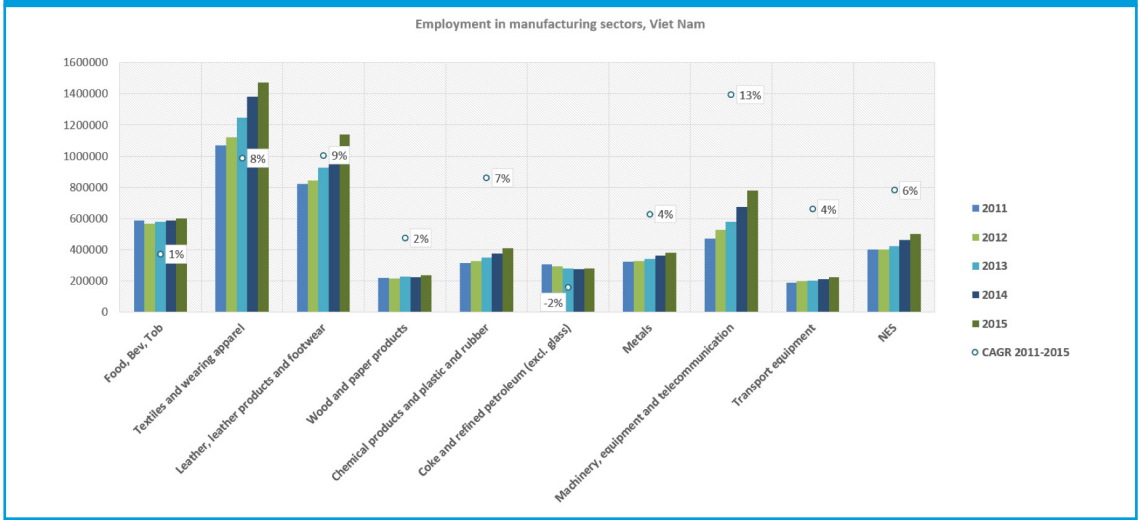
Source: UNCOMTRADE

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.

Employment and productivity

In terms of population structure, Viet Nam's population is currently booming, 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 11 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.

Selection of subsectors to be analysed

The targets of Decision No.879-QD/Ttg to 2025 and Resolution No.23-NQ/TW 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 7 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 8, which provides insightful information for policymakers to make decisions on subsector priority.

Table 7 Subsector's comparative advantages

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

Source: UNIDO INDSTAT, UNCOMTRADE

Table 8 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
10	Food	12	14	10	12
11	Beverages	8	8	7	9
12	Tobacco	8	6	6	10
13-14	Garment	14	16	14	13
15	L&F	14	15	15	12
16	Wood	8	8	9	8
17	Paper	7	7	7	7
18	Printing	7	6	9	6
19	Petroleum	9	8	8	12
20	Chemicals	12	13	11	12
21	Pharmaceutical	8	6	9	8
22	R&P	12	12	12	11
23	Glass	10	11	10	10
24	Iron & steel	12	11	11	13
25	Mechanicals	12	13	12	10
26	Electronics	20	20	20	19
27	Electrical equipment	14	14	14	14
28	Machinery	12	11	12	12
29	Vehicles	13	12	14	14
30	Other transport	9	9	7	9
31	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, including food processing, textile and garment, leather & footwear, electronics and vehicles. In addition, the machinery industry may also have a positive impact on the manufacturing industry, both in terms of scale, growth and efficiency, and should be further developed in the future. Because the scope of the machinery 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.

II. SUBSECTOR ANALYSIS & SUGGESTIONS

1. Food processing

1.1. Production and employment

Total formal employment and VA (INDSTAT) for food processing 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. 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).

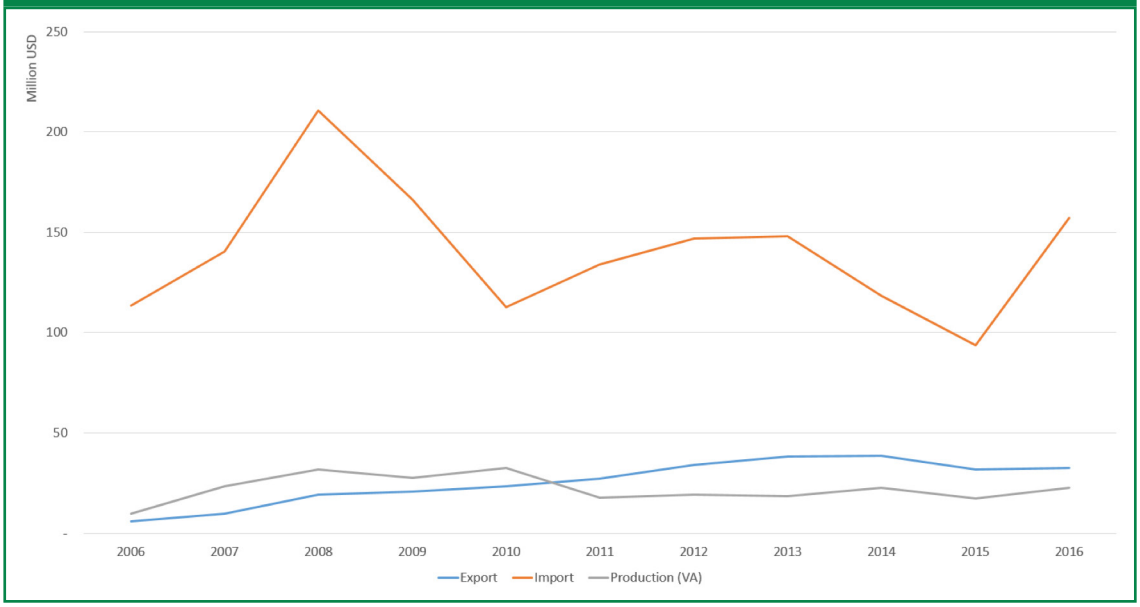
Table 9 CAGR per subsector, food processing, 2006-2016 (%)

	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

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 12 Food processing equipment[6] production and trade, 2006-2016 (million USD)



Source: UNIDO INDSTAT and UNCOMTRADE

1.2. 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.

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

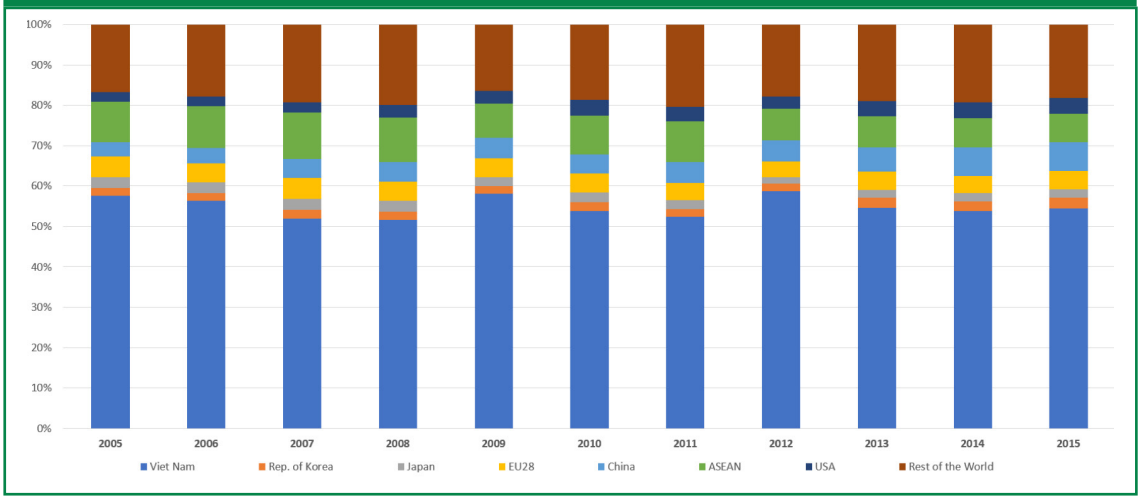
Figure 13 Food processing export values, 2007-2017 (million USD)

Source: UNCOMTRADE

1.3. Value-chain analysis

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.

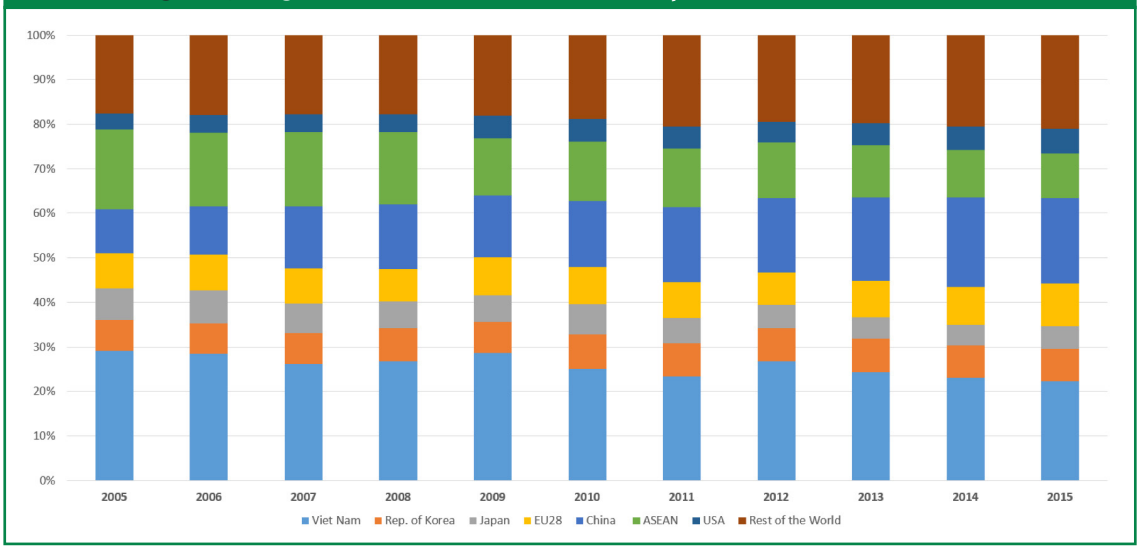
Figure 14 Origin of value added of Viet Nam's exports of FBT (from primary)



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 15 Origin of value added of Viet Nam's exports of FBT (from chemicals)



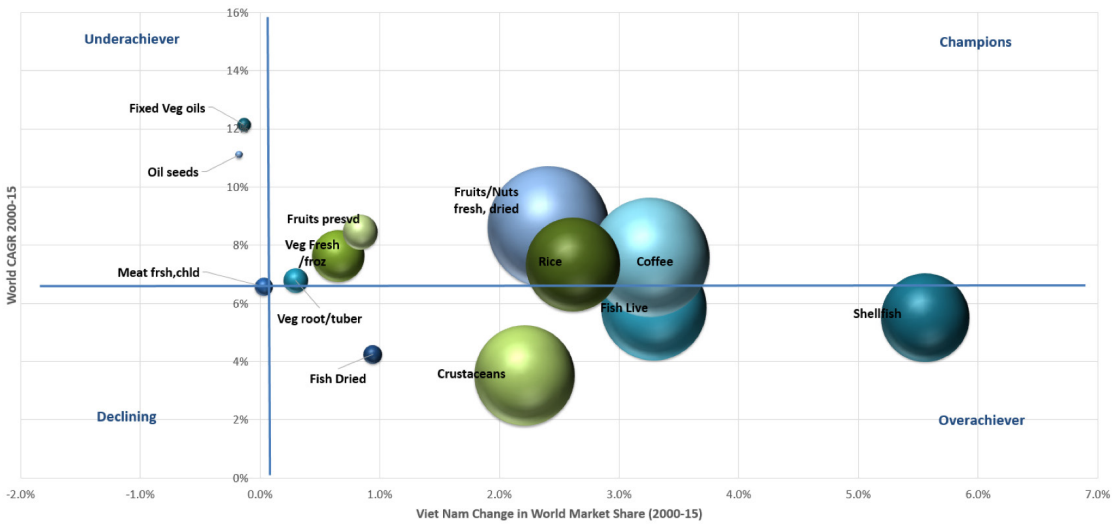
Source: OECD

1.4. Market structure, dynamics and diversification

In 2015, Viet Nam boasted a very high revealed comparative advantage, particularly in the export of fish and shellfish (either 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.

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 16 Sectoral market competitiveness matrix for Viet Nam (2000-2015) - Food processing[7]



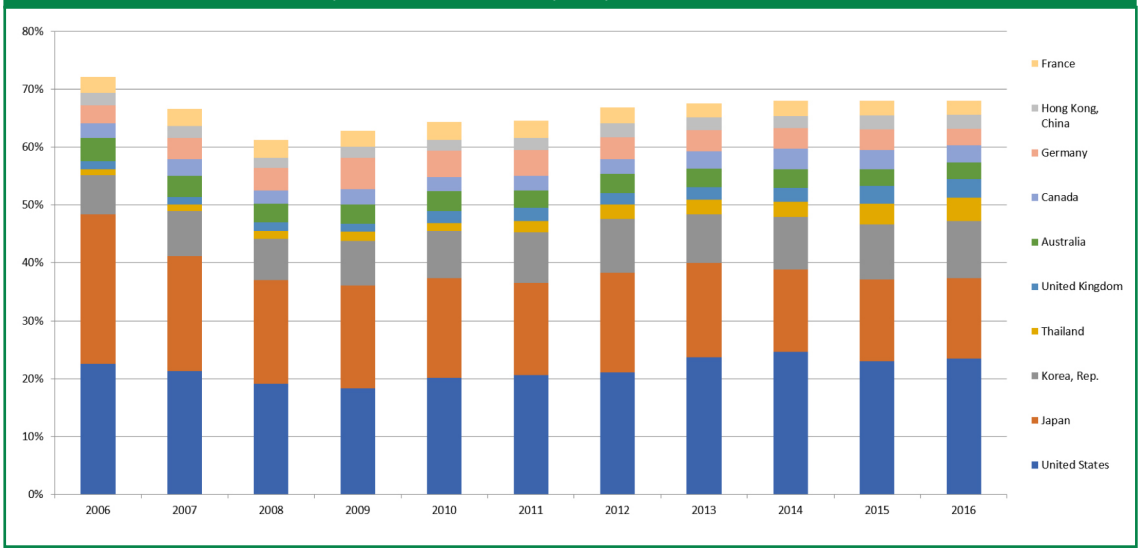
Source: OECD

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.

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. 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.

[7] Bubble size refers to export values in 2015

Figure 17 Top 10 Vietnamese import partners for fish (2006-2016)



Source: UNCOMTRADE

1.5. Policy recommendations

Viet Nam 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.

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 this analysis, the following recommendations can be made:

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

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.

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 work-

ers 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.

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.

Standardization of local produce by utilizing a common brand

A co-brand system 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.

2. Textile Apparel and Leather – Footwear (TALF)

2.1. 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.

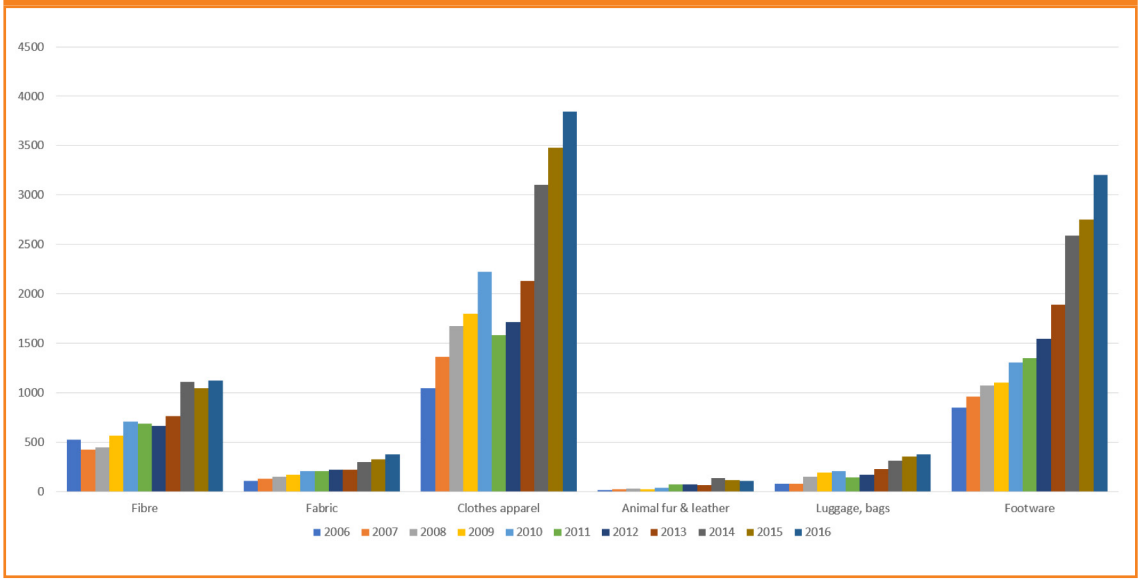
The footwear industry suffers from the same weaknesses as the apparel industry: high dependence on exports and subcontracting schemes, import of intermediate inputs, limited contribution from the domestic chemical industry, and a predominant focus on assembly, with sewing stages accounting for 60 per 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[8]. 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.

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

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.

Figure 18 Value added from different textile/leather subsectors, 2006-2016 (billion USD)



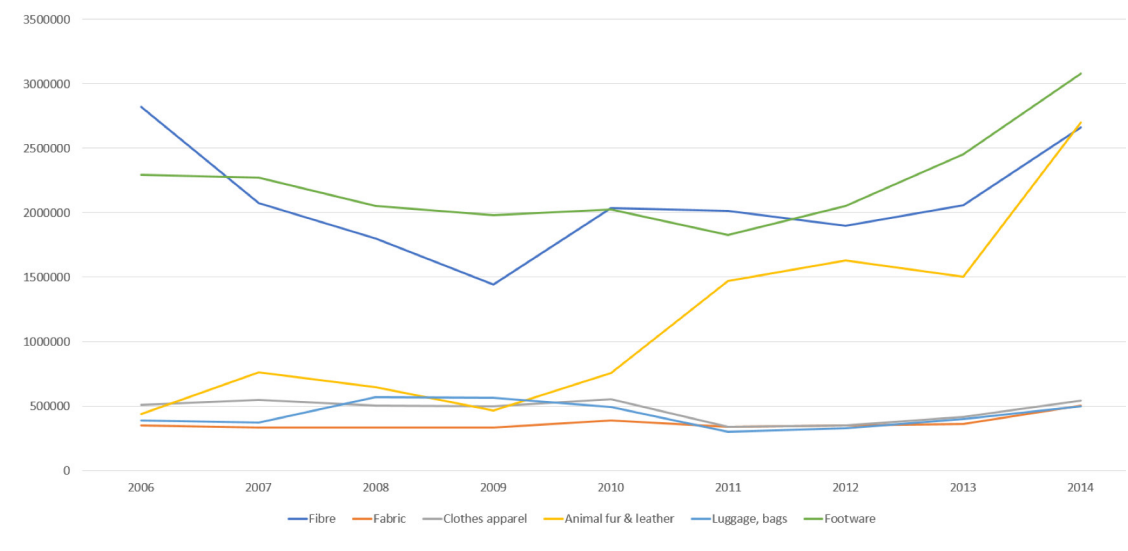
Source: UNIDO INDSTAT

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.

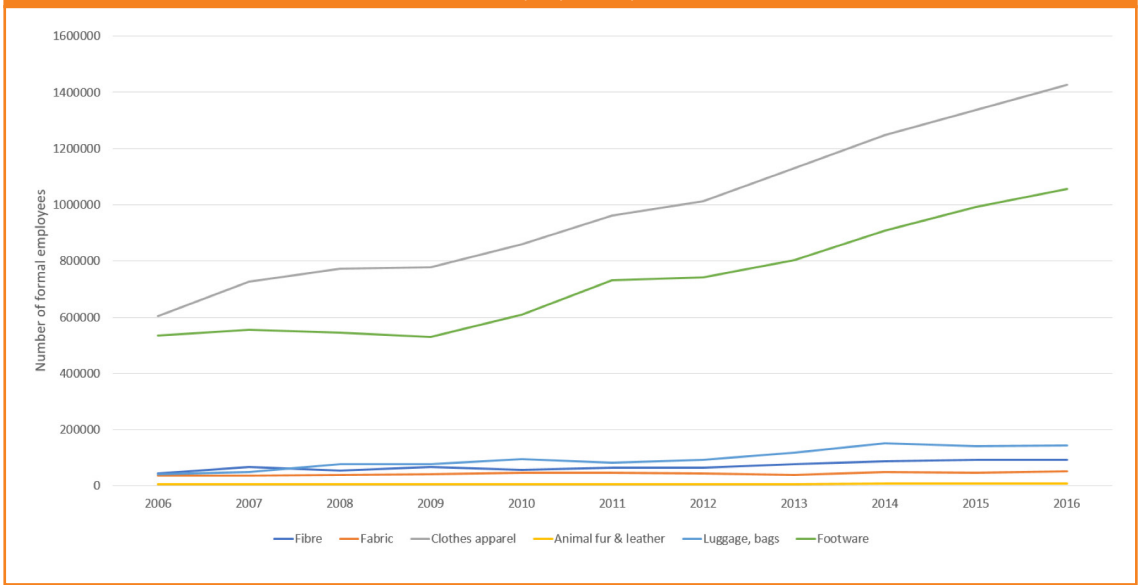
Figure 19 Value added per establishment, TALF (USD)



Source: UNIDO INDSTAT

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

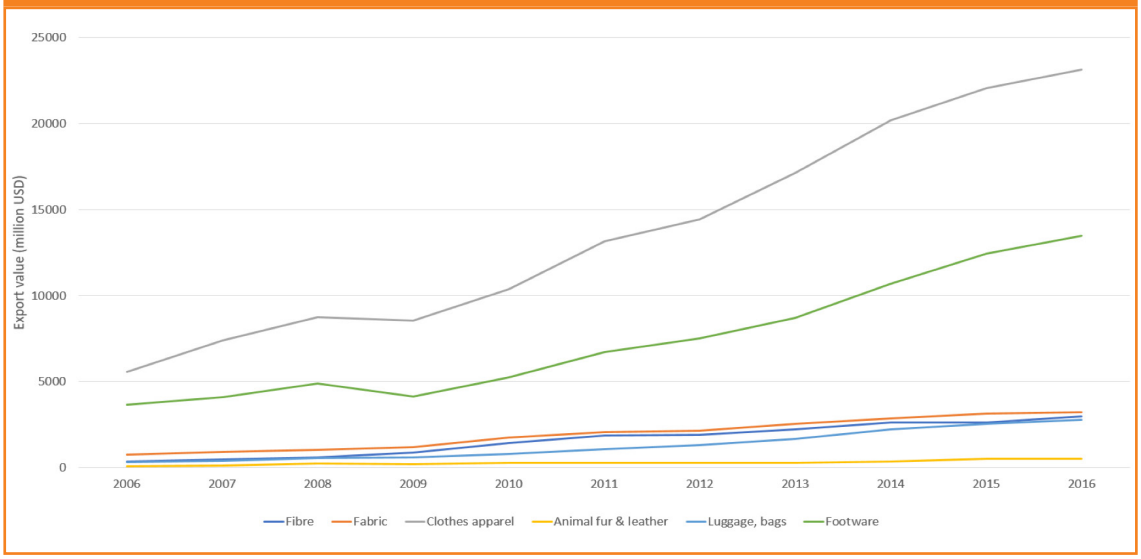


Source: UNIDO INDSTAT

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.

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.

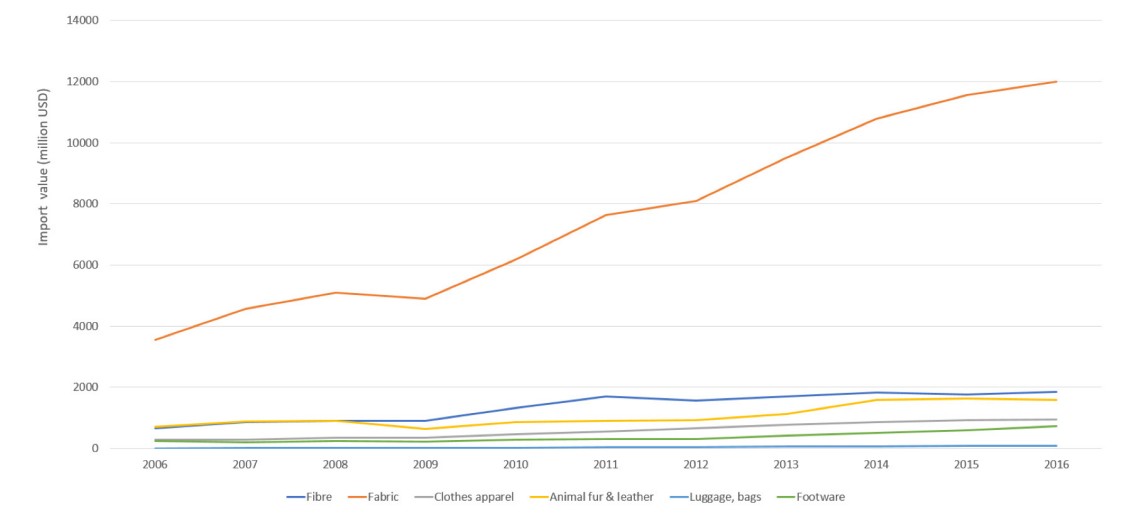
Figure 21 Export values for textile/apprel, leather/footwear, 2006-2016 (million USD)



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

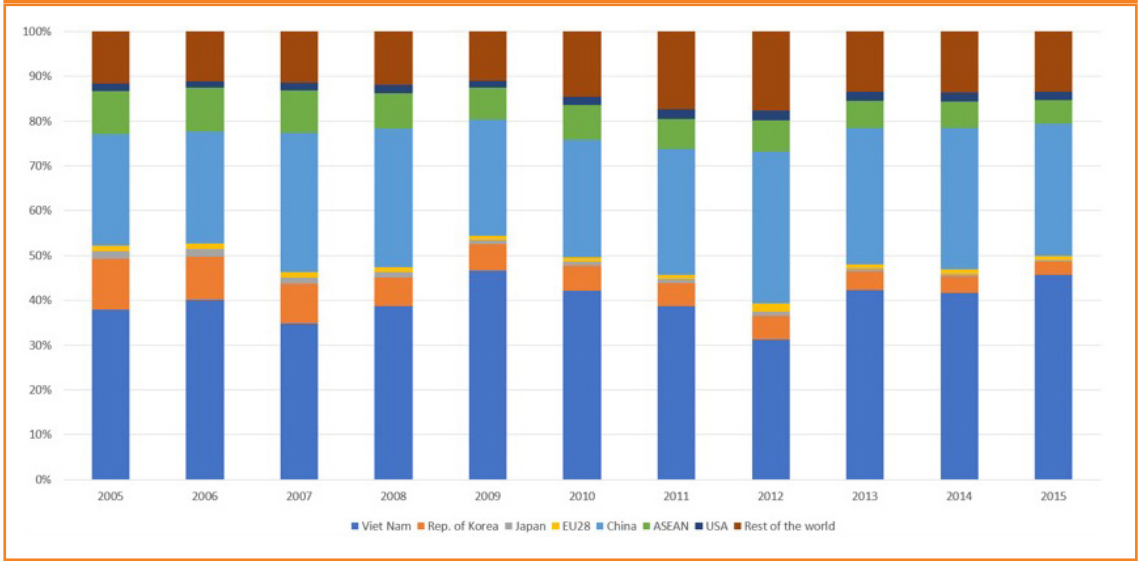


Source: UNCOMTRADE

2.3. Value-chain analysis

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.

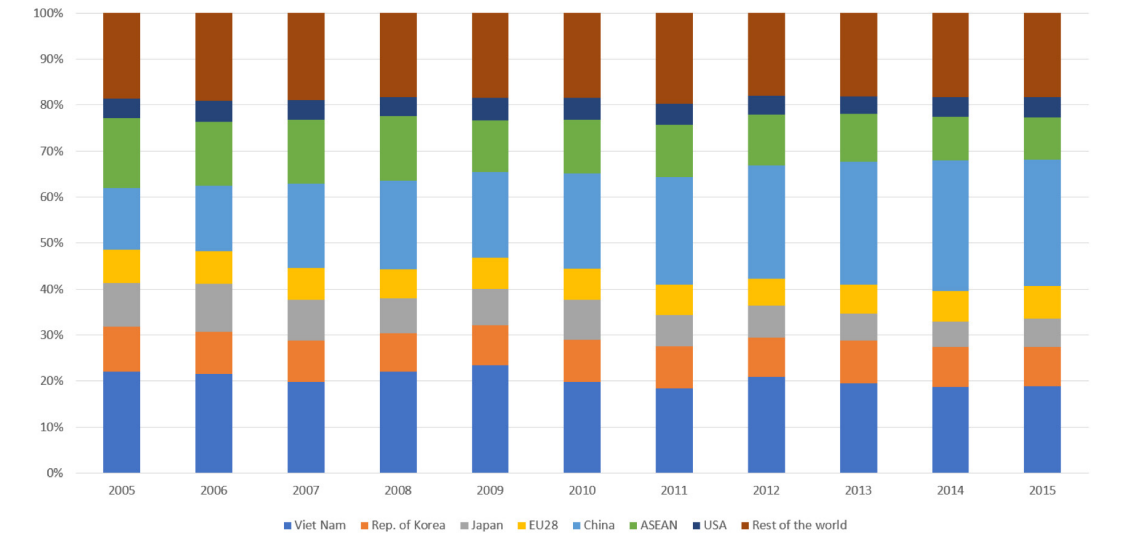
Figure 23 Origin of value added of Viet Nam's exports of textile/garment and leather/footwear (from primary)



Source: UNCOMTRADE

As expected, the situation worsens if chemicals/pharmaceuticals are 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).

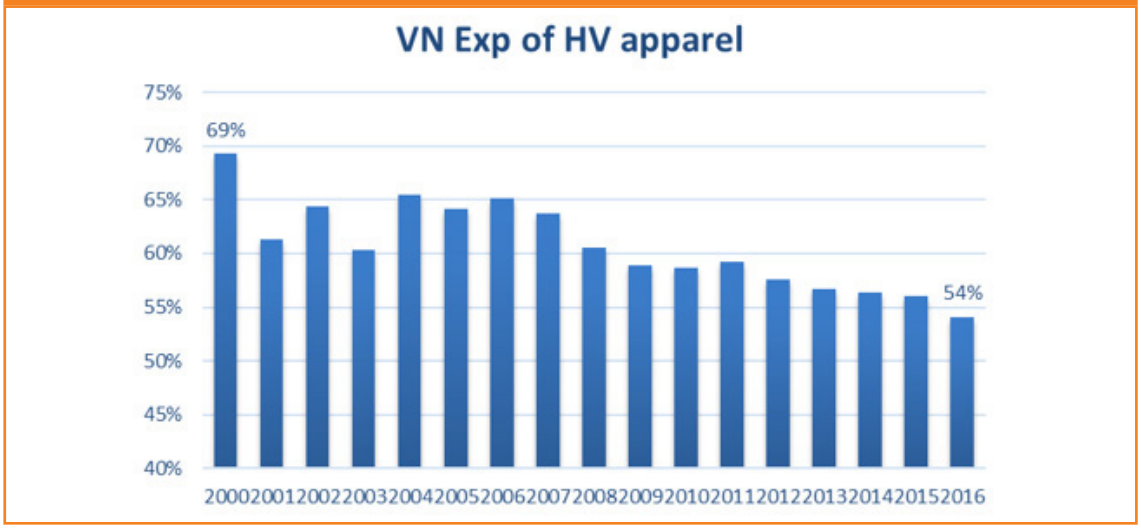
Figure 24 Origin of value added of Viet Nam's exports of TALF (from chemicals)



Source: OECD

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

Figure 25 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.

2.4. Market structure, dynamics and diversification

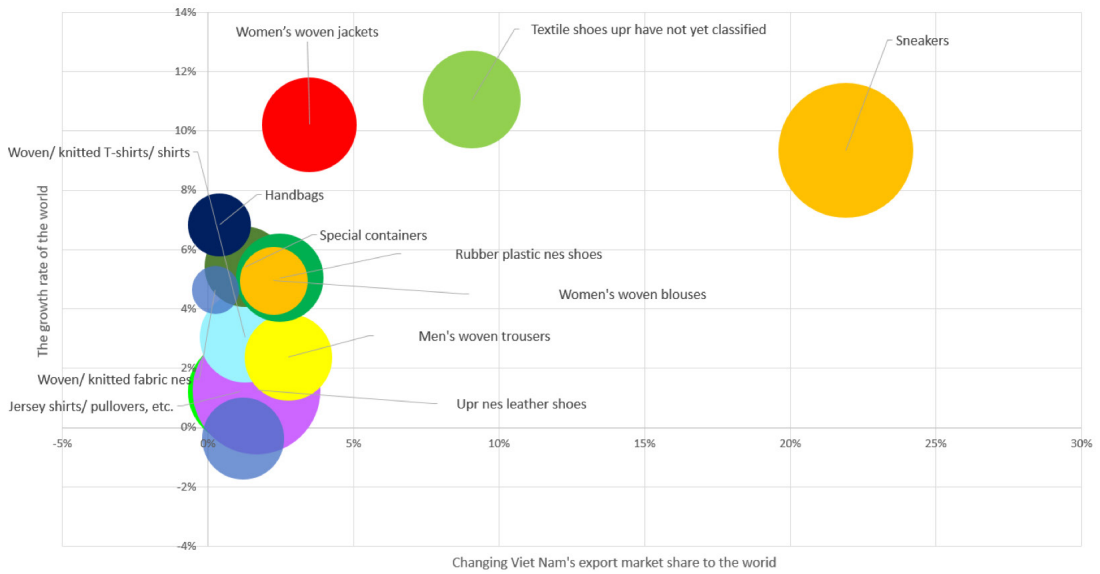
The following analysis attempts to add a final element to the overall picture, namely that of market dynamism, both from the domestic and the international viewpoint. More specifically, the focus is on understanding to what extent Viet Nam's textile/apparel exports match domestic and international demand,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

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 26 Sectoral market competitiveness matrix for Viet Nam, 2006-2016[9]



Source: UNCOMTRADE

[9] Bubble size refers to export values from Viet Nam in 2016.

2.5. 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.

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.

(1) 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.

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.

(2) 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.

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.

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.

3. Electronics

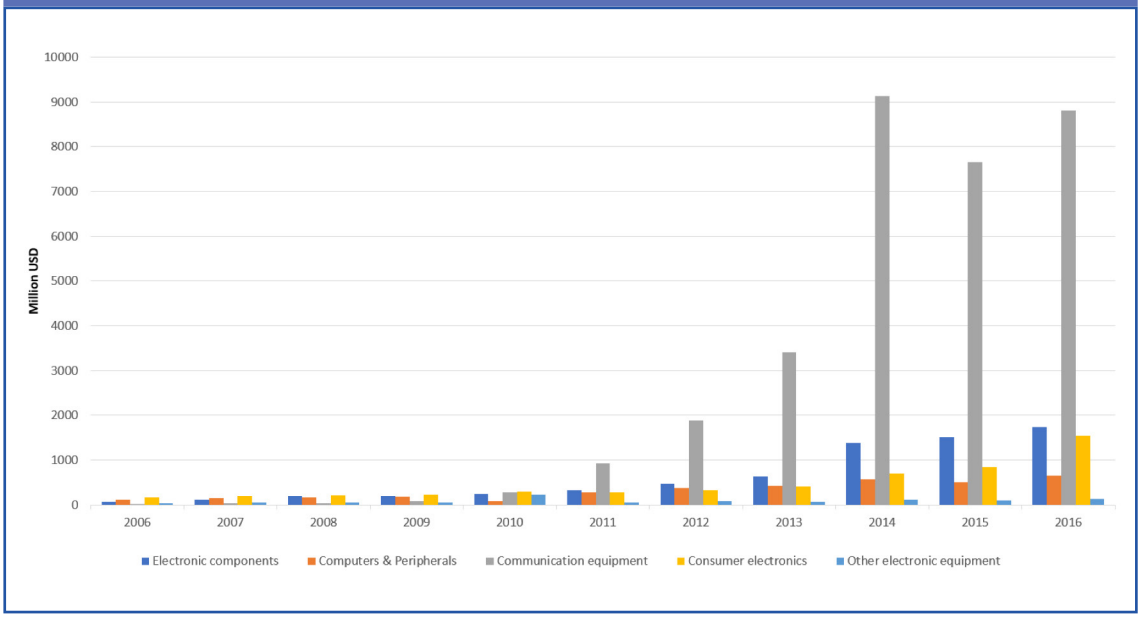
3.1. Production and employment

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 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.

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.

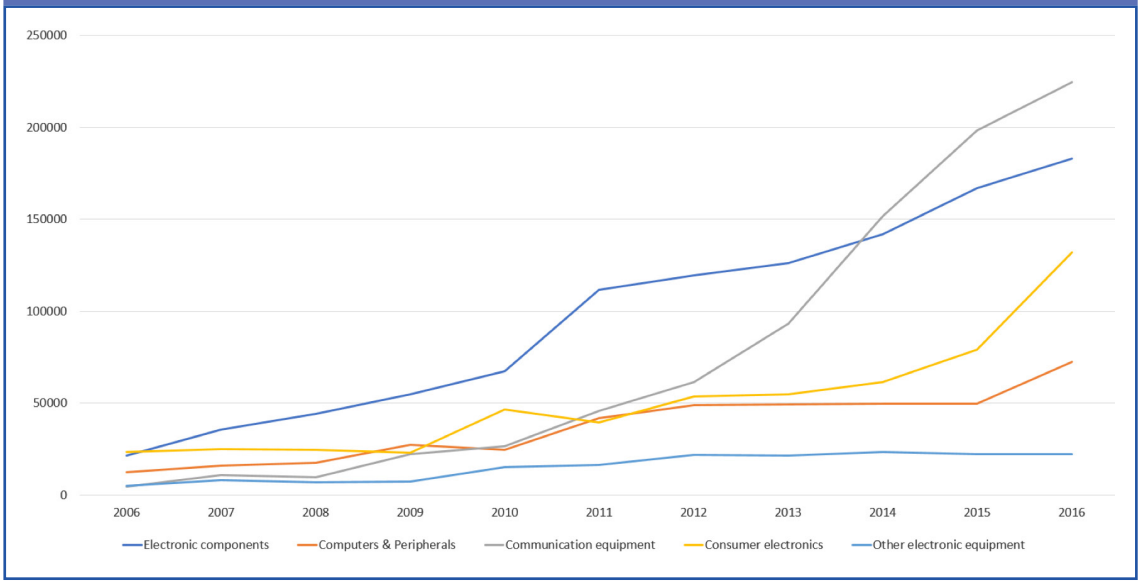
Figure 27 Value added from Viet Nam's electronics subsectors, 2006-2016 (million USD)



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.

Figure 28 No. of employees in Viet Nam's electronics subsectors, 2006-2016

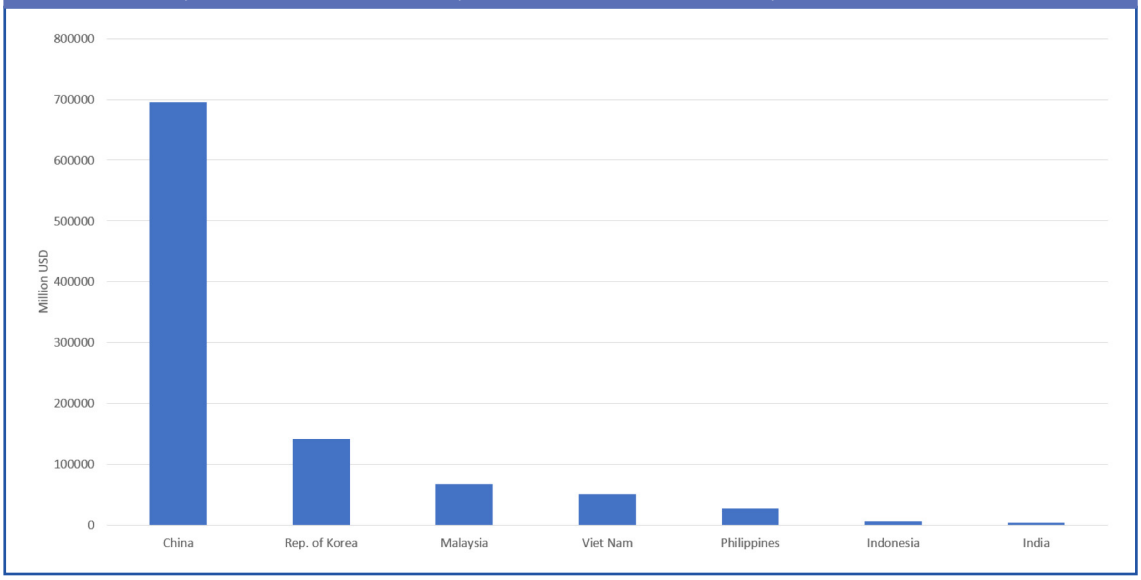


Source: UNIDO INDSTAT

3.2. 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.

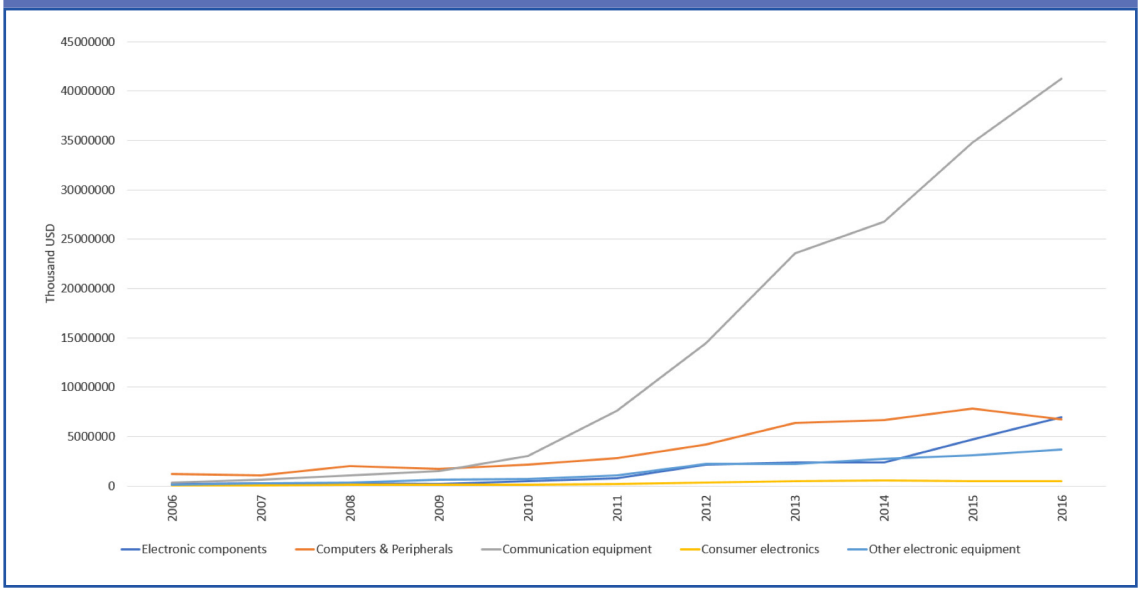
Figure 29 Export value of electronics products, Viet Nam and comparators, 2015 (million USD)



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 30 Export values of Viet Nam's electronics sub-sectors, 2006-2016 (thousand USD)



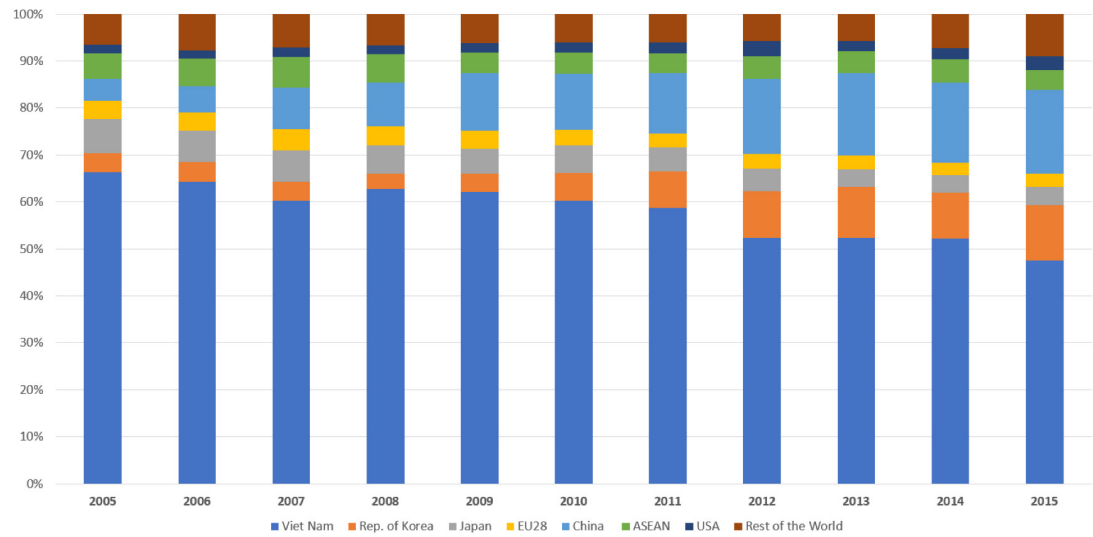
Source: UNCOMTRADE

3.3. 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 31 Origin of value added of Viet Nam's electronics exports (from manufacturing)



Source: OECD

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.

3.4. 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 10 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 11 Major markets of Viet Nam telecomm equipment exports, 2010-2016 (thousand USD)			
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

3.5. Policy recommendations

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

Focus on IT software and R&D system

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.

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 the context of the fourth industrial revolution, IT start-ups are also flourishing in Viet Nam, 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.

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 indus-

trial 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 32 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 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.

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.

4. Automotive

4.1. Production and employment

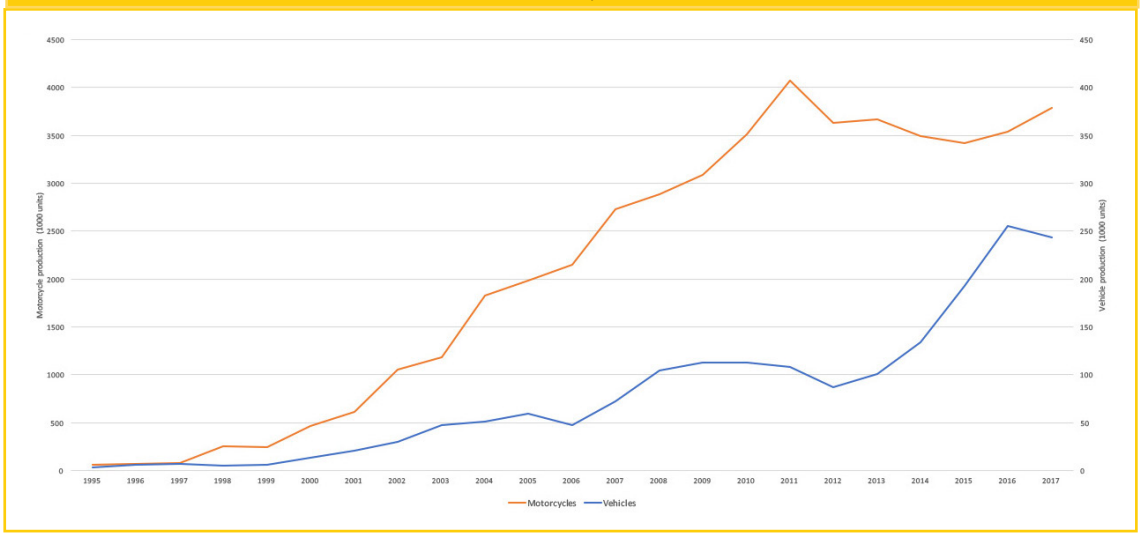
Over the past 20 years, Viet Nam has become both a production base and a large market for motorcycles, a popular means of transport that is suitable in light of the country's infrastructure conditions and people's income. Viet Nam is the fourth largest producer of motorcycles in the world with a scale of 3.7 million motorcycles / 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 motorcycles 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.

Figure 33 Production of cars and motorcycles in Viet Nam, 1995-2017 (units)



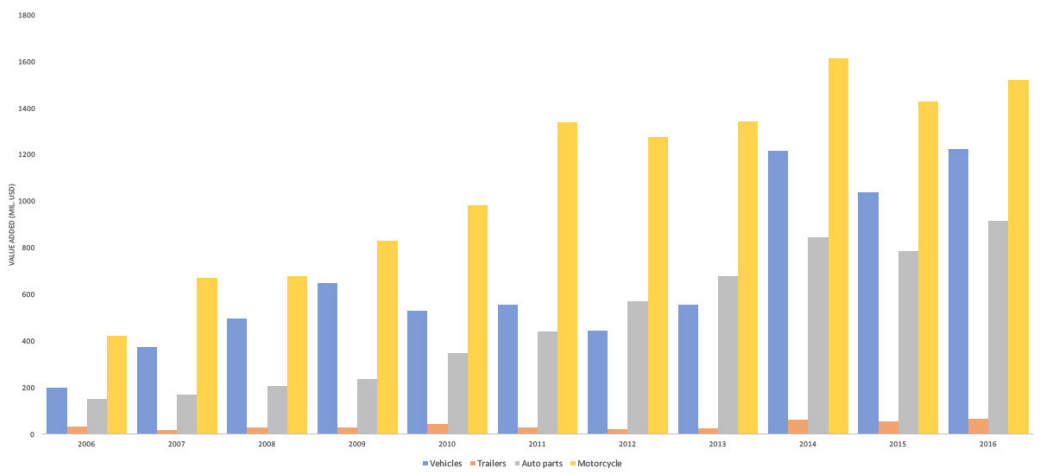
Source: GSO (2017)

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

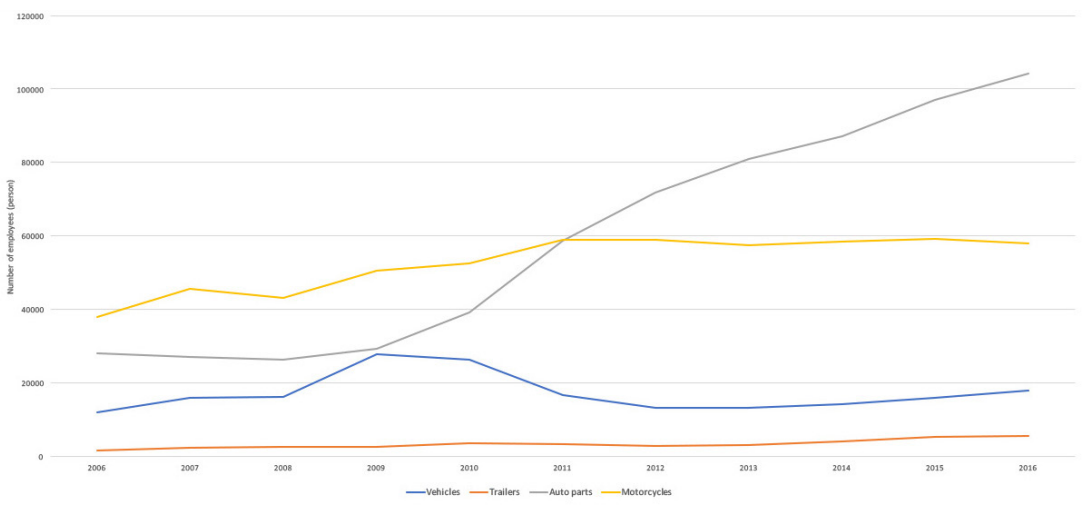


Source: UNIDO INDSTAT (accessed in June 2019)

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



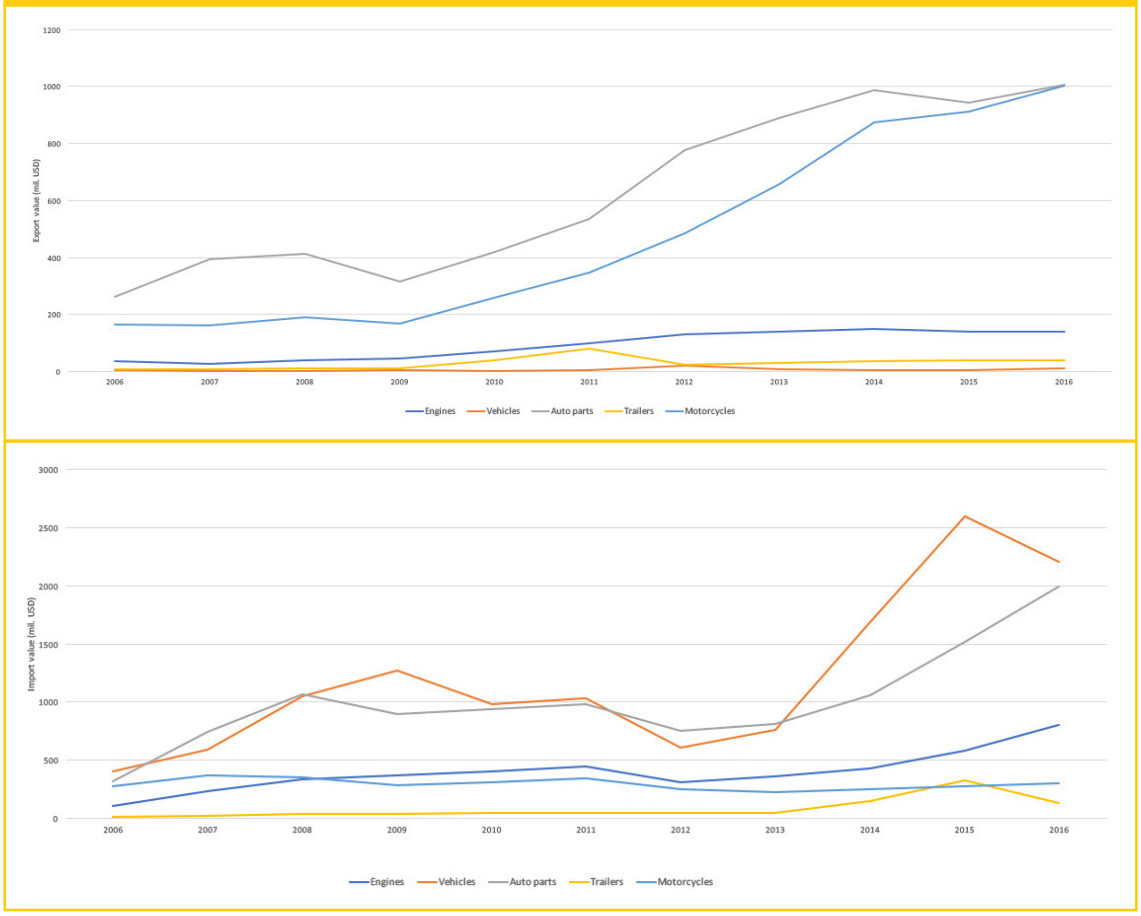
Source: UNIDO INDSTAT (accessed in June 2019)

4.2. 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.

Figure 36 Export and import value of automotive equipment



Source: UNIDO INDSTAT (accessed in June 2019)

Automobiles are manufactured and assembled in five of the ASEAN countries, namely Thailand, Malaysia, Indonesia, the Philippines and Viet Nam. Figure 37 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 markets 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, not only in terms of vehicle consumption, but also in production. Figure 38 links GDP per capita with motorization rate on the below one (expressed in number of cars per 1,000 people). The motorization rates can be compared at different levels of GDP per capita.

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.

Figure 37 Automobile production and consumpotion in selected ASEAN countries

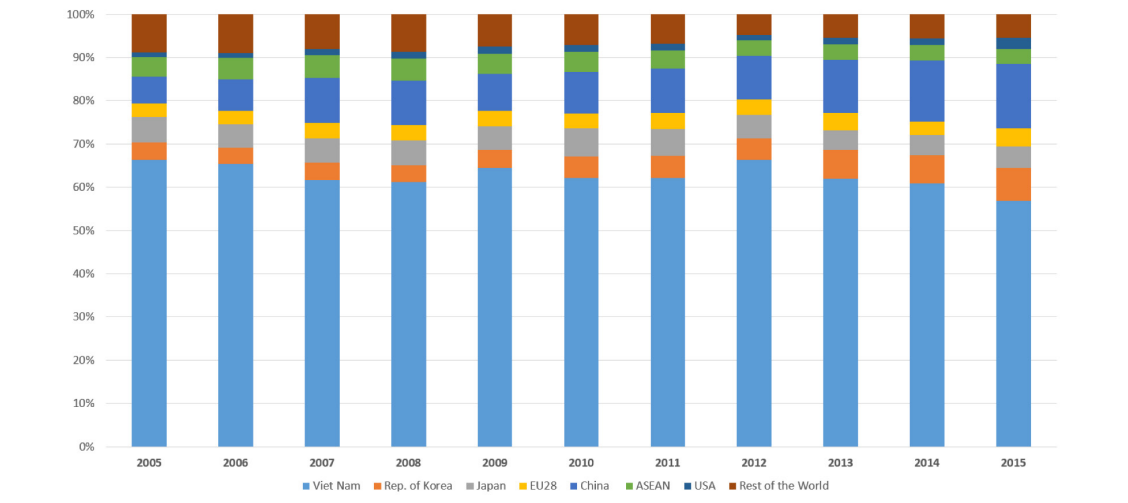
Source: ASEAN Automotive Federation (AAF), International Organization of Motor Vehicle Manufacturers(OICA)

4.3. 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.

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



Source: OECD data (accessed in June 2019)

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 motorcycles 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.

Motorcycle manufacturing and assembly firms have built a wide network of level 1, 2 and 3 suppliers, and many domestic enterprises have become grade 1 suppliers for Honda, Piaggio, Yamaha, Suzuki and SYM. By contrast, 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.

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.

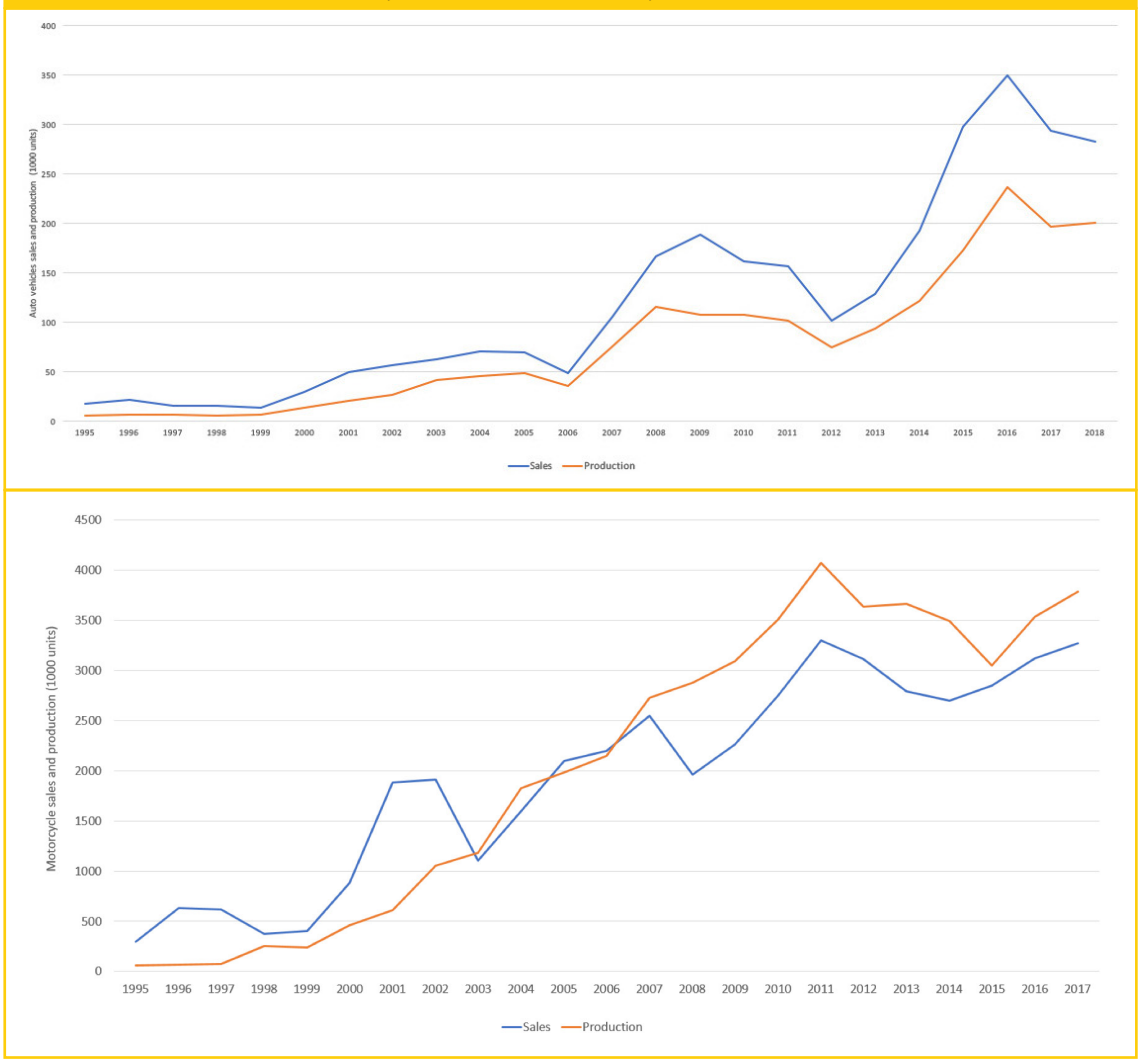
4.4. Market structure, dynamics and diversification

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 implies that more vehicles imported to meet domestic demand. If the local production does not catch up with the growth of domestic demand, the gap 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 39 Output and sales of motorcycles and automobiles



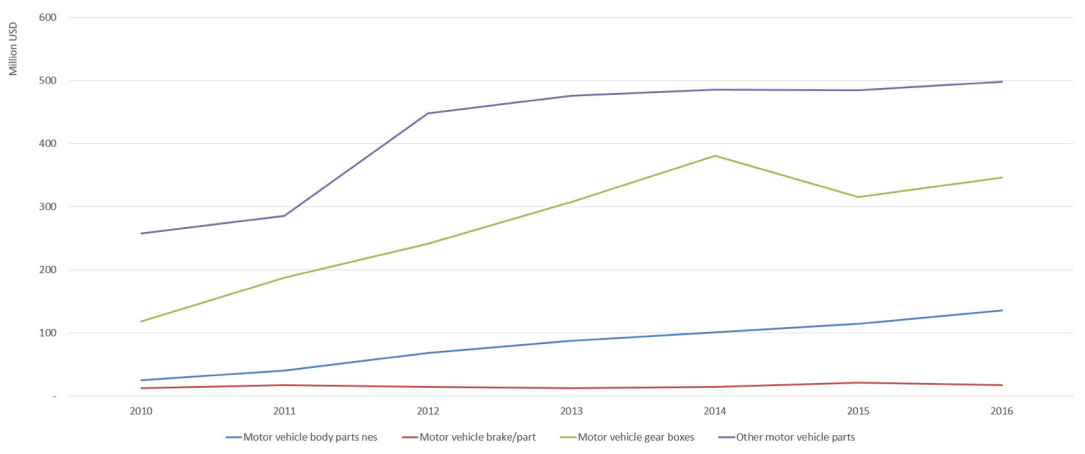
Source: General Statistics Office of Viet Nam (GSO), Viet Nam Association of Motorcycle Manufacturers (VAMM), Viet Nam Automobile Manufacturer's Association (VAMA)

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



Source: UNCOMTRADE (accessed in June 2019)

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

T he 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.

4.5. 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.

Major obstacles of 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.

Characteristics of Viet Nam's automotive industry

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.

Prerequisites for policy implementation

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[10], 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.

Other issues for the ecosystem of automotive industry

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 develop-

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

ments 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.

(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[11]. 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.

[11] 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.

III. OVERALL SUGGESTIONS

1. Monitoring and evaluation (M&E)

Introduction of M&E system

Good governance is a key for inclusive economic development, and accountability is a 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[12].

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:

[12] 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.

- 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 policymakers 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 (see Table 12). 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).

Table 12 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 tobusiness environment, quality of jobs
Outcome	Increased diversification of industry, changes in business environment, quality of jobs
Higher-level Outcomes	Increased output and income

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.

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 13 illustrates examples of such indicators along the results chain.

Table 13 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 business environment, quality of jobs	• 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 14). 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 14 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 changeved
Output	Policies are adopted and adhered to business environment, quality of jobs	• 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, 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.

2. Horizontal issues

Increasing domestic capabilities

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 composition, 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.

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[13]. 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.

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

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