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Unbundling Regimes and Structural Transformation in Malaysia

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Abstract

Technological changes have significant transformative effects on economic activities. The waves of technological innovations in transport and ICT have provided opportunities for globalisation. Malaysia has levied the first unbundling - enabled by lowering of transport costs - to industrialise for five decades. The ICT-driven second unbundling is proving to be more challenging for the country's manufacturing competitiveness. Weaknesses in the linkages within the technology-services-GVC nexus is a structural weakness that needs to be overcome. This is crucial for effective participation in the third-unbundling.

Keywords: Unbundling, Global Value Chain, Technological Change, Services

JEL Codes: F14, F63, L60, O14

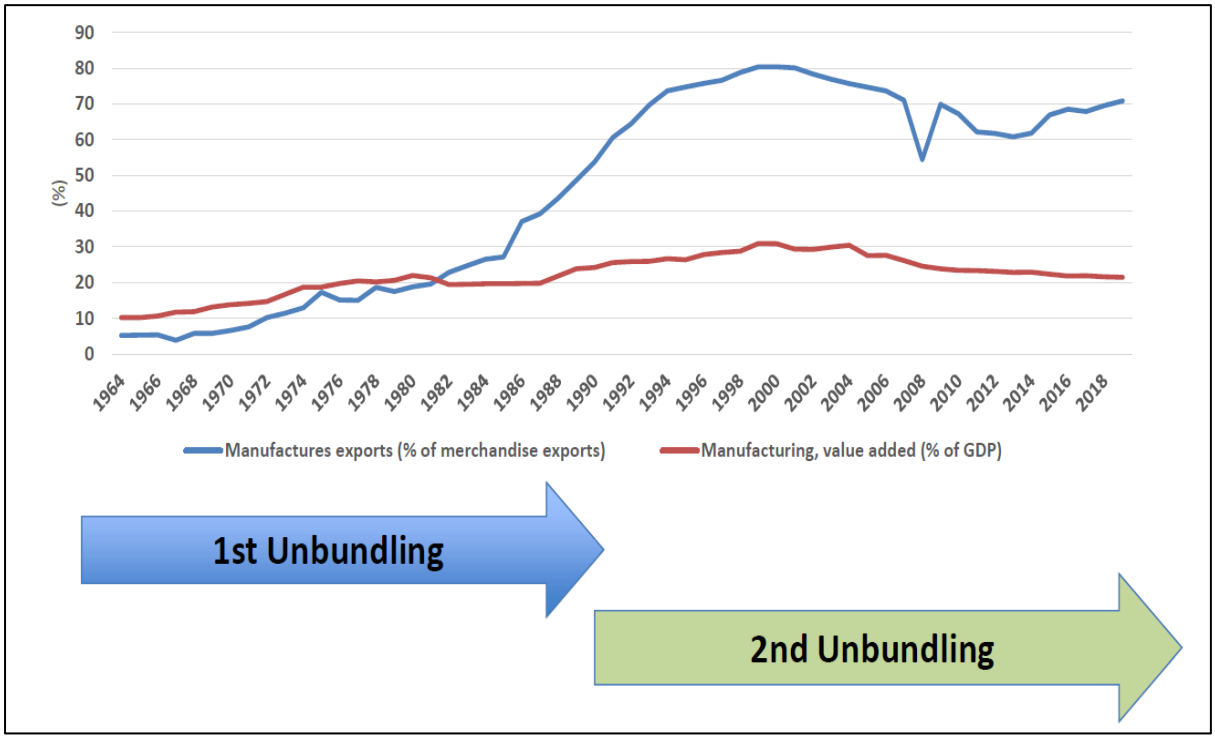
Unbundling Regimes and Structural Transformation in Malaysia

Cassey Lee[1]

1. Introduction

Malaysia's export-oriented industrialisation has served the country well for four decades between the 1960s to 1990s. However, the manufacturing sector's relative contribution to the economy started to decline in late 1990s to early 2000s. This phenomenon of "premature deindustrialisation" coincided with the emergence of the second stage of unbundling in the 1990s (**Figure 1**). In the second stage of unbundling, advancements in information and communication technologies (ICTs) lowered communication and coordination costs across borders. These developments made it possible to fragment the different vertical stages of the production process in manufacturing. As a result, manufacturing production activities began to be increasingly organised using global value chains (GVCs).

Figure 1: Structural Change and Unbundling in Malaysia



Source: Author and the World Bank

[1] The author thanks Fukunari Kimura, Shandre Thangavelu, Dionisius Narjoko for their comments and the Economic Research Institute for ASEAN and East Asia (ERIA) for supporting the research. The usual caveat applies.

The research question that motivates this study is whether Malaysia's experience in structural change involving a greater role of services and a reduced role of manufacturing (premature deindustrialisation) is related to the emergence of the second stage of unbundling. This analysis draws Baldwin's (2013) argument that the second unbundling fundamentally changed the nature of industrialisation by making the single-country production location less relevant.

In the context of Malaysia (which has been industrialising since the 1960s), was the country able to adapt and take advantage of the new economic realities of second-stage unbundling? If the country failed to take full advantage of the second unbundling, was this the main explanation for its premature deindustrialisation? Is the rise in services related to the second and third unbundling? These questions need to be addressed in a broader context of structural change because technological changes such as those related to ICTs affect not only manufacturing but the services sector as well. Thus, the goal of this study is to examine the relationship between structural change and regime unbundling in Malaysia.

The outline of this study is as follows. Section 2 will review the literature on unbundling regimes and structural change to better understand how to empirically investigate the relationship between unbundling regime and structural change. Section 3 provides empirical analyses of the trends in Malaysia's GVC participation and the relationships between services and GVC participation. Section 4 provides some policy implications. Section 5 concludes.

2. Unbundling Regimes and Structural Change: Literature Review and Research Framework

An understanding of the relationship between unbundling regimes and structural change begins with an exposition of the fundamental concepts of structural change and unbundling.

Structural Change

Structural change or structural transformation is a phenomenon that involves changes in the relative importance of different types of economic activities (or sectors) in an economy. Underlying the process of structural change is the dynamic reallocation of economic activity across the three broad sectors of the economy, namely, agriculture, industry and services

(Herrendorf et al., 2014).[2] The traditional trajectory of structural change involves several stages or phases that start with an economy that is predominantly agricultural to one that is more dependent on industrial or manufacturing activities (Syrquin, 1988). The shift from an agricultural to a manufacturing-driven economy is known as **industrialisation**. Economic historians have also used the term **industrial revolution** to describe the industrialisation of England in the period from the mid-18th to the mid-19th century. Once an economy has industrialised, it could undergo further structural change by shifting to a more services-based economy. When this occurs, the structural change process that brings about a relative decline in manufacturing activities is labelled as **deindustrialisation**.

The process of structural change is very complex, involving many dimensions such as demand, technology, employment, factor accumulation, employment, migration, location, demography, income distribution and environment. The literature on the industrial revolution, for example, alludes to other simultaneous revolutions in agriculture and energy.

The theories and empirics of structural change have focused on several drivers.[3] From a domestic demand perspective, a rise in per capita real income is accompanied by a decline in the share of food in final demand and an increase in producer goods, machinery and social overhead (Chenery and Syrquin, 1986). Not only is there an increase in the production of manufactured goods with greater income elasticity, but a higher proportion of them are also intermediate goods – which leads to greater inter-sectoral interactions and dependencies. Sectoral change is also driven by the prices of manufactured goods relative to agricultural goods – brought about by differences in productivity growth. For many countries, especially smaller countries with relatively less endowment of natural resources, the rise in the trade of manufactured goods is another characteristic of industrialisation (Syrquin, 1988; Syrquin and Chenery, 1989).

More recent empirical work has emphasised the importance of heterogeneity in technology across countries and across sectors within countries (Eberhardt and Teal, 2012; Herrendorf et

[2]The more "modern" studies of economic structure and structural change date from the 1930s following the Great Depression. The early pioneering works focused on the development of the data collection methods and tools such as national accounts (Simon Kuznets, Colin Clark, and Richard Stone) and input-output analysis (Wassily Leontief). The study of economic structure and structural change is not a recent endeavour. An early precursor is Quesnay's Tableau Économique (first published in 1758) which depicted the economy as comprising three classes - the proprietary class (landlord), productive class (farmer and farm labourer) and sterile class (artisan and foreign merchant). In a more dynamical and historical approach, Adam Smith – influenced by the ideas of Samuel Pufendorf and Francis Hutcheson - theorized that societies evolve through four stages, namely hunters, shepherds, agriculture and commerce. See Okan (2017) for further discussions.

[3] For a comprehensive review, see Herrendorf et al (2014) and van Neuss (2018).

al., 2015). This leads us to research the role of technology in globalisation that is featured in the literature on unbundling.

The Concept of Unbundling

The literature on unbundling can be traced to the works of Baldwin (2006, 2016), who explored how technological change has transformed the nature of globalisation. A key element of this concept is the locational fragmentation of the economic activities of production and consumption. Baldwin (2006) identified two stages of unbundling (**Table 1**). In the **first stage of unbundling**, the decline in transportation costs expanded global trade, thus separating consumption from production, with the latter clustering locally. The **second stage of unbundling** was brought about by the ICT revolution (1990-2015) which fragmented the production across countries in the second unbundling with production clustering in a few countries located near G7 industrial centres.

Baldwin (2016) and Kimura (2018) have extended this framework by theorising a **third stage of unbundling** in which technological advancement (since 2015) has further lowered the face-to-face costs in production and consumption activities. This takes place through the use of new technologies that provide substitutes for face-to-face interactions. Such technological changes make it possible for the execution of tasks at a distance that previously required close physical presence. Baldwin describes this as unbundling labour services from labourers. It also improves the matching between individuals (e.g. through digital platforms) and the unbundling of tasks across different locations. Greater connectivity is also enhanced through the expansion and deepening of cross-border data flows.

Table 1: Unbundling Regimes

	Pre-Globalised World	First Unbundling	Second Unbundling	Third Unbundling
Trade Costs	High	Lower	Lower	Lower
Communication Costs	High	High	Lower	Lower
Face-to-Face Costs	High	High	High	Lower
What Starts Moving	None	Goods	Ideas	People
International Division of Labour	Autarky	Industry-wise	Task-wise	Person-wise
Dominant Years	Pre-1820	1820-1990	1990-2015	2015-

Source: Kimura (2018), Figure 1, p.14.

Research Framework – Technologies, Services and Unbundling

Undertaking empirical research on unbundling requires identifying the drivers of unbundling and figuring out how to measure them. Technology is the key driver of changes in production and consumption activities over time, as encapsulated in the three stages of unbundling. Thus, a key challenge is how to conceptualise technologies in unbundling. Many types of technologies were being diffused during the different stages of unbundling. The literature on unbundling focuses on specific types of technologies for each type of unbundling. The 1st unbundling regime is driven by technological changes in transport, whilst the 2nd unbundling emphasises ICT technologies (**Table 2**).

Table 2: Elements of Unbundling

	1st	2nd	3rd
Period	1820-1990	1990-2015	2015-
Technology	Transport	ICT – internet, mobile	Internet+, IOT, AI
Effects	Trade costs	Communication costs	Face-to-face costs
Unbundling	Production & consumption	Factory / Industry	Task
Variables	Exports	Foreign VA in Exports	Foreign Services VA in Exports?
Services	Transport & Logistics (direct/indirect)	ICT (direct/indirect)	Digital Platforms

Source: Author

Another possible way to think about technological change is through the concept of **general purpose technologies (GPT)** (Jovanovich & Rousseau, 2005). The literature n GPT predates the discussions on unbundling. In general, GPTs are types of technologies that have a deep and long-lasting impact on economic activities. Three characteristics of GPTs are:

i. Pervasiveness – such technologies are widely applied to most sectors;
ii. Improvement – in which such technologies are improved over time, resulting in the lowering of costs; and
iii. Innovation spawning – the use of such technologies makes it easier for firms to invent new products and processes.

Examples of GPTs that have been cited in the literature include steam, electricity, internal combustion, and information technology. The classification of GPTs seems to be broader than the characterisation of technologies in the unbundling literature. GPTs can impact globalisation but that is not their defining characteristic. The impact of GPTS on economic activities (including globalisation) is not a straightforward empirical matter. This is because there might be time gaps between invention and innovation (diffusion, commercial application). There are also lags in the impact of new technology on productivity.

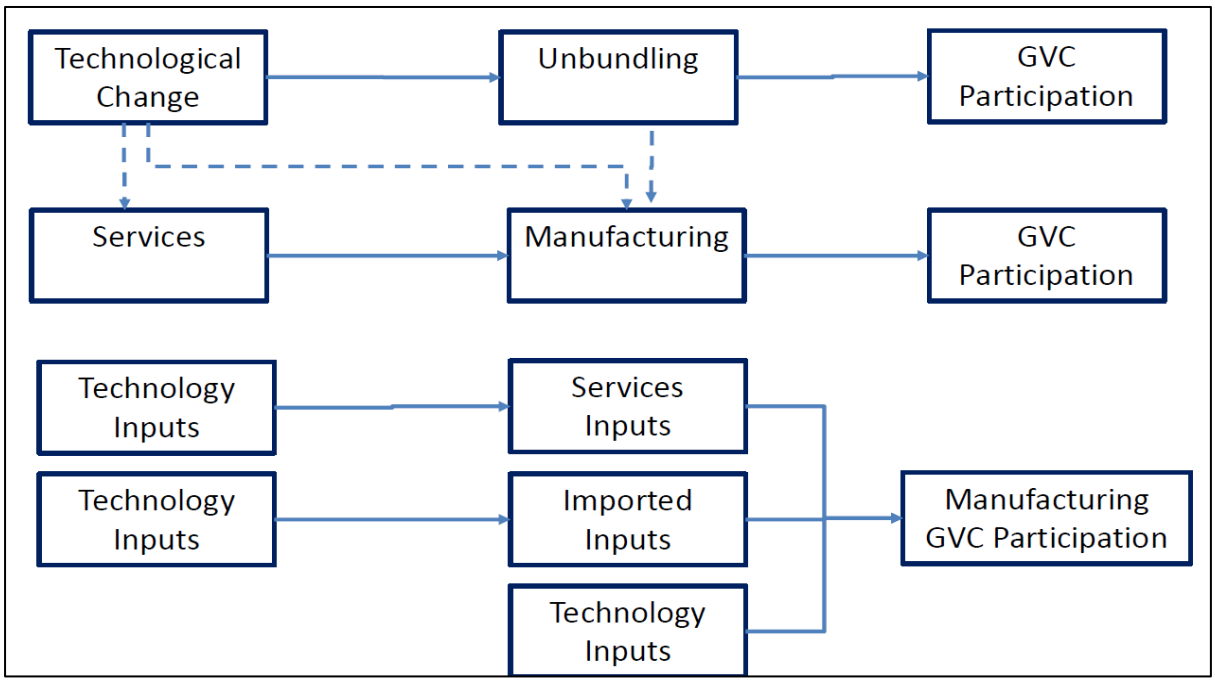
A challenging task in characterising the key technologies underlying unbundling is the concurrent diffusions of many different types of technological changes during the historical periods assigned to unbundling.

(i) First Unbundling (1820-1990) – The key technologies underpinning this unbundling are transport-related technologies. These technologies involved significant changes in the sources of power, namely, steam engines (1869-1890s) and internal combustion (1900s-1930s). Other technologies that were important during this period include electrification (1890s-1929), container boxes for shipping (1960s-1980s) and wired telephony (1870s – 1930s).
(ii) Second unbundling (1990-2015) – The technology assigned to be the key driver of unbundling in this period is information and communications technologies (ICTs). These technologies include wires (mobile) telephony (1970s – 2020s), fibre optic cables (1980s-2020s), personal computers and computer software (1970s-2020s), and the internet (1990s-2020s).

The above brief survey of technologies suggests that the evolution of technologies is complex. There are many types of technologies emerging and diffusing simultaneously during each period. Many are these technologies co-exist and complement each other. Thus, one task of empirical research on unbundling would be to identify the different types of technologies that matter and how they interact in such a way as to enhance participation in the global value chains

(GVCs). Empirically, this would require a framework that maps technological change to services and manufacturing inputs, which is then linked to GVC participation (**Figure 2**).

Figure 2: Linkages between Technological Change and GVC Participation



Source: Author

The role of services in unbundling is crucial, as key technologies in the unbundling context in transport (1st unbundling) and ICT (2nd unbundling) are implemented or operationalised as service inputs. These include communication services and computer services, which can be procured and used by a manufacturing firm directly or outsourced. New technologies also enable outsourcing of new types of services – professional and business services. The successes and failures of manufacturing firms to utilise these technologies and services determine their competitiveness and, ultimately, structural change at the macro level.

Unbundling and Economic Agglomerations

Finally, another important aspect of unbundling and structural change is the spatial dimension. More specifically, how the different stages of unbundling affect the spatial distribution of production activities across and within countries. In the case of the first and second unbundling, regional clusters of production have emerged (Baldwin, 2016, p.132). This has occurred

because the face-to-face constraint is still binding due to the high cost of moving people. Hence, urban agglomerations are also driven to some extent in the first and second unbundling.

It is less clear how third unbundling affects economic agglomerations. As digital inputs and services related to it play a key role in the third unbundling, a different type of economic agglomeration might be an important driver. The types of economic agglomeration associated with third unbundling could be digital ecosystem clusters where the digital input services are located. The locations of these clusters are likely to be different from the clusters supporting manufacturing activities driven by first and second unbundling. Such clustering also affects the location of value-adding.

Research on third unbundling and economic agglomeration is still at a very nascent stage at the moment. From a policy perspective, there is also a need to examine how industrial policies have evolved differently under the three stages of unbundling.

3. Empirical Analyses

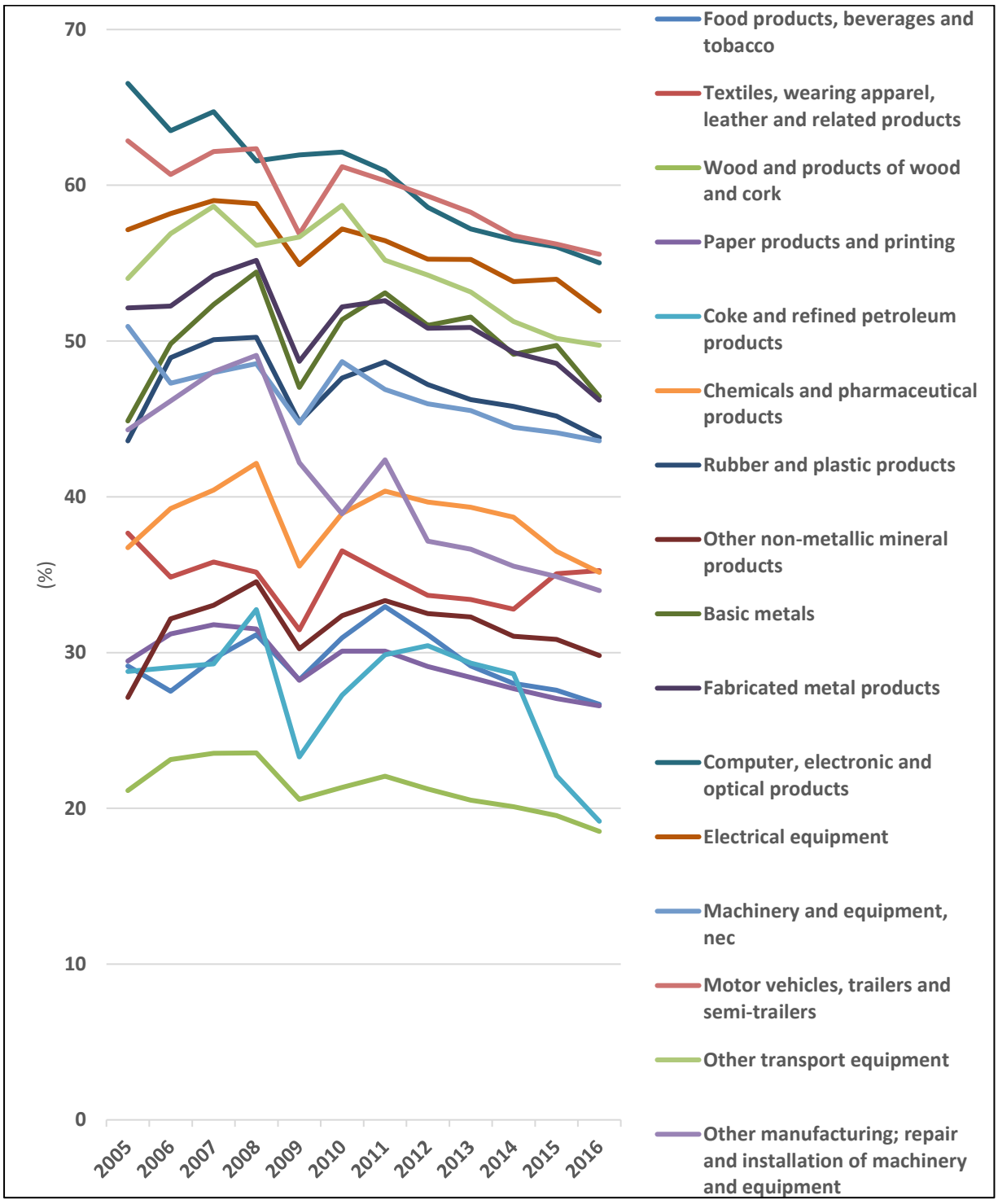
The empirical analyses are carried out at two levels of aggregation – at the industry level and the firm level. For the industry-level analyses, two sets of data are used – OECD's TiVA dataset and input-output tables from the Department of Statistics, Malaysia (DOS). For the firm-level analysis, data from the World Bank's 2015 Enterprise Survey is used.

3.1 Industry-Level Analysis – OECD's TiVA Dataset

The TiVA dataset provides some evidence of the trends in backward participation in GVC for the Malaysian manufacturing industries during the 2005-2016 period (**Figure 3**).[4] The country's backward participation in GVC showed a downward trend across all manufacturing industries. There was a severe contraction in backward participation during the Global Financial Crisis (GFC) in 2009 but this was followed by a strong recovery in the following year. However, the downward trend resumed after 2010. An exception is the textile and apparel industries. There are significant variations in the level of GVC participation across manufacturing industries. In general, the machinery, electrical and electronic industries have the highest levels of backward GVC participation. In contrast, food and resource-based industries have lower levels of backward GVC participation.

[4] Backward GVC Participation is defined as the ratio of the foreign value added content of exports to the economy's total gross exports.

Figure 3: Foreign Value-Added Share of Gross Exports (%)



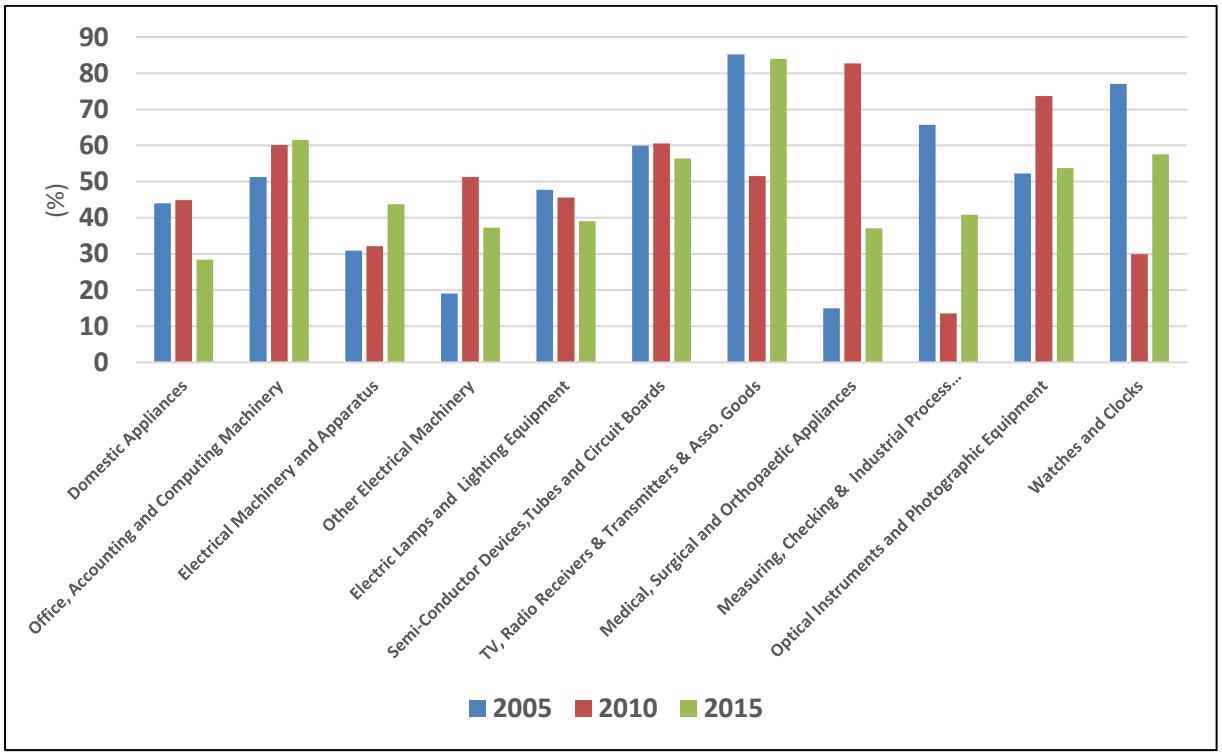
Source: OECD

3.2 Industry-Level Analysis – DOS's Input-Output Dataset

Three sets of DOS's input-output data covering the years 2005, 2010, and 2015, can be used to examine backward GVC participation which is defined as imported inputs as a share of gross exports. The dataset covers 12 agriculture industries, 4 mining industries, 68 manufacturing industries and 30 services industries.

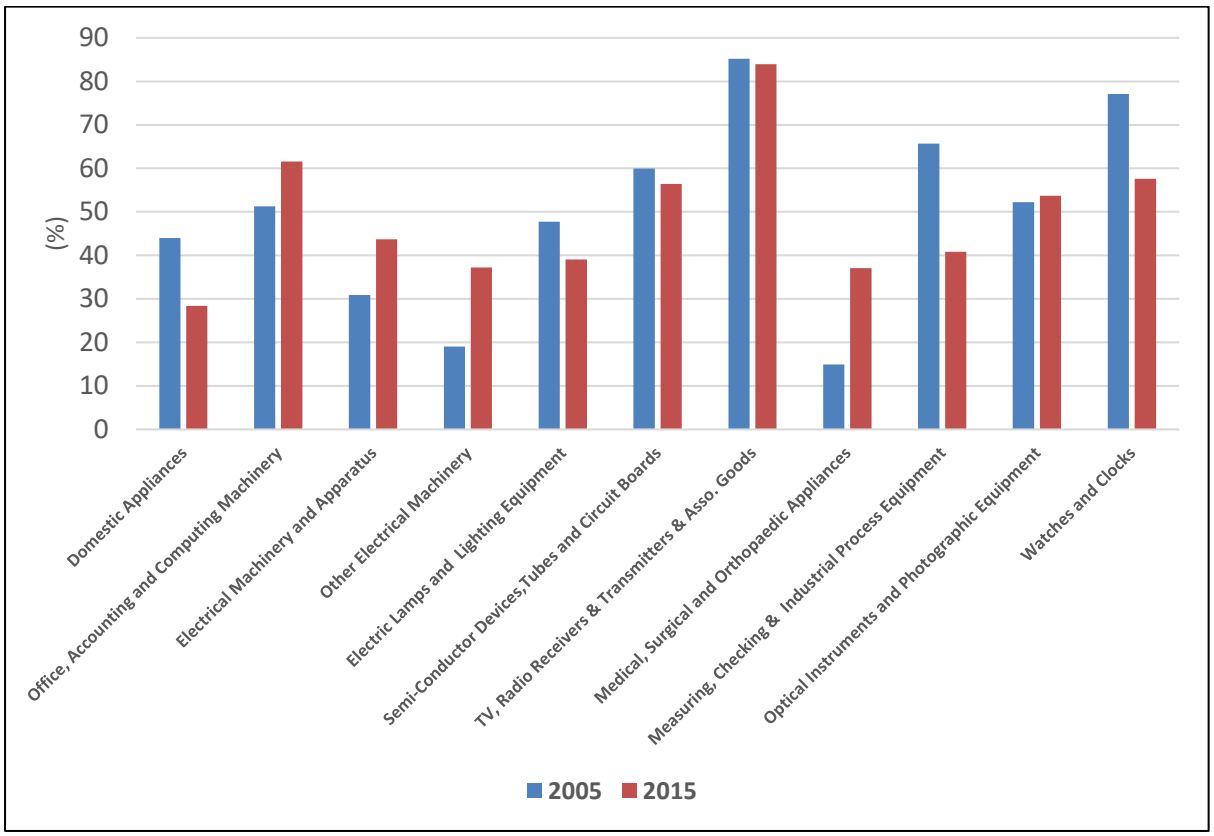
The trends observed are a bit different and more nuanced than those obtained using the TiVA dataset (**Figure 4** and **Figure 5**). **Figure 5**, which covers 2005 and 2015, excludes 2010 to remove the potential impact of the GFC. There has been a decline in the imported inputs as a share of gross exports for a number of industries, namely, domestic appliances, electric lighting, semiconductor & circuit boards, industrial equipment, and watches and clocks. However, some industries have experienced the opposite – namely, office and computing machinery, electrical machinery, medical equipment, and optical equipment.

Figure 4: Imported Inputs as a Share of Gross Exports – 2005, 2010, 2015



Source: Department of Statistics, Malaysia

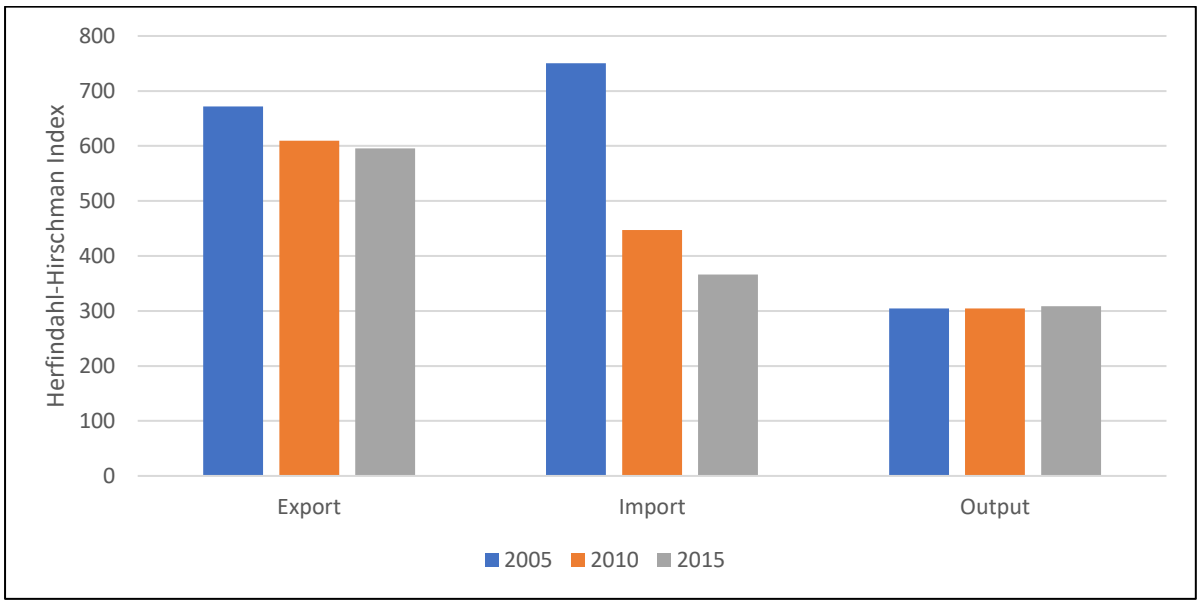
Figure 5: Imported Inputs as a Share of Gross Exports – 2005, 2015



Source: Department of Statistics, Malaysia

The decline in the imported inputs as a share of gross exports impacts the overall trade structure of the country. One measure of this is the degree of diversification as measured by the Herfindahl-Hirschman Index (HHI). The HHI is the sum of the square of the market share of each industry. There is a slight decline in the value of HHI for exports, but the decline is significantly larger for imports. The HHI value for output has remained relatively stable. These trends indicate that the country's trade structure (especially imports) has diversified in the ten years between 2005 and 2015 despite having a relatively stable production structure (**Figure 6**).

Figure 6: Trade and Industry Diversification



Source: Department of Statistics, Malaysia

3.3 Industry-Level Analysis – Econometric Analysis

The industry data can also be used to examine the relationship between the imports-exports ratio and different types of services associated with unbundling regimes. The interpretation of the import-export ratio is nuanced. Low imports compared to high exports could mean high forward GVC participation for resource-based industries. High imports compared to exports could imply greater backward GVC participation.

Transport services input (TRANS) is a proxy variable for an important driver of 1st unbundling. There are three types of transport services inputs - land, air, and water. For the 2nd unbundling, the services related to relevant technologies are information and communication technology (COMMICT). These comprise two types of services inputs, namely, communications and computer services. Other types of services (OTHSERV) that are enabled by ICT may also be relevant. These include professional services, business services, and financial services such as banking and insurance.[5]

[5] Business services include employment activities, travel agency, tour operator, reservation service and related activities, security and investigation activities, services to buildings and landscape activities, and office administrative, office support and other business support activities. Professional services include legal and

A panel fixed-effects estimation is applied to the following specification:

$$MX_{it} = \beta_0 + \beta_1 TRANS_{it} + \beta_2 COMMICT_{it} + \beta_3 OTHSERV_{it} + \varepsilon_{it} \quad (1)$$

All services inputs are measured in terms of percentage share of total inputs. The results obtained are rather weak with most variables being statistically insignificant (**Table 3**). For the agriculture-related industries, the banking variable has a negative coefficient. It is statistically significant indicating that the import-export ratio is lower when higher levels of banking input services are used. This could be interpreted as meaning highly export-oriented agriculture industries with low imported inputs (high forward GVC participation) would use significant banking services. A similar interpretation can also be applied to business services.

For the manufacturing sector, the computer services variable has a negative coefficient and is statistically significant. This sector is likely to have higher levels of imports-exports ratio. The negative coefficient suggests that a higher share of business services inputs is associated with a lower imports-exports ratio – the latter could proxy lower forward participation in GVC. This result seems counter-intuitive at first glance. It could mean that such services are less important for manufacturing industries that import a higher proportion of their inputs compared to exports. It is difficult to come up with a convincing explanation given the heterogeneity of manufacturing industries. To overcome this problem, estimations are carried out for selected manufacturing industries.

accounting activities, activities of head offices; management consultancy activities, architectural and engineering activities; technical testing and analysis, scientific research and development, advertising and market research, and other professional, scientific and technical activities, and veterinary activities.

Table 3: Panel Estimation of Sectoral Import-Export Ratio and Services Inputs

	Agriculture	Manufacturing
Variables	**Import/Export**	**Import/Export**
Water Transport	20,012	-2,032
	122,445	2,636
Land Transport	8,756	-5,412
	19,051	5,476
Air Transport	62,364	-147.4
	129,051	1,365
Communications	-16,149	5,662
	145,514	5,293
Computer	3.37E+06	-64,859*
	1.93E+06	33,534
Banking	22,231**	-2,082
	-9,967	2,912
Insurance	175,204	5,316
	130,830	14,817
Professional Services	-1,045**	27.59
	470.6	75.65
Business Services	-7,914***	125.2
	2,491	149.3
Constant	477.5*	196.6***
	270.1	47.12
Observations	36	203
R-squared	0.526	0.052
Number of Industries	12	68
*** p<0.01, ** p<0.05, * p<0.1		

Source: Author

The results for panel estimation covering three groups of manufacturing industries are reported in **Table 4**. The results for the food and beverage industries are very weak – none of the services inputs variables are significant. In the case of the machinery, electrical and electronics industries (MEE), three variables – land transport, computer and insurance - are significant and all have negative coefficients. The results suggest that higher levels of backward GVC participation for MEE are associated with lower usage of land transport, computer and insurance services inputs. This is somewhat surprising but given the context of declining GVC participation, it could imply a weakness in these services industries. The banking service variable is weakly significant with a positive coefficient indicating the contribution of these services to backward GVC participation.

If the range of industries sample is narrowed further to electrical and electronics (EE), the results for land transport and computer services are stronger (higher absolute value of coefficient). The water transport service variable (shipping) is positively correlated to the import-export ratio, possibly suggesting the importance of these services to EE industries. This is in contrast with land transport presumably because EE products are not bulky (higher value-weight ratio).

Overall, the sectoral and industry-level econometric analysis on the relationship between the import-export ratio and different types of services inputs do provide some confirmation of the importance of how unbundling (GVC participation) is related to enabling services. Land-transport services inputs – a 1st unbundling factor – appear to be less important for Malaysia's MEE industries. The results for the 2nd unbundling services factor – computer services - could be more difficult to interpret. Either computer services are not important for EEM or the quality of such services is weak in the country. Another possibility is the variables used to proxy drivers of 2nd unbundling are not suitable.

Table 4: Panel Estimation of Industry Import-Export Ratio and Services Inputs

	Food & Beverage	Machinery, Electrical & Electronics	Electrical and Electronics
Variables	**Import/Export**	**Import/Export**	**Import/Export**
Water Transport	3,422	1,301	11,699*
	6,262	1,731	5,076
Land Transport	1,553	-4,596*	-9,051**
	11,923	2,368	-3,124
Air Transport	-8,135	4,535	15,070
	24,320	5,533	-18,112
Comm	4,413	4,797	1,845
	13,186	2,880	2,440
Computer	44,415	-39,421**	-64,094**
	51,351	17,928	19,539
Banking	-11,000	5,757*	9,552
	8,097	2,908	7,313
Insurance	-2,268	-11,829**	30,212
	19,175	5,126	19,929
Professional	51.57	0.208	-134.8
	67.92	20.32	77.59
Business	12.19	114.2	132.8
	146.8	79.4	72.5
Constant	141.2***	52.66***	62.20***
	26.66	12.11	9.58
Observations	39	45	24
R-squared	0.169	0.39	0.908
Number of Industries	13	15	8
*** p<0.01, ** p<0.05, * p<0.1			

Source: Author

3.4 Firm-Level Analysis – Econometric Analysis

The IO data has some limitations in terms of capturing variables related to technologies associated with the different unbundling regimes. The use of the import-export ratio has limitations as it has different possible interpretations. To overcome these problems and to supplement the earlier analyses, a firm level analysis is undertaken. GVC participation is defined as simultaneous importing and exporting activities at different threshold levels defined by shares of revenues above 0%, more than 10%, and more than 20%. Different types of services activities and infrastructure services variables are used. These include transport services via infrastructure services (ROADDENSITY), usage of ICT technology in terms of email and website (ICT), product innovation (INNOV), and agglomeration effects (POPDENSITY). Firm characteristic variables (CHAR) are also used as explanatory variables. These include age, size, foreign ownership. A probit estimation is applied to the following specification:

$$\Pr(GVC) = f(CHAR, ICT, INNOV, ROADDENSITY, POPDENSITY) \quad (2)$$

The data used is firm-level manufacturing data from the World Bank's Enterprise Survey covering the year 2015. The results are reported in **Table 5**.

The probability of a firm participating in GVC is higher when it is foreign-owned, larger and has product innovation. The ICT variables are statistically insignificant. This could be due to the fact that these measures are too basic. A more sophisticated measure of ICT variables may be needed. The agglomeration effects are positive. The insignificance of the road density may also imply it is a poor indicator of road infrastructure or alternatively, as suggested by earlier analysis, it is not important.

Overall, the GVC participation rate could be better measured at the firm level but relevant measures of services inputs related to unbundling could be difficult to obtain in existing data sets. This could indicate that the empirical testing of the technology-services-GVC nexus in the unbundling framework could be difficult to carry out unless new types of surveys are implemented.

Table 5: Probit Estimation of Firm-Level GVC Participation

Variables	GVC	GVC10	GVC20
Age	-0.0616	-0.0964	-0.0612
	0.113	0.114	0.117
Foreign Ownership	0.0125***	0.0110***	0.00916***
	0.00337	0.0034	0.00333
Workers	0.192***	0.191***	0.129***
	0.0454	0.0455	0.0471
Email	-0.0456	-0.0558	-0.0556
	0.0897	0.0905	0.0889
Website	0.0472	0.0761	-0.0119
	0.0705	0.071	0.0732
Product Innovation	0.115**	0.190***	0.556***
	0.0547	0.0732	0.177
Population Density	0.234***	0.332***	0.305***
	0.0863	0.0862	0.0909
Road Density	-0.0997	-0.17	-0.207
	0.125	0.124	0.132
Constant	-0.981**	-0.692*	-0.714*
	0.406	0.406	0.418
Observations	568	568	568
*** p<0.01, ** p<0.05, * p<0.1			

Source: Author

4. Policy Implications

The unbundling-GVC participation literature suggests that manufacturing competitiveness can be affected by technological changes. Such technological changes drive the evolution and contribution of technologically-enabled services to manufacturing. Hence, policymakers do need to pay more attention to enhancing the linkages between services and manufacturing within the GVC framework. Policymakers embarking on evidence-based approaches will need to undertake industry-by-industry analysis. This is a challenging task due to data limitations.

To overcome this, a new generation of surveys will need to be crafted with the view to seeking greater details on the services inputs-technology-GVC nexus. Another policy challenge is how to prioritise economy-wide and industry-specific policies that enhance technology-driven services to enhance manufacturing competitiveness. This approach, which is akin to the growth diagnostics method can be used to identify which linkages within the technology-services-GVC nexus are the most important and which is the weakest. There is also a need to further investigate the technology-services-GVC nexus for agriculture and services industries. These two industries have also been transformed by technological changes which alters the production space and frontiers for these sectors.

5. Conclusions

Technological change has always had a transformative effect on economic activities over the ages. In the modern era, successive technological changes have enabled and transformed globalisation through, first, reductions in transport costs (1st unbundling) and later, lowering of communications and computation costs (2nd unbundling). These two distinct phases have been theorised using the unbundling framework which traces how such technological changes alter the production-consumption spatial configurations globally. The coming of age of each of the unbundling regimes has had great consequences for the economic structure and fate of nations.

Malaysia benefited from the first unbundling to industrialise over a period of five decades. The second and third unbundling has proven to be more challenging. There is some evidence that the country has moved from the 1st stage of unbundling (transport-enabled) into the 2nd stage of unbundling (ICT-enabled). The country's success in the 2nd stage of unbundling is mixed given the deindustrialisation of the country. This could be due to weaknesses in technology-enabled services industries. Malaysia began its digital transformation in the mid-1980s with the Multimedia Super Corridor (MSC) project. However, ICT technology has evolved further and beyond the older technologies which underpin the MSC project. A re-evaluation of its digital service ecosystem needs to be undertaken by paying more attention to the technology-services-GVC nexus. This will require an evidence-based approach using new data and policy frameworks to identify major weaknesses in the technology-services-GVC nexus within all sectors and industries. A major empirical and policy issue to be addressed is to what extent is the nexus in the 2nd unbundling important for the 3rd unbundling. In doing so, a number of key areas need to be examined further. They include restrictions on investment and services, ICT

connectivity, human capital, trade facilitation and social amenities in urban areas. New policy initiatives that attempt to address some of these issues include the National Fourth Industrial Revolution Policy (2021) and the Digital Economy Blueprint (2021). Effective implementation of these policies will be crucial to enhance the country's ability to benefit from the second and third unbundling.

References

Antràs, Pol and Alonso de Gortari. (2017). “On the Geography of Global Value Chains”, NBER Working Paper No. 23456.

Baldwin, Richard. (2013). “Trade and Industrialisation after Globalization's Second Unbundling: How Building and Joining a Supply Chain Are Different and Why It Matters”, in Globalization in an Age of Crisis: Multilateral Economic Cooperation in the Twenty-First Century, edited by Robert C. Feenstra and Alan M. Taylor. Chicago: University of Chicago Press.

Baldwin, Richard. (2016). The Great Convergence: Information Technology and the New Globalization. Cambridge, MA: Harvard University Press.

Baldwin, Richard and Toshihiro Okubo. (2019). “GVC Journeys: Industrialisation in the Age of the Second Unbundling”, Journal of the Japanese and International Economies, 52, 53-67.

Baldwin, Richard and Anthony J. Venables. (2013). “Spiders and Snakes: Offshoring and Agglomeration in the Global Economy”, Journal of International Economics, 90, 245–254.

Bernard, Andrew B., Valerie Smeets, and Frederic Warzynski. (2017). “Rethinking Deindustrialization”, Economic Policy, 32(89), 5-38.

Branson, William H,, Isabel Guerrero and Bernhard G. Gunter. (1998). “Patterns of Development 1970-1994”, mimeo.

Chenery, Hollis B. (1960). "Patterns of Industrial Growth." American Economic Review, 50(4), 624-54.

Chenery, Hollis B., and Moshe Syrquin. (1975). Patterns of Development, 1950-1970. New York: Oxford University Press.

Chenery, Hollis B., and Moshe Syrquin. (1986). “Typical Patterns of Transformation”, in Industrialization and Growth: A Comparative Study, edited by Hollis B. Chenery, Sherman Robinson and Moshe Syrquin. New York: Oxford University Press.

Chenery, Hollis B., Sherman Robinson and Moshe Syrquin. (eds) (1986). Industrialisation and Growth: A Comparative Study. New York: Oxford University Press.

Criscuolo, Chiara and Jonathan Timmis. (2018) “GVCs and centrality: mapping key hubs, spokes and the periphery”, OECD Productivity Working Papers, 2018-12, OECD Publishing, Paris.

Dasgupta, Sukti and Ajit Singh. (2006). “Manufacturing, Services and Premature Deindustrialization in Developing Countries: A Kaldorian Analysis”, UNU-WIDER Research Paper No. 2006/49.

De Backer, K. and S. Miroudot (2013). “Mapping Global Value Chains”, OECD Trade Policy Papers, No. 159, OECD Publishing, Paris.

Eberhardt, Markus and Francis Teal. (2012). “Structural Change and Cross-Country Growth Empirics”, World Bank Economic Review, 27(2), 229-271.

Engel, Jakob and Daria Taglioni. (2017). “The Middle Income Trap and Upgrading Along Global Value Chains”, in Global Value Chain Development Report 2017.Washinton DC: World Bank.

Herrendorf, Berthold, Christopher Herrington and Akos Valentinyi. (2014). “Growth and Structural Transformation”, in Handbook of Economic Growth, Volume 2B. Amsterdam: Elsevier.

Herrendorf, Berthold, Richard Rogerson and Akos Valentinyi. (2015). “Sectoral Technology and Structural Transformation”, American Economic Review, 7(4), 104-133.

Johnson, Robert C. and Guillermo Noguera. (2017). “A Portrait of Trade in Value-Added over Four Decades”, Review of Economics and Statistics, 99(5), 896-911.

Jovanovic, Boyan and Peter Rousseau. (2005). “General Purpose Technologies”, in Handbook of Economic Growth, Volume 1B edited by Philippe Aghion and Steven Durlauf. Amsterdam: Elsevier.

Kaldor, Nicholas. (1966). Causes of the Slow Rate of Economic Growth of the United Kingdom. Cambridge: Cambridge University Press.

Kennedy G. (2005) The Four Stages. In: Adam Smith’s Lost Legacy. Palgrave Macmillan, London.

Kimura, Fukunari. (2018). “Unbundling Regimes and Development Strategies in ASEAN”, Journal of Southeast Asian Economies, 35(1), 13-21.

Kuznets, Simon. (1957). "Quantitative Aspects of the Economic Growth of Nations: II. Industrial Distribution of National Product and Labor Force." Economic Development and Cultural Change, 5(4), 1-111.

Kuznets, Simon. (1966). Modern Economic Growth. New Haven, Conn.: Yale University Press.

Narayanan, Suresh and Lai Yew-Wah. (2014). "Immigrant Labor and Industrial Upgrading in Malaysia", Asian and Pacific Migration Journal, 23(3), 273-297.

Okan, Ecem. (2017). "How did it all begin? Adam Smith on the early and rude state of society and the age of hunters", European Journal of the History of Economic Thought, 24(6), 1247-1276.

Rasiah, Rajah. (2011). "Is Malaysia Facing Negative Deindustrialisation?", Pacific Affairs, 84(4), 715-736.

Rasiah, Rajah, Vicki Crinis and Lee Hwok Aun. (2015). "Industrialisation and Labour in Malaysia", Journal of the Asia Pacific Economy, 20(1), 77-99.

Robert-Nicoud, Frédéric. (2008). "Offshoring of routine tasks and (de)industrialisation: Threat or opportunity—And for whom?", Journal of Urban Economics, 63, 517–535.

Rodrik, Dani. (2016). "Premature Deindustrialisation", Journal of Economic Growth, 21, 1-33.

Rowthorn, Robert and Ramana Ramaswamy. (1997). "Deindustrialisation: Causes and Implications", IMF Working Paper No.WP/97/42.

Rowthorn, Robert and Ramana Ramaswamy. (1998). "Growth, Trade and Deindustrialization", IMF Working Paper No.WP/98/60.

Rowthorn, Robert & John Wells. (1987). De-Industrialisation and Foreign Trade. Cambridge: Cambridge University Press.

Singh, Ajit. (1977). "UK Industry and the World Economy: A Case of De-industrialisation", Cambridge Journal of Economics, 1(2), 113–136.

Stijepic, Denis. (2011). "Structural change and economic growth: analysis within the partially balanced growth framework". PhD dissertation, FernUniversit¨at in Hagen.

Sumner, Andy. (2019). “Deindustrialization, Tertiarization and Development in a ‘GVC-World’: What do new trajectories of structural transformation mean for developing countries?”, ESRC GPID Research Network Working Paper No.16.

Syrquin, Moshe. (1988). “Patterns of Structural Change”, in Handbook of Development Economics, Volume I, edited by H. Chenery and T.N. Srinivasan. Amsterdam: Elsevier.

Syrquin, Moshe and Hollis Chenery. (1989). “Three Decades of Industrialisation”, in World Bank Economic Review, 3(2), 145-181.

Tan, Jeff. (2014). “Running Out of Steam? Manufacturing in Malaysia”, Cambridge Journal of Economics, 38, 153-180.

UNIDO. (2009). Industrial Development Report 2009.

Van Neuss, Leif. (2019). “The Drivers of Structural Change”, Journal of Economic Surveys, 33(1), 309-349.

World Bank. (2016). Making Global value Chains Work for Development. Washington DC: World Bank.

World Bank. (2017). Global Value Chain Development Report 2017. Washington DC. World Bank.

World Bank. (2019). Global Value Chain Development Report 2019. Washington DC. World Bank.

World Bank. (2020). World Development Report 2020: Trading for Development in the Age of Global Value Chains. Washington DC. World Bank.