Thailand and The World Economy
P-ISSN: 2630-0931
E-ISSN: 2651-0529
Homepage : https://www.tci-thaijo.org/index.php/TER
Vol. 37, No. 2, May - August 2019 Page [26-38]

Structural Change and Urbanization: The Case of Peninsular Malaysia

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Received 16 January 2019, Received in revised form 1 July 2019,
Accepted 3 July 2019, Available online 1 August 2019

Abstract

Structural change and urbanization are two key features of economic development. This study examines how urbanization has taken place during the different phases of structural change in Peninsular Malaysia. There is empirical evidence that urbanization – measured in terms of population growth at different level of aggregation – is driven by different economic sectors in the past one hundred years from 1911-2010. In the early stages of the country's development, a succession of emphasis on different primary commodities – tin, rubber, palm oil – affected urbanization. Industrialization was a key driver of urbanization from 1960s to the 1980s. However, with deindustrialization since the 1990s, services began to assume a more important role.

Keywords: Structural Change, Urbanization, Malaysia
JEL Classifications: O18, R11

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1. Introduction

Urbanization is a key feature of economic development. Historically, urbanization has occurred as part of the process of structural change in the economic development process in which the composition of national output shifts from primary activities (agriculture) to secondary (manufacturing) and tertiary (services) activities (Hamer and Linn, 1987). Rapid urbanization is also often accompanied by an increase in the concentration of urban population in a few large cities (Henderson, 2002). This concentration of economic activity in cities is driven by local external economies of scale in production and consumption (Fujita and Thisse, 2013). Agglomeration economies are particularly strong in the initial phase of structural transformation involving a shift away from agricultural activities (Michaels et al, 2012).

Malaysia's experiences in structural change and urbanization reflect the theoretical and empirical findings in the research literature. The Malaysian economy underwent significant structural changes in its journey from a low-income to middle-income country. From the late 19th century until the mid-20th century, the country's primary sector – agriculture and mining – was the main driver of the economy. However, since the 1960s, manufacturing became an increasingly important sector, at least until the late 1990s. Since the late 1990s, another form of structural change began to take place – deindustrialization and the increasing prominence of the services sector.

These structural changes have been accompanied by changes in population density and distribution across the country. One manifestation of this is urbanization which has resulted in higher concentration of population in urban areas. There have been a number of studies on economic structural change in the Malaysian economy such as Lim (1967), Jomo (1990), Drabble (2000) and Rajah (2011). These studies have not examined how structural change has affected urbanization. Geographers and historians such as Lim (1978) and Cho (1990) have examined urbanization and structural change but not from a quantitative perspective.

This paper aims to fill the empirical gap in the literature by undertaking a quantitative study on how the different phases of structural change has affected urbanization in Malaysia. As the quality of data coverage is better for Peninsular Malaysia compared to East Malaysia (Sabah and Sarawak), this study focuses on the former. Furthermore, the structural change experienced by Peninsular Malaysia is quite different from East Malaysia, the latter being more dependent on the agriculture sector.

This paper will focus on two levels of analysis. First, it looks at urbanization within the context of long-term structural change by examining how cities in Peninsular Malaysia have evolved over the past hundred years from around 1911 to 2010. Second, it examines urbanization within the context of medium-term structural change (industrialization and de-industrialization) since the 1960s.

The structure of the paper is as follows. Section 2 examines the relationship between long-term structural change and urbanization in Peninsular Malaysia. Section 3 analyses how urbanization is related to medium-term structural change in terms of industrialization and deindustrialization. Section 4 concludes.

2. Long-Term Structural Change: Political Economy and Cities

2.1 Political History

Peninsular Malaysia (or "Malaya" before 1963), progressively came under the control of the British since the late 18th century. This began with Penang, which was secured by the English East India Company (EEIC) in 1786. Two other states subsequently came under British control, namely Singapore in 1819 and Melaka in

1825.[1] The three states became part of the Straits Settlement from 1826 to 1867, after which they became under direct rule of the British Crown (or more specifically, the Colonial Office). Since 1867, the British began exerting control over other states in Malaya via the appointment of advisors (British Residents) to Malay rulers in the states of Perak (year 1875), Selangor (1875), Pahang (1877-78) and Negeri Sembilan (1975, 1883-1887). These states were then reconstituted into the Federated Malay States (FMS) via the Federation Treaty in 1886. Johor resisted the appointment of a British adviser until 1910. Four other Malay states – Kedah, Perlis, Kelantan and Terengganu – came under British rule when these states were transferred from Siam in 1909. Thus, by 1911, it can be said that the British gained full control of Malaya. This was only interrupted by the Japanese Occupation from 1941 to 1945. Malaya subsequently gained independence in 1957 and joined three other states – Singapore, Sabah and Sarawak – to form Malaysia in 1963. Singapore separated from Malaysia in 1965.

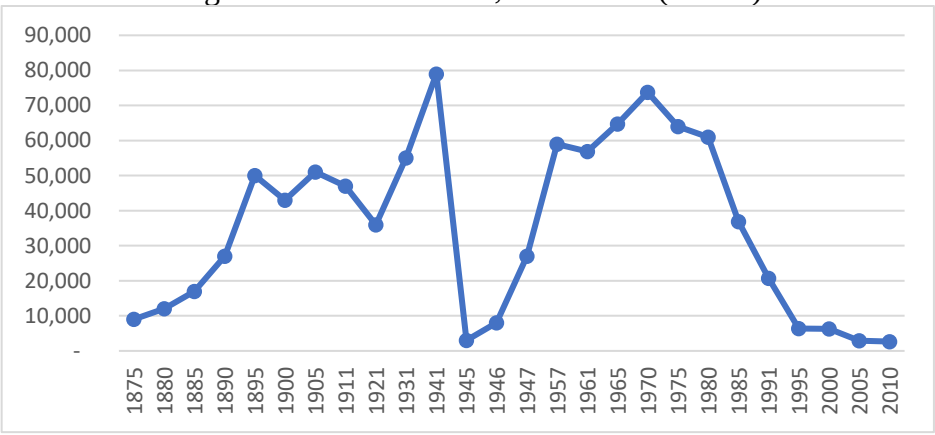
2.2 Economic Structure

In the late 19th century, the primary sector dominated the economy. The agriculture sector during this period was dualistic in nature. Rice farming was carried out by the local population on a subsistence basis in many states. There were also farmers who cultivated a variety of cash crops such as pepper, gambier, tapioca, coconuts, coffee and sugar. In particular, sugar was an important crop during the period from 1880s to 1910 (Chai 1964). Other primary commodities were to have more significant impact on the Malayan economy.

2.2.1 Tin

Mining, especially of tin, was another important activity in the late 1880s. Although tin had been mined in Malaya for hundreds of years, the discovery of tin in Perak in 1840 led to a rapid expansion of the industry until the mid-1890s. The tin industry also developed rapidly in other states, such as Selangor, Negeri Sembilan and Pahang. The Second World War adversely affected tin production. Tin production recovered after the war, reaching a peak around 1970 but declined thereafter (Figure 1).

Figure 1: Tin Production, 1875-2010 (tonnes)



Sources: ITRI (2011), Fong (1989), Chai (1967), Lim (1967).

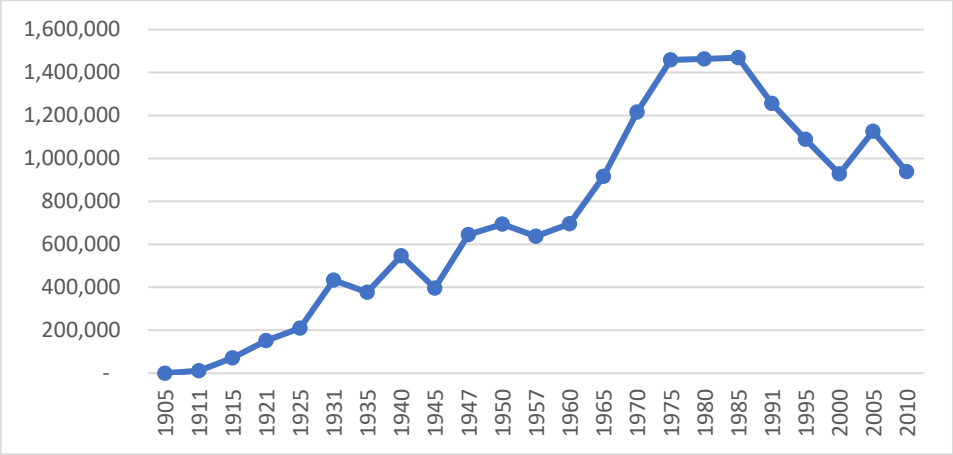
2.2.2 Rubber

Rubber was another primary commodity that was important to Malaya after the 1890s. The rubber industry grew rapidly in the states of Selangor, Perak and Negeri Sembilan since 1905. The industry stagnated during the Japanese occupation and

[1] Melaka came under British control briefly from 1795-1818 during the Napoleonic War.

during the 1950s (due to competition from synthetic rubber). However, it continued to grow rapidly from the 1960s until the mid-1980s (Figure 2). The rubber industry only began to become stagnant and decline after the mid-1970s.

Figure 2: Rubber Production, 1905-2010 (tonnes)

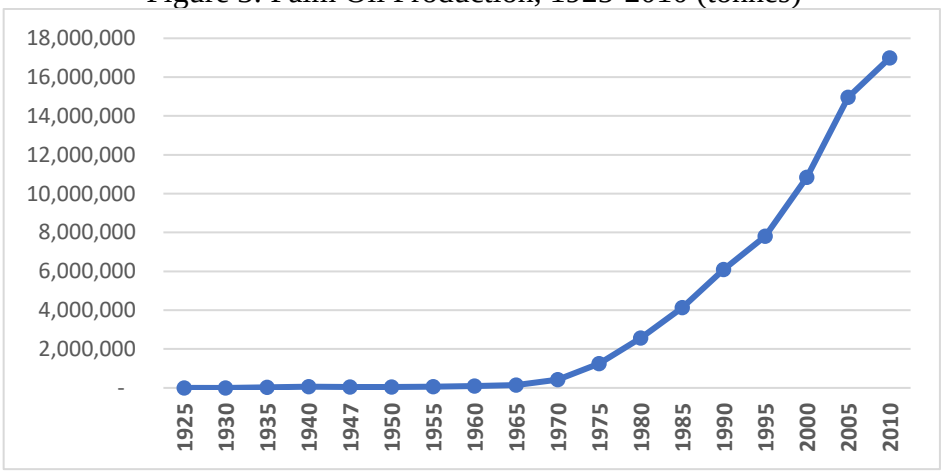


Sources: FAO, Bruton (1992), Lim (1967)

2.2.3 Palm Oil

Oil palms were first introduced to Malaya in the 1870s, but became an important commercial crop between 1917 and 1960 (Rasiah 2006). Palm oil production grew very rapidly since the 1970s partly due to the land development schemes implemented by the Malaysian government (Figure 3). Even today, palm oil remains an important export, accounting for 7-9 per cent of total exports.

Figure 3: Palm Oil Production, 1925-2010 (tonnes)



Sources: FAO, Lim (1967), MPOB

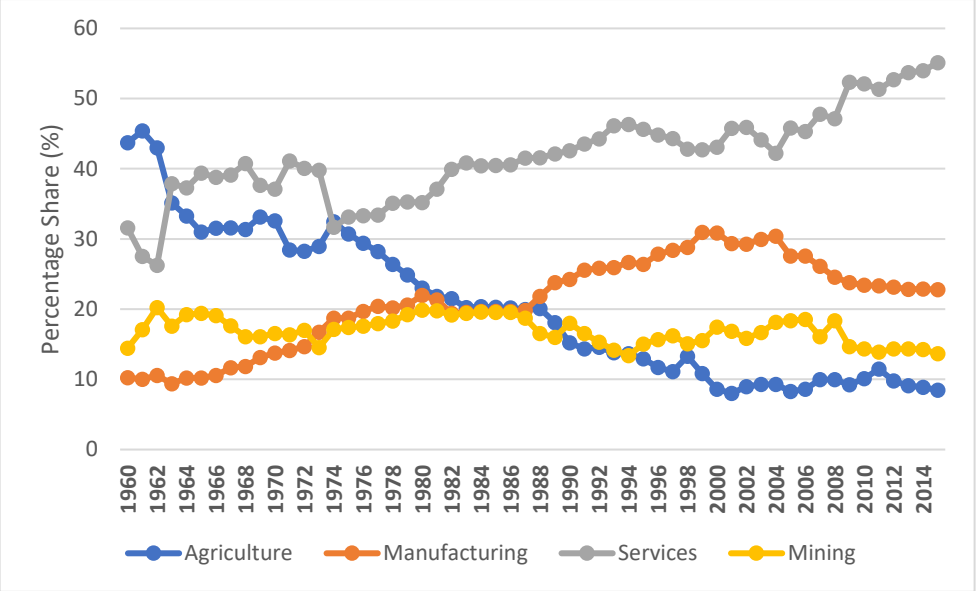
2.2.4 Petroleum and Gas

Petroleum and gas were important industry commodities, especially in the 1980s-1990s. The early phase of commercial oil exploration was from 1910 to 1929 in Sarawak, but this was exhausted by 1973 (Adnan 1982). Major discoveries in 1973 and 1974 off the coast of Terengganu, Sabah and Sarawak expanded the industry significantly. Liquefied natural gas (LNG) became an important industry since the 1980s. Both crude oil and LNG account for some 10-15 per cent of total exports in recent years.

2.2.5 Manufacturing

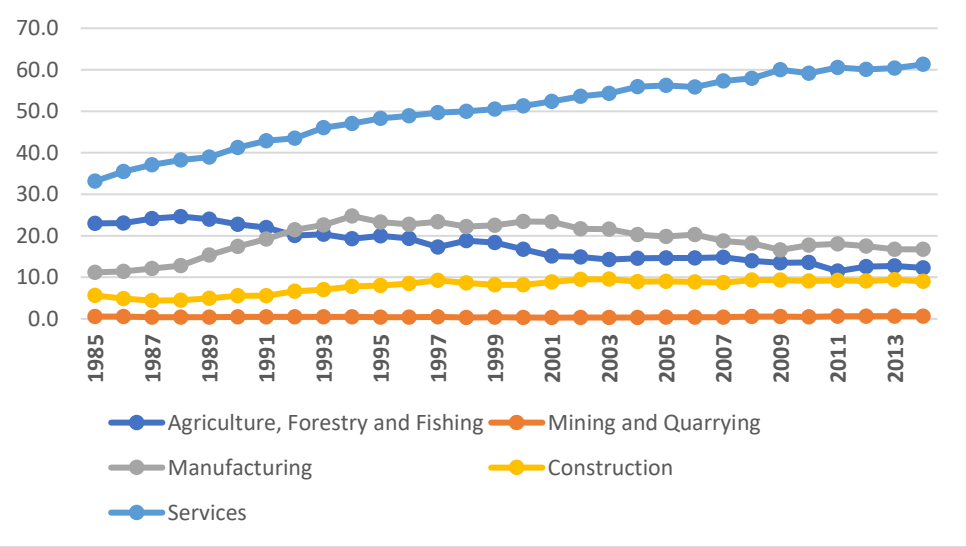
An even greater structural change has been the rise of the manufacturing sector. Malaysia's export oriented industrialization strategy began in the 1960s. As a result, the manufacturing sector's share of the GDP has risen over time from 10 per cent in 1960 to 31 per cent in 1999 (Figure 4). However, since 1999, manufacturing's contribution to the economy has declined and this can also be seen from the employment data (Figure 5).

Figure 4: Structural Composition of Malaysia's GDP, 1960-2015



Source: World Bank

Figure 5: Sectoral Composition of Total Employment, 1985-2014

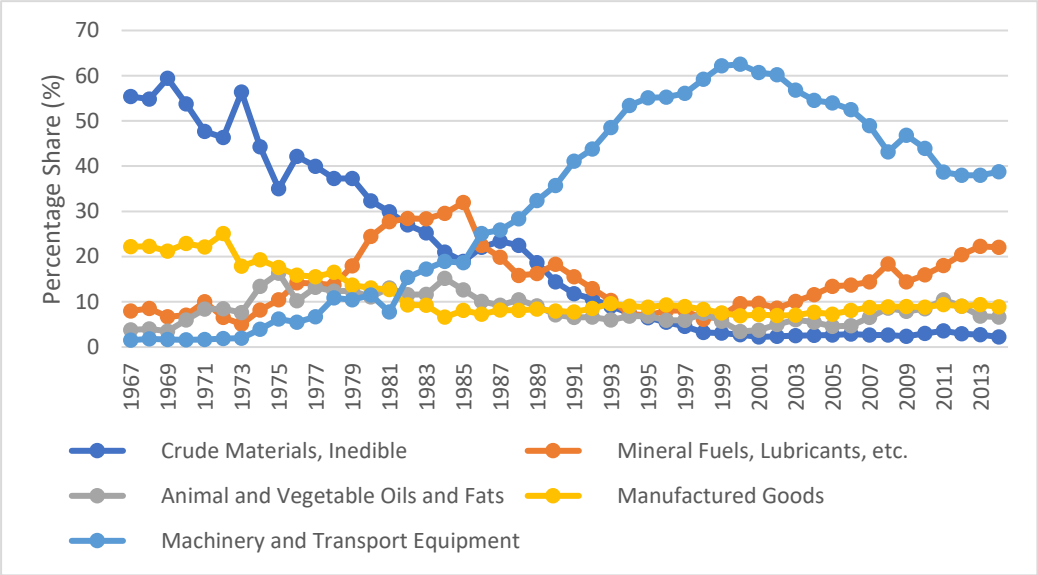


Source: DOS

The country's export structure has also changed over time (Figure 6). At its peak, in 1999, the manufacturing sector accounted for some 80 per cent of the country's total exports (Figure 7). The sector's share of GDP has, however, declined from 30 percent in 1999-2004 to about 22 percent in 2015. Thus, after a long period of industrialization over a period of forty years from around 1960 to 2000, the economy

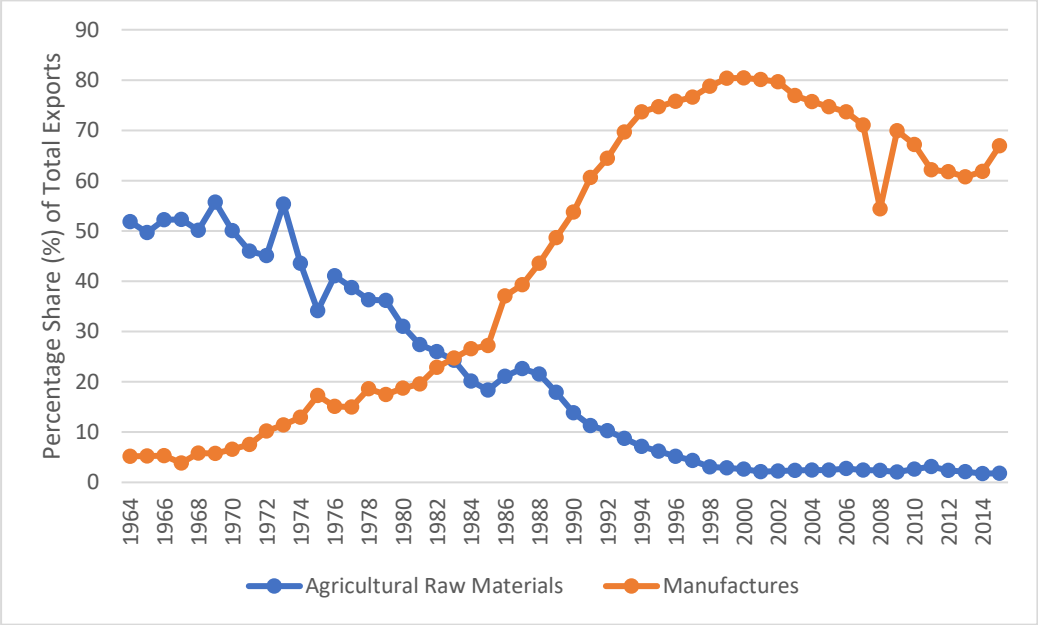
has been deindustrializing for more ten years since 1999/2000.This has been accompanied by the rise of the services sector's share of GDP (60 per cent) and employment (55 per cent).

Figure 6: Major Export Products (% Share of Total Exports)



Source: DOS

Figure 7: Agricultural and Manufactured Exports



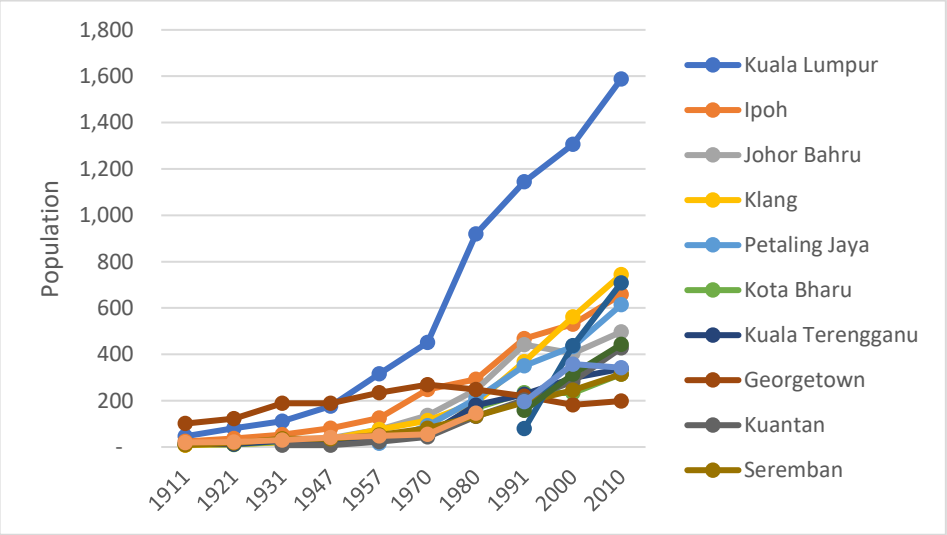
Source: World Bank

2.3 Structural Change and City Growth

The Malaysian economy has clearly undergone distinct phases of structural transformation, with each phase having distinct impacts on urbanization in Peninsular Malaysia. In the first phase (1850-1930), the development of the tin industry brought about massive migration of Chinese workers in the tin mining areas in three states, namely, Perak, Selangor and Negeri Sembilan (Sidhu and Jones 1981). The five largest cities during 1911-1931 were Georgetown (Penang), Kuala Lumpur (Selangor), Ipoh (Perak), Melaka and Taiping (Perak) (see Figure 8). With the exception of Melaka,

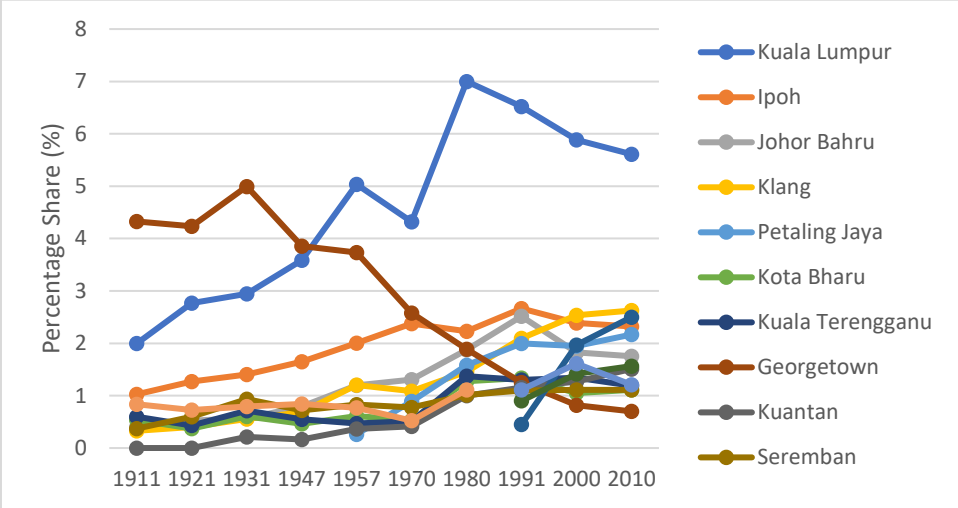
these cities were mainly associated with tin mining activities. With the decline in mining, a few cities that relied on mining such as Georgetown (which was involved in the trading and shipping of tin) and Taiping declined in importance (Figure 9). For other cities, such as Seremban and Kuala Lumpur, the advent and rapid growth of the rubber industry (during the periods 1911-1931 and 1947-1980) and later palm oil are likely to have mitigated the effects of the decline in the tin mining industry

Figure 8: Size of Major Cities, 1911-2010
('000 people)



Source: Lim (1978), Saw (2015), DOS

Figure 9: Major Cities' Share of Total Population, 1911-2010



Source: Lim (1978), Saw (2015), DOS

It might be possible to disentangle the effects of structural changes on city growth by estimating the following panel model:

$$PopCity_{it} = \beta_0 + \beta_1 Tin_{it} + \beta_2 Rubber_{it} + \beta_3 PalmOil_{it} + \varepsilon_{it} \quad (1)$$

Where *PopCity* is population size of city and the remaining independent variables measure output of commodities. All variables are measured in natural

logarithm. As the tin mining industry prospered in the pre-war period (before 1941), separate estimations are carried out for the post-war period. The Hausman specification test is used to check whether the random effects or fixed effects model should be used. The test indicate that the fixed effects model is appropriate and should be used. The results are summarized in Table 1.

During the pre-war period (1911-1931), population growth of cities was positively correlated with both tin and rubber productions. The coefficient size suggests that tin mining has a stronger correlation with city growth than rubber. As expected, the contributions of tin mining to city growth clearly declined after the war period (1947-2010). When palm oil production is included, this industry clearly has a greater correlation with city growth than rubber production.

Table 1: Commodity Production and City Size

	1	2	3	4
Period	1911-1931	1947-2010	1947-2010	1970-2010
Variables	Population	Population	Population	Population
Tin	0.753***	-0.568***	0.0354	-0.119
	0.204	0.0515	0.135	0.209
Rubber	0.185***	1.865***	-0.304	0.217
	0.0231	0.199	0.489	0.868
Palm Oil			0.419***	0.313**
			0.0884	0.127
Constant	-0.0565	-8.018***	9.968**	5.814
	2.17	2.705	4.461	8.932
Observations	28	82	82	61
Number of cities	10	14	14	14

Notes: *** p<0.01, ** p<0.05, * p<0.1
Source: Authors' calculations.

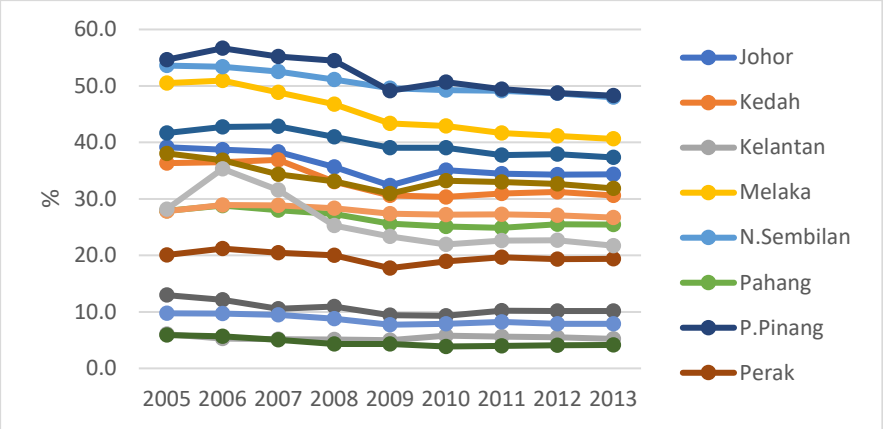
3. Medium-Term Structural Change: Industrialization and De-Industrialization

The Malaysian economy began de-industrializing in the 1990s. The manufacturing sector's share of GDP began declining in 1999 whilst the sector's share of employment began declining even earlier in 1994 (see Figure 4 and Figure 5). In this section, the economic geography of industrialization and de-industrialization is analysed at three levels of aggregation for population – state and district levels. This is undertaken to assess how economic activities affect agglomerations at different levels of aggregations.

3.1 State-Level

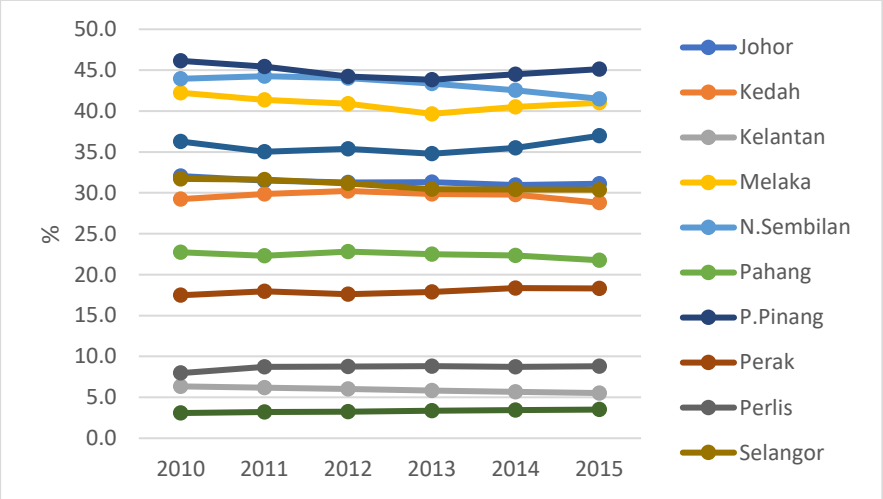
Some states are more industrialized than others (Figure 10 and Figure 11). The more industrialized states include Penang, Negeri Sembilan, Melaka, Terengganu (Oil and Gas), and Johor. During the period from 2005 to 2013, all states in Peninsular Malaysia experienced a decline in the manufacturing sector's share of GDP (Figure 12). The states that were most affected included Melaka (-9.9 per cent), Penang (6.4 per cent), Selangor (6.2 per cent), and Kedah (5.7 per cent).

Figure 10: Manufacturing Share of GDP, 2005-2013
(GDP Constant Price, 2005)



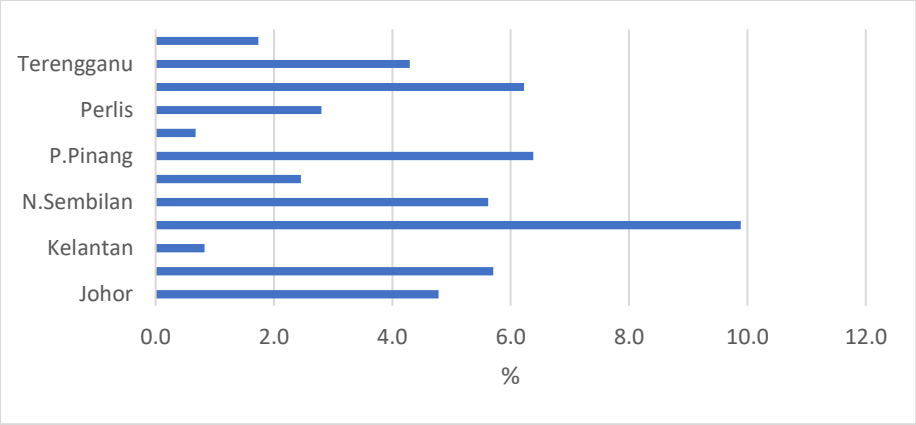
Source: DOS

Figure 11: Manufacturing Share of GDP, 2010-2015
(GDP Constant Price, 2010)



Source: DOS

Figure 12: Decline in Manufacturing Sector's Share of GDP, 2005-2013



Source: DOS

The following model can be estimated to investigate the relationship between population growth and structural change at the state level:

$$PopState_{it} = \alpha_0 + \alpha_1 AgriGDP_{it} + \alpha_2 ManufGDP_{it} + \alpha_3 ServGDP_{it} + \alpha_4 ConstGDP_{it} + \alpha_5 MinGDP_{it} + \varepsilon_{it} \quad (2)$$

Where PopState is state population and the right-hand side variables are sectoral real GDP (at constant price) for agriculture (AgriGDP), manufacturing (ManufGDP), services (ServGDP), construction (ConsGDP) and mining (MinGDP). All variables are measured in natural logarithm.

Two sets of data covering different periods are used, namely, (i) 2005-2013 (at constant 2005 prices); and (ii) 2010-2015 (at constant 2010 prices). The Hausman specification test indicates that the fixed effects model should be used. The results are summarized in Table 2. The negative correlation between manufacturing GDP and state population clearly indicates that the sector no longer contributes positively to state-level population growth after the year 2005. In contrast, the correlation between state population and services GSP is positive with a relatively large coefficient size.

Table 2: Population Growth and Sectoral GDP at State-Level

	1	2
	2005-2013	2010-2015
	Population	Population
Agriculture	0.0244***	-0.0431***
	0.00466	0.0149
Manufacturing	-0.0431***	-0.0504**
	0.0112	0.0194
Services	0.222***	0.235***
	0.00908	0.0244
Construction	0.0156***	0.0221***
	0.00558	0.0067
Mining	0.00795	-0.00938*
	0.00655	0.00488
Constant	5.248***	5.733***
	0.0803	0.125
Observations	108	72
R-squared	0.971	0.962

Notes: *** p<0.01, ** p<0.05, * p<0.1
Source: Authors' calculations.

3.2 District-Level

A more disaggregated level of analysis is at the district level. There are 82 districts in Peninsular Malaysia. Unfortunately, only population figures are available at the district level. Data on sectoral economic activities is at the state-level. A similar model is estimated for population in district *j* and state *i*:

$$PopDist_{it} = \alpha_0 + \alpha_1 AgriGDP_{it} + \alpha_2 ManufGDP_{it} + \alpha_3 ServGDP_{it} + \alpha_4 ConstGDP_{it} + \alpha_5 MinGDP_{it} + \varepsilon_{it} \quad (3)$$

District-level population are available from population censuses. Instead of total population, the density of population may also be another useful measure. Sectoral employment could be used as dependent variables as well:

$$PopDist_{it} = \alpha_0 + \alpha_1 AgriEmp_{it} + \alpha_2 ManufEmp_{it} + \alpha_3 RetailEmp_{it} + \varepsilon_{it} \quad (4)$$

where the right-hand side variables are state-level sectoral employment in logarithms.

The district-level population data are for 2005 and 2010.The results are summarized in Table 3. The Hausman specification test indicated that the fixed effects model should be used.

For sectoral GDP and employment, both population growth and population density growth are positively correlated to services GDP and employment growth. The opposite results are obtained for agriculture GDP. The manufacturing GDP and employment variables have negative coefficients but are not statistically significant. Thus, urbanization in more recent years have been driven by services employment.

Table 3: Population and Sectoral GDP and Employment, District-Level

	1	2
Agriculture (GDP / Employment)	-0.134**	-0.326**
	0.0616	0.149
Manufacturing (GDP / Employment)	-0.0137	-0.0162
	0.0933	0.244
Services (GDP)	0.428***	
	0.136	
Construction (GDP)	0.0346	
	0.155	
Mining (GDP)	-0.0766	
	0.0809	
Retail (Employment)		0.354**
		0.143
Constant	2.293***	4.990***
	0.805	1.124
Observations	163	164
Districts	82	82

Notes: *** p<0.01, ** p<0.05, * p<0.1
Source: Author's calculations.

4. Conclusion

Urbanization is a key feature of economic development. As a country becomes more developed, an increasing proportion of its population will migrate to, and live in urban areas. This process is also driven by structural transformation in terms of sectors of the economy. Malaysia underwent these changes for the past hundred years. The production of different types of primary commodities drove city growth during different period and phases – tin during 1911-1931, rubber in 1947-1970, and palm oil during 1970-2010. As the Malaysian economy industrialized, manufacturing activities became important drivers of city growth, especially from 1960 to 1990. However, as the Malaysian economy began to deindustrialize since the 1990s, the services sector has become the main driver of city growth.

For developing countries that are in the process and industrializing, Malaysia's experiences provide an example on how structural change can impact the trajectories of agglomeration economies spatially. From a policy perspective, as argued by Stiglitz (2019), a neglect of the impact of structural change on relocation of economic activities can have grave consequences arising from the rise in inequality. Such problems can be compounded by demographic factors such as aging population. This is a key policy challenge in countries such as Thailand which has a rapidly aging society and an economy that has begun to premature deindustrialize. For such economies, more attention is needed to facilitate participation of elderly workers in the services sector.

The productivity of the services sector will also need to be raised to ensure decent wages in the sector.

Acknowledgement

This paper was written as part of the research project on "Global Production Value Chain, Cities and Urban Amenities" organized by the Economic Research Institute for ASEAN and East Asia (ERIA). The author thanks the project leaders and participants in the project for their comments and suggestions. The usual caveat applies

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