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Tobacco Endgame: An economic justification for ending the Tobacco Epidemic in Malaysia

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Abstract--The 150th session of the WHO's executive board meeting in Geneva witnessed Malaysia's stance on passing legislation to bring about a generational endgame to smoking by making the sale of tobacco products illegal to individuals born after 2007. Nevertheless, the policy move was opposed mainly by tobacco-related multinational corporations, putting forward their stand as a responsible industry contributing to economic growth. Therefore, this study assessed the contribution of the tobacco industry to Malaysia's economy to justify the relevance of the endgame strategy. An initial viewpoint based on the industry's developmental progress indicated that tobacco had not significantly contributed towards growth. Based on the input-output modelling technique, the findings from the input content and multiplier impact analyses substantiated this view, showing a mismatch between the industry's potential impacts and its actual contribution. The results also showed that the industry's growth prospects were unsustainable in the long term since the industry's integration with its domestic input suppliers relied mainly on contract-farming practices. Therefore, Malaysia's tobacco endgame strategy implementation is justified based on the study's findings.

Keywords---economic impact, input-output modelling, Malaysia, tobacco endgame, tobacco industry

JEL classification: C67, L66, I18

1. Introduction

Tobacco control advocacies in Malaysia started as early as the 1970s. However, such advocacies failed to materialise into meaningful legislation as the industry was an important source of economic development and poverty alleviation (Assunta & Chapman, 2004; Barraclough & Morrow, 2017). The National Tobacco Board (NTB) substantiated the importance of the industry with its establishment in 1973 to regulate its operations and provide technical advice to farmers (NKTB, 2023). The NTB was then rebranded into the National Kenaf and Tobacco Board (NKTB) in 2010 due to government policies towards promoting the reduction of tobacco use and compliance with the World Health Organization's (WHO) Framework Convention on Tobacco Control (FCTC). Adding kenaf¹ as part of the board's jurisdiction was specifically aimed at assisting tobacco farmers transitioning to the new crop.

Despite the ratification of the WHO's FCTC and the NKTB's establishment, and Malaysia's location between Singapore and Thailand, which has among the world's most comprehensive tobacco control laws, tobacco control progress in Malaysia has been rather slow (Assunta & Chapman, 2004). Presently in Malaysia, seven major tobacco control milestones have been achieved; (i) Tobacco Control Law enactment²; (ii) WHO FCTC ratification; (iii) Malaysian Health Promotion Board establishment³; (iv) pictorial health warnings labelling on cigarette packets (PHWs) for the top 40% of the front and 60% the back or packets; (v) a second rotation of PHWs covering the top 50% of the front of packets; (vi) expansion of smoke-free areas; and (vii) cigarette minimum retail price increments (Tan & Dorotheo, 2021). Nevertheless, the milestones achieved have been far lower than those of Singapore and Thailand, which covered 11 and 20 areas, respectively.

Ramping up the nation's efforts towards tobacco control, Malaysia's Ministry of Health in 2022, through the 150th session of the WHO's executive board meeting in Geneva, expressed Malaysia's intention to pass legislation to bring about a generational endgame to smoking by making the sale of tobacco products illegal to individuals born after 2007. The move was justified by the continued prevalence of smoking in Malaysia, which has remained consistent over the past three decades and contributed directly to various malignant diseases. Through the endgame strategy, tobacco use is set to rapidly and permanently be reduced to a minimal level, effectively ending the tobacco epidemic by 2040. Building from this policy direction, the Generational Endgame (GEG) Bill was initially proposed for tabling in 2023, positioning Malaysia as a potential pioneer alongside New Zealand in phasing out tobacco sales to the younger generation. However, the Bill did not materialize, reflecting the policy and political complexities surrounding comprehensive tobacco control (Das, 2022; Rahim, 2023).

¹ Kenaf or scientifically known as *Hibiscus cannabinus*, is a short-term, fibrous plant that resembles a shrub. Kenaf crops were commercially introduced through the NKTB in 2010 as an alternative crop to tobacco.

² See Appendix 1 for the Tobacco Control Laws enacted by the Association of Southeast Asian Nations (ASEAN) member states.

³ The Malaysian Health Promotion Board was abolished in 2019 as part of the government's initiatives to implement rationalisation in agencies in the public service (see Tan & Dorotheo, 2021).

While the endgame strategy is crucial in determining the success of the WHO's FCTC, which reflects Malaysia's commitment to the global tobacco control movement, tobacco-related multinational corporations have continued their stand as members of a responsible industry contributing to economic growth. Therefore, this study sought to assess the contribution of the tobacco industry to Malaysia's economy, focusing on the tobacco products industry under the manufacturing segment. Concerning the modelling approach, this study applied the input content, multiplier and industrial integration measures based on the input-output modelling technique using the harmonised 2010 and 2015 input-output tables. This approach was justified by its capability to address the interdependencies relating to the industry's integration into the economic system.

It is important to note that this study offered two novel aspects. First, concerning scientific knowledge, this study developed impact assessment models specifically for the case of the tobacco industry to ascertain its impact on the Malaysian economy. Second, the study provided evidence-based insights into the relevance of implementing the tobacco endgame strategy, which is currently lacking in Malaysia. Although these exercises were structured from an academic perspective, the outcomes are highly applicable to policy decisions.

The presentation of this study is structured into five sections. Section 2 discusses the gaps in the existing literature to justify this study's contribution to the literature. Section 3 explains the methodological approach. Section 4 presents the study's main findings, and Section 5 provides the concluding remarks.

2. Literature Review

The Malaysian tobacco endgame strategy is a novel effort which lends support to the international movement to restrict the demand and supply of tobacco products, the marketing and sponsorship of tobacco products, as well as the global shift of contraband and illicit cigarettes (Pei Heng et al., 2020). In addition, it has also explicitly aimed to address the tobacco-induced health problem, which has created social and economic costs for both the people and the government (Lim et al., 2016; Pei Heng et al., 2020). Despite the ratification of the WHO's FCTC and the implementation of various tobacco control measures⁴, the smoking prevalence in Malaysia is still high, leading to an increased financial burden on the nation's healthcare system in preparing to address the increasing incidence of tobacco-related diseases.

The review of existing literature showed that the number of tobacco endgame and tobacco-related studies for the Malaysian case has been increasing. However, none were found to be studied from a macro-perspective, considering the interconnections of the tobacco industry with other industries in the economic system. As such, past studies have not been able to ascertain the potential

⁴ The current tobacco control measures in Malaysia have been guided by the MPOWER, which highlighted six tobacco-control strategies in-line with the WHO's FCTC (World Health Organization, 2021). The strategies include (i) monitoring tobacco use and prevention policies, (ii) protecting people from tobacco smoke, (iii) offering help to quit tobacco use, (iv) warning people about the dangers of tobacco, (v) enforcing bans on tobacco advertising, promotion and sponsorship, and (vi) raising taxes on tobacco.

implications of the endgame strategy from various economic viewpoints—economic losses and gains from the endgame. A key challenge that has hindered such a research perspective has been the difficulty of developing a robust model to bridge tobacco endgame strategy's implications for growth.

Assessing how the tobacco industry impacts various economic perspectives is no longer a new empirical development. In the early 1990s, a case study was conducted in Glasgow, UK, to assess the regional economic impact of reducing the resident's cigarette expenditure using the input-output approach (Mcnicoll & Boyle, 1992). A similar method was applied in Canada to examine the resource allocation effects of reducing tobacco consumption resulting from tobacco control legislation (Irvine & Sims, 1997). A more recent study in Indonesia also employed the same model to provide a comprehensive estimate of the net impact of tobacco taxation on Indonesia's economy (Bella et al., 2023). On top of the input-output method, the social accounting matrix (SAM) approach was also utilised to quantify the impact of changes in tobacco demand in Bangladesh (Husain & Khondker, 2016).

A critical lesson highlighted in the existing studies is the importance of robust models to guide evidence-based policy decisions. The studies have validated that the tobacco industry has contributed to economic growth. However, implementing tobacco control measures, whether through the ceasing of sales and production or taxation, would not negatively impact the economy as the reallocation of resources from the industry to other productive industries offsets the overall impacts (Bella et al., 2023; Husain & Khondker, 2016; Irvine & Sims, 1997; Mcnicoll & Boyle, 1992). In the case of Malaysia, a model that considers the value chain perspective would best capture the broader economic implications of comprehensive tobacco control policies, given their potentially disruptive effects on the economic structure.

3. Methodology

The input-output modelling technique was utilised as the primary approach in this study due to its capability to address the industrial interdependencies aspect in the economy. Such a perspective was vital to achieving the underlined objective since this study aims to assess how the tobacco industry impacts the Malaysian economy, thus, justifying whether implementing the endgame strategy would disrupt the economic system.

This section is structured into four subsections. The first subsection gives an introductory exposition of input-output modelling. Next, the second subsection expands the basic input-output model for input content and multiplier analysis. The third subsection describes the industrial integration measures, and the last subsection provides the data sources and classifications.

3.1 Input-Output Model

The implementation of tobacco endgame strategy, banning tobacco product sales to youths and, thus, eliminating the smoking habit among Malaysians by 2040, is indeed a novel policy approach. However, implementing such a strategy is feared

to bring adverse economic consequences as the industry is integrated deeply into Malaysia's economic system. From an industrial interdependency perspective, banning tobacco product sales implies that policymakers need to eliminate the value chain of the tobacco industry, thus, disrupting the overall economic system. The input-output modelling technique was employed in this study to ascertain the impact of the tobacco industry on Malaysia's economy and to address the interdependency concern, following the strand of literature in this area (Bella et al., 2023; Irvine & Sims, 1997; Wijaya et al., 2014).

The interdependency perspective in the input-output model, referred to as the Leontief model, is given in Equation (1) below:

$$\begin{aligned} \mathbf{x} &= \mathbf{Z}\mathbf{i} + (\mathbf{c} + \mathbf{i} + \mathbf{g} + \mathbf{e}) \\ \mathbf{x} &= \mathbf{Z}\mathbf{i} + \mathbf{f} \end{aligned} \quad (1)$$

where \mathbf{x} is total output, \mathbf{Z} denotes the intra- and interindustry transactions in acquiring domestically produced intermediate inputs, \mathbf{i} is a column vector of sector n , and \mathbf{f} is the final demand vector, which consists of; private consumption (\mathbf{c}), investment (\mathbf{i}), government consumption (\mathbf{g}) and exports (\mathbf{e}). As a result, Equation (1) states that total output equals the sum of intermediate inputs plus final demand.

Intermediate inputs are represented as endogenous variables in the model, whereas final demand is treated as exogenous variables. Equation (1) can be modified as follows to create a standard Leontief input-output model:

$$\begin{aligned} \mathbf{x} &= \mathbf{A}\mathbf{x} + (\mathbf{c} + \mathbf{i} + \mathbf{g} + \mathbf{e}) \\ \mathbf{x} &= \mathbf{A}\mathbf{x} + \mathbf{f} \end{aligned} \quad (2)$$

where \mathbf{A} is the input-output coefficient matrix, which depicts the amount of input a sector buys from other sectors per unit of output. By adopting an n -sector economy with an intersectoral transaction matrix (\mathbf{Z}) and sectoral total output vector (\mathbf{x}), the input-output coefficient matrix can be expanded as follows:

$$\mathbf{A} = \mathbf{Z}\hat{\mathbf{x}}^{-1} \quad (3)$$

where $\hat{\mathbf{x}}$ is the diagonalised matrix of \mathbf{x} reflecting the intermediate purchase of sector j from sector i . Equation (2) can be represented as follows:

$$\begin{aligned} \mathbf{x} &= (\mathbf{I} - \mathbf{A})^{-1}\mathbf{f} \\ \mathbf{x} &= \mathbf{L}\mathbf{f} \end{aligned} \quad (4)$$

where \mathbf{I} is the identity matrix and $(\mathbf{I} - \mathbf{A})^{-1}$ is the Leontief inverse matrix or multiplier matrix. The elements in this matrix reflect the total output impacts for any sector j to meet each unit of final demand.

3.2 Input Content and Multiplier Measures

In the first part of the impact assessment procedure, input content and multiplier measures were developed to inform the magnitude of the economic contribution of

the tobacco industry. Specifically, the measures were intended to quantify the intensity of inputs utilised in production activities and the economic returns generated from final demand changes. It is worth noting that input content reflected the actual contribution of the industry, while the multiplier impacts only reflected the potential contribution. The assessment process included four focus indicators; value-added, compensation of employees (COE), imports and employment. Taking the example of value-added, the modelling approach for the input content and multiplier impact started with the derivation of sectoral value-added coefficient \mathbf{r} as follows:

$$\mathbf{r} = \mathbf{c}\mathbf{x}^{-1} \quad (5)$$

The value-added coefficient \mathbf{r} denotes the value-added per unit of output for each industry, indirectly informing the intensity of value-added (in terms of COE and operating surplus) per unit of production. By expressing \mathbf{r} in a diagonal matrix and introducing it into Equation (4), the amount of value-added used to produce output for final demand can be derived as:

$$\mathbf{c} = \hat{\mathbf{r}}(\mathbf{I} - \mathbf{A})^{-1}\mathbf{f} \quad (6)$$

where $\hat{\mathbf{r}}$ is the value-added coefficient expressed in the form of a diagonal matrix. As shown in Equation (5), a similar procedure can be repeated to obtain the coefficient for the variable of interest and introduced into Equation (4) to expand the model for other indicators.

3.3 Industrial Integration Measures

Industrial integration measures were developed to describe the degree of integration between the tobacco industry and other domestic industries to deepen the analysis's scope. The measures (including the backward (BL) and forward (FL) linkages) were modelled using the hypothetical extraction method (HEM) to examine the backward and forward integration. The application of HEM was centred on the idea that the hypothetical elimination of the tobacco industry from the economic system would allow for the estimation of its economy-wide contribution (Temurshoev & Oosterhaven, 2014). Globally, a similar approach has been applied since the early 2000s in studying the cases of water and construction industries (Duarte et al., 2002; Song et al., 2006). While in Malaysia, the approach has been utilised to analyse the impacts of the waste industry and identify the drivers of the economy (Utiti et al., 2015, 2021).

For BL, HEM eliminated the i -th column of the input-output coefficient matrix, denoted by \mathbf{A}^{-i} , and nullified the i -th element of the final demand vector, denoted by \mathbf{f}^{-i} . Following this process, the vector of total output after extracting industry i was given by:

$$\mathbf{x}_l^{-i} = \mathbf{L}^{-i}\mathbf{f}^{-i} \quad \text{with} \quad \mathbf{L}^{-i} = (\mathbf{I} - \mathbf{A}^{-i})^{-1} \quad (7)$$

For FL, HEM eliminated the i -th row of the output coefficient matrix, denoted by \mathbf{B}^{-i} , and nullified the i -th element of the primary input vector, denoted by \mathbf{d}^{-i} —consisting of value-added (\mathbf{v}), imported intermediate input (\mathbf{m}) and indirect tax (\mathbf{t}). Therefore, the total input after extracting industry i was given by:

$$\mathbf{x}_b^{-i} = (\mathbf{d}^{-i})' \mathbf{G}^{-i} \text{ with } \mathbf{G}^{-i} = (\mathbf{I} - \mathbf{B}^{-i})^{-1} \quad (8)$$

The coefficients in matrix \mathbf{B} are also known as elements of the Ghosh inverse matrix. The Ghosh model is supply-driven, where the value-added and imports are treated as exogenous variables, and the final demand is the endogenous variable. In short, the Ghosh model can be summarised as follows:

$$\mathbf{x}' = \mathbf{i}' \hat{\mathbf{x}} \mathbf{B} + \mathbf{d}' = \mathbf{x}' \mathbf{B} + \mathbf{d}' \quad (9)$$

where $\mathbf{i}' \hat{\mathbf{x}} = \mathbf{x}'$, \mathbf{B} ($\mathbf{B} = \hat{\mathbf{x}}^{-1} \mathbf{Z}$) represents the output coefficient matrix, and \mathbf{d}' is the vector of the primary inputs (i.e., value-added and imports). Each element of the output coefficient matrix shows the delivery z_{ij} of the commodity from industry i to industry j per unit of the seller's output. Equation (9) can be solved to yield:

$$\mathbf{x}' = \mathbf{d}' (\mathbf{I} - \mathbf{B})^{-1} = \mathbf{d}' \mathbf{G} \quad (10)$$

The normalised BL and FL, due to the complete extraction based on Equations (7) and (8), can be derived as follows:

$$\hat{B}_i = \frac{\mathbf{i}' \mathbf{x} - \mathbf{i}' \mathbf{x}_l^{-i}}{x_i} \text{ and } \hat{F}_j = \frac{\mathbf{x}' \mathbf{i} - (\mathbf{x}_b^{-i})' \mathbf{i}}{x_i} \quad (11)$$

where $\mathbf{i}' \mathbf{x} - \mathbf{i}' \mathbf{x}_l^{-i}$ and $\mathbf{x}' \mathbf{i} - (\mathbf{x}_b^{-i})' \mathbf{i}$ represent the total output and inputs after extraction of the industry i .

The tobacco industry was considered to have a robust economic integration if any of the BL or FL indices exceeded the benchmark value of 1.

3.4 Data Source and Classification

The primary datasets used in this study were the input-output tables for the base years 2010 and 2015 (DOSM, 2014, 2018), which were transformed into 2015 constant prices through the double-deflation technique⁵ employed by Saari et al. (2020). The tables comprised 124 sectors and were classified according to the Malaysia Standard Industrial Classification 2008 (MSIC 2008) (DOSM, 2008). Table 1 lists the tobacco-related economic activities available in the harmonised input-output tables. Despite the extensive coverage of tobacco-related activities, ranging from upstream agriculture to downstream manufacturing and wholesale and retail activities, this study focused only on tobacco products in the Manufacturing segment to represent the tobacco industry. Two factors justified the focus. First, the size of tobacco-related activities at the upstream level was insignificant, with most small farmers concentrated on the Eastern Coast of Malaysia (Barraclough & Morrow, 2017). In 2007, an estimated 3,140 tobacco farmers were recorded across states, declining from 20,821 in 2000 due to the closure of tobacco processing operations. Second, the wholesale and retail

⁵ The double-deflation technique is a standard procedure used to estimate the real value added of a sector (see, for example, Dietzenbacher et al., 2013). In the context of input-output analysis, the technique is applied to transform input-output tables expressed in nominal prices into a constant price to reveal the actual magnitude of structural changes over the years.

segment is theoretically independent of the local tobacco industry since tobacco products are readily obtainable at a lower cost from neighbouring countries.

Table 1. List of economic activities according to the MSIC 2008 and industrial grouping

MSIC	Description of activities	Industry
01150	Growing of tobacco	Other Agriculture
01632	Preparation of tobacco leaves – preliminary processing	
12000	Manufacture of tobacco products	Tobacco Products
46327	Wholesale of tobacco, cigar, cigarettes	Wholesale & Retail
47230	Retail sale of tobacco products in specialised stores	Trade
47810	Retail sale of food, beverages and tobacco products via stalls or markets	

Source: DOSM (2008)

4. Results and Discussion

This study assessed the impacts of the tobacco industry on Malaysia's economy as a measure towards justifying the tobacco endgame strategy. Specifically, the models developed in Subsections 3.2 and 3.3 were applied to the harmonised input-output tables for 2010 and 2015. The results from the analyses were structured into three subsections. The first subsection provides an overview of the industry's developmental progress. The following subsection discusses the industry's input content and multiplier impact, and the last subsection details the findings for industrial integration.

4.1 Overview of the Tobacco Industry Developmental Progress

The tobacco industry has long been deeply integrated into Malaysia's economic system, from upstream growing and preliminary processing activities to downstream wholesale and retail trades. However, little developmental progress has been recorded over the years due to the growing advocacy for tobacco regulations, primarily because of government policies and compliance with the WHO's FCTC. Figure 1 presents the industry's economic contribution in terms of GDP creation between 2010-2020 to reflect its developmental progress.

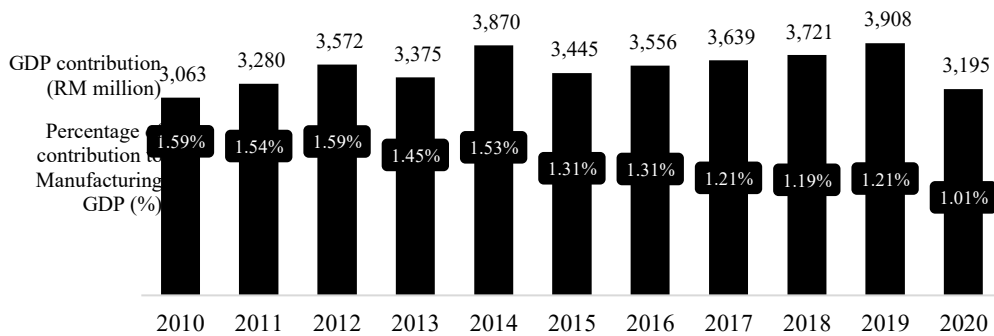


Figure 1. The economic contribution of Malaysia's tobacco industry, 2010-2020
Source: DOSM (2021)

The average contribution of the tobacco industry (under the Manufacturing segment) towards the Malaysian economy between 2010-2020 was valued at approximately 0.3% or less than RM4 billion per year, growing marginally at 0.4% annually (DOSM, 2021). While there seemed to be consistent growth during 2015-2019, the industry's contribution to the economy was small. From the overall Manufacturing perspective, the contribution size was estimated at 1.0% in 2020, decreasing consistently from the highest value of 1.6% in 2010. The main factor which explains this trend has been the faster growth of other focused manufacturing activities, including electrical and electronics, as well as machinery and equipment industries.

Based on this overview, an initial viewpoint has been established that the industry has contributed less towards Malaysia's economic growth. The following subsections describe the magnitude of its impacts and integration level to confirm such a claim.

4.2 Input Content and Multiplier Impacts

The discussion in this subsection focuses on the input content and multiplier impacts of the tobacco industry in Malaysia. As described in Subsection 3.2, content analysis was conducted to quantify the intensity of inputs utilised in producing each Ringgit of output. Based on the input-output modelling framework, inputs were separated into four components covering; value-added, COE, imported intermediate input and employment. As such, value-added content quantified the overall amount of input in terms of salary and wages (COE) and capital expenditure (operating surplus) required to produce RM1 of tobacco industry products and the same applied to the remaining indicators. Table 2 presents the input content findings between 2010-2015.

Table 2. Tobacco industry input content per Ringgit of output, 2010-2015

Indicator	Content per Ringgit of output (RM)		Average annual growth (%)
	2010	2015	2010-2015
Value-added	0.67	0.50	-5.72
- Compensation of employees ^a	0.14	0.04	-21.12
Imported intermediate input	0.12	0.29	18.87
Employment ^b	144	42	-21.81

Notes: ^aThe System of National Accounts (SNA) records COE as part of value-added. ^bEmployment content was valued by the number of jobs created per RM100 million output.

Source: Estimated based on Equation (5).

The overall findings highlighted that value-added, COE and employment showed decreasing content per Ringgit of output throughout the study period, implying a reduced contribution to the economy. For instance, the reduced value-added content from RM0.67 to RM0.50 indicated the industry's contribution to labour and capital owners had reduced. From the national accounting perspective, such a situation also reflected the reduced capacity of the tobacco industry to generate GDP⁶. As for the COE, a similar outcome was witnessed as it was accounted for as part of the value-added. Additionally, the growth of the industry's contribution to value-added seemed to have less impact on the workers in the industry, with only 20.9% of the value-added share attributed to salary and wages in 2010 and 8.0% in 2015⁷. Concerning employment creation, fewer jobs were estimated per RM100 million output, reducing from 144 to 42 jobs in only five years.

Malaysia's commitment to regional trade agreements, especially in the ASEAN community, was mainly responsible for the shrinking contribution (Barraclough & Morrow, 2017). With tobacco listed among goods subjected to tariff liberalisation under the Common Effective Preferential Tariff (CEPT) agreement between the ASEAN member states in 2010, local small farmers must compete with those in other ASEAN countries. Therefore, these developments resulted in a drastic growth in raw tobacco product imports, leading to the growing import content per Ringgit output from RM0.12 to RM0.29.

Table 3 provides an alternate view of the contribution of the tobacco industry based on the multiplier measure. The table describes the magnitude of the potential economic returns generated by the industry as a consequence of the growth in its final demand.

⁶ In the SNA, the production approach of measuring the GDP includes the components of value-added and import duty. In 2010 and 2018, value-added represented 99% of the total Malaysian GDP, while import duty only constituted about 1%. Therefore, it justified the direct linking of value-added to GDP.

⁷ The value-added share attributed to salary and wages was calculated by taking the share of COE content as a percentage of value-added content. This calculation conformed to the SNA's standards that treat COE as part of value-added.

Table 3. Tobacco industry multiplier impacts, 2005-2015 (RM)

Indicator	2010	2015	Multiplier trend	movement
Value-added	0.77	0.65	Decreasing	
- Compensation of employees ^a	0.17	0.09	Decreasing	
Imported intermediate input	0.23	0.35	Increasing	
Employment	452	223	Decreasing	

Notes: ^aThe System of National Accounts (SNA) records COE as part of value-added.

Source: Estimated based on Equation (6).

In general, similar trends are shown in Table 3 compared to the input content findings in Table 2. The multiplier magnitude reduced from 0.77 to 0.65 between 2010-2015, implying that RM1 growth in final consumption (both domestic and foreign consumers) resulted in only RM0.65 value-added creation in 2015, taking value-added as an example. Although the findings from both tables were comparable (both are expressed per Ringgit), the multiplier outcomes were quantified to be slightly higher. In short, this highlights the fact that there has been a mismatch between the industry's potential impacts (multiplier impacts) with its actual contribution (input content) due to external determinants, such as regional trade agreements.

4.3 Industrial Integration

The discussions in this subsection are particularly important as they complement the input content and multiplier impact findings, thus, shaping the overall framework towards justifying the endgame strategy's relevance. Based on the BL and FL, industrial integration has been commonly utilised in development planning processes to reveal the integration level between domestic industries. Specifically, BL describes the integration between the tobacco industry with industries acting as its input supplier, while FL describes the integration between the tobacco industry and industries serving as its output buyers. Figure 2 presents the backward and forward integration of the tobacco industry between 2010-2015.

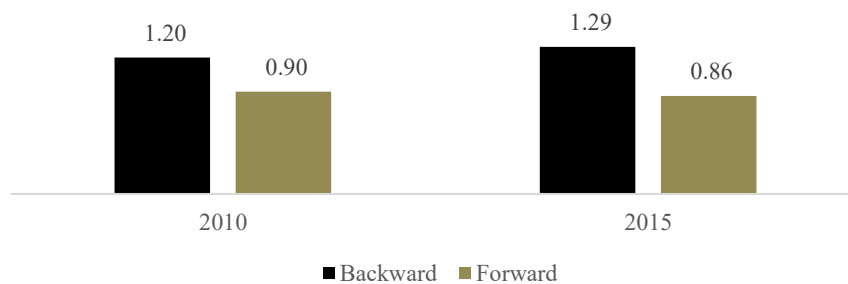


Figure 2. The backward and forward industrial integration of the tobacco industry, 2010-2015

Note: Linkages are expressed in index form.

Source: Estimated based on Equation (11).

From the BL perspective, the above-average normalised index of 1.20 and 1.29 during the studied period proved the strong integration of the industry with industries along its input chain. Therefore, it suggested the increasing output demand (assuming for exports) for tobacco products, which has led to the industry's growth, potentially creating economic spillover to its input supplier industries. This situation is particularly true for upstream tobacco-related activities that comprise mostly contract farmers for the tobacco processors (Barraclough & Morrow, 2017). Another important evidence for the strong BL was the inability of local upstream industries to penetrate international tobacco processing markets due to the inefficiency of local leaf production by international standards. Therefore, locally grown leaves have only been sold to local tobacco processors.

For the FL, clear evidence for the lack of integration was available, with the index between 2010-2015 declining from 0.90 to 0.86. Considering the nature of business for the tobacco industry, the outcome indicated that tobacco products were mainly intended for end-consumers. A detailed description of end-consumers by source, as reflected by the final demand components, is given in Table 4.

Table 4. Composition and growth of final demand components in the tobacco industry, 2010-2015

Components	2010		2015		Average Annual Growth (%) 2010-2015
	RM Bil	% Share	RM Bil	% Share	
Private consumption	1.87	85.45	2.17	59.15	3.03
Gross fixed capital formation	-	-	-	-	-
Change in inventory	-	-	-0.15	-3.97	-
Export	0.32	14.55	1.65	44.82	38.87
Total final demand	2.19	100.00	3.67	100.00	10.89

Sources: Authors' calculation based on the harmonised input-output tables (2015=100)

Table 4 shows a significant share of tobacco products have been marketed domestically. Nevertheless, the percentage reduced from 85.45% to 59.15% between 2010-2015. The drastic growth in exports of tobacco products, by almost 39% in the same period, explained the shrinking share of local marketing. These observations are alarming for the Malaysian economic system as they signified that productive domestic resources had been utilised to support the growing export demand for tobacco products. Furthermore, a substantial share of the tobacco processing industry in Malaysia is controlled by multinational corporations (Assunta & Chapman, 2004; Barraclough & Morrow, 2008). Therefore, the operation of the tobacco industry in Malaysia mainly benefits multinational corporations rather than local ones in terms of value-added and COE creation (refer to Table 2).

5. Conclusion and Policy Recommendations

This study assessed the contribution of the tobacco industry to Malaysia's economy as a measure of justifying the relevance of implementing the tobacco endgame strategy. The assessment was performed by developing the input content, multiplier and industrial integration measures using the harmonised 2010 and 2015 input-output tables.

An initial viewpoint based on the industry's developmental progress indicated that tobacco had contributed less towards growth. The input content and multiplier impact findings substantiated this view, indicating a mismatch between the industry's potential impacts and its actual contribution. While the multiplier impact, especially on value-added, was considered high, the estimated value-added content per Ringgit of tobacco industry output was slightly lower and demonstrated a reduced trend. This situation reflected the reduced capacity of the tobacco industry to generate GDP. Its contribution to COE was also marginal, as the capital owners enjoyed most of the value-added growth. A similar trend of contribution was available for employment.

Although the tobacco industry is highly integrated with its domestic input suppliers, evidence from past studies has shown that the strength of integration has relied mainly on contract-farming practices. These findings asserted that the industry's growth prospects are unsustainable in the long term. Additionally, the recent marketing trend has been weighted more towards exports. Despite exports being the primary source of national income, weighing it against the import content per Ringgit of tobacco industry output revealed that the growth of this industry would create more economic leakages due to the currency outflow. A more concerning issue is that utilising productive domestic resources to support export demand might only benefit multinational corporations.

Malaysia's tobacco endgame strategy implementation has been justified as the industry brings a minimal contribution towards growth based on the present study's findings. Furthermore, promoting and supporting the development of the industry also contradicts the policy directions underlined in the Malaysia Plan that focuses on catalysing strategic and high-impact industries to boost economic growth and improve the COE share (see EPU, 2021).

Despite the novel aspects offered, this study had two limitations. First, this study excluded the latest input-output tables for base years 2019 and 2020 in the assessment due to constraints related to the data required for transforming the tables into 2015 constant prices. Second, the present study only attempted to reveal the economic contribution of the tobacco industry without considering the comparison between the economic cost of the endgame strategy as opposed to the public healthcare cost committed to tobacco-related illnesses. Addressing these limitations should be key considerations for future studies.

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Appendix

Appendix 1. Tobacco control policy milestones in ASEAN

Country	WHO Ratification	FCTC	Tobacco Control Law Enacted
1. Myanmar	21 April 2004		Control of Smoking and Consumption of Tobacco Product Law (2006)
2. Singapore	14 May 2004		Smoking (Prohibition in Certain Places) Act (1992), Tobacco (Control of Advertisements and Sale) Act (1993) and its Notifications and Regulations
3. Brunei	3 June 2004		Tobacco Order 2005 and its Regulations
4. Thailand	8 November 2004		Tobacco Products Control Act B.E. 2535 (1992), Non-Smokers' Health Protection Act B.E. 2535 (1992) and Tobacco Products Control Act (2017)
5. Vietnam	17 December 2004		Tobacco Control Law 2012
6. Philippines	6 June 2005		Tobacco Regulation Act 2003 (RA 9211), Sin Tax Reform Law (RA 10351) and Graphic Health Warnings Law (RA 10643)
7. Malaysia	16 September 2005		Control of Tobacco Products Regulation 2004 and Control of Tobacco Product (Amendment) Regulations 2008; 2009; 2010; 2011, and 2013 under the Food Act 1983, National Tobacco Control Law already drafted
8. Cambodia	15 November 2005		Tobacco Control Law 2015
9. Lao PDR	6 September 2006		Tobacco Control Law 2009
10. Indonesia	Has not signed the FCTC		National Health Law No. 36/2009

Source: Tan & Dorotheo (2021)