MALAYSIAN BATIK INDUSTRY CONTRIBUTION ANALYSIS USING DIRECT AND INDIRECT EFFECTS OF INPUT-OUTPUT TECHNIQUES

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ABSTRACT

The objective of this paper is to examine the economic contribution of batik industry to the Malaysian economy by using the input-output analysis technique. Today, batik industry is known as a successful cottage industry. Throughout the years of its existence, batik industry has contributed to creating jobs for local communities, raise the prestige of country's fashion industry through creative design on fabric, support the development of country's cultural tourism industry as well as to lead the development of Malaysian craft industries. Despite the success of the industry, it's still developed by small enterprises and even, some of batik firms are categorized as microenterprises. This sense raises the question of the extent to which batik industry contributes to the Malaysian economy. Data on batik making in the Malaysian Input-Output Table 2010 was used to examine the economic contribution of batik industry in terms of direct and indirect effects of input-output techniques. This analysis found that this industry contribute significantly to the Malaysian economy through the advantages of indirect effects that is, how the first-order effects of batik industry give rise to second and higher-order effects to other sectors and also, lead to an additional input required especially import commodities and labor.

Keywords: Malaysian Batik; Input-Output analysis; Direct Effects; Indirect Effects.

1. INTRODUCTION

Malaysian batik is one of the local craft that is well known around the world. By taking into account the view of past studies by local researchers, most of local batik entrepreneurs define batik as a process of drawing fine lines or dots of wax on the surface of fabrics to inspire batik design to avoid the absorbing colours during the dyeing process (Akhir, and Ismail, 2015; Yunus, 2011; Azmi et al., 2009; Osman, 2002; Kheng, 2002). Commonly, local people recognize batik through the uniqueness in variety of designs and colours. Globally, United Nations Educational, Scientific and Cultural Organization (UNESCO) has classified the batik craft as an "intangible cultural heritage of humanity"[1], in which it highly related to the one of the traditions or living expressions inherited from

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[1] UNESCO has classified Indonesian batik as a part of the "intangible cultural heritage of humanity". The global recognition by UNESCO will give the old tradition of batik some degree of protection under the UNESCO charter.

our ancestors to be passed on to our descendants. In the meantime, this recognition creates better opportunities for the Malaysian batik to be developed in a more advanced manner, not only locally, but also internationally. In the case of Malaysia, this industry is categorized in the manufacturing sector of Small and Medium Enterprises (SMEs) (Hairuddin, Noor, and Malik, 2012; Mokhtar and Ismail, 2012).

In recent years, there has been growing attention to the development of Small and Medium Enterprises and their roles to boost economics performance (Saleh and Ndubisi, 2006; Hoq, Che Ha, and Said, 2009; Bozkaya and Van Pottelsberghe De La Potterie, 2008; Moore and Manring, 2009; Khan and Khalique, 2014). Furthermore, the larger part of world economies are the small firms and that is why government, relevant agencies and researchers are seeking and take deep interest in understanding the role of SMEs and how this industry would help to develop the business activites in urban or rural area in a country (Khan and Khalique, 2014). SME Annual Report 2014/2015 revealed that the long term growth trend of SMEs in Malaysia since 2004 has remained, indicating the SME Gross Domestic Product growth continuously outpacing the overall growth of Malaysian economy. In fact, due to positive growth of SMEs, SME employment recorded more workers absorbed rather than large firms. With this classification, batik industry also expected to help the development of Malaysian economy. To understand in general view, we explore the current performance of Malaysian batik industry.

Historically, batik craft has been known for centuries, where it is presumed to be 2000 years old (Robinson, 2001). Presently, this industry has been known as a successful cottage industry in Malaysia (Nordin and Bakar, 2012). Explore more indepth in local craft performance, Malaysian Handicraft Development Corporation has acknowledged the sales of batik as a main performance indicator to lead the Malaysian local craft sales to reach its target of RM1 billion in 2016. In the case of Malaysia, Malaysian Handicraft Development Corporation (MHDC) implements various initiatives and methods at domestic and global levels to ensure that local craft industry keeps moving forward in the future. Figure 1 shows that the performance of craft sales has increased every year since 2009 to 2013.

Figure 1: Malaysian Handicraft sales (RM million)
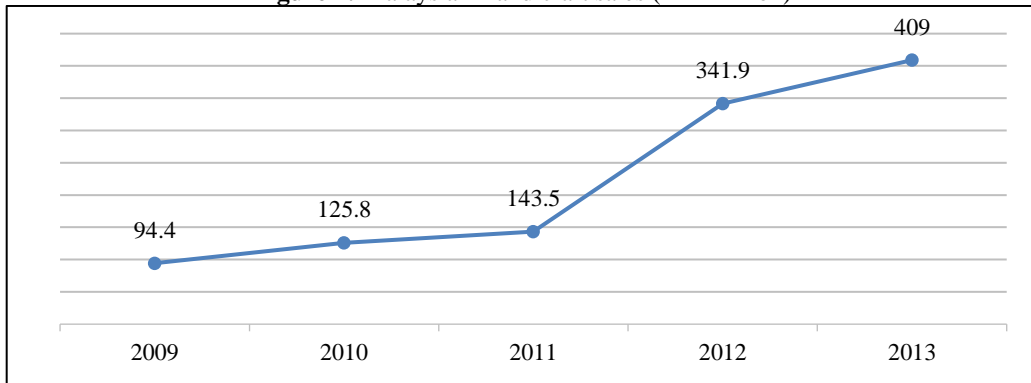
Source: Series of Malaysian Handicraft Annual Report, 2009-2013

Figure 1 highlights that the sales of craft increased to RM341.9 million in 2012, showing a rise of RM198.3 million as compared to 2011 (RM143.5 million). The sales then increased to RM409

million in the following year. Despite there is the limitation of series data related to batik industry performance, throughout the years of its existence, batik industry is believed to contribute to creating jobs for local communities (Redzuan and Aref, 2009), raise the prestige of country's fashion industry through creative design on fabric (Yunus, 2011), attract more tourists to support the development of country's cultural tourism industry (Sofian and Azman, 2010; Ahmad et al., 2011; Choy, 2013), as well as to lead the development of Malaysian craft industries (Buletin Kraftangan 03, 2012).

The detailed performance of the batik industry can be demonstrated through the following points. Examining their role in fashion industry, batik collection has participated in various fashion show activities at a domestic and international level. It can be proven through an impressive performance of batik products in 17 fashion shows with total collections of 1059 throughout the year 2012 (Malaysian Handicraft Annual Report 2012). For tourism industry, being as "intangible cultural heritage of humanity" that illustrate the social cultural context within which it occurs, this product is believed to be an attractive heritage product that can be offered to the tourist from all over the world especially to those tourists that interested in culture and art of society in a country. In Malaysia, local batik craft can play a role in cultural tourism, for instance, in Malaysia's Economic Corridor of the East Coast Region (ECER), Kelantan and Terengganu (Sofian and Azman, 2010; Ahmad et al., 2011), which also known as batik producers in Malaysia and in Malacca which declared as Historical City in Malaysia (Choy, 2013). Coherent with the idea to retain the uniqueness of batik as handmade products which means less use of machine tools in production process, the growth of this cottage industry will create more job opportunities to the villagers. Despite the success of the industry, it's still developed by small enterprises and even, some of batik firms are categorized as microenterprises. (Hairuddin, Noor, and Malik, 2012). Microenterprise firms is a very small company in SMEs business classification where their sales turnover is less than RM300, 000. In this sense, batik firms may not able to reach full potential and just having day to day income (Mokhtar and Ismail, 2012).

Accordingly, there are some issues in this matter. Does batik industry contribute to the Malaysian economy? The extent to which it contributes to Malaysian economy? Due to the availability of series data related to batik industry performance is quite limited, this study choose to use the batik-making data in the Malaysia input-output table. Thus, the objective of this paper is to examine the contribution of batik industry to the Malaysian economy by using the input-output analysis technique. This study contribute to the batik literature by offers empirical evidence for the idea that batik as a cottage industry can be an important vehicle to spur nation economic activities. More in-depth, by using direct and indirect effects of input-output techniques, the finding of this study is expected to offer a worth input for government in terms of the degree of integration batik industry with other production sectors in Malaysian economy even its normally known as cottage industry. In this vein, this study is believed to explain that an expansion in the final demand of batik industry does not only benefit its own sector but also all other sectors with strong linkages with that sector. Second, unlike previous studies that have often emphasized on batik firm performance, the finding in this study will provide evidence at national level which is underrepresented in the literature despite batik is being a high-valued heritage of Malaysia.

This paper structured as follows: Section 2 provides a review of related literature; Section 3 explains the research methodology that used in this study; Section 4 discusses the finding of study; and Section 5 presents the conclusion of study.

2.   REVIEW OF LITERATURE

Technically, the available research on Malaysian batik is more emphasis on the micro studies related to the performance of batik firms in Malaysia (Rajuddin and Alias, 2010; Manan and Jan, 2010; Muda, Amin, and Sofian, 2011; Mokhtar and Ismail, 2012; Ismail, Mokhtar, and Ali, 2013). These studies emphasised on the effects of several variables to the batik firm performance as follows: (i) the role of human resource management, marketing, technological use and financial management (Rajuddin and Alias, 2010); (ii) the elements of firm's resources such as reputation, designer's human capital, network, market and adhocracy culture, as well as the marketing capabilities (Manan and Jan, 2010); (iii) the relationship between business commitments and product innovation variables with business expansion (Muda, Amin, and Sofian, 2011); (iv) the marketing strategies (Mokhtar and Ismail, 2012); and (v) the new designs and designs from customer's spesification (Ismail, Mokhtar, and Ali, 2013). Due to limited data on batik at national level, they used a survey method to measure the batik firm performance. SME Annual Report only provides a data on textiles, wearing apparel and leather product sector while the series of Malaysian Handicraft Annual Report demonstrates the total of Malaysian craft sales which consists of textile-based (including batik industry), earth-based, metal-based and forest-based. This condition raise difficulty in quantifying directly and quantitatively the contribution of batik industry at national level. With this limitation, we have little understanding on how batik industry influences Malaysia economy at national level.

To answer this issue, the Malaysian Input-Output (IO) Table that provides the data of batik-making in the finishing of textiles is used to measure the economic contribution of the batik industry to the Malaysian economy. The unique of results generated from input-output table is it provides more information associated to the production and supply chain and the interdependencies among production sectors in the economy. In other words, this relationship implies that production industries will purchase goods and services from other industries as intermediate input for their production and produce output that is then sold to other industries and consumers (Utit et al., 2015). Thus, we are able to measure the extent to which expansion in batik industry affects inter-industry transactions in Malaysian economy. At the meantime, the results obtained from this table are fully consistent with national accounting as well as the basic theory of market equilibrium that ensures demand equals supply (Saari, 2014).

In practice, there are several studies that used input-output analysis technique to know more details the relationship and contributions among production sectors in the Malaysian economy and in the other countries. Alarcon (1985) used the input-output analysis technique to examine growth and identify the basic needs of planning for transition into Ecuador's economy. He highlighted that it is more important to generate the highest possible growth rate and use capital resources more optimally in the economy of Ecuador in order to generate an income distribution efficiently, generate more profit and employment, and it will not worsen the balance of payment deficit. In China, the input-output analysis has provided several findings as follows: i) by using the input-output table in 1992, China would not be able to support the increasing demand for land intensive products with its available land without significant improvement in land productivity and/or by increasing imports (Hubacek and Sun, 2001); ii) to quantify the economy indirectly and induce impact of the ocean economy to the Chinese national economy in 2007, Zhao (2013) found that the ocean industries in Tianjin are more strongly linked to the rest of the economy, especially marine fishery; and iii) through the social-economic impact multiplier, the algae-derived biodiesel industry was discovered to have a significant impact on promoting regional economic and employment growth in China (Yang et al., 2015). Furthermore, Lurweg, Oelgemöller, and Westermeier (2010) used the input-output analysis to

explore the relationship between trade and both job creation and job destruction in the German manufacturing industry in 2005. The findings clarified that being integrated into the world economy in trade is advantageous to induce job creation in the German economy.

In the Malaysian context, several studies showed a deep interest in understanding the contribution of the production sector to the Malaysian economy through the input-output analysis technique. Tin (2014) investigated the relationship between final demand and labor growth in the manufacturing sector in 1978-1991 and 1991-2000. The results from the Structural Decomposition Analysis (SDA) showed that changes in the final demand structure were the major source of labor growth and dominated by domestic demand in 1978-1991 and by export demand in 1991- 2000. Within the same period, Kamaruddin, Rashid, and Jusoff (2008) found that there was transition between the role of domestic demand and export demand expansion for the sub-periods of 1978-1991 and 1991-2000. For the period of 1978-1991, the output was changed mostly by domestic demand expansion and followed by export demand expansion. Nevertheless, in the second sub-period of 1991-2000, export demand expansion increased, but domestic demand expansion decreased. By looking at the entire 1978-2000 period, domestic demand expansion appeared to act as a major source of output growth, followed by export demand expansion.

Fauzana (2007), Bekhet and Abdullah (2010), and Saari, Alias, and Chik (2013) investigated the role that agriculture sector plays in the national economy. By using the Malaysia input-output table for the years between 1991 and 2000, Bekhet and Abdullah (2010) discovered that there is a direct and backward linkage in the use of energy in the agriculture sector. Further comparison between the three energy-related sectors that are crude petrol, natural gas, and coal showed that the agriculture sector depends more on petrol and coal products as input for its production process. The input-output table for the year 2000 revealed that the agriculture subsector that used the highest amount of petrol and coal products was the fisheries sector, followed by forestry, logging, and oil palm estates. The industrial linkage results showed the importance of the energy sector to the agriculture development. An in-depth investigation into agriculture development by Fauzana (2007) found that, via the use of the input-output table for 2000, the agriculture sector was foreseen to be able to stimulate the economy and act as a catalyst to boost the economic development in Malaysia, both directly and indirectly, for instance, through new emerging industries such as the agro-based industry. By using the input-output table for the year 2005, the study conducted by Saari, Alias, and Chik (2013) showed that the agriculture sector contributed to the Malaysian economy through forward linkages. This result implied that the output of this sector is of large demanded by other sectors, particularly from the manufacturing sector. They suggested that the oil palm sector should be highlighted in growth policies because of the strong pull effects on the rest of the economic sector. Therefore, decision-makers or the government may provide a strategic planning related to energy in order to boost the agriculture sector and in turn will speed up the Malaysian economy.

On the edge of the services sector, via the multiplier analysis for the input-output table of the year 2000, Mazumder, Ahmed, and Al-Amin (2009) found that the tourism industry contributed significantly to the economy and was also proven as a potential sector to enhance economic growth towards a developed nation by 2020. By using the input-output tables of Malaysia between the years of 2000 to 2005, Sauian, Kamarudin, and Rani (2013) found that the labor productivity for three subsectors, namely transportation, communication, and financial, were increasing throughout the period. This finding is a good indication to the government that these three subsectors can become target sectors in the New Transformation Programme to make Malaysia an advanced country with high-income status by 2020.

In this vein, we realize the available research related to input-output table for Malaysia are often concentrated on the contribution of the main sectors or head-sectors to the Malaysian economy such as agriculture sector, manufacturing sector, services sector, tourism sector, financial sector and transportation sector rather than the indepth sub-sector like as batik industry. Thus, we suggest measuring the economic contribution of the Malaysian batik industry to the Malaysian economy by using the input-output analysis techniques. We address this gap by testing a model direct and indirect analysis to examine the extent to which batik industry contribute to Malaysian economy.

3.   METHODOLOGY

3.1.   Data Collection

To measure the economic contribution of the batik industry to the Malaysian economy, data on batik making from the Malaysian input-output table acquired from the Department of Statistics of Malaysia was utilized. In this study, the latest Malaysian input-output table for year 2010 was utilized. The Malaysian input-output table for year 2010 was classified according to the Malaysia Standard Industrial Classification (MSIC) version 2008. By referring to the Malaysia Standard Industrial Classification (MSIC) 2008 Ver. 1.0, batik making being a part of the manufacturing sector, it is placed in the section under the finishing of textiles which is itself listed under the manufacturing of textiles. Specifically, batik making is an activity that is classified under division 13 on the Manufacture of Textiles, under group 131 of spinning, weaving and finishing of textiles with code item 13131. For the purpose of this study, the IO table 2010 was expanded into 125 sectors instead of 124 sectors due to the fact that batik making is excluded from the finishing of textiles and included as another sector under the manufacturing sector. From an expanded IO table for year 2010, the contribution of the local batik industry to the Malaysian economy at the national level are able to be quantified directly.

3.2.   Input-output Analysis: Direct and Indirect Effects

To measure in details the contribution of batik industry in Malaysian economy, we need to find the Leontief inverse matrix through demand-driven model and followed by multiplier analysis to find the total for both, direct and indirect effects.

3.2.1.   Demand-driven Model

In leontief model, the relationship between output, intermediate deliveries, and final demand can be shown as:

$$x = z_i + (c + g + s + e)$$

$$x = z_i + f \qquad (1)$$

Where x is the vector for gross output, z_i is the summation vector for matrix intermediate deliveries, and f is the vector for final demand (private consumption (c), public consumption (g), investment (s) and exports (e)). Generally, in matrix form, equation (1) can be rewrite as follows:

$$x = \begin{pmatrix} x_1 \\ \vdots \\ x_{10} \end{pmatrix} \quad z = \begin{pmatrix} z_{1.1} & \cdots & z_{1.10} \\ \vdots & \ddots & \vdots \\ z_{10.1} & \cdots & z_{10.10} \end{pmatrix} \quad f = \begin{pmatrix} f_1 \\ \vdots \\ f_{10} \end{pmatrix} \tag{2}$$

Theoretically, the input-output table is partitioned in two components, namely endogenous and exogenous components. In this model, endogenous component covers the intermediate deliveries and exogenous component is a final demand. Next, equation (1) can be transformed into a standard Leontief IO model as follows:

$$x = Ax + (c + g + s + e)$$

$$x = Ax + f \tag{3}$$

This fundamental equation states that the gross output, x, is the sum of all intermediary output, Ax, and final demand, f. A is known as the input coefficient or technical coefficient. Each element of A represents:-

$$\alpha_{ij} = \frac{z_{ij}}{x_j} \tag{4}$$

where α_{ij} denoting the amounts of inputs that a sector is purchased from other sectors and from primary input suppliers per unit of its own output (Saari, 2014). Then, we can solve equation (3) for x as $(I - A)x = f$, where I is the identity matrix. The matrix I – A is known as technology matrix and if this matrix is a non-singular matrix, the $| I - A |$ is not equal 0, therefore $(I - A)^{-1}$ is exist. The output of each good will be given by the solution:

$$x = (1 - A)^{-1} f$$

$$x = Lf \tag{5}$$

Where $(I - A)^{-1}$ is known as the Leontief inverse matrix (L). Leontief inverse matrix is assumed to be fixed due to the assumption of constant input coefficients matrix A and the only variable is the exogenous final demand (Park, 2007; Saari, 2014). In other words, equation (5) shows the total output effects for any sector *j* to satisfy each unit of the final demand. In more details, Leontief inverse matrix is able to estimate the total output impact on the whole economy and also for sector by sector, of a stimulus to any individual sector to be made.

3.2.2. Multiplier Analysis

Theoretically, input-output model is linear and therefore, it allows for a decomposition analysis in which the main element is the Leontief inverse matrix. The Leontief inverse matrix shows any exogenous final demand injection does not only benefit its own sector but also spread to other sectors that have strong linkages with that sector. Therefore it is possible to find the direct and indirect effects once the Leontief inverse matrix is decomposed. To decompose the total effects of final demand injection, we can further expand the Leontief inverse matrix as follows:

$$(1 - A)^{-1} = L^{-ini} + L^{-dir} + L^{-ind} \tag{6}$$

Where $L^{-ini} = I$ gives the initial effects, $L^{-dir} = A$ is the direct effects and $L^{-ind} = A^2 + A^3 + \ldots$ is the sum of all indirect effects.

The initial effects demonstrate that a one Ringgit increase in the final demand for a certain production sector will lead immediately to an increase in the output of this sector by one ringgit. Meanwhile, for direct effects, it shows how a one ringgit increase in output of this sector has first-order effects on the output in the sector itself and also to other sectors. This effect is due to the additional input required to satisfy the increased output. The indirect effects demonstrate how the first order effects give rise to second and higher-order effects. Practically, the Leontief inverse matrix is decomposed into two kinds of effects namely, direct and indirect effects because the initial effects are completely equal to the final demand. The direct and indirect effects is equivalent to:

$$\Delta x^{-dir} = A\Delta f \qquad (7)$$

$$\Delta x^{-ind} = (1 - A)^{-1}\Delta f - A\Delta f \qquad (8)$$

4.   RESULTS AND DISCUSSION

4.1.   *Input-output Structure for Batik Making, 2010*

The input-output table has developed through the idea of inter-industry transactions among production sectors in economy. This idea seeks to explain how one industry sector affects others in the economic structure of a country. It demonstrates the output produced in any industry will not only be used by that sector, but also being applied in other sectors. Hence, the IO table is capable to provide a complete picture of the flow of goods and services bought (supply) and sold (demand) in an economy for a given year. With this premise, we are able to measure the level of integration between one sector to another sector. In this study, we intend to examine how batik industry contribute to Malaysian economy due to an injection in the final demand.

In the early stage towards to examine more details the extent to which batik industry contribute to Malaysian economy, it is more practical to us to understand the input-output structure of batik as shown in Table 1. In the year 2010, the total output for batik was valued at RM67, 979 thousand. From the input structure analysis, it allows us to find the amounts of inputs that batik sector purchased from other sectors and from primary inputs suppliers while output structure gives the amount that batik sector had sold its output to all sectors as intermediate inputs and to the consumption of the final demand. To produce a finished batik, input structure analysis was discovered that the batik making process used 53.7 percent of intermediate inputs and 46.3 percent of primary inputs.

Examining in detail the intermediate inputs structure, it was discovered that among the higher inputs, inputs from yarn and cloth (12 percent), wholesale & retail trade and motor vehicle (19.3 percent), land transport (4.7 percent), basic chemicals (2.4 percent) and highway, bridge and tunnel operation services (2.2 percent) represented the bulk of inputs while inputs from banks were only 0.9 percent and financial institutions only 1.4 percent. Among some of the unique findings were the important role of workers (14.5 percent) in the batik production process and the fact that the raw materials to produce local batik are mostly obtained from import commodities (19.5 percent). On the edge of gross value added, the batik sector contributed to the labor income of 55 percent and 45 percent to operating surplus (profit). In input-output analysis, labor income is referring to payment for labor

input which includes remuneration (in cash or in kind) payable by the production activities in return for work that employees did during the accounting period (Saari, 2014). This payment comprised wages and salaries, allowances and other payments received in kind. The output structure analysis further revealed that the demand for Malaysian batik appeared to be concentrated in private consumption and recorded 96.7 percent. The extended IO table 2010 revealed that there is no transaction for the external market in terms of export market for the batik industry.

Table 1: Contribution of Batik in Domestic Production, 2010

Sector	Value (RM Thousand)	Contribution (%)
Total output for batik	**67,979**	**-**
Inputs structure		
Intermediate inputs	**36,532**	**53.7**
Yarn and cloth	8,174	12.0
Basic chemicals	1,657	2.4
Wholesales & Retail trade and Motor Vehicle	13,136	19.3
Land transport	3,168	4.7
Highway, Bridge and Tunnel Operation Services	1,465	2.2
Banks	613	0.9
Financial institution	935	1.4
Primary Inputs	**31,447**	**46.3**
Import commodities	13,285	19.5
Gross value added	17,925	26.4
Compensation of employee	9,838	14.5
Operating surplus, gross	8,057	11.9
Output structure		
Intermediate demand	**1,084**	**1.6**
Finishing of textiles	998	1.5
Total final demand	**66,895**	**98.4**
Private consumption	65,727	96.7
Changes in inventories	1,168	1.7

Note: *This table only presents selected sectors in the input structure and output structure that have strong relationship with batik-making (Malaysian Input-Output Table 2010).

Table 1 highlighted several hidden issues that deserved more attention from the government, the batik entrepreneurs and other stakeholders. Firstly, it was discovered that the batik industry has a high dependency on imported raw materials. In the batik making process, most of the main raw materials such as white fabric (silk and cotton), wax, chemical dyes and chemicals for the finishing process have to be imported from other countries. This high dependency on imported raw materials is caused by there is no accessibility to local raw materials and resulted in an inconsistent supply of raw materials for batik workers to process into finished goods. This problem has led to rising prices of raw materials and further increased the costs of production. The high costs of production limited the production capacity and in turn increased the price for batik that can cause the demand for batik to decline. As a consequence, the sale of batik continues to be reduced and hinders the growth of the batik firms.

Second, batik industry is an labor intensive industry. It demonstrable through the contribution of 55 per cent to the labor income while for operating surplus (profit) accounted 45 per cent. To produce a genuine product, batik workers should follow the six stages of process started from drawing,

colouring, fixing, de-waxing, washing and drying process. Doing so, batik sector must really have an enough workers to save the operation cost, especially the time cost to produce batik, and further, increase the number of batik productions. Being a cottage industry that developed by villagers, an expansion in local batik would help to create more job opportunities for local communities. Thus, if policy makers interested to develop the rural area, government may should provide a good environment to batik entrepreneurs in terms of access to economic opportunities, access to know-how, technologies, credit, and training to upgrade the entrepreneurs capabilities in terms of entrepreneurial and business skills. This strategy would lead to accelerate the development of batik industry that indirectly capable to uplift the quality of life of local communities through the household income generation.

4.2.   *Impact of Final Demand Injection to the Malaysian Economy*

If we reexamine the results of input-output structure in Table 1, it clearly shows the potential of the batik industry to contribute to the other sectors in intermediate level (yarn and cloth, wholesale & retail trade and motor vehicle, land transport, basic chemicals and highway, bridge and tunnel operation services), import commodities, value added, and labor income. To offer empirical evidence on this relationship, let us measure how a 10 per cent increase in private consumption of batik from the actual level would benefit to the Malaysian economy. To support an expansion in batik consumption, batik making requires additional inputs. Thus, Table 2 quantifies the contribution of a 10 percent increase in private consumption of batik to the output level, value added, import level and labor income. Result presents the increased in private consumption of batik would generate RM6, 576 thousand of new output level in its own sector, RM814.3 thousand for yarn and cloth sector, RM388.4 thousand for basic chemical sector, RM1,524 thousand for wholesale & retail trade and motor vehicle sector, RM356.8 thousand for land transport sector and RM157.2 thousand for highway, bridge and tunnel operation services. These new output levels provide clear interdependencies among sectors in the sense that any expansion in the private consumption of batik does not only benefit its own sector but also other sectors that has strong industrial linkages with the batik making.

Table 2: Output Level and Changes in Selected Sector (RM Thousand), 2010

Sector	Old output (x)	New output (Δx)	Changes	Value added	Import	Employment
Batik making	67,979	74,554	6,576	1,733.91	1,285.06	951.64
Yarn and cloth	3,377,633	3,378,447	814.3	198.14	220.86	50.51
Basic chemical	34,149,476	34,149,864	388.4	99.60	86.19	17.05
Wholesale & retail trade and motor vehicle	202,491,491	202,493,015	1,524	851.13	186.07	229.93
Land transport	20,535,395	20,535,752	356.8	127.68	60.52	35.67
Highway, Bridge and Tunnel Operation Services	6,096,168	6,096,325	157.2	116.84	10.52	25.71

Note: *This table only presents selected sectors at the intermediate level that have strong relationship with batik-making (Malaysian Input-Output Table 2010)

To support an expansion in batik consumption, batik making requires additional inputs. In this case, we interested to measure the effects of expansion in batik consumption to the import, labor income and value added. As indicated in Table 2, the expansion in private consumption for batik generated RM6, 576 thousand of new outputs to its own sector and this change led to an increased labor income of 14.5 percent, import commodities of 19.5 percent, and value added of 26.4 percent. Through backward linkages of batik making, this new batik output also benefitted the other sectors that have

strong linkages with batik making as follows: (i) RM814.3 thousand increase in yarn and cloth will lead to an increase of labor income of 6.2 percent, import commodities of 27.1 percent, and value added of 24.3 percent; (ii) RM388.4 thousand increase in basic chemicals will lead to increased labor income of 4.4 percent, import commodities of 22.2 percent and value added of 25.6 percent; (iii) RM1, 524 thousand increase in wholesale and retail trade and motor vehicle will lead to increased labor income of 15.1 percent, import commodities of 12.2 percent and value added of 55.8 percent; (iv) RM356.8 thousand increase in land transport will lead to increased labor income of 10 percent, import commodities of 17 percent and value added of 35.8 percent and (v) RM157.2 thousand increase in highway, bridge and tunnel operation services will lead to increased labor income of 16.4 percent, import commodities of 6.7 percent and value added of 74.3 percent . The figures clearly demonstrated the existence of industrial linkages among sectors in the Malaysian economy.

In order to examine in more detail on the extent to which batik contributes to the linkages in the Malaysian economy, the multiplier analysis into direct and indirect effects was used. Results are as in Table 3. In overall, the direct effects of a 10 percent increase in the private consumption of batik showed a 23.1 percent increase of the output growth while the indirect effects contributed the most at 76.9 percent. Examining the batik making sector in detail, an injection in private consumption contributes to a high degree of integration with other sectors with the value of the indirect effects of this sector being considerably high at 98.7 percent. The high indirect effects of batik making mean that the first-order effects of batik making gave rise to second and higher order effects to other sectors. This finding can be proven when the first order effects of batik making to the other production sectors, for instance, yarn and cloth, basic chemicals, wholesale & retail trade and motor vehicle, land transport and highway, bridge and tunnel operation services also showed high degrees of integration and generated second and higher-order effects to other sectors. Table 3 lists the indirect effects for these sectors, showing how the effects are considerably high, for example, yarn and cloth at 68.38 percent, basic chemicals at 74.98 percent, wholesale and retail trade and motor vehicle at 74.70 percent, land transport at 62.61 percent and highway, bridge and tunnel operation services at 56.8 percent . Finally, the results from this study can be used to conclude that the batik industry contributed significantly to the Malaysian economy through the integration of the first order effects that gave rise to second and higher-order effects with other sectors in the Malaysian economic structure.

Table 3: Multiplier Analysis: Direct and Indirect Effects

Sector	Direct effect (RM Thousand)	Indirect effect (RM Thousand)	% Direct	% Indirect
Batik making	1,005	73,549	1.35	98.65
Yarn and cloth	1,068,337	2,310,110	31.62	68.38
Basic chemical	8,545,044	25,604,820	25.02	74.98
Wholesale & retail trade and motor vehicle	51,223,786	151,269,229	25.30	74.70
Land transport	7,678,685	12,857,066	37.39	62.61
Highway, Bridge and Tunnel Operation Services	2,633,538	3,462,787	43.20	56.80

Note: *This table only presents selected sectors at the intermediate level that have strong relationship with Batik-making (Malaysian Input-Output Table 2010)

5. CONCLUSION

This study measure the economic contribution of batik industry in Malaysian economy through the input-output analysis technique. Our study is a new step to test empirically the contribution of batik industry via the use of multiplier analysis to measure the direct and indirect contribution of batik

industry, which is underrepresented in the context of Malaysia. An expanded Malaysian IO table 2010 revealed that there is high dependency on imported raw materials, the type of market is a local market and it is known as labor intensive industry for local batik industry. Input structure analysis presents the yarn and cloth, basic chemical, wholesale & retail trade and motor vehicle, land transport and highway, bridge and tunnel operation services sectors have a strong integration with batik industry. An increase in private consumption in final demand is able to create first-order effects and further, increase the second and higher-order effects to other sectors. Therefore, we hope that government can provides a better strategic planning to develop batik industry especially associated to labor, raw materials and market for product in order to boost the performance of batik industry itself and also, other production sectors in Malaysian economy. The interplay between the external suppliers and the government are believed will help to control the price of raw materials in local market. Furthermore, through the Malaysian batik wearing campaign among government servants on Thursday in every week, local batik entrepreneurs have high hopes that the batik wearing culture will be inculcated in the daily life of local societies, leading to a promising future for the Malaysian batik industry. The results of study may point to other possible issue for future research. Next research may focus on the relationship between input-output structure analysis with constraints and potential of batik industry in Malaysian economy. From this relationship, we are able to explore how transaction among production sector would provide an information related to obstacles to the success of batik industry. The combination of findings from secondary data of input-output table and from survey of obstacles to the success of batik industry would be a critical contribution to the batik literature.

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