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Intersectoral Linkages of Malaysian Batik Industry: An Application of Input-Output Analysis

(Rantaian Sektor Industri Batik Malaysia: Aplikasi Analisis Input-Output)

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ABSTRACT

This paper examines the contribution of batik industry to the national economy through the idea of inter-industry linkages. Batik industry's contribution to Malaysian economy is through the performances of the manufacturing in textiles, the development of tourism with being high-valued heritage products, and to the total Malaysian craft sales. The local batik entrepreneurs also require local traders of raw materials for producing batik from abroad to the local market. This shows that batik not only plays a vital role in fostering heritage and cultural, but it has economic values via its contribution to the other production sectors in economy. However, it is difficult to measure the economic contribution of the batik industry because there is no specific data on this industry in the SME Annual Report and the Malaysian Handicraft Annual Report. Thus, we used data from Malaysian Input-Output Table 2010 to measure the industrial linkages of batik industry with other production sector in Malaysian economic structure. It is found that batik industry has backward linkages with other production sectors. This result implies that stimulating growth in the output of the batik industry would benefit other sector through positive spillover effects due to the higher demand on the output of other sectors (e.g. textiles) to be used as inputs by batik firms in producing batik.

Keywords: Malaysian batik; input-output analysis; industrial linkages; backward linkages

ABSTRAK

Kertas ini mengkaji sumbangan industri batik kepada ekonomi negara melalui konsep rantaian antara industri. Industri batik dipercayai mampu menyumbang kepada ekonomi Malaysia melalui prestasi yang memberangsangkan sebagai produk tekstil dalam sektor pembuatan, pembangunan pelancongan melalui produk warisan yang bernilai tinggi, dan juga, sebagai penyumbang utama kepada jumlah jualan kraf Malaysia. Usahawan batik tempatan juga memerlukan peranan peniaga tempatan dalam transaksi bahan-bahan mentah untuk menghasilkan batik dari luar negara untuk pasaran tempatan. Situasi ini menjelaskan bahawa batik bukan sahaja memainkan peranan penting dalam mengembangkan warisan dan budaya, tetapi ia mempunyai nilai ekonomi melalui sumbangannya kepada sektor pengeluaran yang lain dalam ekonomi. Walau bagaimanapun, adalah sukar untuk mengukur sumbangan ekonomi industri batik kerana tidak ada data khusus mengenai industri ini dalam Laporan Tahunan PKS dan Laporan Tahunan Kraftangan Malaysia. Oleh itu, kajian ini menggunakan Jadual Input-Output Malaysia 2010 yang menyediakan data pembuatan batik untuk mengukur hubungan industri batik dengan sektor pengeluaran yang lain dalam struktur ekonomi Malaysia. Didapati bahawa industri batik mempunyai rantaian ke belakang dengan sektor pengeluaran yang lain. Keputusan ini menunjukkan bahawa usaha merangsang pertumbuhan dalam pengeluaran industri batik akan memberi manfaat kepada sektor lain melalui kesan limpahan positif disebabkan oleh permintaan yang lebih tinggi ke atas output sektor lain yang akan digunakan sebagai input oleh firma batik dalam pengeluaran batik.

Kata kunci: Batik Malaysia; analisis input-output; rantaian industri; rantaian ke belakang

INTRODUCTION

Batik is one of the techniques used for textiles decorations. Batik is well known its uniqueness in variety of designs and colors. In simplest form, batik refers to the resist technique for producing designs on fabric using dyes (Krevitsky1964; Yunus 2011). In Malaysia, local crafts can be grouped into several categories namely earth-based, metal-based, forest-based, as well as textile-based. Additionally, batik that is categorized in textile-based

craft also contains other crafts such as weaving and embroidery (Amin 2006).

According to Malaysian Handicraft Development Corporation (MHDC), batik has been highlighted as the main contributor to the overall performance of craft sales in Malaysia. This can been seen in Figure 1 which shows the total of Malaysian handicraft sales from year 2009 to 2013. The figure depicts that craft sales has increased significantly from RM143.5 million in 2010 to RM341.9 million in 2011. The sales continuously increased in the following year to RM409 million. Reflecting on the performances, it is projected that batik sales will lead the Malaysian craft sales to reach the sales target of RM1 billion in 2016 (Buletin Kraftangan 03, 2012). This key performance indicator signifies the importance of batik industry in enhancing the development of Malaysian craft for the current year and in the future.

Moreover, batik has been recognized as a high-valued heritage of Malaysia (Akhir et al. 2016; Hairuddin, Noor & Malik 2012; Mokhtar & Ismail 2012). Meanwhile, Ahmad et al. (2011) and Choy (2013) believed that batik can act as an important tool in the development of cultural tourism in Terengganu, Kelantan and Malacca. Being a cultural heritage of Malaysia that is closely related to the social cultural context, batik products can be attractive heritage products that can be offered to the tourist from all over the world especially for those who are interested in cultural and art. This also implies that the cultural heritage products are able to play an important role in supporting the tourism industry in Malaysia. For instance, Yunus (2011) highlighted the importance of batik in the development of country's fashion industry.

Thus, as part of products in creative industry, we believed that batik could contribute to Malaysian economy. However, there is no empirical evidence on the contribution of batik industry because of the limitation of data. Due to the data limitation, we used the input output data to examine the contribution of batik to the Malaysian economy. Several previous studies (Hairuddin, Noor & Malik 2012; Ismail, Mokhtar & Ali 2013; Mokhtar & Ismail 2012) has clustered batik industry under the manufacturing sector as Small Medium Enterprises (SMEs). Being part of textile-based industry, batik can be classified under the textiles manufacturing in Small Medium Enterprises (SMEs). Effective from 2 March 2012, Malaysian Investment Development Authority (MIDA) has listed batik in their promotion activities and products in manufacture of textiles and textile products which are eligible for consideration of pioneer status and investment tax allowance under the Promotion of Investment Act 1986. Thus, technically, the contribution of batik can be measured through their performance in textiles, wearing apparel and leather product industry, specifically, and manufacturing sector, generally.

In terms of performance by economic sectors, SME Annual Report 2014/2015 highlighted that the increase in share of SMEs to Gross Domestic Product was contributed by all economic sectors particularly in construction, services and manufacturing sectors. Examining in detail at the performance of sector in the manufacturing sector, the gross output value of textiles, wearing apparel and leather product has increased from RM12.2 billion in year 2012 to RM14 billion in year 2014 (Report on the Annual Survey of Manufacturing Industries, 2013-2015). Additionally, the Economic/SME Census 2011 revealed that the strong performance was underpinned by robust growth in textiles and apparels (26.5%), food & beverages products (15.9%), and fabricated metal products (10.5%). Nevertheless, there is still no specific data related to the batik industry in the SME Annual Report that allows us to measure directly the contribution of batik industry to the Malaysian economy.

The analysis from input-output (IO) technique allows us to identify the linkages between batik industries with other production sectors in Malaysian economic structure. Technically, production sectors explain how the industry used the raw materials and transformed it into intermediate goods or final products in order to deliver the products to local and international consumers. In the batik production process, this industry required input from other production sectors, such as white fabric (cotton and silk) and wax from China and chemical dyes from Germany to produce their products. Thus, a positive growth in batik industry will be beneficial to the local traders especially in textiles manufacturing and others

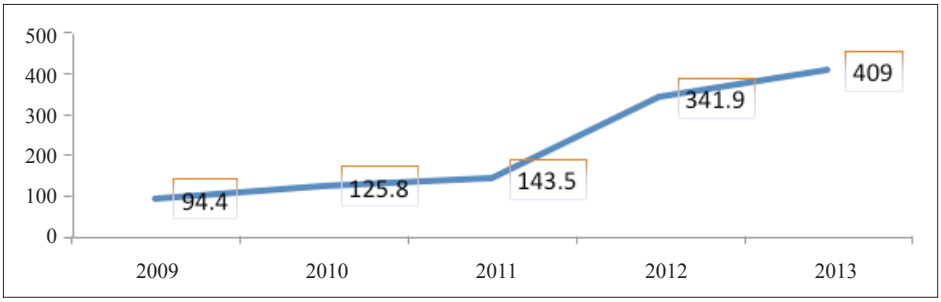

FIGURE 1. Malaysian handicraft sales (RM million)
Source: Series of Malaysian Handicraft: Annual Report, 2009-2013

sectors such as tourism and fashion industries. Against this background, it is obvious that batik industry has potential to contribute to the Malaysian economy. Due to limited data on batik industry, we used data from Malaysian IO table that provides detailed data on batik making in finishing of textiles as part of manufacturer of textiles.

Thus, this paper aims to measure the economic contribution of batik industry to the national economy through the idea of inter-industry linkages in Malaysian economic structure. This study is a new step to test empirically the contribution of batik industry via the use of industrial linkages model in IO analysis technique. The interdependencies or linkages among production sectors will reveal how any changes (i.e positive or negative shock) in one sector would affect the whole economic structure of Malaysia. This explains that, for instance, if batik industry declines, this negative shock is not only affect batik industry alone but it would spill over to other sectors that has strong linkages with batik industry. Therefore, this study is expected to make substantial contribution in terms policy implications to government and policy makers towards a sustainable development of Malaysian batik industry.

Beside policy implications, our study contributes to the existing literature in several ways. First, we offer empirical evidence using the concept of inter-industry linkages between batik industries with other production sectors. Inter-industry linkages seek to explain how one industry sector affects others in the economic structure of a country. The finding indicates that there are backward linkages between batik industries with other production sectors in Malaysian economic structure. Second, the study contributes to the literature by focusing on Malaysia which is underrepresented or examined in the literature despite batik being classified as a high-valued Malaysian heritage which is able to enhance the economic wellbeing of local communities, especially those involved in the batik making businesses.

This paper consists of five sections. The first section discusses the background of the study. The following section provides a review of related literature. Third section explains the research methodology used in this study. The fourth section discusses the finding of study. The last section presents the conclusion with some policy implications.

LITERATURE REVIEW

Historically, batik has been known for centuries, it presumed to be 2000 years old (Robinson 2001). Although batik is considered as a traditional industry, it is believed that the batik industry has linkages with other production sectors in national economy. Generally, the available studies on Malaysian batik industry mostly focused on the micro-analysis relating to the performance of batik firms in Malaysia. For instance, Rajuddin and Alias (2010) examined the level of human resource management, marketing, technological use and financial management among batik entrepreneurs in Kelantan.

Meanwhile, Manan and Jan (2010) and Muda, Amin and Sofian (2011) studied the factors that influence the performances of local batik firms. Specifically, Manan and Jan (2010) investigated the elements of firm's resources such as reputation, designer's human capital, network, market and adhocracy culture, and the marketing capabilities on the batik firm performance. By using the multiple regression analysis on the resources-performance relationship, they highlighted the resources that have direct impact on firms' performance are reputation, market culture and marketing capability. On the other hand, Muda et al. (2011) examined the relationship between business commitments and product innovation variables with business expansion. Furthermore, Redzuan and Aref (2009, 2011) explained the barriers, opportunities, constraints and potentials in the development of the Malaysian craft industry. Through the interviews with government officials, interviews with key informants in local handicraft industry and fieldwork in the districts of Tumpat for silverware industry and Kota Baharu for batik industry, Redzuan and Aref (2009) found that handicraft industries plays an important role for the people in rural area by providing occupation and income., Additionally, in terms of constraints, Redzuan and Aref (2011) highlighted that the unavailability of skilled labor, the difficulty in obtaining raw materials, the reluctance to adopt modern methods of production or technology and the lack of credit facilities as the main problem faced by the craft industry.

Other studies, for instance, examined the impact of marketing strategies (Mokhtar & Ismail, 2012) and the impact of design (Ismail, Mokhtar& Ali 2013) on the performance of batik firms. Using the Mann-Whitney U Test and Chi-Square Test on data collected from 186 batik firms in Malaysia, Mokhtar and Ismail (2012) highlighted that that to achieve high sales and profits, batik firms should not only focus in local market, but they should expand their sales beyond their states. They also highlighted that high sales performers frequently advertised their businesses and uses various promotional tools such as personal network, media and competition and exhibition tools. Furthermore, Ismail et al. (2013) found that an introduction of new design is the main factor that distinguishes the sales performance between SMEs, meanwhile design from customer's specification is the only cause that distinguishes the level of profit performance between SMEs.

In the case of Malaysia, several previous studies using IO analysis focused on various sectors such as, manufacturing sector (Tin 2014), transportation, communication and financial services (Sauian, Kamarudin & Rani 2013), tourism industry (Mazumder, Ahmed,

& Al-Amin 2009) and agriculture sector (Bekhet & Abdullah 2010; Fauzana 2007). Using the structural decomposition analysis (SDA) on Malaysia IO tables for 1978, 1991 and 2000, Tin (2014) revealed that changes in the final demand structure were the major source of labor growth in manufacturing sector. Meanwhile, based on the IO tables of Malaysia for the years 2000 and 2005, Sauian, Kamarudin and Rani (2013) found that the labor productivity for three sub-sector namely transportation, communication and financial would help the government in achieving the target in the New Transformation Programme that aims to transform Malaysia into an advanced country with high-income status by 2020. Furthermore, Fauzana (2007), Saari, Alias and Chik (2013) and Bekhet and Abdullah (2010) investigated the role of agriculture sector in national economy. By using the IO table for the years 1991 and 2000, Bekhet and Abdullah (2010) found that there is a direct and backward linkage in the use of energy in agriculture sector. Fauzana (2007) found that agriculture sector is able to stimulate the economy and acts as a catalyst to speeds up economic development in Malaysia, both directly and indirectly, for instance through new emerging industries such as agro-based industry. A recent study by, Saari, Alias and Chik (2013) found that the agriculture sector contributes to the Malaysian economy through forward linkages. On the edge of services sector, via the multiplier analysis for IO table 2000, Mazumder, Ahmed, and Al-Amin (2009) found that the tourism industry contributed significantly to the economy and proved as a potential sector to enhance economic growth towards a developed nation by 2020. Compared to other IO analysis in Malaysia which mainly focused on main sectors in economy such as manufacturing, agriculture and services, the present study fills in the gap by measuring the intersectoral linkages of local batik industry with other production sectors in Malaysian economy.

METHODOLOGY

DATA COLLECTION

This study used the Malaysia IO table (2010) from Department of Statistics Malaysia. In Malaysia, the Economic Census are conducted every five years, and therefore, the IO table is constructed and published by the Department of Statistics every five years once. The IO table for year 1978, 1983, and 1987 consists of 60 sectors, but the latest table for year 2010 was extended into 124 sectors. This change indicates that the more recent IO tables provide a more detailed sectoral breakdown because of the diversification of economic activities and expansion of the economy. In IO table, batik making is placed under the finishing of textiles in the manufacture of textiles, which is a part of the manufacturing sector. By referring to the MSIC 2008 Ver.1 standard, batik making is classified under the item 13131. In this study, the IO table 2010 was extended into 125 sectors instead of 124 sectors when we take out batik making from finishing of textiles and included as one more sector in manufacturing sector. From an extended IO table 2010, we are able to measure the intersectoral linkages of local batik industry with other production sectors in Malaysian economy.

FOUNDATION OF INPUT-OUTPUT TABLE

The IO table is an extension of national accounts accounting. It's able to provide a complete picture of the flow of goods and services bought (supply) and sold (demand) in an economy for a given year (Saari 2014). Table 1 shows the structure of Malaysia IO table. The horizontal row gives the amount that a particular sector had sold its output to all sectors as intermediate inputs (**Z**) and to the consumption of the final demand (**f**)

TABLE 1. Simplified Malaysia Input-Output table

<table>
<tr><td rowspan="2"></td><td colspan="7">Intermediate demand</td><td colspan="4">Final demand</td><td rowspan="2">Total output</td></tr>
<tr><td>Agr</td><td>Min</td><td>Man</td><td>.</td><td>.</td><td>.</td><td>Oth</td><td>c</td><td>i</td><td>g</td><td>e</td></tr>
<tr><td>Agriculture (Agr)</td><td colspan="7" rowspan="7">Z
(intermediate demand required among production sectors)</td><td colspan="4" rowspan="7">f
(final demand)</td><td rowspan="7">x
(total output)</td></tr>
<tr><td>Mining (Min)</td></tr>
<tr><td>Manufacturing (Man)</td></tr>
<tr><td>.</td></tr>
<tr><td>.</td></tr>
<tr><td>.</td></tr>
<tr><td>Other sectors (Oth)</td></tr>
<tr><td>Import</td><td colspan="7">m (imported input)</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Indirect tax</td><td colspan="7">t (taxes paid)</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Value added</td><td colspan="7">v (value added)</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total input</td><td colspan="7">x' (total input)</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

categories (private consumption, public consumption, gross fixed capital formation, change in stocks and total exports). Meanwhile, the individual vertical column shows how much each sector purchased as inputs from other sectors to produce output for its own sector. In addition to the intermediate inputs (**Z**), the sectors also consume primary inputs (**m, t, v**) (Saari 2014). Hence, this system shows how interdependent each sector is on every other sector, at both levels as a customer of outputs from other sectors and as a supplier of inputs. It clearly demonstrates the output produced in any industry will not only be used by that sector, but also being used in other sectors. By assumption, income (output) is equal to expenditure (input) and thereby, the corresponding row and column totals of the IO structure also are equal.

Based on Table 1, the matrix **Z** ($n \times n$) denotes the intermediate deliveries and each element of *zij* indicates the amount of commodity industry *i* used by industry *j*. The vector of **f** represents final demand components; (i) private consumption (**c**), (ii) investment (**i),** (iii) government consumption (**g**), and (iv) export (**e**). Primary input (**d**) components consist of vector of imports (**m**), vector of value added (**v**) and vector of indirect tax (**t**). (Based on matrix form of IO table, batik making data is able to provides a complete picture on the purchases (supply) and sold (demand) of output by batik industry in an economy. Thus, IO analysis can illustrates the interdependencies of batik industry with other sectors in economy.

INPUT-OUTPUT ANALAYSIS: INTERSECTORAL LINKAGES

IO analysis is an economic modeling technique that aims to provide an understanding on the extent of interdependencies among production sectors in an economy. Presently, IO analysis technique is the only modeling technique that available for dealing with large scale multi sectoral problem empirically. IO analysis can be used as a tool to assess the structural changes in the economy, for instance, the intersectoral linkages between production sectors in an economy when one of the sectors changes. In the IO framework, there are two types of interdependence namely backward linkages and forward linkages. For backward linkages, if a particular sector, for instance, sector *j* increases its output, , there will be an increase in demands from sector *j* (as a purchaser) on the sectors whose goods are used as inputs to the production *j*. While, forward linkages refers to the increased output in sector *j* which also indicates that additional amounts of product *j* (as a seller) are available to be used as inputs to other sectors for their own production (Saari 2014). To measure the level of intersectoral linkages, we need to find the demand-driven model and supply-driven model.

DEMAND-DRIVEN MODEL

In basic demand-driven model (also known as Leontief model), the relationship between output, intermediate deliveries, and final demand can be shown as:

$$\begin{aligned} x &= Zi + (c + g + s + e) \\ &= Zi + f \end{aligned} \tag{1}$$

Where x is the vector for gross output, Zi is the summation vector for matrix intermediate deliveries, and f is the vector for final demand (c is the private consumption, g is the public consumption, s is the investment and e is the exports). Equation (1) shows the total output of sectors is equal to intermediate deliveries and final demand. Then, equation (1) can be rewrite detailed in matrix form as follows:

$$\begin{bmatrix} \mathbf{x}_1 \\ \vdots \\ \mathbf{x}_{10} \end{bmatrix}, \mathbf{z} = \begin{bmatrix} \mathbf{z}_{1,1} & \cdots & \mathbf{z}_{1,10} \\ \vdots & \ddots & \vdots \\ \mathbf{z}_{10,1} & \cdots & \mathbf{z}_{10,10} \end{bmatrix}, f = \begin{bmatrix} f_1 \\ \vdots \\ f_{10} \end{bmatrix} \tag{2}$$

In IO modeling, the IO table or matrix is partitioned in two components, namely endogenous and exogenous components. For IO demand-driven model, endogenous component is the intermediate deliveries and exogenous component is final demand. In matrix notation, equation (1) can be transformed into a standard Leontief IO model as follows:

$$\begin{aligned} x &= Ax + (c + g + s + e) \\ &= Ax + f \end{aligned} \tag{3}$$

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 (also called as a technical coefficient or direct coefficient). Each element of A, input coefficient is equal to:-

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

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). Therefore, the input coefficients matrix A examines the backward effects of inter-industry relationships due to the coefficient ($\alpha_{ij} = z_{ij}/x_j$) is based on total input (Park, 2007). 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, which means $|I - A|$ is not equal 0, therefore $(I - A)^{-1}$ is exist. The output of each good will be given by the solution:

$$\begin{aligned} x &= (I - A)^{-1} f \\ x &= Lf \end{aligned} \tag{5}$$

Where $(I - A)^{-1}$ is known as the Leontief inverse matrix (L). In IO model, the L is assumed to be fixed due to the assumption of constant input coefficients matrix A and the only variable is the exogenous final demand. Each element of the L shows the total output effects for any

sector *j* to satisfy each unit of the final demand. Therefore, equation (5) shows the dependence of each of the gross output on the value of each of the final demand. This linkage provides a clear independencies among sectors, which means an expansion in the final demand of any sector, does not only benefit its own sector but also all other sectors that have strong linkages with that sector.

SUPPLY-DRIVEN MODEL

The supply-driven model is used to analyze the issue of factor supplies (also known as Ghosh model). The model provides an alternative interpretation which relates sectoral output to primary inputs. This model operates by essentially rotating the vertical (volume) view of the model to a horizontal (row) one. Therefore, instead of dividing each element column by the gross output of the sector associated with that particular column, we divide each element of row by the output of the sector associated with that row (Saari 2014). The 'Ghoshian' supply-driven model requires construction of an allocation (output) coefficients matrix B, which allocates (sales) the current total inputs to each sector. In other words, coefficients matrix B implies the amount sector *i* supplies to all sectors in the economy for use of its output as inputs in their production process. Thus, the allocation coefficients matrix B should be measured as a fraction of total outputs ($b_{ij} = z_{ij} / x_i$) in order to examine allocation processes of input in sectors. B is widely used in order to find forward linkages of the sectors of the economy (Park, 2007). In the Ghosh model, we transpose all elements of matrix B so that the resulting vector of output is a column rather than a row. Then, basic Ghoshian inverse matrix equation can be written as:-

$$\begin{aligned} X &= (I - B')^{-1} d \\ &= G'd \end{aligned} \qquad (6)$$

Where G'is the transposed Ghoshian inverse matrix. Finally, through the Leontief multiplier (l_{ij}) which is based on input coefficients in demand-driven model and Ghoshian multiplier (b_{ij}) which is based on output coefficients in supply-driven model, the simple index for the measure of backward and forward linkages can be acquired as follows:-

i) backward linkages

$$B_i = [(1/n)\textstyle\sum_i l_{ij} / (1/n^2)\sum_i\sum_j l_{ij}] \qquad (7)$$

ii) forward linkages

$$F_i = [(1/n)\textstyle\sum_i b_{ij} / (1/n^2)\sum_i\sum_j b_{ij}] \qquad (8)$$

Where n is the number of sectors, $\sum_i l_{ij}$ is the column sum for sector i, $\sum_i\sum_j l_{ij}$ is the sum of all elements of the Leontief inverse matrix, $\sum_i b_{ij}$ is the row sum for sector j and $\sum_i\sum_j b_{ij}$ is the sum of all elements of the Ghoshian inverse matrix. The differential between both model are; (i) in Ghosh model, the variables of primary inputs (imports, indirect taxes and value added) are the exogenous components but they are endogenous in the Leontief model; and (ii) in Leontief model, the final demand variables (private consumption, investment, government consumption, export) are exogenous components but they are endogenous in the Ghosh model.

The linkages provide one mechanism for identifying the 'key' or 'leading sector' in an economy. The index of linkages will exhibit the spillover effect of particular industry in an economy via intra-industry linkage effects. Briefly, backward linkages index measures the level of integration of batik industry in using or demanding output from other sectors to be used as inputs to produce their output and forward linkages index indicates the level of integration of other sector in using outputs from batik industry to produce their output.

RESULTS AND DISCUSSIONS

MALAYSIAN ECONOMIC STRUCTURE 2010

This section discusses the findings on the economic structure based on the data extracted from Malaysia's IO Table 2010. Table 2 highlights the value and contribution of output for Malaysia in 2010. We found that the total domestic output of Malaysia's economy was RM2074.2 billion. Examining in detail at the performance of economic sector, the finding revealed that the main contributor to domestic output was secondary sector (50.3%), followed by tertiary industry (38.4%) and followed by primary industry (11.3%). In terms of share by industry to the types of sector, manufacturing sector contributes highest value to secondary sector which recorded 86.7 per cent while for tertiary sector, wholesale and retail trade sector was the main contributor and recorded 25.1 per cent. For primary industry, it is dominated by agriculture, fishery and forestry sector at 54.1 per cent. With all these figures, manufacturing sector that contains 69 sectors can be classified as an important sector to boost Malaysian economy. Increases in any of the sectors will able to enhance the performance of manufacturing sector and eventually assist Malaysia in achieving the developed nation status by 2020. This implies that, the positive growth in batik industry would increase significantly the performance of manufacturing sector in Malaysian economy provided that there are substantial intersectoral linkages between batik and manufacturing industry.

CONTRIBUTION OF BATIK MAKING TO THE DOMESTIC PRODUCTION 2010

Table 3 depicts the contribution of batik making related to manufacturing sector, input structure and output structure. The total output for batik industry in 2010 was valued at RM67.98 million. By year 2010, the batik's total output contributed 1.0 per cent to the total of textiles and 5.3

TABLE 2. Value and contribution of domestic output 2010

Sector	Value (RM Million)	Contribution (%)	Shared by industry (%)
Primary industry	***234,200***	***11.3***	***100%***
Agriculture, Fishery & Forestry	126,651	6.1	54.1
Mining & Quarrying	107,549	5.2	45.9
Secondary industry	***1,043,814***	***50.3***	***100%***
Manufacturing	905,133	43.6	86.7
Utilities	47,319	2.3	4.5
Construction	91,362	4.4	8.8
Tertiary industry	***796,157***	***38.4***	***100%***
Wholesale & Retail Trade	199,972	9.6	25.1
Hotel & Restaurants	47,681	2.3	6.0
Transport & Communication	165,051	8.0	20.7
Finance & Insurance	145,528	7.0	18.3
Real estate & Ownership of Dwellings	38,145	1.8	4.8
Business & private services	87,844	4.2	11.0
Government Services	111,936	5.4	14.1
Total	**2,074,171**	**100%**	

Source: Malaysian IO Tables, 2010, Department of Statistic Malaysia.

percent to the finished textiles. This figure does not mean that the batik industry does not play a role in Malaysian economic development. Its contribution can be measured through their linkages with other production sectors by exploring the IO structure of batik making.

Through the input structure analysis, the result showed that the batik making process used 53.7 per cent of intermediate inputs, for instance, inputs from yarn and cloth (12%), wholesale & retail trade and motor vehicle (19.3%), land transport (4.7%), basic chemicals

TABLE 3. Contribution of batik in domestic production 2010

Sector	Value (RM Thousand)	Contribution (%)
Total output for batik	**67,979**	**-**
Manufacturing sector		
Total manufacturer of textiles	6,757,683	1.0
Total finishing of textiles	1,274,001	5.3
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
Banks and financial institution	1548	2.3
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

Source: Authors' calculations.

(2.4%) and banks & financial institution (2.3%) sectors. Approximately 46.3 per cent of primary inputs has been used in batik making structure. We have obtained a unique finding when the inputs to produce local batik are mostly contributed by import commodities (19.5%) and followed by the income to workers (14.5%). In sum, batik sector contributes 5 per cent to the labor income while 45 per cent to operating surplus (profit). Furthermore, output structure analysis revealed that Malaysian batik appears to be too concentrated on the private consumption and recorded 96.7 per cent. The extended IO table 2010 revealed that there is no transaction or linkages to the external market in terms of export market for batik industry.

Figures in Table 3 highlighted several issues that deserve more attention from government and batik entrepreneurs. First, we realize that there is high dependency on imported raw materials. By looking at the batik making process, most of the main raw materials has to be imported from abroad such as white fabric (silk and cotton), wax, chemical dyes and chemical for finishing process. High dependency on imported raw material will cause poor accessibility to raw materials and produce an inconsistent supply of raw materials for batik producers or entrepreneurs to shape into finished goods., Another related problem is the rising price of the raw materials which eventually will increase the cost of production and raising the batik price., The high production cost will limit production capacity while the higher price for batik will cause decrease in demand for batik. Second, batik products mainly target the local or domestic market. In this case, if there is income constraint among local people and the batik price is high, this likely to have an adverse effects on the demand for batik in local market in the future. Third, batik industry is a labor intensive industry. In batik making process, batik artisans should follow the six stages of process starting from drawing, coloring, fixing, de-waxing, washing and drying process. This indicates that batik entrepreneurs must have sufficient manpower to produce a piece of batik. With a suitable number of workers, they can save the operation cost, especially the time cost to increase the volume of productions. Due to being a highly labor intensive industry, the growth of batik sector is capable of creating more job opportunities to the local communities. Being a rural industry this would help to lift the quality of life of local communities through generation of household income.

Fourth, most of the local batik industry operates as small family business that is managed with owned capital. Typically, local batik producers or entrepreneurs prefer to use their own savings as capital rather than taking loans from banks and other financial institutions. There are several reasons why loans is regarded as the least preferred method, among of them are: (i) requirement for written document such as business paperwork and financial statement; (ii) high interest rate; and (iii) requires collateral. This explains why most of batik entrepreneurs are categorized as microenterprise firms. In summary, several factors such as high cost of raw materials, focusing on domestic market, the dependency on labor, and lack of capital would become obstacles in the production of batik. The government may needs to give a serious consideration in formulating appropriate strategies to ensure that batik industry as a highly-valued national heritage will be sustained in the future.

INTERSECTORAL LINKAGES 2010

The section discusses the types and extent of intersectoral linkages for batik industry. Table 4 shows the index of backward and forward linkages of Malaysian economic structure for selected sectors. As we know, backward linkages denotes the dependence of a given industry on other industries while, forward linkages denotes the dependence of other industries on a given industry. The sector is defined as the key sector if it shows strong backward and forward linkages, which mean both indexes is higher than 1. By using an extended IO table 2010, we finds that there are 34 sectors (27.2%) defined as a key sector in Malaysian economy (refer Table 4). A key sector plays a vital role in supporting and boosting the production in other sector in Malaysian economy and it also can be used as an indicator to the government for the development strategy of Malaysia economy. The finding reveals that the major contributor to a key sector is manufacturing sector with 61.8 per cent and followed by services sector with 32.4 per cent. If we examine in detail at the intersectoral linkages in textiles manufacturing it is found that, yarn and cloth (1.055), finished textiles (1.100) and batik making (1.093) has backward linkages with other sectors in the economy. This implies that the contribution of the batik industry to growth of the economy is through backward linkages rather than forward linkages, indicating that the output from other sector is demanded much higher by batik industry than what other sectors demands from batik industry.

To provide a more detailed view on this relationship, a simulation was conducted on; i) how much if a 10 per cent increase in private consumption of batik from the actual level would benefit all sectors in the economy; and ii) how much if a 16 per cent increase in cost of imports for yarn and cloth from the actual level would affect prices of manufactured textiles. Exploring to the inputs used to produce batik in the extended IO table 2010, we find yarn and cloth, basic chemical, wholesale & retail trade and motor vehicle and land transport sectors has a strong linkages with batik making sector. Table 5 depicts that 10 per cent increase in private consumption of batik would generate RM6.6 million of new output level in its own sector, RM0.8 million for yarn and cloth sector, RM0.4 million for basic chemical sector, RM1.5 million for wholesale & retail trade and motor vehicle sector and RM0.4 million for

TABLE 4. Leontief Multiplier, Ghosh Multiplier and Industrial Linkages 2010

Sector	Leontief Multiplier	Ghosh Multiplier	Backward Linkages	Forward Linkages
AGRICULTURE, FISHERY & FORESTRY				
Forestry and Logging	2.101	2.823	1.189	1.650
MANUFACTURING				
Meat and Meat Production	2.293	1.991	1.297	1.164
Preservation of Seafood	2.517	1.754	1.424	1.025
Oils and Fats	2.660	1.758	1.505	1.028
Animal Feeds	1.867	1.926	1.056	1.126
Yarn and Cloth	1.865	1.621	1.055	0.947
Finishing of Textiles	1.944	1.069	1.100	0.625
Batik Making	1.933	1.017	1.093	0.595
Other Textiles	1.688	1.413	0.955	0.826
Sawmilling and Planning of Wood	2.442	1.947	1.381	1.138
Builders' Carpentry and Joinery	2.492	2.267	1.410	1.325
Wooden and Cane Containers	2.591	2.260	1.466	1.321
Basic Chemicals	1.998	1.909	1.130	1.115
Fertilizers	1.853	2.400	1.048	1.402
Paints and Varnishes	1.794	2.361	1.015	1.380
Soap, Detergents, Perfumes, Cleaning & Toilet Preparations	1.939	1.894	1.097	1.107
Other Chemicals Product	2.055	1.864	1.162	1.089
Rubber Processing	2.356	2.624	1.333	1.534
Sheet Glass and Glass Products	1.906	2.143	1.078	1.252
Clay and Ceramic	1.807	1.986	1.022	1.161
Cement, Lime and Plaster	2.080	2.466	1.177	1.441
Concrete & Other Non-Metallic Mineral Products	2.253	2.561	1.275	1.497
Iron and Steel Products	1.904	2.446	1.077	1.429
Structural Metal Products	1.828	1.991	1.034	1.164
Other Transport Equipment	1.895	1.887	1.072	1.103
Repair & Maintenance	2.019	3.139	1.142	1.834
UTILITIES				
Sewerage, Waste Collection & Remediation Activities	1.776	2.575	1.004	1.505
CONSTRUCTIONS				
Special Trade Works	1.899	1.801	1.074	1.052
HOTEL & RESTAURANTS				
Accommodation	1.905	1.890	1.077	1.105
TRANSPORT & COMMUNICATIONS				
Land Transport	1.885	2.218	1.066	1.296
Other Transport Services	2.116	2.520	1.197	1.473
Telecommunications	2.078	2.077	1.175	1.214
Cinema, Video and Television Activity	1.778	1.915	1.006	1.119
ICT & Computer Services	1.939	2.507	1.097	1.465
FINANCE & INSURANCE				
Financial Institution	2.230	2.960	1.262	1.730
Other Financial Institution	2.017	2.818	1.141	1.647
REAL ESTATE & OWNERSHIP OF DWELLINGS				
Real Estate	1.848	2.667	1.046	1.559
BUSINESS & PRIVATE SERVICES				
Business Services	1.862	2.490	1.053	1.455

Source: Authors' calculations.

TABLE 5. Output Level and Changes in Selected Sector (RM Thousand) 2010

Sector	Old output	New output	Changes
Batik making	67,979	74,554	6,576
Yarn and cloth	3,377,633	3,378,447	814.3
Basic chemical	34,149,476	34,149,864	388.4
Wholesale & retail trade and motor vehicle	202,491,491	202,493,015	1,524
Land transport	20,535,395	20,535,752	356.8

Source: Authors' calculations.

land transport sector. This new output level provides clear independencies among sectors in the sense that expansion in the private consumption of batik does not only benefit its own sector but also other sectors that have strong industrial linkages with the batik making.

In the second case, we assume that cost of imports increased by 16 per cent for yarn and cloth sector. We assume the current prices for silk fabric is RM25 per meter and the price increased about RM4 in a given year. By using the price model analysis, we found that the most affected sectors are those sectors categorized in manufactures of textiles, wearing apparel and leather products. We focused on these sectors, to what extent the increased cost affect prices in manufactures of textiles, wearing apparel and leather products. The cost of primary inputs covers the cost of imports, labor, capital and taxes. Table 6 depicts that an increase in 16 per cent in cost of imports for yarn and cloth sector has increased 4.45 per cent prices in their own sector. In-depth investigation on Table 6 highlights an increase in cost of imports for yarn and cloth sector also increases prices in batik making sector by 0.54 per cent, other textiles sector by 0.5 per cent, finished textiles by 0.3 per cent, wearing apparel by 0.4 per cent and leather products by 0.2 per cent. This figure indicated that there is a backward linkage in the use of yarn and cloth with batik making sector. With this, the government or policy makers may consider formulating relevant measures or strategies related to yarn and cloth sector in order to boost batik making sub-sector. As a whole, we conclude that the growth in batik industry would indirectly increase the contribution of manufacturing sector to the Malaysian economy.

CONCLUSION

This study focused on the economic contribution of batik industry in Malaysian economy. The aim of this study is to measure the economic contribution of batik industry to the national economy through the idea of inter-industry linkages in Malaysian economic structure. Inter-industry linkages explain how one sector affects others in the economic structure of a country. Our study is a new effort measure empirically the contribution of batik industry via the use of industrial linkages model in IO analysis technique which is underrepresented in the context of Malaysia. The findings from the extended IO table 2010 reveals that there is high dependency on imported raw materials, domestic market and labor in the batik-industry. Result on intersectoral linkages indicate that there is backward linkages between batik industry with other production sectors in Malaysian economic structure especially with yarn and cloth, wholesale & retail trade and motor vehicle, land transport and basic chemical sectors. This linkage demonstrates that by stimulating growth in the output of the batik industry would be beneficial to other sectors and not only to the batik industry itself. Batik industry demand more outputs from other sectors as inputs to produce their own products rather than other sectors demanding output from the batik industry. Any changes in a sector that has strong linkages with batik industry would lead to significant changes in the level of output and prices in batik industry. Thus, we suggest the government may consider formulating a strategic planning on sectors that has strong linkages with batik industry in order to develop and preserve the national's heritage. A valuable point for future research

TABLE 6. Changes in Prices in Manufacturer of Textiles 2010

Sector	Baseline	Price	Changes (%)
Yarn and cloth	1.0000	1.0445	4.4529
Finishing of textiles	1.0000	1.0032	0.3215
Other textiles	1.0000	1.0050	0.5047
Batik making	1.0000	1.0054	0.5385
Wearing apparel	1.0000	1.0041	0.4125
Leather products	1.0000	1.0016	0.1604

Source: Authors' calculations.

is opened from this research. Future research may focus on the strength of inter-industry linkages between batik with other production sectors via the direct effects and indirect effects of injection in final demand. Thus, we are able to measure the extent to which an expansion in final demand of batik industry contribute to the output effects, whether its high-degree or low-degree of integration with other sectors in Malaysian economy.

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REFERENCES

Ahmad, H., Jusoh, H., Siwar, C., Buang, A., Noor, M. S. H., Ismail, S. M., & Zolkapli, Z. A. 2011. Pelancongan budaya di koridor ekonomi wilayah pantai timur (ecer): isu dan cabaran. *GEOGRAFIA Malaysian Journal of Society and Space* 7. Special Issue: Social and Spatial Challenges of Malaysian Development: 180–189.

Akhir, N. H. M, Ismail,N.W., Said, R, & Kaliappan, S. R. 2016. Creative craft: the uniqueness and potential of the Malaysian batik industry. *International Journal of Interactive Media* 4(1): 10–14.

Amin, I. M. 2006. Manufacturing and marketing of traditional crafts: Malaysian perspective. Paper presented at the meeting of the APEC/SME Seminar on Support for Local and Cottage Industries, Hanoi, Vietnam, September 2006. Available at http://www.asiaseed.org/apec2006sme/presentation at_pdf/session3_2_ismail_outline.pdf.

Bekhet, H. A. & Abdullah, A. 2010. Energy use in agriculture sector: Input-output analysis. *International Business Research* 3(3): 111–121.

Buletin Kraftangan 03. 2012. *Medium Transformasi Kraf Malaysia*. Kraftangan Malaysia: Perbadanan Kemajuan Kraftangan Malaysia. Available at www.kraftangan.gov.

Choy, E. A. 2013. Pembangunan Pelancongan Lestari di Melaka: Perspektif Pelancong. *GEOGRAFIA Malaysian Journal of Society and Space* 9 (3): 12–23.

Fauzana, I. 2007. Structural change of the agricultural sector: Analysis based on input-output tables. Working Paper. Department of Statistics Malaysia.www.statistics.gov.my.

Hairuddin, H., Noor, N. L. M. & Malik, A. M. A. 2012. Why do microenterprise refuse to use information technology: a case of batik microenterprise in Malaysia? *Procedia-Social Behavioral Science* 57: 494–502.

Ismail, W. N. S., Mokhtar, M. Z. & Ali, A. 2013. Design activities and the difference level of sales and profits performance of the batik SMEs in Malaysia. *International Review of Management and Business Research* 2(2): 627–642.

Krevitsky, N. 1964. The Art of Batik Today. *Art Education* 17 (8): 33–35.

Malaysian Handicraft Annual Report 2009. Malaysia Handicraft Development Corporation. Available at www.kraftangan.gov.my

Malaysian Handicraft Annual Report 2010. Malaysia Handicraft Development Corporation. www.kraftangan.gov.my

Malaysian Handicraft Annual Report 2011. Malaysia Handicraft Development Corporation. www.kraftangan.gov.my

Malaysian Handicraft Annual Report 2012. Malaysia Handicraft Development Corporation. www.kraftangan.gov.my

Malaysian Handicraft Annual Report 2013. Malaysia Handicraft Development Corporation. www.kraftangan.gov.my

Manan, D. I. M. & Jan, N. M. 2010. Do resources contribute to firms' performances? Exploring batik industry in Malaysia. *International Review of Business Research Papers* 6 (3): 189–204.

Mazumder, M. N. H., Ahmed, E. M. & Al-Amin, A. Q. 2009. Does tourism contribute significantly to the Malaysian economy? Multiplier analysis using I-O technique. *International Journal of Business and Management* 4(7): 146–159.

Mokhtar, M. Z. & Ismail, W. N. S. W. 2012. Marketing strategies and the difference level of sales and profits performance of the batik SMEs in Malaysia. *International Journal of Business and Management* 7(23): 96–111.

Muda, M. S., Amin, W. A. A. W. M. & Sofian, A. H. M. A. 2011. Craft Entrepreneurs in Malaysia: Analysis of Relationship between Product Innovation, Business Commitment and Business Expansion. Proceedings from Persidangan Kebangsaan Ekonomi Malaysia ke VI (PERKEM VI) 2: 208–217.

Park, J. Y. 2007. The supply-driven input–output model: a new reinterpretation and extension. Paper Presented at 46thAnnual Meeting of the Western Regional Science Association, Newport Beach, CA, February 21–24. www-bcf.usc.edu/~pgordon/pdf/200703supply.pdf

Redzuan, M. & Aref, F. 2009. Barriers and opportunities in the development of rural industries: A case study of silverware and batik production in Kelantan, Peninsular Malaysia. *J. Agric. & Environ. Sci* 6(2): 96–202.

Rajuddin, M. R. & Alias, F. 2010. Tahap Pengurusan Perniagaan Dalam Industri Kecil dan Sederhana (IKS) Pengusaha Batik Di Daerah Kota Baharu. Available at www.eprints.utm.my/10511/

Redzuan, M. & Aref, F. 2011. Constraints and potentials of handicraft industry in underdeveloped region of Malaysia. *African Journal of Business Management* 5(2): 256–260.

Report on the Annual Survey of Manufacturing Industries 2013-2015. Department of Statistic Malaysia www.statistics.gov.my

Robinson, R. 2001. *Creative Batik*. Search Press Limited.

Saari, M. Y. 2014. *Input-output Analysis: Foundations and Applications for Policy Analysis in Malaysia*. Kuala Lumpur: University of Malaya Press.

Saari, M. Y., Alias, E. H. & Chik, N. A. 2013. The importance of the agricultural sector to the Malaysian economy: analyses of inter-industry linkages. *Pertanika J. Soc. Sci. & Hum*. 21 (S): 173–188.

Sauian, M. S., Kamarudin, N. & Rani, R. M. 2013. Labor productivity of services sector in Malaysia: analysis using Input-Output approach. *Procedia Economics and Finance* 7: 35–41.

Tin, P. B. 2014. Decomposition analysis for labour demand: evidence from Malaysian manufacturing sector. *WSEAS Transactions on Business and Economics* 1: 32–41.
Yunus, N. A. 2011. *Malaysian Batik: Reinventing a Tradition.* Yayasan Budi Penyayang Malaysia.

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