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Sources of Labour Growth in Malaysian Manufacturing Sector

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ABSTRACT

Manufacturing sector play an important role in the Malaysian industrial development. High growth rates and technology expansion in the manufacturing sector resulted in a substantial increase in demand for labour. This process of rapid growth and changes in labour were also accompanied by changes in labour structure and skills. At the same time, the range of activities and products became more diversified and correspondingly sub sectors composition of manpower changed significantly. This study employed the input-output SDA. The analysis computed the compositional manpower change as a result of decomposition. The result of this study indicates that sources of labour growth in the manufacturing sector were favored by changes in the final demand structure. Within the changes in the final demand structure, changes in domestic demand structure were the dominant source of employment growth during 1978-1991 and overall period 1978-2000. However, from 1991 to 2000, an employment change was due mainly to changes in export structure. Changes in the structure of domestic demand had relatively strong increasing effect on service workers, production and related workers, transport equipment operators and laboures and clerical and related workers during 1978-1991. Changes in the export structure were the main factor that had an employment increasing effect on high skill workers and sales workers. However, during the second sub period 1991-2000, manpower growth was exports structure driven. Interestingly, human capital accumulation occurred in the heavy industry was higher than light industry over the period considered.

Keyword: Manufacturing, Labour, Input-Output , Structural Decomposition Analysis

INTRODUCTION

Malaysian economy has undergone a significant structural transformation from a basic agrarian-based economy to an industrialised one. Manufacturing sector in Malaysia is the main engine for the growth. Measured in terms of contribution to GDP and labour, manufacturing sector is now by far the most important and major sector in the economy's growth. This sector become more important to be developed when vision 2020 was proposed that is let the economy to be become fully industrialised nation. The structural changes in the economy have also transformed the country from an exporter of primary commodities to an exporter of high value-added manufactured products. At the same time, integration of the economy into global and advancement technology economy prompted structural changes not only in output composition but also in employment and occupational composition of the workforce. Indeed, currently the economy is continuously experiencing further structural adjustments in output and employment as the degree of integration with world markets increases and changes in technology deepen. Naturally, as a small open economy, Malaysia's domestic demand, exports, imports, economic growth and technological change would certainly affect directly and indirectly changes in manpower structure especially in the manufacturing sector. At the same time, the range of

activities and products became more diversified and correspondingly manufacturing sub-sectors composition of manpower changed significantly.

Technological progress in an economy certainly also changes the requirements for the economy's labour force in terms of knowledge level and skill combination and causes replacement of some occupation by others. The present study would like to investigate the sources of manpower changes in the manufacturing sector as it moves towards a more high skilled, high-technology and capital-intensive method of production in order to remain competitive, especially in broad sectors like electronics and electrical goods. The continuation of economic transformation to the era of industrialisation will undoubtedly place new demands on high level technical skills, managerial and entrepreneurial capabilities as well as increased technological development and improved capital utilization. Hence it is important to undertake new research in labour issues in manufacturing sector because the sector is anticipated to become a major absorber of manpower. Failure to take these into consideration in the promotion of the national development may severely affect the economy because the national development plan aims to ensure sustainable economic growth. It would be interesting to study whether there was any significant shift in labour structure and if there was, what are the sources of labour change during the industrialisation process? As a result, it is important to understand and identify the sources of growth that would give strongest impetus to this transition.

In addition, structural decomposition analysis, which is employed in this research, has the capability of not only decomposing changes in the manpower of the economy into economic growth, technical change and changes in the structure of final demand effects but also identifying explicitly the occupation and the labour productivity of technical change.

LITERATURE REVIEW

Manpower input-output structural decomposition analysis is the extension of the Structural Decomposition Analysis (SDA) and input- output labour models. Moore and Peterson (1955) were among the first to identify the capability of an input-output model to be useful in analysing the labour impacts of changes in final demand. They utilised what has become known as the 'labour requirement function' in conjunction with the I-O transactions matrices to illustrate the relationship between sectoral labour and the value output. Richardson (1972), Gould and Kulshreshtha (1985), Groenewold et al. (1987) develop models that incorporate these types of equations to estimate the labour impacts of changes in final demand. Diamond (1975) and Bathelt (1991) employed an input-output model for analysing labour changes and linkages within an economy. While Holub and Tappeiner (1989) introduced an extension of input-output labour models to overcome the weaknesses in the tradition model.

A number of recent studies on labour input output includes study done by Leclair (2002), examined the effect that export composition had upon manufacturing labour in the United State during the 1991 recession. This analysis estimated the labour effects of manufacturing exports by utilizing an input-output model to measure direct and indirect effects. The results demonstrated that export composition has reduced and strengthened demand for labour. By using two input-output tables, Guncavdi et al. (2003) calculated labour demand of the Turkish industries and analysed the changes in labour demand. Their finding showed that foreign trade in intermediate goods creates extra use of domestic labour.

Napoles (2004) measured the impact of Mexico exports both on gross output (production for intermediate and final demand) and labour through input–output analysis, which includes the technical coefficients matrix, the direct labour vector, and the final demand vector (in this case, of exports). The results of this analysis concluded that the positive effect of increasing manufacturing exports on production is limited and offset by manufacturing imports, thus displacing domestic production. The positive effect of exports on direct and indirect labour is not as important as that of domestic production. The direct impact of exports on labour has increased as a percentage of total labour; it is still low when compared to the rapid growth of total exports. This may be due at least in part to the fact that manufacturing exports are increasingly less labour and more capital.

The above input-output labour studies; however has a serious weakness which restricts its use for analyses of concrete labour problems. Labour is assumed to be absolutely homogeneous. Therefore it is not possible to treat problem which arise from different qualifications of labour. More recently, Gu and Rennison (2005) used an input-output model to examine the effect of trade integration on demand for skilled workers and productivity growth in Canada for 1981-1997. They found that trade integration had a positive effect on both total factor productivity and labour productivity. Total factor productivity and labour productivity grew faster in import and export industries than in the total

business sector over this period, and this productivity growth gap has widened over time. Canada is found to have a comparative advantage in natural resource-intensive industries and capital, although it has reduced over time. They also found that trade integration had little effect on the demand for unskilled and skilled workers in Canada.

As mention earlier, input output structural decomposition analysis has been used to observe other effects of economic change on independent and dependent variables. Although the main predominant object of the most study has been to examine change in trade, investigating energy use and economic growth are close followers. Other key dependent variables to which SDA has been applied include labour requirements. Forssell (1990), for example, has analysed the changes in the use of labour by education attainments in the Finnish economy by using input output framework. The educational level of the population is classified according to the amount of education received (level 1 until level 9). The shifts in the use of labour input between the initial year and the terminal year are decomposed into the effect of structural change in final demand, the effect of growth, the effect of changes in intermediate input-output coefficients, effect of changes in labour coefficients themselves. The two last stated effects are measures of technical changes. The result of the study indicated that the changes due to intermediate input-output coefficients are small compared to other changes. Most of the changes are due to labour input coefficient, which have decreasing effects in the use of labour in education level 2 and 9 but zero increasing effects on the use of labour in education levels 3-8. Though, the changes in the structure of final demand categories usually have decreasing effects on the use of labour input.

Input-output tables are used to examine output and labour growth patterns in Japanese industries between 1980-85 and 1985-88 by Fujita and James (1991). The objective is to measure if substantial structural change in labour and output had occurred following the sharp real appreciation of the yen against the dollar and other currencies in 1985. The results indicate Japan had shifted from export-leg growth in 1980-85 to domestic-demand-driven growth in 1985-88. Where as factors of labour growth in the manufacturing sector are decomposed into the domestic final demand expansion effect (DF), labour productivity effect (LP effect), import substitution effect (IS effect), e export expansion effect (EE effect) and technological change effect (TC). During 1980-85, labour productivity increased in most manufacturing sectors. However, this was not accompanied by unemployment because the expansion of export and domestic final demand largely offset negative effects from the increase in the labour productivity.

Instead of focus on the output and labour growth patterns, Betts and McCurdy (1993) decomposed labour changes in each industry-occupational group (manpower) in the Canadian private sector by combining input-output table and census information data from 1961, 1971 and 1981. Industries are grouped into services, manufacturing /construction and primary. Following Wolff and Baumol's study, labour occupations are divided into five groups; data services workers, goods workers, services workers, knowledge workers and n.e.c. (occupations not elsewhere classified). Labour in each occupation and industry are expressed as a function of (i) the number of hours worked by labour in each industry, (ii)the occupational mix of labour by industry, , (iii) the labour productivity by industry in terms of output per person hour, (iv) the level of consumption, (v) each industry's input-output vector and the components of final demand for each industry's commodities, (vi) the level of private investment, (vii)the level of government spending on goods and services, (viii) the level of exports and lastly the level of imports.

On the other side, Lakshmanan et al. (1993) tracked the progression of knowledge levels in the labour force in the Japanese economy. By using SDA method, changes in the levels of knowledge embodies in all workers in the different industries are decomposed into their sources: changes in the structure of final demand, changes in labour productivity, technical changes and lastly changes in the component structure of occupation.

Different from previous studies, which analysis the labour requirement as a small part or partial of their study, Han (1995) employs the labour requirement model by extends the framework of input output decomposition analysis into a model which decomposes changes in the labour requirement of the Japanese economy into effects of technical change, effect of changes in the structure of final demand, interaction of technical change and changes in final demand and effect of economic growth. Production is distinguished between 28 industries while labours are disaggregated into 5 categories: professional and technical, manager and officials, white collar workers, blue collar workers and services workers. The empirical study indicated that Japanese labour force experienced the replacement of blue collar workers by highly skilled professionals and technicians in the period 1975-85. Both technical change and changes in the structure of final demand fostered the increasing demand for professional and technicians. Further more, when the total labour intensity of the Japanese

economy decreased, it's highly quality labour intensity increased. However, this study will be more comprehensive if the author classified the labour by skill levels.

Ruiz and Wolff (1996) utilized the input-output structural decomposition analysis to analyze the sources of labour growth in Puerto Rico, 1967-1987. The sources of labour growth are decomposing to the technical change effect, final demand effect and the import leakage effect. They find that labour growth was led primarily by a rapid increase in final output (5.1% per year) although labour productivity growth also substantial, at 3.7% per year. Import leakages also fell over the period, but had little impact on labour growth. Labour generated by local absorption was more successful than exports, even though increased in exports demand more than local. There was also a notable shift in the occupational structure toward white-collar labour (professional, technical, managerial, sales and clerical) and away from blue-collar jobs (operative, craft, labour and service). The main reason for this was the changes in the composition final demand toward in rely greatly on white-collar workers. The second reason was due to bias in technological change, which favoured white collar-collar over blue-collar workers.

In this line of research, Cheon (1999) study focuses on the labour and skill effects of increasing global competition and technological innovations in Korean manufacturing sector. In order to investigate the effects of technology, domestic demand and trade on employment, the researcher decomposed labour changes into three sectors such as net trade (export-import), domestic consumption and technical change. Result showed that 3.3 million increase in labour were occurred between 1970 and 1990, which resulted from a net addition of an estimated 15.9 million gain due to domestic economic growth, and 0.1 million gain due to net trade (3.3 million due to export minus 3.2 million due to import), offset by net losses of 12.7 million from implementation of change in the labour-output ratio (labour-saving technological changes). However, the effects of foreign trade and technology on labour varied from industry.

Wolff (2006) examined the effect of technological change, computerisation and structural change on the growth of information workers in the US economy. He constructs matrices of employment by 64 industries and 267 occupations. He then aggregate the occupations into four categories namely; data processors, knowledge producers, service workers and good-processing workers. By using input-output decomposition analysis, he notice that growth in information workers was driven not by a shift in tastes toward information-intensive goods and services (as measured by the composition of final demand) but rather by a roughly equal combination of the substitution of information workers for goods and service workers within the unbalanced growth effect (from differential rates of industry productivity growth) and structure of production of industries. Finally, on the basis of regression analysis, he found that computer investment and R&D expenditures are negatively associated with the growth of data workers but positively associated with the growth in knowledge workers.

More recently, Jenkins (2008) used Chenery type decomposition analysis of employment change for different type of labour in South Africa. The researcher decomposed labour changes into five components such an exports, import substitution, domestic demand, productivity growth (proxied for technological change) and net trade. Both technology and trade are found to have had a negative impact on employment. The decomposition analysis would appear to suggest that technological changer more significant cause of job losses than trade, and trade only had a negative impact on employment during a relatively brief period of sharply raised import penetration during the early 1990s. In the case of skilled workers, technological change has also tended to have a negative effect except in the 1980s. A rather different pattern appears in the case of highly skilled labour where technology increased demand until the mid 1990s, reflecting the skill-biased nature of technological change.

The above manpower input-output SDA analysis describes the structural development of a production system by separating certain components and thus helps to explain better what has happened to the structure of manpower. As such SDA does not explain why structural changes have occurred. Furthermore, SDA technique relies on comparative static analysis, this implied that the driving forces behind structural changes and dynamic process of development are not analyzed.

METHODOLOGY

In the input-output approach, the balance equation can be written as:

$$X = AX + F \qquad (1)$$

Where,

F is the vector of final demand
X is the vector of sectoral output
And A is the technical coefficient matrix

Solving the balance equation for X, we obtain

$X = (I - A)^{-1} F$

Let $R = (I - A)^{-1}$

Where $R = (r_{ij})$ is Leontief inverse matrix

We may write equation (1) as $X = RF$ (2)

The labour requirement equation of an I-O production system of n sector is

$$L = l(I - A)^{-1} F \quad (3)$$

The theoretically and empirically most serious supposition in the I-O labour model is the assumption of a single type of labour per sector (labour is homogenous). By ironing out all differences between types of employed labour this assumption directly violates the basic idea of I-O economics, i.e. structural differentiation (Holub and Tappeiner, 1989). The most important of these structural differentiations is certainly based on the different categories of labour. The model of manpower structural decomposition analysis begins with the labour requirement equation of an input-output production system with n sectors and m labour occupations or manpower. Labour row vector coefficients l_i have to be extended to an m x n matrix or manpower coefficient matrix (H). Thus, the replacement of labour vector coefficient (l) with manpower coefficient matrix (H) yield below equation;

$$L = H(I - A)^{-1} F \quad (4)$$

where

$$H = \begin{bmatrix} h_{11} & h_{12} & h_{13} & \cdots & h_{1n} \\ h_{21} & h_{22} & h_{23} & \cdots & h_{2n} \\ h_{31} & h_{32} & h_{33} & \cdots & h_{3n} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ h_{m1} & h_{m2} & h_{m3} & & h_{mn} \end{bmatrix}$$

where L is a total manpower requirement column vector by occupations (m x 1), measured in workers; H is a manpower coefficient matrix by occupation and by sector (m x n) with the coefficients measured in terms of workers required per unit output; F is a final demand vector (n x 1) measured in value terms; A is a technical coefficient matrix (n x n), which measures the input requirements per unit output in value terms; and I is an identity matrix (n x n).

From equation 4, the present study defines $R = (I - A)^{-1}$, and then equation 4 can be expressed as;

$$L = HRF \quad (5)$$

From equation 5, thus sources of manpower change for n sectors can be express as:

$$L = HR(F)^{\Lambda} \quad (6)$$

( ) ^ denotes the diagonal matrix of the F vector in the parentheses and let

$$\theta = \frac{GDP_t}{GDP_0}$$

is the expansion rate of the gross domestic product (GDP) between terminal year and initial year.

Then the change in the manpower requirement of an economy between the two years (years 0 or initial and year 1 or terminal) can be decomposed into;

$$\Delta L = L_t - L_0$$

$$= H_t R_t F_t - H_0 R_0 F_0$$

$$= H_t R_t F_t - H_0 R_0 F_t + H_0 R_0 F_t - H_0 R_0 \phi F_0 + H_0 R_0 \phi F_0 - H_0 R_0 F_0 = (H_t R_t - H_0 R_0) F_t + H_0 R_0 (F_t - \phi F_0) + H_0 R_0 (\phi - 1) F_0$$

$$= (H_t R_t - H_0 R_0) F_t - (H_t R_t - H_0 R_0) F_0 + (H_t R_t - H_0 R_0) F_0 + H_0 R_0 (F_t - \phi F_0) + H_0 R_0 (\phi - 1) F_0$$

Or

$$\Delta L = (H_t R_t - H_0 R_0) F_0 + H_0 R_0 (F_t - \phi F_0) + H_0 R_0 (\phi - 1) F_0 + (H_t R_t - H_0 R_0)(F_t - F_0) \quad (7)$$

From equation 7, the sources of manpower change is summarized as Table 1.

Technical change

We shall assume that the technical change within each sector can be broken into two separate parts, i.e. changes in intermediate input using technology and changes in manpower using technology, and denoting H^* as a hypothetical direct manpower coefficient matrix (m x n) with the labour intensity of each sector the same as that of H_t, but the occupation mix of each sector manpower the same as that of H_0, which is mathematically defined as ;

$$H^* = H_0 (\nu H_t)\hat{} \; (\nu H_0)\hat{}^{-1} \quad (8)$$

ν is a unit row vector (1 x m) and ( ) ^ denotes the diagonal matrix of the vector in the parentheses,

Then, the effect of technical change (first term) can be further decomposed into;

$$(H_t R_t - H_0 R_0) F_0$$

$$= (H_t R_t - H_0 R_t + H_0 R_t - H_0 R_0) F_0$$

$$= (H_t - H_0) R_t F_0 + H_0 (R_t - R_0) F_0$$

$$= (H_t - H_0) R_t F_0 - (H_t - H_0) R_0 F_0 + (H_t - H_0) R_0 F_0 + H_0 (R_t - R_0) F_0$$

$$= (H_t - H_0)(R_t - R_0) F_0 + (H_t - H^* + H^* - H_0) R_0 F_0 + H_0 (R_t - R_0) F_0$$

$$= (H_t - H^*) R_0 F_0 + (H^* - H_0) R_0 F_0 + H_0 (R_t - R_0) F_0 + (H_t - H_0)(R_t - R_0) F_0 \quad (9)$$

Base on above equation, the effect or technical change is summarized as Table 2.

Final demand

Final demand comprise of domestic consumption, government expenditure, investment, stock change, exports and imports. The effect of changes in the structure of final demand also can be further decomposed. Let us suppose that the final demand is decomposed into domestic final demand

(including domestic consumption, government consumption (federal, state, local), changes in inventory, gross fixed capital formation), exports and imports, and let

$$\gamma^{d} = \frac{\mu F_t^{d}}{\mu F_0^{d}} \qquad \gamma^{e} = \frac{\mu F_t^{e}}{\mu F_0^{e}} \qquad \gamma^{m} = \frac{\mu F_t^{m}}{\mu F_0^{m}}$$

where

F^{d} = Domestic final demand (n x 1)

F^{e} = Exports (n x 1)

F^{m} = Imports (n x 1)

μ = Unit row vector (1 x n) and

$f = (F^{d} \; F^{e} \; F^{m})$ (n x 3)

$$\bar{\gamma} = \begin{pmatrix} \gamma^{d} \\ \gamma^{e} \\ \gamma^{m} \end{pmatrix} \qquad \bar{\phi} = \begin{pmatrix} \phi \\ \phi \\ \phi \end{pmatrix}$$

(3 x 1) (3 x 1)

Then, the effect of changes in the structure of final demand can be further decomposed into;

$$\begin{aligned} H_0 R_0 (F_t - \phi F_0) &= H_0 R_0 [F_t^{d} + F_t^{e} + F_t^{m} - \phi (F_0^{d} + F_0^{e} + F_0^{m})] \\ &= H_0 R_0 (F_t^{d} + F_t^{e} + F_t^{m} - \gamma^{d} F_0^{d} - \gamma^{e} F_0^{e} - \gamma^{m} F_0^{m} \\ &\quad + \gamma^{d} F_0^{d} + \gamma^{e} F_0^{e} + \gamma^{m} F_0^{m} - \phi F_0^{d} - \phi F_0^{e} - \phi F_0^{m}) \\ &= H_0 R_0 [(F_t^{d} - \gamma^{d} F_0^{d}) + (F_t^{e} - \gamma^{e} F_0^{e}) + (F_t^{m} - \gamma^{m} F_0^{m}) + f_0 (\bar{\gamma} - \bar{\phi})] \\ &= H_0 R_0 (F_t^{d} - \gamma^{d} F_0^{d}) \\ &+ H_0 R_0 (F_t^{e} - \gamma^{e} F_0^{e}) + H_0 R_0 (F_t^{m} - \gamma^{m} F_0^{m}) + H_0 R_0 f_0 (\bar{\gamma} - \bar{\phi}) \end{aligned} \qquad \textbf{(10)}$$

Base on equation 10, the effect or final demand is summarized as Table 3.

Interaction between Technical Change and Changes in the Final Demand.

The effect of interaction between technical change and changes in the final demand also can be further decomposed into;:

$$\begin{aligned} &(H_t R_t - H_0 R_0)(F_t - F_0) \\ &= (H_t R_t - H_0 R_0)(F_t - \phi F_0 + \phi F_0 - F_0) \\ &= (H_t R_t - H_0 R_0)(\phi - 1) F_0 \; + \; (H_t R_t - H_0 R_0)(F_t - \phi F_0) \end{aligned} \qquad \textbf{(11)}$$

Base on equation 11, the effect or final demand is summarized as Table 4.

This study applied two types of data. The first set of data used three sets of Malaysia's I-O tables for 1978, 1991 and 2000 published by the Department of Statistics Malaysia. The presented structure of national income account classification has administrated the possible maximum size of the Malaysian Input Output Tables. Basic sets of symmetric tables published by Department of Statistic (DOS) were offered at the 60 x 60 level of industries (commodities) aggregation for I-O table 1978, 92 x 92 level of industries (commodities) for I-O table 1991 and 94 x 94 level of industries for I-O table

2000. We have reduced the tables to 32 by 32 sub-sectors, covering all 31 manufacturing sub-sectors/commodities and single sector which represent "other sectors" that includes the services, agriculture, mining, construction, and the rest of public sectors. While the second group of data used different categories of workers (unpublished data) for manufacturing industries for 1978, 1991 and 2000 at 5 digits Malaysian Industrial Classification 1972 (MIC) and Malaysian Standard industrial Classification 2000 (MSIC). The data are taken from the Industrial Production and Constructions Statistic Division, Department of Statistics Malaysia (DOS). In order to make all the I-O table comparable, the nominal values of 1991 and 2000 have been deflate into their 1978 constant price. This conversion is necessary to present the real changes in the variables. The present study used producer prices indices (PPI) for local production by commodity group and import price indices (IPI) to deflate some of the variables to reflect the real change in the variables.

RESULTS AND DISCUSSION

The result of this study indicates that causes of structural changes on labour increasing effect are driven by shifts in final demand structure. Beside capital, labour is one of the important inputs in the production function. In general, when output increase, the amount of labour will also increase. As shown in Figure 1, the current study found that during sub-periods and overall period, the sources of labour growth in the manufacturing sector either in light or heavy industry is favored by changes in the final demand structure. As presented in Figure 2, within the changes in the final demand structure, the analysis by sub-periods, 1978-1991 and 1991-2000 show that there is a switch in the role of changes in domestic demand structure, and changes in export structure. The underlying factors that contribute towards employment increasing effect on the manufacturing sector for the period 1978-1991 are mostly changes in domestic demand structure (87.37 percent), and changes in export structure (53.80 percent). Employment changes were driven by domestic demand structure during 1978-1991 could be attributed to the emphasis on import substitution policies through government sponsored heavy industries. During the second stage of import-substituting industrialization, priorities on industrial development are given to manufacturers of capital and intermediate goods for export oriented industries. The strengthening of macroeconomic fundamentals and the financial sector together with prudent fiscal policy management have contributed to the expansion in aggregate domestic demand after the global recessionary years of 1985-1986.

Though, in the second sub-period, 1991-2000, changes in export structure increased to 168.14 percent and changes in domestic demand structure only 33.36 percent. Employment changes were driven by export demand during second sub-period 1991-2000, resulting from greater promotion of export orientation strategy (1985 onwards). Expansion of labour-intensive exports stimulated strong growth in employment in sub-sectors such as electrical and non electrical machinery. During the period 1990-1997, employment growth in export oriented sub-sector slow down due to the tight labour market and rising production. However after the East Asian financial crisis 1997-1998, manufacturing exports especially the labour-intensive exports began to grow again impressively, thus stimulated strong growth in employment in the export oriented sub-sectors.

During the overall period 1978-2000, changes in domestic demand structure appeared to have been the major source of employment change, followed by changes in export structure, changes in final demand component structure, and changes in import structure.

In term of manpower, changes in the structure of domestic demand had relatively strong increasing effect on (i) service workers, (ii) production and related workers, transport equipment operators and labourers, and (iii) clerical and related workers during the first sub-period 1978-1991. Changes in the export structure were the main factor that had an employment increasing effect on high skill workers and sales workers. It is interesting to note that changes in the structure of imports had employment-increasing effects on all categories of manpower particularly on high skill workers.

However, during the second sub-period 1991-2000, changes in the export structure appear to have been the major employment increasing effect for all categories of manpower. These imply that manpower growth was exports structure driven during second sub-period. In the first sub-period, the results of this investigation also show that changes in the structure of import had employment-increasing effects on all categories of manpower particularly on high skill workers. Conversely, changes in the structure of import had reducing effects on all categories of manpower during the second sub-period.

If compared to previous studies on sources of output growth by Hoffman and Tan (1975) for the year 1959-1968, Zakariah and Ahmad (1999) for the year 1978-1987 and Rohana et al (2008) for the year 1978-2000, the findings of this study suggest that given the current economic structure, the

sources of output growth is parallel with sources of employment growth which relied on changes in final demand structure. Even though the current study has used different dependent variable (labour and manpower) and methodology but generally the determinants of sources of the changes are the same, namely the changes in the components of final demand structure (changes domestic demand structure, changes in export structure, changes in import structure, and changes in final demand component structure).

As can be seen from the Figure 1, another important finding was that economic growth was the second factor contributed to the employment increasing effect for both sub-periods and overall period. In the first sub-period, the estimated result across the effects of different changes on all manpower reveals that economic growth was the second factor underlying the increasing effect of all categories of manpower, particularly on clerical and related workers (55.96 percent) and high skill workers (54.90 percent). However, during the second sub-period, employment increasing effect for all categories of manpower due to economic growth was smaller compare to the first sub-period. A possible explanation for this might be due to the East Asian financial crisis in 1997/1998.

Technical change is one of the important factor of output growth as well as sources of labour growth even though overall net effect of technical change to labour is employment decreasing effect for both sub-periods and overall period. These may be due to labour saving technological progress. Technological progress since the late nineteenth century consisted largely of rapid advances in labour saving technologies such as computers, the internet and many other kinds off modern machinery and equipment for the production process. From the data in Figure 8.1, the evidence from this study also suggests that effect of technological change on employment was smaller than other factors.

At highly aggregated manpower level, changes of technology have increased demand for high skill workers. This is evidenced by the result that showed favourable inter-occupation substitution and manpower increasing effect due to changes in intermediate input for both sub-periods and overall periods. These imply that more high skill workers (human capital accumulation) were employed in the manufacturing sector especially in the heavy industry. Additionally, these findings suggest that in general, skill structure of labour market in the manufacturing sector during 1978-2000 was favour to high skill biased technological change. This study can conclude that even though changes in final demand structure and economic growth were the two main sources of manpower change, technological change still has high potential influencing changes of manpower. The initial effect of technological change is to lower the production cost by substitute labour with machinery and equipment. However, in the long run, technological change and productivity growth also lead to jobs creation in the economy because they result in lower prices and greater income, fueling an increase in product and labour demand.

CONCLUSION

In general, the results of present study indicate that the amount of employment changes (increasing effect) was determined by both changes in the structure of domestic demand and export. These two factors were found to exert a positive and almost an equal effect on manufacturing employment. In other words, an emphasis on domestic demand expansion is constructive to employment creation. In a situation of poor export performance, the domestic market should be promoted rigorously to achieve sustainable employment in the manufacturing sector. In order to complement this effect, the government can introduce a more caring policy to the society by implementing some reduction and incentives on income tax, so that it can boost domestic spending successfully.

The evidence from this study also suggests that the effect of technological change was small (reducing effect) than the effect of other factors on employment. However, even as technological change reduces the amount of labour needed per unit of output, it can be compensated by an expansion in total output that demands more labour. Technological progress is one of the important components of economic growth beside capital accumulation and population and labour force growth. Furthermore, technological progress in an economy certainly changes the requirements for the economy's labour force in terms of knowledge level and skill combination. Therefore, technological change may have adverse impact on workers in certain occupations by making their particular skill obsolete. Based on the above reasons, government should increase human resource development through training and upgrade research and development (R&D). An appropriate strategy and choice of human resource development and innovation are also crucial in improving labour productivity. Higher labour productivity brings lower production cost, higher products quality, and better wages for workers and better investment returns for investors.

The findings of Structural Decomposition Analysis (SDA) also indicate that higher growth of high skill workers in the manufacturing sector especially in the heavy industry in both sub periods and overall period. In order to respond to this high demand, additional amount of administrative and managerial workers, professional, technical and related workers have got to be supplied from either the local educational institutes or/and repatriate them from abroad. Hence, aspect of manpower must be given due priority in the development planning of the economy so as to ensure that the manufacturing sector continues to contribute towards maintaining Malaysia's overall global competitive position. Manpower planning is an important step that should precede, or at least parallel to any plan for a country's overall development. Planning the supply of labour, particularly highly trained labour, to meet the requirements of future economic growth and development, is essential not only in developing countries but also developed countries. The rapid economic growth in certain nation causes the manpower planning become more important. Malaysia is also one of the nations that experienced the situation.

A strong evidence of human capital accumulation was found in this study when the amount of high skill workers increased due to a favourable inter-occupation substitution. Additionally, human capital accumulation occurred in the heavy industry and was higher than in the light industry. Human capital is crucial for the development of a country. Investment in human capital ranges from basic needs expenditure to education. Therefore, another challenge that the country is now and will be facing is in the area of education. The country's education system is now being challenged by the changing environment of the economy's labour market. One popular view is that education system should be consistent with the aspiration of the country's national development. Thus, it has to be market-driven with regards to designing a creative curriculum, supporting the country to move to an era of K-economy. Education serves national socio-economic development through its academic curricula and content of education. Higher education systems, private and local universities in particular, are aware of the need to respond constructively with more creative curricula that can support the aspiration towards K-economy. Basically, the major challenge in the education system now is to train teachers that are more innovative and computer-literate so that they can produce quality human resources. The country also needs to identify sub-sectors' skills requirement and improve training and education programmes. Malaysia needs to have the right kind of labour in place especially world-class knowledge workers if she wants to move up the ladder of competitiveness and produce higher value-added goods. Workers not only have to be equipped with the right skills and training but also the environment to make them change their ways of thinking when needed.

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TABLE 1: Sources of Labour Change

First Term	$(H_t R_t - H_0 R_0) F_0$	The first term is the effect of technical change on the labour requirement of the economy, which includes both the direct effect of technical change on the labour requirement, through changing direct labour input coefficients, and the indirect effect of technical change on the labour requirement, through changing intermediate input coefficients.
Second Term	$H_0 R_0 (F_t - \phi F_0)$	The second term is the effect of changes in the structure of final demand.
Third Term	$H_0 R_0 (\phi - 1) F_0$	The third term is the effect of economic growth.
Fourth Term	$(H_t R_t - H_0 R_0)(F_t - F_0)$	The final term is the effect of interaction between technical change and changes in the final demand.

Note: F vector is in the form of diagonal matrix for n sectors manpower

TABLE 2: Structural Decomposition of Technical Change for Labour

1.	$(H_t - H^*) R_0 F_0$	Effect of inter –occupation substitution
2.	$(H^* - H_0) R_0 F_0$	Effect of changes in labour productivity

3.	$H_o(R_t - R_0)F_0$	Effect of changes in intermediate input
4.	$(H_t - H_0)(R_t - R_0)F_0$	Effect of interaction between changes in manpower coefficient and changes in intermediate input coefficients

Note: F vector is in the form of diagonal matrix for n sectors manpower

TABLE 3: Structural Decomposition of Final Demand for Labour

1.	$H_0R_0(F_t^d - \gamma^d F_0^d)$	Effect of changes in domestic demand structure
2.	$H_0R_0(F_t^e - \gamma^e F_0^e)$	Effect of changes in export structure
3.	$H_0R_0(F_t^m - \gamma^m F_0^m)$	Effect of changes in import structure
4.	$H_0R_0 f_0(\bar{\gamma} - \bar{\phi})$	Effect of changes in final demand component structure

Note: F vector is in the form of diagonal matrix for n sectors manpower

TABLE 4: Structural Decomposition of Interaction between Technical Change and Changes in the Final Demand For Labour

1.	$(H_tR_t - H_0R_0)(\phi - 1)F_0$	Growth multiplied technical change effect
2.	$(H_tR_t - H_0R_0)(F_t - \phi F_0)$	Effect of interaction between technical change and changes in final demand structure

Note: F vector is in the form of diagonal matrix for n sectors manpower

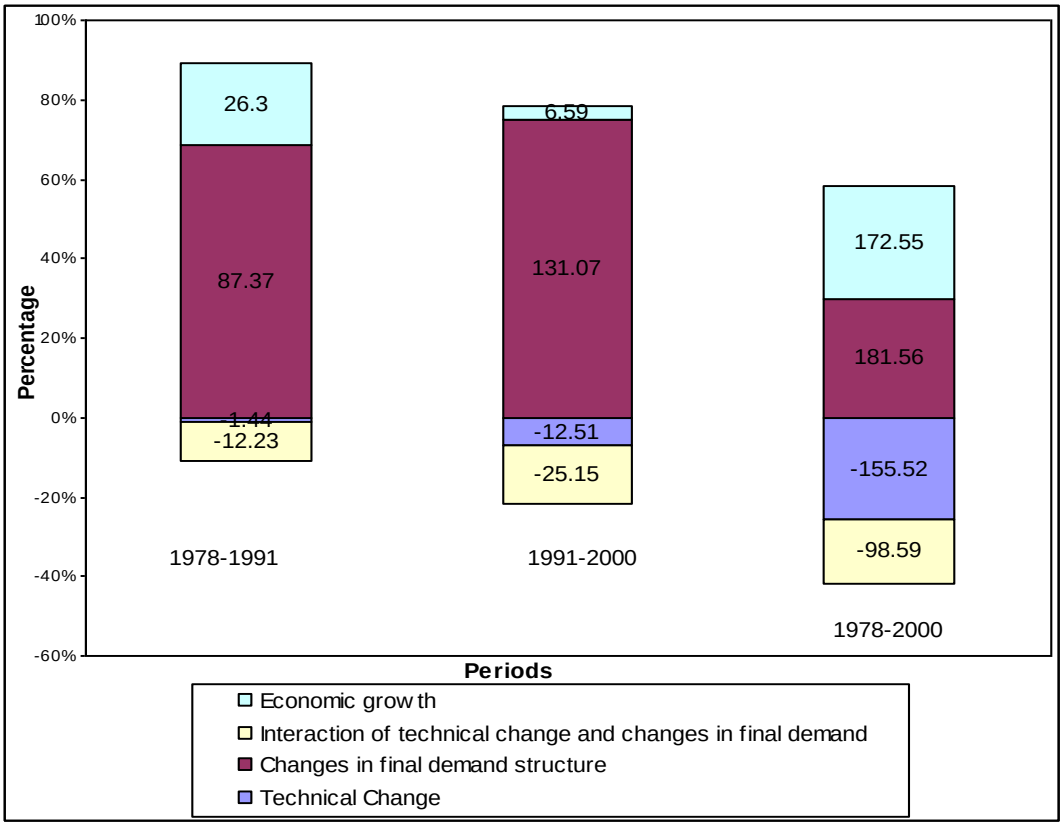

FIGURE 1: Sources of Labour Change in the Sub-periods 1978-1991, 1991-2000 and Overall Period 1978-2000

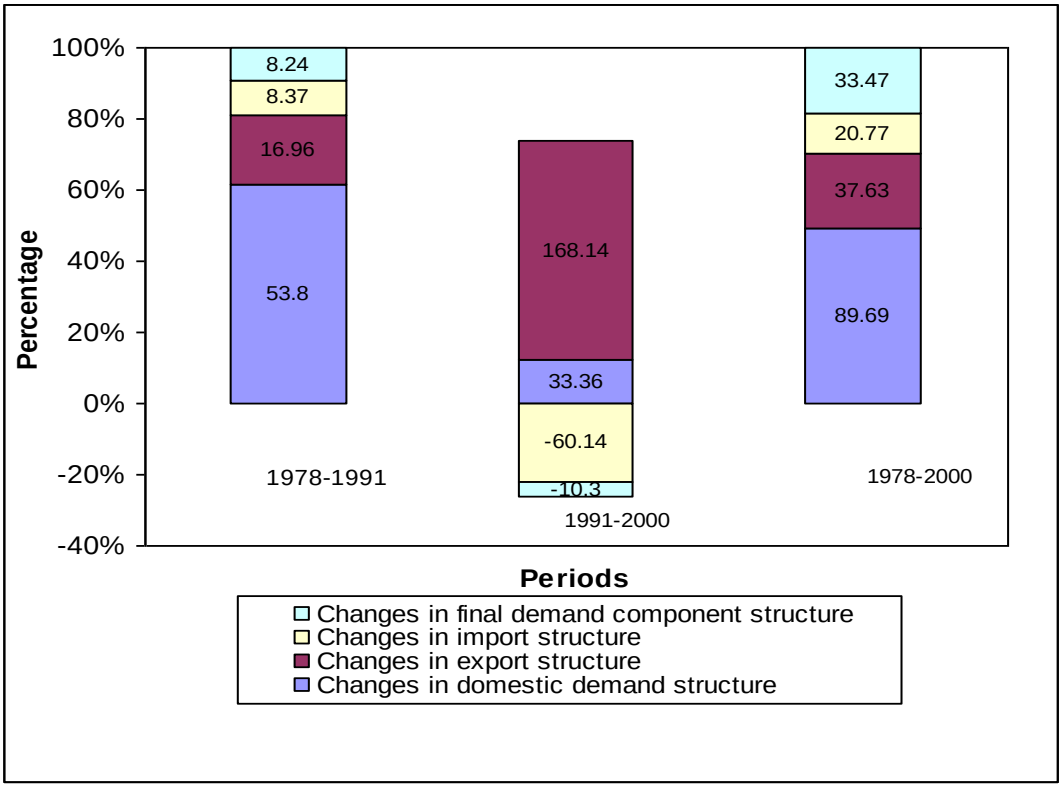

FIGURE 2: Sources of Labour Change Within Changes in Final Demand Structure in the Sub-periods 1978-1991, 1991-2000 and Overall Period 1978-2000