Sources of change	Light		Heavy		Manufacturing	
Technical change	-2739	(-1.42)	-5852	(-1.45)	-8591	(-1.44)
Inter-occupation substitution*	29	(0.02)	-29	(-0.01)	0	(0.00)
Changes in labor productivity	-3726	(-1.93)	-7888	(-1.95)	-11614	(-1.95)
Changes in intermediate input	1526	(0.79)	3284	(0.81)	4810	(0.81)
Interaction of changes in labor input and changes in intermediate input	-568	(-0.29)	-1219	(-0.30)	-1787	(-0.30)
Changes in final demand structure	169147	(87.83)	351835	(87.15)	520982	(87.37)
Changes in domestic demand structure	105103	(54.58)	215712	(53.43)	320815	(53.80)
Changes in export structure	32498	(16.88)	68621	(17.00)	101119	(16.96)
Changes in import structure	15397	(8.00)	34513	(8.55)	49910	(8.37)
Changes in final demand component structure	16149	(8.39)	32989	(8.17)	49138	(8.24)
Interaction of technical change and changes in final demand	-24536	(-12.74)	-48409	(-11.99)	-72945	(-12.23)
Growth multiplied technical change effect	-8633	(-4.48)	-16281	(-4.03)	-24914	(-4.18)
Interaction of technical change and changes in final demand structure	-15903	(-8.26)	-32128	(-7.96)	-48031	(-8.06)
Economic growth	50703	(26.33)	106123	(26.29)	156826	(26.30)
Total	192575	(100.00)	403697	(100.00)	596272	(100.00)

Table 1: Decomposition of Labor Changes in the Manufacturing Sector in the First Sub-period, 1978-1991

Further analysis showed that technical change was the second factor that had reduced total employment by 8.591 thousand workers (1.44 percent) and this reduction was absolutely significant because of the increase in labor productivity in the manufacturing sector especially in the heavy industry. Thus, the gains from technical change can be attributed to the use of more advanced imported technology brought about by the promotion and significant flow of Foreign Direct Investment (FDI) into Malaysian manufacturing sector since 1986. In addition, this also accords with our earlier observations, which showed that electrical machinery, textile products, plastic products, China, glass and clay product and non- electrical machinery were the sub-sectors that experienced large increases of direct labor productivity between 1978 and 1991. This finding is also in agreement with [19] findings which showed technical change as the source of Total Factor Productivity (TFP) growth, in the manufacturing sector during 1981-1984, 1986-1990 and 1990-1996.

All things being equal, the estimated results reveal that an increase in the labor productivity would have reduced manufacturing sector total employment by 11.614 thousand workers. It is interesting to note that most of the labor decreasing effect due to the labor productivity improvement was from heavy industry (7.888 thousand workers) compared to light industry (3.726 thousand workers). These findings of the current study are consistent with those of [20] who found that heavy industry like chemical, non-metallic mineral products, transport equipment and rubber products enjoyed higher TFP growth, whereas TFP growth in the light industry likes food and textiles products was quite low for the period 1982-1994. However, employment-decreasing effect due to improvement in the labor productivity was offset somewhat by the employment-increasing effect of changes in the intermediate input coefficients. The employment-increasing effect of changes in the intermediate input coefficients had increased total employment by 4.810 thousand workers. This result can be explained by the fact that labor is one of the important inputs in the production function as the output increased. Consequently, the amount of labor will also increase. As can be seen from Table 1, inter occupation substitution in the manufacturing sector

323.16 percent from 374.937 thousand workers in 1978 to 1586.583 thousand workers in 1991 if there had been no structural change. In other words, *ceteris paribus*, the economic growth would have increased manufacturing total employment by 1211.646 thousand workers. On the other hand, manufacturing total employment was only 971.209 thousand workers in 1991 (376.833 thousand workers in the light industry and 594.376 thousand workers in the heavy industry). There were about 615.374 thousand workers short compared with proportional growth to the gross value of output. Table 1 provides the results of sources of labor growth in the manufacturing sector in the first sub-period 1978-1991. The reason that manufacturing sector total employment did not grow as fast as its gross value of output were that (i) technical changes, and (ii) interaction of technical change and changes in final demand effects had reduced the total employment.

During first sub-period, this study found that interaction of technical change and changes in final demand was the main factor that had reduced manufacturing sector total employment by 72.945 thousand workers (12.23 percent). Out of these 72.945 thousand workers, 24.914 thousand workers resulted from new technologies, rather than the old technologies. As mention by [16], when the output grew, the effect of technical change was magnified. Therefore, we identify this effect as the growth multiplied technical change effect. The interaction between technical change and changes in the structure of final demand had a reducing effect of 48.031 thousand workers on manufacturing sector total employment.

was equal to zero. A possible explanation for this might be that movement or mobility of labor was only within the manufacturing sector and this may be due to promotion or changing occupation.

The most interesting finding was that the employment-reducing effect of increased labor productivity was further offset by the effect of changes in final demand structure. All things being equal, changes in the structure of final demand were the main factor that had increased total employment in the manufacturing sector either in light or heavy industry. The empirical results of this study indicate that changes in the final demand had a total increasing effect of 520.982 thousand workers or 87.37 percent on manufacturing sector total employment (169.147 thousand workers from light industry and 351.835 thousand workers from heavy industry). Of this, 320.815 thousand workers (53.80 percent) would have been the result of changes in the structure of domestic final demand (which includes domestic consumption, government consumption, changes in inventory and gross fixed capital formation), 101.119 thousand workers (16.96 percent) would have resulted from changes in the structure of exports, increasing of 49.910 thousand workers (8.37 percent) as a result of changes in the structure of import and an increasing of 49.138 thousand workers (8.24 percent) would be the result of changes in final demand component structure. The current study found that within the changes in final demand structure, changes in the structure of domestic demand and export were the both dominant factors that underlying the changes of labor in the manufacturing sector either in light or heavy industry.

In the present study, economic growth was the second important factor that had an increasing effect of 156.826 thousand workers on manufacturing sector total employment of which, 50.703 thousand workers in light industry and 106.123 thousand workers in heavy industry. As can be seen from the Table 1, sources of labor growth in the manufacturing sector either in light or heavy industry were favored by both changes in the final demand structure, and economic growth.

4.2 Second Sub-period 1991-2000

Like the first sub-period, it is clear that the changes in final demand structure and economic growth were the determinants of employment increasing effect in the manufacturing sector as shown in Table 2. Changes in the structure of final demand have a total increasing effect of 779.242 thousand workers

(131.07 percent) on manufacturing sector total employment (181.303 thousand workers in the light industry and 597.939 thousand workers in the heavy industry).While economic growth would have increased employment by 39.199 thousand workers. However, scenarios of employment increasing effect due to changes in final demand structure, and economic growth were slightly different from the first sub-period.

(i) Firstly, within the changes in final demand structure, changes in export structure were the dominant factor in increasing employment. It seems possible that these results were due to export expansion in the second OPP2, 1991-2000.

(ii)Secondly, the employment increasing effect due to economic growth was relatively small in the second sub-period compared to the first sub-period. The reason for this was not clear but it may have something to do with Malaysian economic being adversely affected by the East Asian financial crisis since July 1997 The majority of those retrenched were mainly employed in the manufacturing sector.

(iii) It is also interesting to mention here that employment changes in the second sub-period was favoured by both changes in final demand structure, and interaction of technical change and changes in final demand which is different from the first sub-period.

For the duration of 1991-2000, manufacturing sector gross value of output had expanded from RM108,477,987 thousand in 1991 to RM316,463,861 thousand in 2000 (in 1978 prices), obviously an increase of 191.73 percent. *Ceteris paribus*, manufacturing total employment would also have increased by 191.73 percent from 971.209 thousand workers in 1991 to 2833.308 thousand workers in 2000. However, manufacturing total employment was only 1565.746 thousand workers in 2000. There were about 1267.562 thousand workers short compared with proportional growth to the gross value of output. It is clear from Table 2 that one of the most important reasons that manufacturing total employment did not grow as fast as its gross value of output were that (i) technical changes, and (ii) interaction of technical change and changes in final demand sector had reduced the total employment.

The empirical results showed that technical change and interaction of technical change and changes in final demand have decreased 74.358 thousand and 149.546 thousand workers respectively. The main factors behind the employment-decreasing effect actually were due to the improvement in labor productivity, and interaction of technical change and changes in final

demand. Comparing with the effect of technical change, and changes in final demand structure between two sub-periods reveals that both effects were much larger in the second sub-period.

Table 2: Decomposition of Labor Changes in the Manufacturing Sector in the Second Sub-Period, 1991-2000

Sources of change	Light		Heavy		Manufacturing	
Technical change	-17052	(-12.05)	-57306	(-12.65)	-74358	(-12.51)
Inter-occupation substitution*	-141	(-0.10)	141	(0.03)	0	(0.00)
Changes in labor productivity	-17202	(-12.16)	-56250	(-12.42)	-73452	(-12.35)
Changes in intermediate input	-156	(-0.11)	-454	(-0.10)	-610	(-0.10)
Interaction of changes in labor input and changes in intermediate input	447	(-0.32)	-743	(-0.16)	-296	(-0.05)
Changes in final demand structure	181303	(128.13)	597939	(131.98)	779242	(131.07)
Changes in domestic demand structure	45757	(32.34)	152609	(33.69)	198366	(33.36)
Changes in export structure	232899	(164.60)	766781	(169.25)	999680	(168.14)
Changes in import structure	-83200	(-58.80)	-274382	(-60.56)	-357582	(-60.14)
Changes in final demand component structure	-14153	(-10.00)	-47069	(-10.39)	-61222	(-10.30)
Interaction of technical change and changes in final demand	-31680	(-22.39)	-117866	(-26.02)	-149546	(-25.15)
Growth multiplied technical change effect	-2793	(-1.97)	-12937	(-2.86)	-15730	(-2.65)
Interaction of technical change and changes in final demand structure	-28887	(-20.42)	-104929	(-23.16)	-133816	(-22.51)
Economic growth	8926	(6.31)	30273	(6.68)	39199	(6.59)
Total	141497	(100)	453040	(100)	594537	(100)

The better technological change during second sub-period indicates the improvement and success of more advanced technology, sufficient and efficient training of workers helped them to adapt and used better equipment over time. It also seems possible that these results were due to government emphasis in Human Resource Development (HRD) in the manufacturing sector by the introducing of Human Resource Development Fund. The scheme provided incentive grants to enterprises undertaking training of the workforce in basic, enterprise-based and new emerging skills as well as retraining for higher skills.

5   Conclusion

The result of this study indicates that causes of structural changes on labor increasing effect are driven by shifts in final demand structure. The current study found that during both sub-periods, the sources of labor growth in the manufacturing sector either in light or heavy industry is favored by changes in the final demand structure. As presented in Table 1 and Table 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 (53.80 percent), and changes in export structure (16.96 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.

However, during the second sub-period 1991-2000, changes in the export structure appear to have been the major employment increasing effect. These imply that labor growth was exports structure driven during second sub-period. Labor changes were driven by export demand during second sub-period 1991-2000, resulting from greater promotion of export orientation strategy (1985 onwards). Expansion of labor-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 labor market and rising production. However after the East Asian financial crisis 1997-1998, manufacturing exports especially the labor-intensive exports began to grow again impressively, thus stimulated strong growth in employment in the export oriented sub-sectors.

In the first sub-period, the results of this investigation also showed that changes in the structure of import had employment-increasing effects. Conversely, changes in the structure of import had reducing effects on employment during the second sub-period. 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.

If compared to previous studies on sources of output growth by [21] for the year 1959-1968, [22] for the year 1978-1987 and [23] 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 (labor 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).

Technical change is one of the important factor of output growth as well as sources of labor growth even though overall net effect of technical change to labor is employment decreasing effect for both sub-periods and overall period. These may be due to labor saving technological progress. Technological progress since the late nineteenth century consisted largely of rapid advances in labor saving technologies such as computers, the internet and many other kinds of modern machinery and equipment for the production process.

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 labor needed per unit of output, it can be compensated by an expansion in total output that demands more labor. Technological progress is one of the important components of economic growth beside capital accumulation and population and labor force growth.

Furthermore, technological progress in an economy certainly changes the requirements for the economy's labor 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 labor productivity. Higher labor productivity brings lower production cost, higher products quality, and better wages for workers and better investment returns for investors. Besides, according to [2], educational institutions also have a special place in the society and provide services related to the transfer of knowledge to their customers–individuals, public and private organizations and the society in general. Their development is influenced by various factors linked to political, technological, economic, environmental, as well as social trends and changes.

References:
[1] Zirra, D., The impact of the economic crises on Romanian labour market, *WSEAS Transactions on Business and Economics,* Vol. 6, No.7, 2009, pp. 362-373.
[2] Gouvara, E., Todorova, Y, and Gourov, N., Skills for future engineers: challenges for universities in Bulgaria, *WSEAS Transactions on Business and Economic,* Vol. 6, No.7, 2009, pp. 386-399.
[3] Rose, A. & Casler, S., Input-output structural decomposition analysis: A critical appraisal. *Economic Systems Research,* Vol.8, No.1, 1996, 8(1), pp. 33-62.
[4] Jackson, R. W., Rogerson, P., Plane, D. & O' Huallachain, B., A causative matrix approach to interpreting structural change, *Economic Systems Research,* Vol.2, 1990, pp. 259-269.
[5] Ciobanu, C., Mattas, K. and Psaltopoulos, D., Structural changes in less developed areas: An input-output framework, *Regional Studies.* Vol. 38, No.6, 2004, pp. 603-614
[6] Chenery, H.B., Interactions between industrialization and exports, *American Economic Review,* Vol. 70, 1980, pp. 281-287.
[7] Rose, A. and Miernyk, W., Input-output analysis: The first fifty years, *Economic Systems Research,* Vol.1, 1989, pp. 229-271.
[8] Rose, A. and Chen, C. Y., Sources of change in energy use in the US economy 1972-82. *Resources and Energy,* Vol. 13,1991, pp. 1-21.
[9] Carter, A., *Structural Change in the American Economy.* Cambridge: Harvard University Press, 1970.
[10] Guo, D., Hewings G.J.D. and Sonis M., Integrating decomposition approaches for the analysis of temporal changes in economic

structure: an application to Chicago's economy from 1980 to 2000. *Economic Systems Research,* Vol. 17, No. 3, 2005, pp. 297-315.

[11] Leontief, W. *Structure of the American Economy,* New York: Oxford University Press, 1941.

[12] Chenery, H.B., Shishido, S., and Watanabe, T., The Pattern of Japanese Growth, 1914-1954, *Econometrica,* Vol. 3, No. 1,1963, pp. 98-139.

[13] Dietzenbacher, E. and Los, B., Structural decomposition analyses with dependent determinants. *Economic Systems Research,* Vol.12, No.4, 2000, pp. 497-512.

[14] Skolka, J., Input-output structural decomposition analysis for Austria, *Journal of Policy Modelling,* Vol. 11, 1989, pp. 45-66.

[15] Miller, R., and Blair, P.D., *Input-Output Analysis: Foundation and Extensions.* Englewood Cliffs, New Jersey: Prentice-Hall Inc, 1985.

[16] Han, X., Structural change and labor requirement of the Japanese Economy. *Economy System Research,* Vol. 7, No. 1, 1995, pp. 47-65.

[17] Malaysia Industrial Classification, Department of Statistic, Kuala Lumpur, 1972.

[18] Malaysia Standard Industrial Classification Department of Statistic, Kuala Lumpur, 2000.

[19] Mahadeven, R., Is there real TFP growth measure for Malaysia's manufacturing industries?, *ASEAN Economic Bulletin,* Vol. 19, No. 2, 2002, pp. 178-190.

[20] Rahmah, I. and Idris, J., Sources of productivity growth in large scale Industries in Malaysia, *Malaysia Journal of Economics and Management,* Vol. 34, 2000, pp. 5-75.

[21] Hoffman, L. and Tan, T. N., Pattern of Growth and Structural Change in West Malaysia's Manufacturing Industry, 1956-68. In David Lim. Malaysian Economics Development. Kuala Lumpur: Oxford University Press, 1975.

[22] Zakariah, A.R. and Ahmad E. E., Source of industrial growth in the Malaysian manufacturing sector: A factor decomposition approach, *The Developing Economies,* Vol. 37, No. 2, 1999, pp. 162-196.

[23] Rohana, K., Zakariah, A. R. and Kamaruzaman, J., An input-output analysis of sources of growth and key sectors. *Modern Applied Science,* Vol. 2, No. 3, 2008, pp. 94-109.