FACTORS AFFECTING THE PERFORMANCE OF FOOD MANUFACTURING INDUSTRIES IN MALAYSIA

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ABSTRACT

This study attempts to fill the gap of extensive growth theory model by providing statistical analysis in a parametric form that removed the doubts in the results generated. Using this model, the factors affecting the output growth in the food industries were identified in this study to be the individual contributions of capital, labour, material as well as the combined contributions of the quality of these inputs, which were expressed as the total factor productivity (TFP) growth.

The results on the food-manufacturing industries showed a characteristically low productivity with an inefficiency problem. The contribution of the TFP growth of 13 out of 27 food industries was found to be negative during the entire period as well as the sub period of 1987-2000. 11 industries were found to have contributed negatively during the sub periods of 1971-1979 and 1980-1986. Finally, these findings were identified to be due to the problem of low quality of inputs of the food industries and the productivity growth of the Malaysian manufacturing industries, which were input-driven rather than TFP growth driven as similarly found by previous studies.

Keywords: Malaysian food industry, productivity performance, total factor productivity
JEL Classification Code: O120

1. INTORDUCTION

The food manufacturing industry in Malaysia plays a significant role in the economy of the country. It serves not only as a source of employment but also a market outlet and added value for primary agricultural products. Under the Industrial Master Plan (IMP) 1986-1995, the food processing industry has been identified as one of the priorities among the twelve manufacturing sectors for industrial development. Such priority was determined on the basis of its potential contribution to manufacturing development, particularly with respect to employment generation, foreign exchange saving and value added creation. In addition, the rationale for the development of this sector lies with the fact that the industry has a strong linkage with other sectors of the Malaysian economy (Government of Malaysia).

Food, being a basic necessity, has always provided ample opportunities for investment consideration. These opportunities were given a boost when the government, as mentioned above, acknowledged the food-processing sector as one of the priority sectors in the context of the industrial development of the country. The Government's intentions were to see further growth of the local food-processing sector, especially through the utilisation of the local raw materials. Relevant government policies such as the National Agricultural Policy (NAP) and the first and second Industrial Master Plans (1986-1995 and 1996-2005) were established to clearly promote and provide direction for the development of the sector. There is however a dichotomy in the structure of the Malaysian food processing sector. On the one hand, Malaysia has large food industries, which are well organised and using modern and up-to-date machinery and technologies. With ample capitalisation, they are in a position to keep abreast of the dynamic changes taking place in the sector; however, a large proportion of their raw material inputs are imported. On the other hand, the country has medium and small industries (SMIs), which use low level technologies, and are often relatively more labour intensive in operation. By definition, SMIs comprise industries with paid-up capital of RM 2.5 million or less. These SMIs are usually characterised by low capitalisation, inefficient management, and more often than not, they are plagued with problems in finance, marketing, and supply of raw materials and labour. According to a survey by the Ministry of International Trade and Industry (MITI) in 1990, the food SMIs constitute the largest group -- 32 percent of the total number of SMIs establishments in the country (MIDA, 1994, p. 1-3).

There is an imbalance in growth between this sector and other manufacturing industries in Malaysia. A number of factors are responsible for the imbalance. These ranges from industry related problems such as inconsistent supply and low quality of raw materials, high labour cost and lack of skilled manpower, difficulties in securing finance and poor technological inputs to problems relating to changes and implementation of government policies for industrialisation. With adequate measures these problems can be addressed and this will lead to further improvement in productivity growth and performance of the food manufacturing industries (Government of Malaysia).

The following selected studies in Malaysian TFPG were based on growth accounting method. In a study between 1960 and 1989, Syrquin (1991) found TFPG of 3% for 1960-1970 and 0.5% for 1980-1989. In a similar study between 1970 and 1990, Kawai (1994) found TFP of 2.5% for 1970-1980 and 0.7% for 1980-1990. Similarly, Gan & Soon (1998) between 1974 and 1995 found TFPG of 1.6% for 1974-1995 and 2.2% for 1990-1995 and between

1980 and 1997 Ab. Wahab (2001) found TFPG of 1.3% and for 1990-1997.

A few studies have used econometric estimation method to derive total factor productivity growth, for instance, Thomas & Wang (1992) found TFPG of 2% between 1960 and 1987. World Bank (1993) report between 1960 and 1990 found TFPG of 1.3%, while Gan & Robinson (1993) found that TFP was negative during first half of 1980 and positive after 1985 during the period 1975 to 1991. Similarly between 1960 and 1990 as well as between 1978 and 1992, Zarina & Shariman (1994) also found that TFPG was negative. Thus, those studies that are based on econometrics estimation have research gap, which shows no calculation of contributions of productivity indicators of the estimated explanatory variables. Therefore, this study attempts to close this gap by providing statistical analysis which is lacking in the divisia translog index approach that was developed by Jorgenson et al (1987) and propose the same approach for Malaysian case.

Thus, in this paper, the main aim is to evaluate and analyse (using modified standard methods), the performance of productivity growth of the Malaysian food manufacturing industries.

2. METHODOLGY AND ESTIMATION TECHMIQUE

An attempt was made to apply the conventional growth accounting framework utilised by Stigler (1947), Abramovitz (1956) and Kendrick (1956), in this study. The framework was developed by Solow (1956, 1957), which was brought to fruition by Kendrick (1961) and further refined by Denison (1962, 1979), Griliches and Jorgenson (1986) and Jorgenson et al., (1987). In this case, the production of each industry is expressed as a function of capital, labour, raw materials and time. It is assumed that the production process is characterised by constant returns to scale for each industry, so that the proportional increase in all inputs results in a proportional change in industrial output. This approach provides more room for the decomposition of contributions of factor inputs and technological change to economic growth.

The production function for i*th* industry can be represented as follows:

$$Qi = F(Ki, Li, Mi, Ti) \quad (1)$$

where output Q is a function of industrial capital input K, the labour input L, and the intermediate input M, and the time T, that proxies for total factor productivity as a technological progress of the food manufacturing industries.

Since the main objective has been to apply the above-mentioned conventional growth accounting framework, it is thus under assumptions of competitive equilibrium (where factors of production are paid the value of their respective marginal products) and constant return to scale. The Divisia Index which is applicable to the above framework, basically decomposes the output growth into the contribution of changes in inputs (such as capital, labour and materials input growth), as well as total factor productivity (TFP) growth. In other words, considering the data at any two discrete points of time, say T and T-1, the growth rate of output Q for an industry can be expressed as a weighted average of the growth rates of capital (K), labour (L), and intermediate inputs (M), plus a residual term typically referred to as the rate of growth of TFP. Hence the TFP growth of each industry is computed as the difference between the rate of growth of output and weighted average of the growth in the capital, labour,

intermediate inputs.

According to Mahadevan, 2001, the TFP growth studies on the Malaysian manufacturing sector have used the nonparametric translog-divisia index approach developed by Jorgenson et al. (1987). This approach does not require the explicit specification of a production function, but the major drawback is that it is not based on statistical theory and, hence, statistical methods cannot be applied to evaluate their reliability, thus casting doubts on their results. The present study attempts to close this gap by developing this model into a parametric model and providing statistical analysis for it in the first step as follows: -

$$\Delta \ln Q_{i,T} = a + \alpha \Delta \ln K_{i,T} + \beta \Delta \ln L_{i,T} + \lambda \Delta \ln M_{i,T} + \varepsilon_{i,T} \quad (2)$$

$$i = 27 \text{ and } T = 1957 \text{ to } 2000$$

where,

α - is the output elasticity with respect to capital

β - is the output elasticity with respect to labour

λ - is the output elasticity with respect to material

a - is the intercept or constant of the model[1]

ε_T - is the residual term[2]

ln - is the log to reduce the problem of heteroskedasticity.

(Δ) Which denotes proportionate change rate, is the difference operator; and i_T denotes the number of industries in time T.

Since the intercept (a) has no position in the calculation of growth rate and contribution of the productivity indicators, a second step is proposed, which calculates the growth rates and contribution of the productivity indicators transforming equation [2] as

$$\Delta \ln TFP_{i,T} = \Delta \ln Qi_{,T} - [\alpha . \Delta \ln K_{i,T} + \beta . \Delta \ln L_{i,T} + \lambda . \Delta \ln M_{i,T}] \quad [3]$$

$$i = 27 \quad \text{and} \quad T = 1970 - 2000$$

where, the average value shares given the weights as follows: -

$\Delta \ln Qi_{,T}$ is the growth rate of output

$\alpha . \Delta \ln K_{i,T}$ is the contribution of the capital

$\beta . \Delta \ln L_{i,T}$ is the contribution of the labour

$\lambda . \Delta \ln M_{i,T}$ is the contribution of material

$\Delta \ln TFP_{i,T}$ is the total factor productivity growth

Thus, the framework decomposes the growth rate of output into the contributions of the rates of growth of the

[1] The intercept term, as usual, gives the mean or average effect on dependent variable of all the variables excluded from the model.

[2] The residual term proxies for the total factor productivity growth that accounting for the technological progress of the food manufacturing industries through the quality of input terms.

capital, labour and material inputs, plus a residual term typically referred to as the rate of growth of total factor productivity (TFP).

3. RESULTS AND DISCUSSION

An analysis of the data for the model showed that most estimated coefficients of input terms of food manufacturing industries were significant at 5 and 10 percent levels. By Durbin-Watson values the model had showed no problem of autocorrelation. In addition, looking at the adjusted R^2 and T values, multicollinearity was not found in the model (Tables 1). Furthermore, Engle and Granger (2003) stated that if economic relationships are specified in first differences instead of levels, the statistical difficulties due to non-stationary variables can be avoided because the differenced variables are usually stationary even if the original variables are not. Since the model used in this study is specified to be in first difference and the calculated growth rates were qualified to be used in the discussions of results and findings of the study, the model was thus found to be stationary.

Table (1): Output Elasticity in Food Manufacturing Industries, 1970-2000

Industry Description	Industry Code	Intercept	Elasticity (K)	Elasticity (L)	Elasticity (M)	Adj.R^2	D-W
1. Food Manufacturing	311-312	0.8356 (4.44)***	0.4878 (7.74)***	-0.01760 (-0.668)	0.5303 (8.54)***	0.9986	1.9400
2. Meat processing	31110	0.5267 (0.929)	1.0350 (17.0)***	0.0.595 (1.69)*	-0.0312 (-1.07)	0.9310	2.0300
3. Ice cream	31121	1.3569 (4.79)***	0.0089 (1.67)*	0.0074 (1.63)***	0.9036 (29.0)***	0.9928	1.9500
4. Other dairy products	31129	4.7554 (1.02)	0.0024 (1.14)	00488 (1.72)*	0.6003 (2.47)**	0.8330	2.0087
5. Pineapple canning	31131	0.2713 (0.32)	0.0437 (1.98)**	-0.1455 (-0.30)	0.9612 (12.2)**	0.9252	1.9000
6. Fruits and vegetables canning	31139	0.9507 (3.13)***	0.1742 (2.22)***	-0.0049 (-1.06)	0.7861 (8.34)***	0.9938	1.8229
7. Fish processing	31140	0.4901 (4.04)***	0.0080 (1.62)*	0.0060 (2.13)***	0.9676 (51.4)***	0.9985	1.9999
8. Manufacture of coconut oil	31151	0.9364 (0.17)	0.0094 (1.75)*	-0.0675 (-1.70)*	0.9182 (1.97)**	0.7300	2.0010
9. Manufacture of palm oil	31152	3.4146 (0.43)	2.0669 (1.9825)**	0.1455 (1.74)*	-1.1844 (-0.67)	0.8115	1.9700
10. Manufacture of palm kernel oil	31153	0.04084 (1.81)*	-0.0043 (-0.59)	-0.0009 (-0.44)	1.0112 (56.9)***	0.9998	1.9900
11. Other vegetable and animal oils and fats	31159	02860 (2.60)*	0.0933 (2.17)**	0.0013 (0.27)	0.9116 (20.2)***	0.9993	1.9400
12. Large rice Mills	31162	0.9001 (3.07)***	0.5126 (29.2)***	0.0360 (4.37)***	0.4711 (27.6)***	0.9991	1.9800
13. Flour mills	31163	0.5804 (0.89)	0.6105 (1.65)*	0.0080 (1.74)*	0.9098 (9.38)***	0.9521	1.9632

14. Sago and tapioca factories	31164	0.2897 (4.72)***	0.1481 (2.90)***	0.0094 (1.33)	0.8572 (18.3)***	0.9988	1.9437
15. Other grain milling	31169	0.7061 (6.38)***	-0.0297 (-1.74)*	0.2034 (3.95)***	0.8632 (32.9)***	0.9953	1.9974
16. Biscuit factories	31171	0.4108 (9.27)***	0.0628 (3.49)***	0.0008 (1.64)*	0.9352 (51.8)***	0.9900	1.8463
17. Bakeries	31172	0.7599 (2.80)***	0.9147 (12.9)***	0.0062 (1.24)	0.1670 (2.48)**	0.9732	1.9751
18. Sugar factories and refineries	31180	1.0326 (1.52)	0.0067 (1.69)*	-0.0020 (-1.55)	0.9274 (15.3)**	0.9857757	2.0104
19. Manufacture of cocoa, chocolate and sugar confectionery	31190	1.6881 (0.75)	0.5778 (2.75)**	0.0431 (1.84)*	0.3262 (2.35)**	0.8757	2.0000
20. Ice factories	31211	0.5117 (6.53)***	0.3827 (4.08)***	0.0025 (1.64)*	0.5931 (6.15)***	0.9994	1.8411
21. Coffee factories	31212	0.2899 (10.8)***	0.0128 (2.66)***	-0.0045 (-1.85)*	0.9837 (67.1)***	0.9960	1.8402
22. Meehoon, noodles and related products	31214	0.3733 (11.8)***	0.0939 (2.62)***	-0.0015 (-1.73)*	0.9067 (26.3)***	0.9998	1.9464
23. Spices and curry powder	31215	0.0880 (0.56)	0.0390 (1.75)*	-0.0035 (-1.00)	0.9899 (27.4)***	0.9987	1.8979
24. Other food products n.e.c.	31219	0.3612 (10.0)***	0.2674 (6.83)***	-0.0560 (-1.67)*	0.8816 (3.01)***	0.9995	1.9766
25. Manufacture of prepared animal feeds	31220	0.3186 (0.57)	0.1304 (2.12)**	-0.00006 (-1.4)	0.9650* (10.6)	0.8568	2.0700
26. Distilling, rectifying, blending spirits and malt liquors and malt	31310 31330	0.2221 (1.88)*	0.9375 (30.7)***	-0.0006 (-1.64)*	0.0914 (3.16)**	0.9960	1.9824
27. Soft drinks and carbonated water industries	31340	0.6286 (8.87)***	0.2310 (4.08)***	-0.0264 (-4.49)***	0.7723 (13.3)***	0.9995	1.9220

Notes: **Indicates Significant at 5% Level

*Indicates Significant at 10% Level

3.1. Empirical Analysis

Empirical analysis was carried out to compare the productivity indictors among the food manufacturing industries using an annual time series data over the period 1970-2000, for gross value of output; value of fixed assets and cost of input (real data) and the number of employment which were obtained from the Department of Statistics, Malaysia. Furthermore, in order to study the effect of government policies to improve the sector's productivity growth, the study period was split into three phases corresponding with the major policy changes, namely, 1971-1979, 1980-1986 and 1987-2000. The period of 1970s witnessed the birth of Malaysia's era of export-oriented economy. The decade of 1980s saw further diversification of the economy into more advanced industries. The period of 1987-2000 witnessed further diversification of the economy into more advanced industries.

Tables 2, 3, 4 and 5 show that output growth was positive for all food manufacturing industries during the entire period and mostly in the sub periods of the study. The contribution of capital input to the output growth of food manufacturing industries was mixed during the entire period and sub periods of 1971-1979 and 1980-1986. It could be seen in Table 2 that the highest contribution of capital input in terms of the average annual growth rate was in the fish processing industry, and the lowest rate was in the coffee factories industry. The results indicates that the overall average annual capital growth rates of the food manufacturing industries during the sub period of 1987-2000 has outweighed the problems that were faced in the entire period and sub periods of 1971-1979 and 1980-1986. It also shows clearly that there was a direct effect of government policies and plans that were applied to the food manufacturing industries which faced declining growth rates after the structural transformation that took place in the Malaysian economy in 1987.

The labour input contribution to the food manufacturing industries output growth is presented in Tables 2, 3, 4 and 5. The average annual labour growth rates of some food industries reported a slowdown with negative growth rates. These industries are the other grain milling and biscuit factories industries. The slowdown of the labour input productivity growth could be attributed to the quality of labour input involved in the food manufacturing industries. This is in terms of labour contribution to total factor productivity growth that was mainly dominated by the factor of unskilled labourers and family owners whom have not attended any formal courses or training in food technology, but are merely following the traditional methods of food processing.

The material input contribution to the food manufacturing industry output productivity growth is shown in Tables 2, 3, 4 and 5. Even though Table 2 shows a slowdown in the average annual material growth rate, there were food industries averages whose annual growth rates of material input were high. The improvement of material productivity could be traced to the government policies that are supporting the position of food manufacturing among other non-resource-based industries. Those industries such as the electronics and electric industries especially in the sub periods of 1987-2000, contributed positively for most of the food industries. The slowdown of material inputs productivity growth rates could be attributed to the low quality of the raw materials and the technological inputs, which were mainly imported.

The use of total factor productivity overcomes the problem of single productivity indicators such as labour productivity and capital deepening by measuring the relationship between output and its total inputs (a weight sum of all inputs), thereby giving the residual output changes not accounted by total factor input changes. Being a residual, changes in total factor productivity are not influenced by changes in the various factors which affect technological progress. Examples here includes the quality of factors of production, flexibility of resource use, capacity utilisation, quality of management, economies of scale, and the like. Subsequently, the improvement and slowdown of total factor productivity contribution to food manufacturing industries in terms of average annual growth rates are dependent on the inputs used in the production of food industries, some of which were reported earlier to be of low quality and insufficient.

The contribution of total factor productivity growth to the food manufacturing industries' output growth was found to be positive, with only 13 out of 27 food industries showing negative growth during the entire period of the study. The highest contribution of total factor productivity growth came from the other dairy products industry (3.0716%), based on the average annual growth rates. The lowest contribution on the other hand was from the manufacture of prepared animal feeds whose contribution was recorded as -21.746 percent (Table2). Although the input terms contribution was improved during the sub period of 1987-2000, the total factor productivity growth declined to give a negative contribution in 13 out of 27 food industries, after the number of these industries had been reduced to 11 in the sub periods of 1971-1979 and 1980-1986. This was due to the fact that the problem of low quality of input terms in the food industries and productivity growth of Malaysian manufacturing industries is input driven rather than total factor productivity driven as found by previous studies. As for empirical evidence in the case of Malaysia, Maisom *et al*, (1993), Choong and Tham (1995) and Elsadig *et al*, (2002), concluded that productivity growth in the Malaysian manufacturing industry is input driven rather than total factor productivity driven, and it is mainly dependent on Foreign Direct Investment (FDI). This was also confirmed by Lall (1995). Newly industrialised Asian countries also have input driven productivity as stated by Young (1992, 1995) and Kim and Lau (1994). Sarel (1996) stated that some East Asian countries may face the same fate of the Soviet Union because these countries have invested primarily on labour and capital rather than in technology over the past few decades.

Table (2): Productivity Indictors in Food Manufacturing Industries %, 1970-2000

Industry Description	Industry Code	TFP	Output growth	Capital growth	Labour growth	Material growth
1. Food Manufacturing	311-312	-0.2574	11.174	12.192	29.060	11.421
2. Meat processing	31110	2.4053	18.328	15.388	7.1826	13.788
3. Ice cream	31121	0.2163	10.570	11.902	3.5678	11.310
4. Other dairy products	31129	3.0716	8.2017	8.3541	5.8201	8.0398
5. Pineapple canning	31131	0.0565	1.4971	3.4279	19.117	-1.7433
6. Fruits and vegetables canning	31139	-0.3652	9.4847	11.377	2.0841	10.022
7. Fish processing	31140	-0.0536	12.451	17.539	30.144	12.607
8. Manufacture of coconut oil	31151	2.2535	3.3180	10.003	22.468	2.7088
9. Manufacture of palm oil	31152	1.6867	15.899	12.247	34.937	16.614
10. Manufacture of palm kernel oil	31153	-0.3125	11.843	-12.907	5.4606	-11.347
11. Other vegetable and animal oils and fats	31159	-0.8387	13.781	-15.069	4.5799	-1.2661
12. Large rice Mills	31162	-2.8517	18.379	-15.100	25.974	-18.519
13. Flour mills	31163	0.3738	4.8208	6.8906	3.0969	4.3961
14. Sago and tapioca factories	31164	-0.5893	19.884	-14.010	-0.1807	-20.087
15. Other grain milling	31169	0.0643	2.5626	-2.5520	-1.3326	-2.8167
16. Biscuit factories	31171	0.4049	15.394	-12.169	27.269	-16.101
17. Bakeries	31172	-1.9208	12.084	-9.0138	31.439	-12.667
18. Sugar factories and refineries	31180	0.5854	3.9472	1.4105	26.057	3.6709
19.Manufacture of cocoa, chocolate and sugar confectionery	31190	-0.1886	12.469	14.464	6.2769	12.353
20. Ice factories	31221	0.4290	16.150	-17.821	4.5052	-16.472
21. Coffee factories	31212	0.5290	15.155	-18.381	2.9487	-15.689
22. Meehoon, noodles and related products	31214	-0.0549	10.370	-7.6598	6.0791	-10.572
23. Spices and curry powder	31215	0.0202	13.320	16.729	6.4286	12.797
24. Other food products n.e.c.	31219	-0.2540	17.034	-13.134	31.581	-16.990
25. Manufacture of prepared animal feeds	31220	-21.746	37.295	-11.732	27.342	-14.163
26. Distilling, rectifying, blending	31310	0.4560	16.772	-16.752	21.633	-16.507

spirits and malt liquors and malt	31330					
27. Soft drinks and carbonated water industries	31340	-0.6838	14.274	-12.885	25.477	-12.871

Table (3): Productivity Indictors in Food Manufacturing Industries %, 1971-1979

Industry Description	Industry Code	TFP	Output growth	Capital growth	Labour growth	Material growth
1. Food Manufacturing	311-312	1.5246	31.768	35.145	33.775	31.053
2. Meat processing	31110	13.308	23.688	10.293	-2.3117	4.3264
3. Ice cream	31121	1.1008	9.3236	-61.232	3.8048	9.7771
4. Other dairy products	31129	7.2595	10.350	7.1393	-71.689	10.950
5. Pineapple canning	31131	0.1592	-2.6129	3.8079	0.0001	-3.0571
6. Fruits and vegetables canning	31139	-0.3264	19.594	23.025	-64.350	19.829
7. Fish processing	31140	0.43365	22.718	29.131	19.908	22.665
8. Manufacture of coconut oil	31151	5.2294	0.6032	8.4242	76.136	4.7421
9. Manufacture of palm oil	31152	18.951	32.228	23.234	22.388	33.977
10. Manufacture of palm kernel oil	31153	-1.8435	27.283	25.840	-64.568	28.686
11. Other vegetable and animal oils and fats	31159	-3.0397	25.763	28.902	-68.804	28.737
12. Large rice Mills	31162	-3.3910	2.9798	9.3156	4.5052	3.0421
13. Flour mills	31163	0.2968	1.7530	6.43352	-73.718	1.8191
14. Sago and tapioca factories	31164	-1.7980	5.0890	16.645	1.0330	5.1481
15. Other grain milling	31169	1.1657	-32.072	-35.985	-18.468	-35.388
16. Biscuit factories	31171	0.1908	4.9648	9.7695	4.5052	4.4446
17. Bakeries	31172	-3.5813	5.0231	8.5187	7.7016	4.5729
18. Sugar factories and refineries	31180	0.6233	2.1068	-2.5038	0.0570	1.6177
19.Manufacture of cocoa, chocolate and sugar confectionery	31190	1.4737	18.138	24.327	-66.205	16.743
20. Ice factories	31221	-0.5024	2.5028	3.1406	0.6391	3.3037
21. Coffee factories	31212	0.4742	4.3980	-18.300	2.6994	4.2405
22. Meehoon, noodles and related products	31214	-0.4224	19.409	24.977	-67.061	19.170
23. Spices and curry powder	31215	0.8444	10.609	6.1465	4.2867	9.6366
24. Other food products n.e.c.	31219	-0.5867	-13.427	-5.9630	0.5810	-14.737
25. Manufacture of prepared animal feeds	31220	-0.6059	8.8329	15.906	7.7016	8.8422
26. Distilling, rectifying, blending spirits and malt liquors and malt	31310 31330	3.8652	13.584	8.9014	-7.7016	14.966
27. Soft drinks and carbonated water industries	31340	-0.5388	12.530	11.611	4.5052	13.601

Table (4): Productivity Indictors in Food Manufacturing Industries %, 1980-1986

Industry Description	Industry Code	TFP	Output growth	Capital growth	Labour growth	Material growth
1. Food Manufacturing	311-312	-11.269	-20.200	-20.155	-26.809	-19.935
2. Meat processing	31110	1.1640	11.035	11.970	-87.401	-85.726
3. Ice cream	31121	2.1924	10.974	11.303	2.2569	8.5796
4. Other dairy products	31129	2.9493	6.7507	17.604	9.9021	5.4571
5. Pineapple canning	31131	-1.3003	-4.3237	-3.2412	-9.9021	-3.0131
6. Fruits and vegetables canning	31139	0.2477	8.2692	10.249	0.0156	7.8251
7. Fish processing	31140	-1.0513	2.6391	40.733	-5.7924	3.5107
8. Manufacture of coconut oil	31151	-0.0315	-4.3370	30.578	-2.4484	-5.1842
9. Manufacture of palm oil	31152	12.941	8.2879	2.7693	0.9219	8.9522
10. Manufacture of palm kernel oil	31153	0.6525	-8.7167	-8.9563	0.0018	-8.6459
11. Other vegetable and animal oils and fats	31159	2.1283	-9.2163	-1.0714	0.0004	-9.2464
12. Large rice Mills	31162	-6.1968	-9.7513	-8.9493	4.1097	-9.6774
13. Flour mills	31163	-0.8132	10.296	7.7757	0.0008	11.689
14. Sago and tapioca factories	31164	1.4263	-9.7139	-9.7139	1.1665	-9.7803
15. Other grain milling	31169	-0.8231	16.227	11.719	5.0200	18.972
16. Biscuit factories	31171	0.4383	-8.6739	-7.4140	7.2975	-8.8247
17. Bakeries	31172	1.7978	-8.7592	-8.1492	1.9902	-8.9263
18. Sugar factories and refineries	31180	0.7727	2.5804	-7.6242	0.0670	2.0046
19.Manufacture of cocoa, chocolate and sugar confectionery	31190	-1.3804	11.875	15.009	5.7924	13.286
20. Ice factories	31221	0.4533	-8.9425	-9.2772	5.2498	-9.1701
21. Coffee factories	31212	-0.2256	-9.3067	-8.5393	-9.6643	-9.93703
22. Meehoon, noodles and related products	31214	0.7171	-8.7205	-8.3007	5.7924	-8.8353
23. Spices and curry powder	31215	-0.5672	25.427	28.770	10.018	25.158
24. Other food products n.e.c.	31219	0.8854	-9.2000	-8.2909	0.0010	-9.2676
25. Manufacture of prepared animal feeds	31220	0.4959	-8.8787	-8.0539	0.0015	0.8935
26. Distilling, rectifying, blending spirits and malt liquors and malt	31310 31330	-3.8163	-9.2201	-9.2201	9.9021	1.4696
27. Soft drinks and carbonated water industries	31340	-1.9788	-9.7210	-8.9593	0.5053	1.4621

Table (5): Productivity Indictors in Food Manufacturing Industries %, 1987-2000

Industry Description	Industry Code	TFP	Output growth	Capital growth	Labour growth	Material growth
1. Food Manufacturing	311-312	4.1027	14.520	14.310	13.964	14.190
2. Meat processing	31110	-3.9827	18.529	20.372	60.578	69.726
3. Ice cream	31121	-1.2808	11.169	8.3533	4.0708	13.661
4. Other dairy products	31129	0.4405	7.5463	4.5103	53.607	7.4602
5. Pineapple canning	31131	0.6689	0.6335	6.5183	45.915	0.2637
6. Fruits and vegetables canning	31139	-0.7352	3.5935	4.4301	45.834	4.8161
7. Fish processing	31140	0.1318	10.757	-5.8163	54.692	10.690
8. Manufacture of coconut oil	31151	1.4829	8.8907	7.3040	0.4262	8.0919
9. Manufacture of palm oil	31152	-17.827	8.0931	9.5348	64.192	8.0611
10. Manufacture of palm kernel oil	31153	0.3260	4.0775	4.1715	66.232	3.6981
11. Other vegetable and animal oils and fats	31159	-0.9261	3.7440	7.5486	67.536	4.2512
12. Large rice Mills	31162	-0.8323	7.4580	6.4006	50.707	6.7485
13. Flour mills	31163	1.1970	3.8465	6.7000	67.916	1.8635
14. Sago and tapioca factories	31164	-0.8203	2.5100	7.8472	-1.6346	2.5477
15. Other grain milling	31169	-0.2000	7.0131	11.805	6.5070	7.2277
16. Biscuit factories	31171	0.5258	7.1915	4.7129	51.889	6.7647
17. Bakeries	31172	-2.2712	14.672	15.954	57.467	14.1455
18. Sugar factories and refineries	31180	0.4353	6.3227	10.362	63.957	6.4112
19.Manufacture of cocoa, chocolate and sugar confectionery	31190	-0.6614	9.1212	7.8515	53.114	9.0638
20. Ice factories	31221	1.0156	8.4970	6.1786	6.6183	8.5998
21. Coffee factories	31212	0.9415	11.231	15.073	52.905	10.506
22. Meehoon, noodles and related products	31214	-0.2047	8.9038	9.0328	53.241	9.1990
23. Spices and curry powder	31215	-0.2158	9.0089	17.512	6.0106	8.6489
24. Other food products n.e.c.	31219	-0.6099	18.130	17.143	67.673	19.404
25. Manufacture of prepared animal feeds	31220	-4.6456	-4.1202	4.9045	53.638	8.6440
26. Distilling, rectifying, blending spirits and malt liquors and malt	31310 31330	4.0065	5.0306	4.4807	46.357	5.0094
27. Soft drinks and carbonated water industries	31340	-0.1295	9.9629	9.7213	51.697	11.925

4. CONCLUSIONS AND POLICY IMPLICATIONS

This study fills the gap of extensive growth theory model by providing statistical analysis in a parametric form which removes doubts in the results generated. The factors affecting the output growth in the food industries as identified in this study using the established model are the individual contributions of capital, the labour, the material and the combined contributions of the qualities of these inputs expressed as the total factor productivity growth.

The results indicated that there was an improvement in the food manufacturing industry's productivity growth following the implementation of the government policies to support the role of the food-manufacturing sector in Malaysia's economic development. Prior to 1987 (the period of structural transformation in the Malaysian economy), the agricultural sector as well as the industries related to it witnessed a decline in growth and contribution to the Malaysian economy. From the analysis in this study, it could be seen that the contribution of capital, labour

and material of food manufacturing industries improved during the first and second Industrial Master Plans (1986-1995 and 1996-2005). These plans were designed to improve the productivity performance of twelve industries among which is the food manufacturing industry. In contrast, the contribution of total factor productivity growth of 13 out of 27 food industries was found to be negative during the entire period and sub-period of 1987-2000. 11 industries were also reported to have contributed negatively during the sub- periods of 1971-1979 and 1980-1986. This has been attributed to the problem of low quality of input terms of the food industries and productivity growth of Malaysian manufacturing industries, which is actually input-driven rather than total factor productivity-driven, as found by previous studies.

5. Policy Recommendations

This study shows that the food manufacturing industry is an important sector in Malaysia's economic development. The first and second Industrial Master Plans (1986-1995 and 1996-2005) identified the food manufacturing industry sector as a priority industry among twelve industries that must contribute to Malaysia's industrial development. The importance of the food-manufacturing sector, besides its connection with many Malaysia's economic sectors, is in its influence on the nation's diet. Furthermore, it plays a role as a strategic product, especially in time of political fluctuations and in the advent of war or famine. Therefore, the starting point for the policy recommendations is to offer policies that can help overcome the main problems of the food-manufacturing sector, especially the inefficiency and low productivity. The following are the main factors that affect the inefficiency and low productivity of the food manufacturing industry:

5.1) Supply of raw materials

For any industry to develop there must be a regular and consistent supply of raw materials. One of the main problems faced by the food manufacturing industry is the lack of supply of raw materials. An estimated of 70 percent of the raw materials required by the food industry are imported. Improvement of the quality of the local raw materials will help to improve the final products, which will enable it to compete in the international markets and also help to reduce the dependency of the food manufacturing sector on imported raw materials.

5.2) Technological Input

Technological input has been identified as a major constraint facing the food manufacturing industry. The findings of this study reflected the relationship between technological inputs and the scale of production of small-scale food industries. Low technologies are adopted in the manufacturing processes and manual handling of materials is applied with low quality control. The first step for improving the productivity growth and efficiency of the food manufacturing industry will be to modernise the technology used by small-scale industries in order to improve the quality of the food-manufacturing product, as well as change their production methods. This must be started right from the cultivation of the agricultural raw materials in order to reduce the harvesting loss, and also to get good quality raw materials. There are good programmes by the government which are designed to up-grade the SMIs and enable them to play an active role in the industrial development.

The local large-scale food industries on the other hand depended largely on imported technology. For a more

sustainable development of the large-scale food industries, this imported technology should be kept to a minimum in the short run, while in the long run efforts are made to produce all the technological inputs locally. This can best be achieved by putting the experience of industrial countries into consideration, as well as getting benefits of the global information technology and researches done in this area.

5.3) The Human Resources capacity

As mentioned earlier, the level of skilled labour employed would usually reflect on the level of technology adopted. Therefore, before any improvements are implemented on technological and material inputs, there is the need to reduce the number of unskilled labour that dominates food-manufacturing sector, and increase the number of skilled labour in the sector. A program could be designed to up-grade labour standards and use high technology in production methods, through institutions involved in the area of food technology, such as MARDI, MARA, and the local universities.

5.4) Management Problems

Family members who have little or no training in food technology operate most SMIs in the food manufacturing industry. This poses a lot of management problems to the food manufacturing industry, in addition to existing financial problems faced by the food manufacturing industry due to its position in the manufacturing industry sector. Based on this result, most food industries have no choice but to continue with the financial programme organised by government institutions, especially the SMIs. There is the need to design new programmes in order to solve the current financial problems of the food manufacturing industries, and in the long run for these industries to become efficient and competitive in the international markets. The solutions that relate to problems of marketing, especially packaging could be improved by using environmentally friendly products, which will ensure high quality and the ability to compete well in the international markets and eventually generate high returns that will guarantee the industrial improvement in the future.

5.5) Research and Development (R&D)

A programme started by the Malaysian Agricultural Research and Development Institute (MARDI) in the 1980's was reported to offer some promise in improving the establishment of food industries and related inputs through (R&D). The advantages of this R&D can be extended should all the food-manufacturing industries be covered in the future. This will help in enhancing the active role of the food-manufacturing sector in Malaysia's industrial development.

Besides this development, R&D in other fields such as the biotechnology of improving food crops genetically, will help to improve the characteristics of the raw materials for the food manufacturing industry. These target characteristics includes superior texture, colour, flavour and nutritional value, among others. Transgenic plants can increase desirable processing characteristics such as higher solids levels, inhibition of enzymatic action, delayed ripening and longer shelf life. In the case of animal sources, the development of animals with faster or improved growth would reduce the cost of meat production. Animals with desirable characteristics such as reduced fat, cholesterol content or improved milk production, eggs with very low cholesterol levels, production of functional components, (especially proteins in milk), could also be developed. The use of unconventional meat sources, as well

as more cross breeding to improve animal species would be the other alternatives. The agricultural system will also have to be changed to allow for more intensive cultivation. Alternative non-chemical means for pest control, organic farming, as well as the use of effective micro organisms also offers some promise in producing products with less chemical residues. Improvement of post harvest technologies for handling, storage, packaging and distribution to reduce losses and increase shelf life have to be given emphasis. There is a need for more mechanisation and better handling, as well as process monitoring and control in order to enable long term storage of products for year round availability of commodities. This point of view is supported by earlier reports of Yeoh et al [1995].

5.6) Physical Infrastructures

The physical infrastructures are very important for the efficiency and productivity of the food manufacturing industry. With a good base of physical infrastructures, high quality products can be produced with low cost and high profit.

As shown earlier, there is lack of adequate infrastructure facilities in the food manufacturing industry. In addition, there is no systematic transport system to facilitate collection, storage and supply of raw materials. Normally, the small-scale food establishments are scattered all over the country. There is a problem of getting group transport, testing the quality of products, the storage system of the input and the output products of the SMIs. To end these problems the government should try to locate all the SMIs in one area so as to offer them the required and sufficient infrastructures. Practically, this could be very difficult. However, considering the experience of industrial countries, a co-operative system can be established for each group of the SMIs and be able to get their services from the production to the marketing stages, as is practised in the US, Holland, Denmark and UK.

5.7) Incentives for the Food Manufacturing Industry

The incentives offered to the food manufacturing sector in order to promote investments in the food manufacturing sector need to be improved. Most of the food manufacturing sub sectors are promoted under the Promotion of Investment Act (PIA, 1986) and enjoy tax incentives, such as Pioneer Status and Investment Tax Allowance. The government has also extended the incentives under the PIA (1986) to the agricultural sector in order to stimulate the production of raw materials locally and to reduce the dependency of the food manufacturing industry on imported raw materials. The government is still yet to offer many incentives in the investment, financial supports, exports and imports, in order to buoy the position of the food manufacturing industry growth among other manufacturing industries.

Finally, the first three factors listed above (5.1-5.3) constitute the main factors affecting the efficiency and productivity growth of the food manufacturing industry. Any attempts to improve the efficiency and productivity growth of the food manufacturing industry could therefore be through the improvement of the supply of raw materials to the food industry and by solving the problems of the low quality and shortages of the local supply, among others. Overcoming the problems of technological inputs, especially with the SMIs and the labour input, that

affects the food manufacturing industry, will also yield great improvements.

In the end the limitation of this study is that the department of statistics of Malaysia has changed the industrial classification codes of these industries; it made it very difficult to extend the data of these industries beyond 2000. In this regards, this study is limited to 2000, however there is changes in the reality of productivity of Malaysia's food industries if the data is extended beyond 2000.

References

Ab. Wahab M. (2004) 'Total Factor Productivity Growth: Survey Report', Asian Productivity Organization, Tokyo, Japan.

Abramovitz, M. (1956) 'Resource and Output trends in the United States since 1870', American Economic Review, Vol. 46, No. 2, pp. 5 23.

Choong and Tham (1995) 'Total Factor Productivity in the Malaysian Manufacturing Sector Preliminary Results', Jurnal Ekonomi Malaysia, Vol. 29, pp. 9-35.

Denison, EF (1962) 'The Sources of Economic Growth in the United States and the Alternative before Use', New York: A Supplementary Paper, Committee for Economic Development, pp.229-255.

Denison, EF and P Edward (1979) 'Accounting of Slower Economic Growth; the United States in the 1970s', Washington: The Brooking Institution.

Department of Statistics Malaysia (2004) 'Survey of Malaysian Economy, Various Issues, Government Printers, Kuala Lumpur.

Elsadig M., Khalid A., Zulkornain Y. and Zakariah A. (2002), 'Factors Determining Malaysian Manufacturing Sector Productivity Growth', Paper presented in Asia Pacific Economics and Business Conference 2002 theme: The Impact of Global Competitive Environment on Asian Economics, Business and Society, Oct 2-4, Kuching, Sarawak, Malaysia.

Engle and Granger (2003) 'Time-series Econometrics: Cointegration and Autoregressive Conditional Heteroskedasticity', Advanced information on the Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel.

Gan, W.B., and E. Robinson (1993) 'Aggregate Supply and Wage Price Mechanism: Some Implications for Inflation Stabilization in Malaysia', Paper Presented at HIID-ISIS Seminar Kuala Lumpur.

Gan, W.B., and L. Y. Soon (1998) 'Input Versus Productivity Driven Growth: Implications for the Malaysian Economy', in Soon, L. Y. and N. Shyamala, (eds.) The Seventh Malaysia Plan: Productivity for Sustainable Development. Kuala Lumpur: University Malaya Press.

Griliches, Z. and Jorgenson D. W. (1962) 'Capital Theory: Technical Progress and Capital Structure, Sources of Measured Productivity change Capital Input', American Economic Review, Vol. 52, No. 1, pp. 50 61.

Jorgenson D. W., Gollop F. M. and Fraumenri B. (1987) 'Productivity and US Economic Growth', Amsterdam North Holland.

Kendrick, J. W. (1956) 'Producative Trends Capital and labour. Review of Economics and Statistics', Vol. 38, No. 3, pp. 248 57.

Kendrick, J. W. (1961) 'Productivity Trends in the United States', Princeton: Princeton

Lall, S. (1995) 'Malaysia: Industrial Success and the Role of the Government', Journal of International Development, Vol. 7, No. 5, pp. 775 789.

Mahadevan, R. (2001) 'Assessing the Output and Productivity Growth of Malaysia's Manufacturing Sector', Journal of Asian Economics, Vol.12, No. 4, pp. 587 597.

Maisom, Mohd Ariff and Nor Aini (1993) 'Productivity and Efficiency in Malaysian Manufacturing Sector', First Malaysian Econometrics Conference, Kuala Lumpur.

Malaysian Industrial Development Authority (MIDA) (1985) Medium and Long term Industrial Master Plan Malaysia (1986-1995). Volume II, Part 3.

Ministry of International Trade and Industry (MITI) '*Annual Report 1993-1995'*, (Government Printers, Kuala Lumpur).

Rao, P. S. and Preston, R.S. (1984) 'Inter-factor Substitution, Economic of Scale, and Technical Change: Evidence from Canadian Industries', Empirical Economics, Vol. 9, No. 4, pp. 247 62.

Sarel, M. (1996) 'Growth in East Asia: What we can and cannot infer', IMF Working Paper 95/98, International Monetary Fund, Washington DC.

Solow R. M. (1956) 'The Production Function and the Theory of Capital. Review of Economics Studies' Vol. XXIII, pp. 101 108.

Solow R. M. (1957) 'Technical Change and the Aggregate Production Function', Review of Economics and Statistics, Vol. 39, pp. 312 320.

Stigler, George, J. (1947) 'Trends in output and Employment', National Bureau of Economic Research, New York.

Syrquin, Moshe (1991) 'A Comparative Analysis of Structural Transformation in Latin America', En Miguel Urrutia (ed.) Long-Term Trends in Latin American Economic Development, Washington, D.C: Johns Hopkins University Press Para el Banco Interamericano de Desarrollo, pp. 81 116.

Tham, S. Y. (1995) 'Productivity Growth and Development in Malaysia', Singapore Economic Review, Vol.40, No.1, pp. 41-63.

Tham, S. Y. (1997) 'Determinants of Productivity in the Malaysian Manufacturing Sector', ASEAN Economic Bulletin, Vol. 13, No.3, pp. 333-343.

Yeoh, Q. L., Othman A. R, Hussein Z., Abu Bakar H. and Adinan H. (1995) 'Food Processing as Priority Sector for Industrial development', Paper presented at the AIM Seminar on Repositioning Malaysian Agriculture, Crown Princess Kuala Lumpur.

Young A. (1992) 'A Tale of two Cities: Factor Accumulation and technological Change in Hong-Kong and Singapore', National Bureau of Economic Research, Macroeconomics Annual, pp. 13 54.

Young, A. (1991) 'A tale of two cities: Factor Accumulation and Technical Change in Hong Kong and Singapore', National Bureau of Economic Research Macroeconomic Annual, Vo. 7, pp. 13-54.

Young, A. (1995) 'The Tyranny of Numbers: Confronting the Statistical Realities of the East Asian Growth Experience', Quarterly Journal of Economics, Vol. 110, pp. 641 680.

Zarina, Z.A., and A. Shariman. 1994 'Growth, Inflation and Potential Output', Central Bank Discussion Paper 33, Kuala Lumpur.