

CHAPTER 3
RESEARCH METHODOLOGY

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This chapter discusses the methodology undertaken in analyzing the impact of the two factors which are real wage and unit labour cost to the real labour productivity in the manufacturing sector. Below are the steps involved in dealing with the study.

3.1 Collection of data

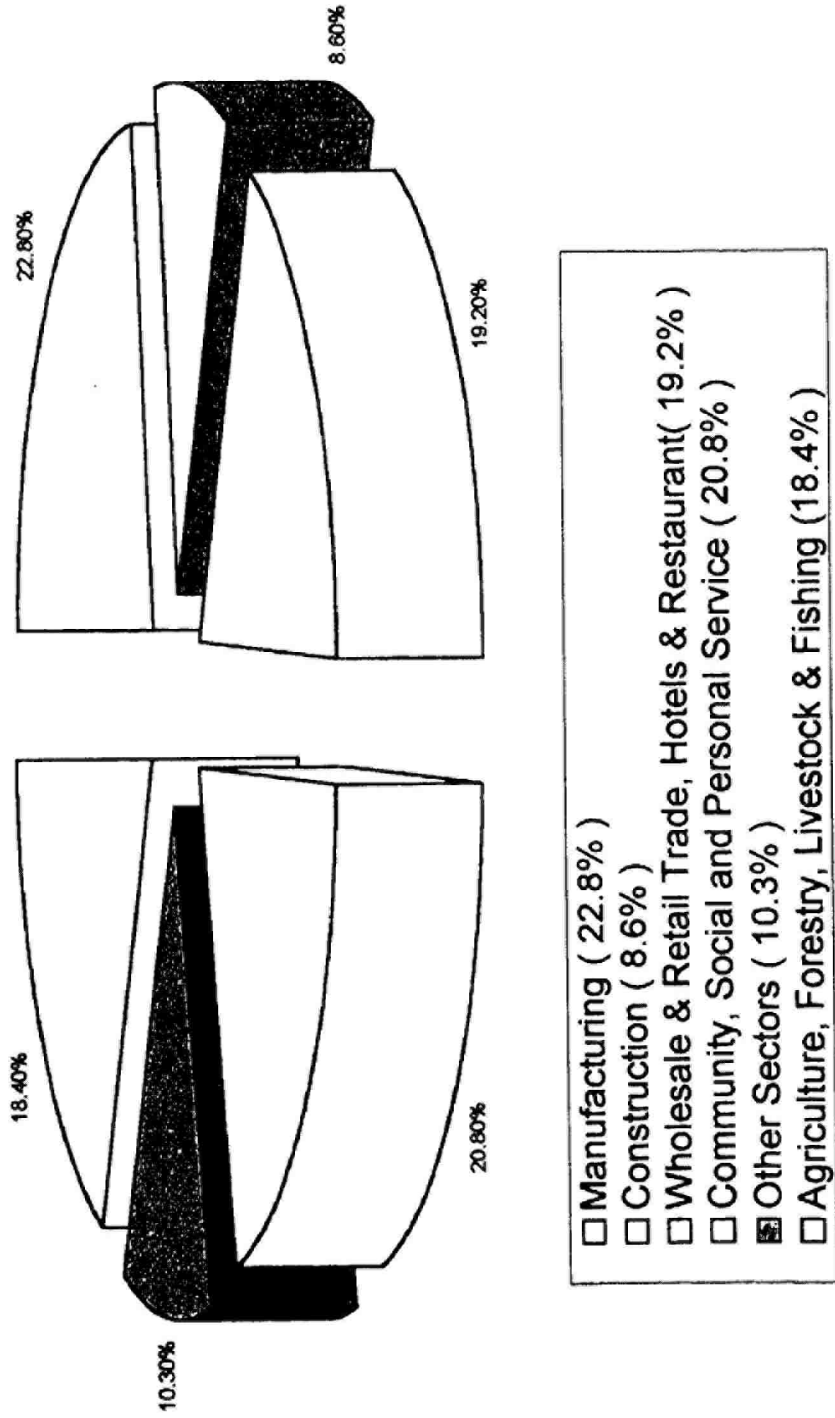
The secondary time series data involved in this project are the Principals statistics of selected industries in Malaysia for various years. The period carried in the study has been from 1978-2002. The sources of data have been obtained from Economic Planning Unit, Department of Statistics and Bank Negara. The variables involved in this study are real labour productivity, real wage and unit labour cost in nominal value. The data for real labour productivity and real wage are measured in constant (1993) prices as obtained from the Economic Planning Unit, Malaysia.

Therefore, those real data, which have been in the form of proxies from 1978 to 1987 have also used 1993 as the base year. It must be noted that the yearly data which have been obtained from EPU are the compilation from the Monthly Manufacturing Survey from Department of Statistics, Malaysia. However, we must also take into account that the sales value may not be the same with the production indices of the manufacturing sector as published in the publication of ' Index of

Industrial Production, Malaysia. This is mainly because the Index of Industrial Production, Malaysia used adjustment factor which is the adjustment for the differences in the varying length of months and the number of 'Federal' public holidays (between the base year months and the reference months).

On the other hand, the sales value statistics that relates with this study does not take into account the adjustment factor. The reason to choose manufacturing industry and to assess its labour productivity is because it has the largest contribution in terms of GDP, export as well as employment creation. In other words, this sector is the main impetus of the growth of Malaysian economy nowadays. As shown in figure 1.2, in 2000, the manufacturing sector has carried the largest share of 22.8 percent in terms of employment by sector among all sectors.

Figure 1.2 Employment By Sector, 2000



Source: Year Book Of Statistics, 2001. Department Of Statistics, Malaysia

The data in this study covers 73 out of a total of 137 manufacturing industries, whereby 11 had been fully enumerated. The remaining 62 industries covered larger establishment above certain employment cut-offs. However, the details of the 73 sub-sectors are enclosed in the appendices. Here, it is worthwhile to mention 5 industries that recorded the highest sales value for the period of January – December, 2002 in comparison with the same period of 2001. This can be seen in the table 1.3.

Table 1.3: Highest Sales Value For 2001 And 2002

No.	Industry	Sales Value (RM Billion)		% Change
		January-December		
		2002	2001	
1.	Semi-Conductors and Other Electronic Components and Communication Equipment and Apparatus (38329)	92.7	92.2	0.5
2.	Radio and Television Sets, Sound Reproducing and Recording Equipment (38321)	28.0	31.7	(11.7)
3.	Crude Oil Refineries (35300)	22.7	21.8	4.1
4.	Manufacture of Industrial Gases (35111)	13.0	13.9	(6.5)
5.	Manufacture & Assembly of Motor Vehicles (38432)	12.4	11.7	6.0

Source: Monthly Manufacturing Statistics, Department Of Statistics, Malaysia.

3.1.1 Definition of the data

A) Sales value of own manufactured products (ex-factory)

This value refers to the amount received by the producer from the purchaser for a unit of good or service produced as output minus tax payable and plus any subsidy receivable on that unit due to sales. Here, the transportation charges are excluded. In short, the basic price refers to prices chargeable to customers minus distribution expenses incurred which are

- i) rebates / discount
- ii) chargers for carriage outwards
- iii) commissions to selling agents
- iv) other chargers such as excise duties paid and sales tax collected by the factory on behalf of the government.

B) Total number of employees

Total number of employees engaged in an establishment is known as the total number of persons employed as at the end of December. It involves all working proprietors and active business partners, unpaid family workers and paid employees as defined later. It also includes part-time workers in the payroll and persons on strike, picket and short-term leave (sick, vocational or emergency leave). Whereas, those who do not include are workers on indefinite leave and pensioners.

(i) *Working proprietors and active business partners*

This refers to all individual proprietors and partners, part-time or full-time, who are actively engaged in the work of the establishment. Thus, it excludes passive and inactive partners.

(ii) *Unpaid family workers*

This is known as all persons (full-time or part-time) of the household of any of the owners of the establishment who perform a specified job and work for a minimum of one-third of the normal working time of the establishment, but do not receive regular payment either in cash or in kind for the work done. Such workers usually receive food, shelter and other support as part of the household of an owner but these provisions would continue whether they worked in the establishment or not.

(iii) *Full – time employees*

This is known as all paid workers who work for at least 6 hours a day and for at least 20 days a month.

(iv) Part-time employees

This includes all paid workers who work for less than 6 hours a day and/ or less than 20 days a month.

C) Salaries And Wages Paid

Salaries and wages paid refer to cash payments, including bonuses, commissions, overtime wages, cost of living allowances and other allowances made to all paid employees during the reference year. The employees' contribution to Employees' Provident Fund (EPF) and Social Security Organization (SOCSO) is included but the employer's contribution is excluded. Allowances to working proprietors, working partners and unpaid family workers are excluded.

3.2 Statement of theory

According to the economic theory, real wage supposed to have a positive relationship with the real labour productivity. Whereas, unit labour cost is supposed to have a negative relationship with the real labour productivity.

3.3 *Specification of the mathematical model*

The relationship of these three variables can be expressed in the form of mathematical model as stated below:

$$LP = B_1 + B_2 RW - B_3 ULC$$

where LP = real labour productivity

RW = real wage

ULC = unit labour cost

This expression can also be known as linear labour productivity function. B_1 , B_2 and B_3 are the parameters of the function. B_1 is the intercept that gives the value of LP when RW and ULC are zero. B_2 and B_3 are the slopes that measure the rate of change in LP for a unit (i.e. thousand) change in RW and ULC. In this model, LP is the dependent variable and RW and ULC is the independent variables.

3.4 *Specification of the econometric model*

The mathematical model denotes a deterministic relationship between the real labour productivity of the manufacturing sector and the real wage and unit labour cost. However, in reality, we rarely find such relationship between those variables. In other words, there are other variables affecting real labour productivity that can be represented in the form of u , which is the error term. It represents those forces apart

from RW and ULC that affect LP but are not explicitly mentioned in the model.

Therefore, the econometric model is presented as follows:

$$LP = B_1 + B_2 RW - B_3 ULC + u$$

where u = random error

The model denotes the analysis on the behavior of RW and ULC to LP with the presence of other factors included in the error term, u .

3.5 *Statistical and economic analysis*

Based on the computer output using E-view, several tests have been performed to look at the significance of the model and its variables. Those tests are goodness of fit (R^2), which is used to assess the significance of the model as a whole. The 'F-test' has been used to assess the relationship between the independent variables and the dependent variable. On the other hand, the 'T-test' has been used to test the independent variables individually to find out whether the values are significant or not. Moreover, the trends and the elasticity of those three variables have also been analyzed.