

3.1 INTRODUCTION

The Malaysian economy has undergone significant structural transformation since the country achieved independence in 1957. Within a time span of less than five decades, it has gone from a major exporter of primary products producer (75.6% of total exports in 1960) to a major exporter of manufactured goods (77.2% of total exports in 2000). This structural transformation has been accompanied by rapid economic growth. The manufacturing sector now contributes one third of all goods produced in the country. In the past, Malaysia has relied on imported technology via foreign direct investments. Malaysia now faces the urgent challenge of developing indigenous technology to ensure sustainable growth and further economic transformation into a knowledge-based economy.

The incidence of technological innovation in the manufacturing sector is an important source of information on the current status of technological innovation in the country. Such information will provide policy makers with an idea of the vibrancy and prospects of indigenous technology development. This chapter provides an aggregated view of the status of technological innovation in the manufacturing sector. It provides an analysis of some of the key characteristics of both innovating and non-innovating firms.

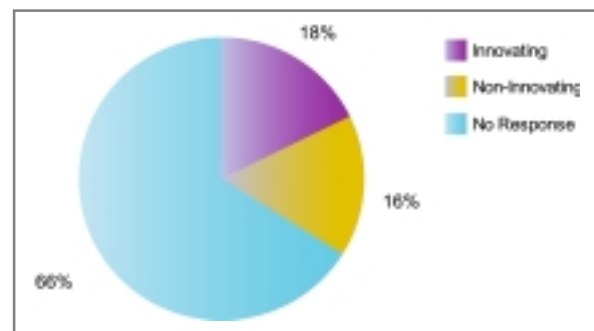
3.2 TECHNOLOGICAL INNOVATION IN THE MANUFACTURING SECTOR

Level of Innovation

In the Stage 1 of the innovation survey for the manufacturing sector, 4,000 questionnaires were sent out. Of these, 714 firms (18%) indicated that they carried out innovation activities. Another 645

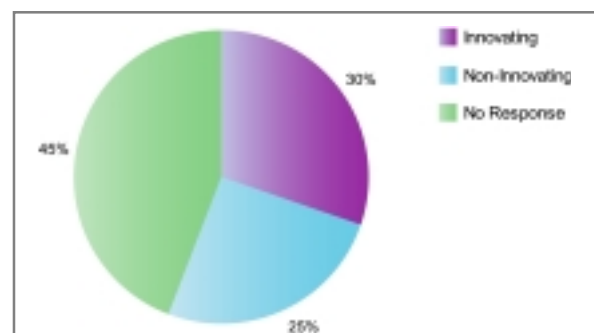
(16%) responded in the negative, while 2,641 (66%) did not respond (missing data) (see Figure 3.1). The 714 firms that indicated in the Stage 1 that they carried out innovation activities were sent a more detailed questionnaire in Stage 2. At this stage, 399 firms responded, of which 217 firms indicated that they carried out innovation activities, 182 firms indicated that they did not and the remaining 315 did not respond (see Figure 3.2).

FIGURE 3.1: RESULTS OF INNOVATION SURVEY FOR MANUFACTURING SECTOR, STAGE 1V



Source : Table 3.1

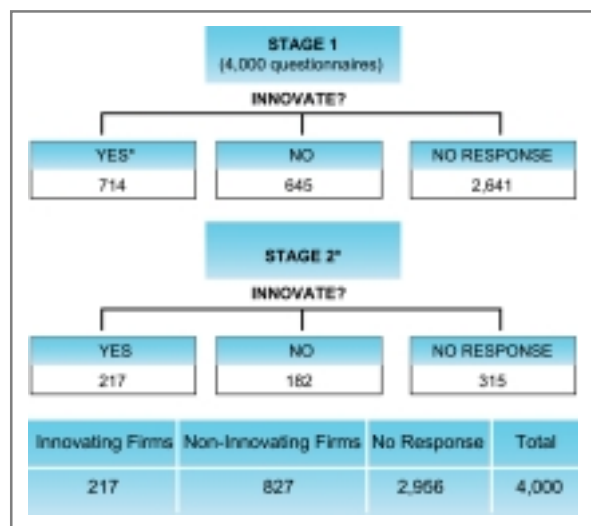
FIGURE 3.2: RESULTS OF INNOVATION SURVEY FOR MANUFACTURING SECTOR, STAGE 2



Source : Table 3.1

Note that 182 firms indicated that they carried out innovation activities in the Stage 1 Survey but the same firms indicated otherwise in the Stage 2 Survey. This inconsistency may be due to the fact that the more detailed questionnaire at Stage 2 further clarified the definition of innovation activities for firms. Unfortunately, we do not know whether what percentage of firms will change their answers in the reverse direction (no innovation in Stage 1

BOX 3.1: SEQUENCE OF INNOVATION SURVEYS FOR MANUFACTURING SECTOR



Survey but has innovation in Stage 2 Survey).

To obtain the total number of respondents indicating no innovation, we combine the survey results from the Stage 1 and Stage 2 surveys. The sequence of surveys for the manufacturing sector and their results are summarized in Box 3.1.

About 26.1% of the 4,000 firms surveyed responded to the National Innovation Survey. Overall, about **21%** of the firms in the manufacturing sector that responded to the survey carry out innovation activities (see Figure 3.3).

Innovation Across Manufacturing Industries

The proportion of innovating firms to non-innovating firms differs from industry to industry. In the responding sample, industries (3-digit industrial classification) in which the percentage of innovating firms is less than 10% include:

- Manufacture of Footwear Except Vulcanised or Moulded Rubber or Plastic
- Manufacture of Wearing Apparel Except Footwear
- Manufacture of Wood, and Wood and Cork Products Except Furniture

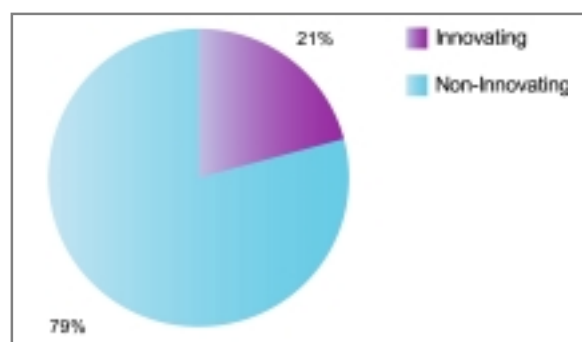
The low incidence of technological innovation in these industries is consistent with OECD’s classification of the technology characteristics of these products. OECD’s classification is based on R&D intensity. All these industries are classified as “low-technology” industries (See Table 3.3).

In the responding sample, industries with the percentage of innovating firms between 10% and 20% include:

- Food Manufacturing
- Beverage Industry
- Manufacture of Textiles
- Manufacture of Paper and Paper Products
- Printing, Publishing and Allied Industries
- Manufacture of Plastic Products, N.E.C.
- Manufacture of Non-Metallic Mineral Products

There is a mixture of “low-technology” and “medium-low-technology” industries in this category (Table 3.3). Food manufacturing, beverage, textile manufacturing, manufacturing of paper and paper products, and printing, publishing and allied industries are all considered to be low-technology industries. In the responding sample, the proportion of innovating firms in two industries that are considered to be medium-low-technology industry – manufacture of plastic products (not elsewhere

FIGURE 3.3: INCIDENCE OF INNOVATION AMONGST THE MANUFACTURING SURVEY SAMPLE RESPONDENTS



Source : Table 3.2

classified), and manufacture of non-metallic mineral equipment - fall between 10% to 20%.

In the responding sample, five industries show incidence of innovating firms in the range between 20% and 30% (Table 3.3):

- < Manufacture of Leather, Products of Leather, Leather Substitutes and Fur Except Footwear and Wearing Apparel
- < Iron and Steel Basic Industries
- < Manufacture of Fabricated Metal Products, Except Machinery and Equipment
- < Manufacture of Machinery Except Electrical
- < Manufacture of Transport Equipment

All except the first industry (i.e. Manufacture of Leather, Products of Leather, Leather Substitutes and Fur Except Footwear and Wearing Apparel) in the above list are “medium-low-technology” industries.

The highest category of innovation incidence in the responding sample is the percentage of innovating firms between 30% and 40%. The type of industries within this category is very mixed (Table 3.3):

- < Two industries are low-technology industries *tobacco manufacture and manufacture of furniture and fixtures.*
- < Three are medium-low-technology industries *manufacture of industrial chemicals, manufacture of miscellaneous products of petroleum and coal, and manufacture of rubber products.*
- < Two are high-technology industries *manufacture of electrical machinery, apparatus, appliances and supplies, and manufacture of professional and scientific and measuring and controlling equipment.*

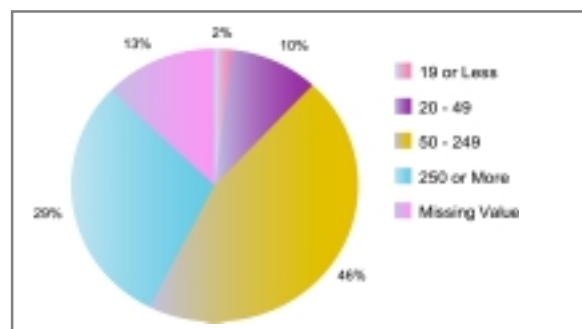
Characteristics of Innovating and Non-Innovating Firms

Are innovating firms different from non-innovating firms? It is important to understand whether innovating firms differ from non-innovating firms.

(a) Firm Size

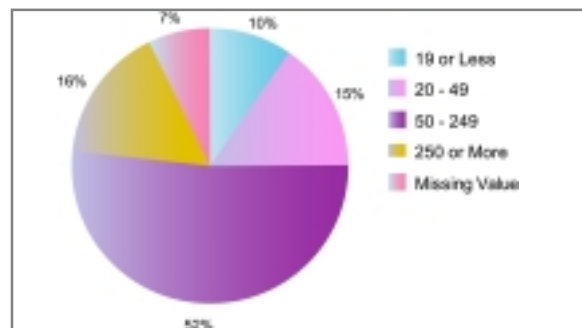
In terms of firm size by employment size, the responding sample indicates that, on average, innovating firms are larger than non-innovating firms.¹ The average employment sizes for innovating and non-innovating firms are 233 employees and 174 employees, respectively. At least 12% of innovating firms and 25% of non-innovating firms have less than 50 employees (Figure 3.4 and Figure 3.5). In the case of larger firms, at least 29% of innovating firms and 16% of non-innovating firms have 250 or more employees.

FIGURE 3.4: EMPLOYMENT SIZE OF INNOVATING FIRMS IN THE MANUFACTURING SECTOR, 1999



Source: Table 3.4

FIGURE 3.5: EMPLOYMENT SIZE OF NON-INNOVATING FIRMS IN THE MANUFACTURING SECTOR, 1999



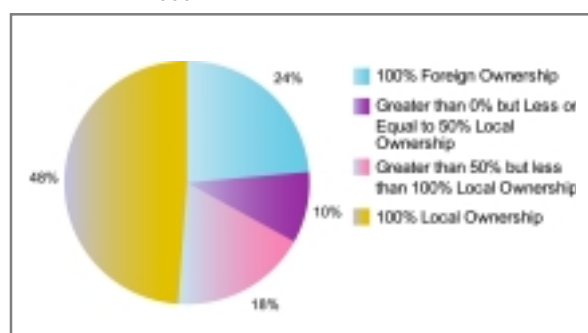
Source: Table 3.4

¹ Firm size is defined here in terms of employment size because it is considered less susceptible to business fluctuations compared to turnover.

(b) Share Ownership

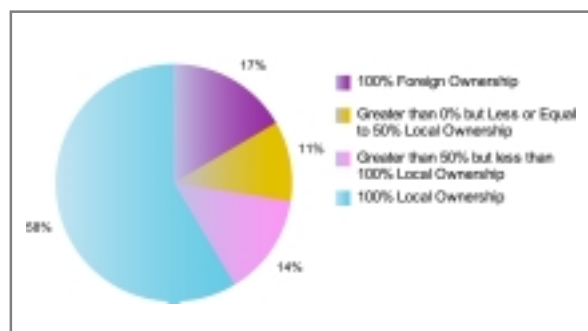
The share ownership profiles (in terms of local and foreign ownership) for both innovating and non-innovating firms are similar (see Figure 3.6 and Figure 3.7). In the responding sample, about 66% of the innovating firms and 72% of non-innovating firms have local ownership exceeding 50%. About 48% of the innovating firms are 100% locally owned. Wholly-owned foreign companies accounted for 24% and 17% of the innovating and non-innovating firms, respectively.

FIGURE 3.6: OWNERSHIP STRUCTURE OF INNOVATING FIRMS IN THE MANUFACTURING SECTOR, 1999



Source: Table 3.5

FIGURE 3.7: OWNERSHIP STRUCTURE OF NON-INNOVATING FIRMS IN THE MANUFACTURING SECTOR, 1999



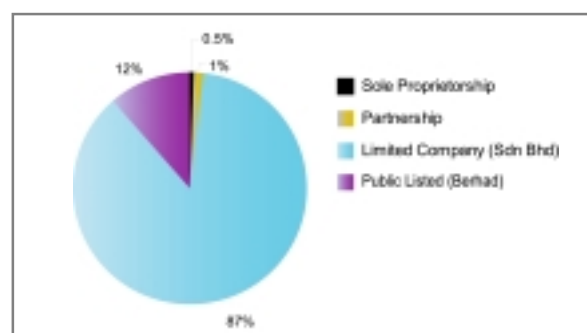
Source: Table 3.5

(c) Ownership Type

For both innovating and non-innovating firms in the manufacturing sector, limited company (*Sendirian Berhad*.) is the most common form of ownership. About 87% of innovating firms are limited companies while 12% are public listed companies (see Figure 3.8). In the case of non-innovating firms, at least 76% are limited companies while at least 7% are public listed companies (see Figure 3.9).

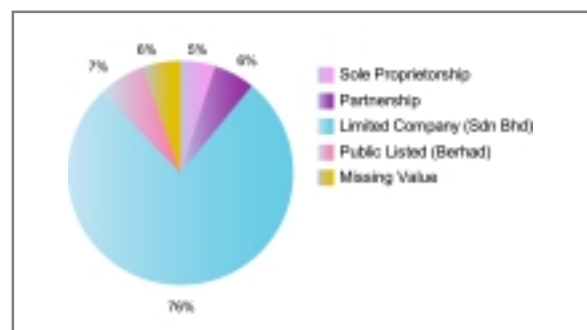
These differences between innovating and non-innovating firms are consistent with the finding of size differences between the two types of firms. Very few innovating firms (less than 2%) are of the sole-proprietor or partnership type, which are more common among non-innovating firms (11%).

FIGURE 3.8: OWNERSHIP TYPE FOR INNOVATING FIRMS IN THE MANUFACTURING SECTOR, 1999



Source: Table 3.6

FIGURE 3.9: OWNERSHIP TYPE FOR NON-INNOVATING FIRMS IN THE MANUFACTURING SECTOR, 1999



Source: Table 3.6