TRAINING FOR AUSTRALIAN INDUSTRY

A GUIDE TO RESEARCH TECHNIQUES FOR ASSESSING INDUSTRY TRAINING REQUIREMENTS

DEPARTMENT OF EMPLOYMENT, EDUCATION AND TRAINING
ACKNOWLEDGEMENTS

In 1986 the National Training Council commissioned the TAFE National Centre for Research and Development to prepare a manual on occupational and training needs analysis. Geoff Hayton and Hugh Guthrie from the Centre started work on the manual, which was to have Industry Training Committees, TAFE and Industry as its main users. At the same time, Don Fuller and Steven Oxley from the (then) Department of Employment and Industrial Relations were developing a method of industry analysis and labour market analysis, called the *Industries Studies Framework*, which was seen as complementary to, and articulated with, the manual on occupational and training needs analysis.

In July, 1987 it was decided to expand the manual to include industry analysis and labour market analysis. The Centre was commissioned to prepare the expanded manual in consultation with Don Fuller and Steven Oxley. Thus the scope of the manual now covered all the main types of workforce study and, as the manual developed, it was decided to broaden the target audience for the manual to include other government departments, industry associations and unions. Matters of concern to both researchers or consultants and research commissioners were to be covered.

The Centre's principal authors of the manual, including occupational and training needs analysis (Chapters 2, 3, 4, 5, 6, 8, 9 and 10) were Geoff Hayton, Terry Clark and Hugh Guthrie. The principal authors of the Introduction and the sections on industry analysis and labour market analysis (Chapter 1 and 7) were Don Fuller and Steven Oxley from the Department of Employment, Education and Training. The team of five authors provided editorial comment on the manual as a whole, and members of the project advisory committee provided valuable comments on the final draft.
TRAINING FOR AUSTRALIAN INDUSTRY
A GUIDE TO RESEARCH TECHNIQUES FOR ASSESSING INDUSTRY TRAINING REQUIREMENTS

DON FULLER & STEVEN OXLEY
INDUSTRY & LABOUR MARKET ANALYSIS

GEOFF HAYTON
OCCUPATIONAL & TRAINING NEEDS ANALYSIS
FOREWORD

This Manual has been designed to assist those concerned with advice to the Government, and education and training authorities, on the skill requirements of industry. For some time there has been a need for an effective methodology for guiding investigations on industry/occupational skill requirements.

The TAFE National Centre of Research and Development was contracted to assist in the detailed exposition of the methods and in particular, the areas relating to Occupational and Training Needs Analysis. This occurred under the direction of a Steering Group chaired by the Department of Employment, Education and Training (DEET) and consisting of representatives of various Industry Training Committees.

Personnel from both DEET and the TAFE National Centre have assisted in the preparation of this Manual.

It is expected that this work will serve as the basis of more specifically focussed packages, aimed at improving the skill base of Australian Industry.
## CONTENTS

<table>
<thead>
<tr>
<th>FOREWORD</th>
<th>iii</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF TABLES</td>
<td>viii</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>viii</td>
</tr>
<tr>
<td>ABBREVIATIONS</td>
<td>x</td>
</tr>
<tr>
<td>CHAPTER 1: INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Economic background</td>
<td>3</td>
</tr>
<tr>
<td>1.2 Structure of the manual</td>
<td>6</td>
</tr>
<tr>
<td>1.3 Skills and economic</td>
<td>7</td>
</tr>
<tr>
<td>development</td>
<td></td>
</tr>
<tr>
<td>- summary</td>
<td></td>
</tr>
<tr>
<td>CHAPTER 2: USING THIS MANUAL</td>
<td>9</td>
</tr>
<tr>
<td>2.1 Who can use this manual?</td>
<td>11</td>
</tr>
<tr>
<td>2.2 Reading guide</td>
<td>12</td>
</tr>
<tr>
<td>2.3 The roles of research</td>
<td>14</td>
</tr>
<tr>
<td>commissioners and</td>
<td></td>
</tr>
<tr>
<td>those who conduct the study</td>
<td></td>
</tr>
<tr>
<td>CHAPTER 3: CONCEPTS AND TERMS</td>
<td>19</td>
</tr>
<tr>
<td>3.1 Preliminary analysis</td>
<td>21</td>
</tr>
<tr>
<td>3.2 The four types of study</td>
<td>21</td>
</tr>
<tr>
<td>3.3 Overview of research</td>
<td>23</td>
</tr>
<tr>
<td>procedure</td>
<td></td>
</tr>
<tr>
<td>3.4 Summary</td>
<td>29</td>
</tr>
<tr>
<td>CHAPTER 4: DEFINING THE</td>
<td>31</td>
</tr>
<tr>
<td>PROBLEM</td>
<td></td>
</tr>
<tr>
<td>4.1 Why do this step?</td>
<td>33</td>
</tr>
<tr>
<td>4.2 The roles of research</td>
<td>33</td>
</tr>
<tr>
<td>commissioners and</td>
<td></td>
</tr>
<tr>
<td>those who conduct the study</td>
<td></td>
</tr>
<tr>
<td>4.3 The 'art' and 'science'</td>
<td>33</td>
</tr>
<tr>
<td>of exploratory research</td>
<td></td>
</tr>
<tr>
<td>4.4 Recognise that a problem</td>
<td>36</td>
</tr>
<tr>
<td>or issue needs to</td>
<td></td>
</tr>
<tr>
<td>be addressed</td>
<td></td>
</tr>
<tr>
<td>4.5 Identify possible</td>
<td>39</td>
</tr>
<tr>
<td>causes or underlying</td>
<td></td>
</tr>
<tr>
<td>factors</td>
<td></td>
</tr>
<tr>
<td>4.6 Consider the range of</td>
<td>44</td>
</tr>
<tr>
<td>possible solutions</td>
<td></td>
</tr>
<tr>
<td>or responses</td>
<td></td>
</tr>
</tbody>
</table>
4.7 Establish a priority among the issues 47
4.8 Prepare a statement of the research issues 48

CHAPTER 5: PLANNING THE STUDY 51
5.1 Why plan? 53
5.2 The roles of research commissioners and those who conduct the study 54
5.3 State the research objectives and expected outcomes 54
5.4 Select the type(s) of study 55
5.5 Prepare a project brief 62
5.6 Prepare a project proposal 67
5.7 Establish a project committee 67
5.8 Select a consultant 69

CHAPTER 6: CONDUCTING THE STUDY 77
6.1 Introduction 79
6.2 Manage consultants 81
6.3 Prepare research design 82
6.4 Review literature 86
6.5 Define population 87
6.6 Select sample 90
6.7 Develop data collection instruments 92
6.8 Collect data 93
6.9 Process and analyse the data 94
6.10 Summary 95

CHAPTER 7: CONDUCTING INDUSTRY ANALYSIS AND LABOUR MARKET ANALYSIS 99
7.1 Introduction 101
7.2 Difficulties with existing approaches to industry and labour market analysis 101
7.3 Development of an industry studies framework 102
7.4 Industry analysis 105
7.5 Labour market analysis 110
7.6 Conducting an industry studies framework survey 113
7.7 Summary 114

CHAPTER 8: CONDUCTING OCCUPATIONAL ANALYSIS AND TRAINING NEEDS ANALYSIS 117
8.1 Introduction 119
8.2 Occupational analysis and training needs analysis - when are they required? 119
LIST OF TABLES

Table | Page
--- | ---
5.1 | Summary of the Four Types of Analysis and Their Outcomes | 58
9.1 | Summary of Likely Reporting Formats, Target Audiences and Desired Outcomes | 179

LIST OF FIGURES

Figure | Page
--- | ---
1.1 | Industry Objectives and Resources | 5
2.1 | Flow Chart of a Suggested Reading Sequence for Those Who Commission or Conduct Workforce Studies | 13
2.2 | Tasks Involved in Workforce Studies for Each Group | 16
3.1 | Stages Involved in a Workforce Study | 23
3.2 | Stages Involved in the Identification and Analysis of Workforce Issues, Showing the Multi-analysis and Single Analysis Paths | 26
3.3 | Flow Chart of the Tasks involved in a Workforce Study | 28
4.1 | Steps Involved in Defining the Workforce Problem or Issue of Concern | 35
4.2 | Identifying Possible Causes or Underlying Factors | 42
4.3 | Consider the Range of Possible Solutions or Responses | 46
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1 Steps Involved in Planning the Study</td>
<td>53</td>
</tr>
<tr>
<td>5.2 Decision Tree for Selecting the Type(s) of Study</td>
<td>59</td>
</tr>
<tr>
<td>5.3 Costing a Project (Adapted from AGB: McNair, 1987)</td>
<td>65</td>
</tr>
<tr>
<td>5.4 Main Steps Involved in Selecting a Consultant</td>
<td>70</td>
</tr>
<tr>
<td>6.1 Steps Involved in Conducting the Study</td>
<td>80</td>
</tr>
<tr>
<td>6.2 The Two Main Types of Population for Workforce Studies</td>
<td>89</td>
</tr>
<tr>
<td>6.3 Graph Showing the Relationship between Sampling Error and Sample Size</td>
<td>91</td>
</tr>
<tr>
<td>7.1 Overview of the Industry and Labour Market Analysis Framework</td>
<td>106</td>
</tr>
<tr>
<td>8.1 Flow Chart of 'Entry and Exits' into Occupational Analysis and Training Needs Analysis</td>
<td>120</td>
</tr>
<tr>
<td>8.2 Flow Chart of Occupational Analysis</td>
<td>125</td>
</tr>
<tr>
<td>8.3 Diagrammatic Representation of Training Needs Across Two Organisations</td>
<td>130</td>
</tr>
<tr>
<td>8.4 Flow Chart of Training Needs Analysis</td>
<td>133</td>
</tr>
<tr>
<td>8.5 Method Selection Matrix</td>
<td>142</td>
</tr>
<tr>
<td>8.6 For Example One: A Quality Problem in a Small Metal Manufacturing Firm</td>
<td>143</td>
</tr>
<tr>
<td>8.7 For Example Two: A Study of a Trade Occupation in an Entire Industry</td>
<td>144</td>
</tr>
<tr>
<td>9.1 Steps Involved in Reporting the Outcomes</td>
<td>175</td>
</tr>
<tr>
<td>10.1 The Next Steps</td>
<td>183</td>
</tr>
<tr>
<td>10.2 Performance Deficiency Analysis Model (Adapted from Herem, 1979)</td>
<td>185</td>
</tr>
<tr>
<td>C.1 Example: Part of the Plastics Industry Register</td>
<td>206</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>ABS</td>
<td>Australian Bureau of Statistics</td>
</tr>
<tr>
<td>ACET</td>
<td>Australian Council for Employment and Training</td>
</tr>
<tr>
<td>ASCO</td>
<td>Australian Standard Classification of Occupations</td>
</tr>
<tr>
<td>ASIC</td>
<td>Australian Standard Industrial Classification</td>
</tr>
<tr>
<td>CES</td>
<td>Commonwealth Employment Service</td>
</tr>
<tr>
<td>DEET</td>
<td>Department of Employment, Education and Training</td>
</tr>
<tr>
<td>DITAC</td>
<td>Department of Industry, Technology and Commerce</td>
</tr>
<tr>
<td>GCCA</td>
<td>Graduate Careers Council of Australia</td>
</tr>
<tr>
<td>ITC</td>
<td>Industry Training Committee</td>
</tr>
<tr>
<td>OCES</td>
<td>Office of the Commonwealth Employment Service</td>
</tr>
<tr>
<td>SVS</td>
<td>Skilled Vacancy Survey</td>
</tr>
<tr>
<td>TAFE</td>
<td>Technical and Further Education</td>
</tr>
<tr>
<td>TDE</td>
<td>Training Development Executive</td>
</tr>
<tr>
<td>TRRA</td>
<td>Tradesmen's Rights Regulation Act</td>
</tr>
</tbody>
</table>
INTRODUCTION
1.1 ECONOMIC BACKGROUND

1.1.1 Present economic context

For nearly a decade, to 1983 Australia experienced periods of sharp economic downturn, slow growth, and high rates of inflation and unemployment. Although there has been a marked improvement in economic and employment growth in the last five years, Australia has recently experienced a sharp erosion in export revenue from traditional sources (agricultural products and minerals), highlighting the vulnerability of Australian living standards to fluctuations in international commodity prices. The economic impact can be seen in a deterioration of both the terms of trade and the balance of payments.

To reduce this vulnerability Australia must expand those elements of the manufacturing and services sectors which can contribute effectively to export growth and compete efficiently with imports. Success in these areas depends heavily on innovation, technology and workforce skills.

With the appearance of these major economic impacts has come a recognition that the Australian economy will need to adapt to changes in the economies with which it is closely related. Significant restructuring will require sharp changes in attitudes and the development of skills and ingenuity from within the Australian labour force.

The enhancement of international competitiveness will require the development of new industries, products and processes. Radical changes in the skill profile of the Australian workforce will be required to accompany this development.

The technological change required to facilitate restructuring will cause changes in the traditional boundaries of occupations, in the range of jobs within occupations and the mix of skills required in jobs. The term skills is used here in its broader sense to include knowledge, manual skills and attitudes required for occupational competence.

1.1.2 Role of education and training

The changes in the pattern of occupational employment, and the impact of technological change on skill requirements, highlight the need for the education and training system to be responsive to changing occupational skill requirements, particularly if restructuring of the Australian economy and the associated economic growth and employment benefits are to be achieved. This requires:

- development of methods aimed at identifying industry occupational skill requirements;
the structuring of appropriate education and training policy responses to the identified requirements;

the allocation of sufficient resources to education and training effort.

This manual is principally concerned with the first point above - that of appropriate methods for undertaking workforce studies aimed at identifying skill requirements as a basis for developing appropriate education and training responses.

1.1.3 Industry objectives and resource decisions

Any study aimed at assessing current or future skill requirements, for an industry or a single enterprise, falls within the scope of this manual. Such studies are often referred to as workforce studies. Workforce studies are largely concerned with the 'human resources' within the economy. The main resources within the economy include:

- management and entrepreneurial skills;
- human resources (workforce skills);
- capital (plant and machinery);
- physical resources (land and buildings).

These resources are combined using particular work methods and technologies to achieve the objectives of individual enterprises, as illustrated in Figure 1.1. The broad objectives of an enterprise (or industry as a whole) may include:

- profits (short, medium or long term);
- growth;
- income generation.

Additional second level objectives of an enterprise (or industry) which may contribute to the achievement of the broader objectives, include:

- export generation;
- import replacement;
- introduction of new technology;
- capital investment.
Such objectives guide decisions on the development and use of the four main types of resources.

FIGURE 1.1: INDUSTRY OBJECTIVES AND RESOURCES

PRINCIPAL OBJECTIVES OF INDUSTRY
- Profits (short, medium or long term)
- Growth
- Income generation

SECONDARY OBJECTIVES
- Export generation
- Import replacement
- Introduction of new technology
- Capital investment

RESOURCE DECISIONS
- Management and entrepreneurial skills
- Capital (plant & machinery)
- Physical resources (land & buildings)
- Human resources (the workforce)
1.2 STRUCTURE OF THE MANUAL

This manual provides a step-by-step guide to those issues requiring consideration by anyone intending to undertake or commission a workforce study. The topics covered include:

- using this manual (Chapter 2);
- defining the problem (Chapter 4);
- planning the study (Chapter 5);
- conducting the study (Chapters 6, 7 and 8);
- reporting the outcomes (Chapter 9);
- specifying the training and non-training responses (Chapter 10).

The manual also provides an introduction to the types of analysis that might be performed in undertaking a workforce study, namely industry analysis, labour market analysis, occupational analysis and training needs analysis. The issues covered include:

- definitions of the different types of analysis (Chapter 3);
- the applicability of the various types of analysis to different situations (Chapter 5).

Chapters 7 and 8 provide a more detailed discussion of the workforce analysis methods introduced in Chapter 3. Chapter 7 deals with industry analysis and labour market analysis. This chapter involves a detailed exposition of the Industry Studies Framework, a methodology specifically developed for undertaking industry analysis and labour market analysis. It is recommended that the Industry Studies Framework is the appropriate methodology to be used in undertaking an industry analysis and/or labour market analysis. Chapter 8 is concerned with occupational analysis and training needs analysis and provides an outline of the different techniques that might be applied in undertaking such analysis.

A central feature of the manual is the proposition that the different types of analysis can be integrated into a single study which moves from definition of an industry and the major factors affecting its performance, to specification of a curriculum change for an identified key occupation in the industry. At the same time, the manual stresses flexibility with respect to workforce studies. Thus, particular circumstances, such as the need to respond to well-identified narrowly structured problems or constraints in
terms of time and/or finances, might mean that one particular type of
analysis should be undertaken. In this manual this latter approach is
referred to as a "fast stream" study.

1.3 SKILLS AND ECONOMIC DEVELOPMENT - SUMMARY

It has become increasingly clear that the performance of Australian industry
(being primary, secondary and tertiary) in both domestic and international markets
is crucially dependent on the availability of up-to-date, high quality skills
at all levels - from senior management to operatives in all functions of the
enterprise. Appropriate skills are essential for the development of
innovative products and services and the creation of new markets.

The employment and skills composition of the workforce required to facilitate
economic growth and generate employment opportunities will change over time
in response to structural shifts, changing demand and expenditure patterns,
changes in the industrial structures of Australia's trading partners and
technological changes. The formulation of policies designed to respond to
changing education and training needs of industry will require the
development of methods aimed at identifying the major determinants of
changing employment and skill requirements, and the structuring of
appropriate policy responses to this changing environment.

This manual is largely concerned with discussing and detailing methods for
assessing current and future industry skill requirements. Results from the
application of these methods can be used as the basis for formulating
education and training policies which provide the best opportunity for:

. enhancing industry economic performance;

. improving international competitiveness;

. generating economic and employment growth.

REFERENCES AND FURTHER READING

ACTU/TDS: Australian Council of Trade Unions/Trade Development

ASTEC: Australian Science and Technology Council, Technological Change
Committee. (1987a). Wealth from skills: Measures to raise the skills
of the workforce. Canberra: AGPS.

ASTEC: Australian Science and Technology Council. (1987b). Education and
National Needs: A report to the Prime Minister. Canberra: AGPS.


USING THIS MANUAL
2.1 WHO CAN USE THIS MANUAL?

This manual is designed for those concerned with workforce studies. It covers workforce studies for a single enterprise through to studies for an entire industry.

This manual will be useful to three main groups of people:

1. those who commission workforce studies;
2. those who conduct workforce studies;
3. those who use the results of workforce studies.

Major 'commissioners' in Australia include:

1. Industry Training Committees;
2. TAFE planners and curriculum developers;
3. other government bodies;
4. large companies.

Workforce studies in Australia are conducted by:

1. Industry Training Committee staff;
2. private consultants;
3. researchers in TAFE;
4. researchers in higher education;
5. personnel officers in industry;
6. researchers in state and federal government departments.

Major 'users' in Australia include:

1. Government departments;
2. Industry Training Committees;
3. TAFE planners and curriculum developers;
This manual is broad in scope, covering the macro (industry level) to the micro (single enterprise level), as well as the following range of workforce study methods:

- industry analysis;
- labour market analysis;
- occupational analysis;
- training needs analysis.

We believe that optimum solutions come from a broader view of workforce problems. A narrow study of workforce problems or requirements may not lead to an optimum response. For example, a study involving only a narrow method of training needs analysis may indicate appropriate training responses, but a broader study involving all four types of analysis (industry, labour market, occupational and training needs analysis) may indicate a preferred combination of training and non-training responses.

It is more likely that the optimum solution to a workforce problem will flow from a comprehensive study; narrow studies however, can be very useful in particular situations. In this manual a narrow study involving a single type of analysis is referred to as a ‘fast-stream’ study. Such studies are usually faster, simpler and cheaper than comprehensive studies. Chapter 3 suggests situations in which fast-streaming may be useful, while Chapter 5 explains how to fast-stream with a narrow study, or alternatively, how to plan a comprehensive study.

The procedures outlined in this manual may be applied when specific workforce problems arise, or they may form part of a longer term planning strategy for skill requirements.

2.2 READING GUIDE

For those who commission or conduct workforce studies, the flow chart in Figure 2.1 summarises a suggested reading sequence.
FIGURE 2.1 FLOW CHART OF A SUGGESTED READING SEQUENCE FOR THOSE WHO COMMISSION OR CONDUCT WORKFORCE STUDIES

CHAPTER 1: INTRODUCTION

CHAPTER 2: USING THIS MANUAL

CHAPTER 3: CONCEPTS AND TERMS

CHAPTER 4: DEFINING THE PROBLEM

CHAPTER 5: PLANNING THE STUDY (choosing one of three paths below)

CHAPTER 6: CONDUCTING THE STUDY

CHAPTER 7: CONDUCTING INDUSTRY ANALYSIS AND LABOUR MARKET ANALYSIS

CHAPTER 8: CONDUCTING OCCUPATIONAL ANALYSIS AND TRAINING NEEDS ANALYSIS

CHAPTER 9: REPORTING THE OUTCOMES

CHAPTER 10: TRAINING AND NON-TRAINING RESPONSES
Figure 2.1 indicates that a choice of one of three paths is required at the stage of PLANNING THE STUDY (in CHAPTER 5). CHAPTER 5 provides a decision tree that will assist in the choice of one or more of the four types of workforce study:

- industry analysis;
- labour market analysis;
- occupational analysis;
- training needs analysis.

The decisions required in the decision tree are based on information obtained in an exploratory research phase, which is discussed in CHAPTER 4: DEFINING THE PROBLEM.

For those who use the results of workforce studies, a suggested reading sequence is Chapters 1, 2 and 3, then Chapters 9 and 10. The other chapters could be referred to as the need arises.

2.3 THE ROLES OF RESEARCH COMMISSIONERS AND THOSE WHO CONDUCT THE STUDY

It is helpful to distinguish two types of researchers who conduct workforce studies:

- commissioned consultants;
- in-house researchers.

Chapters 4, 5, 6, 7, 8 and 9 of this manual describe the tasks involved in workforce studies, and these tasks are listed in Figure 2.2. Different tasks are performed by each of the three groups:

- research commissioners;
- those who conduct research - commissioned consultants;
- those who conduct research - in-house researchers,

and these are indicated in Figure 2.2.
Generally the roles of research commissioner and commissioned consultant are complementary, whereas the in-house researcher may perform all of the tasks. Further discussion of the roles of each of these three groups follows.

2.3.1 Research commissioner

The following procedure is suggested for those who commission workforce studies:

. DEFINE the problem or workforce issues to be addressed. This is probably the most important step in the whole process! All the tasks listed under DEFINE in Figure 2.2 should be performed by those who commission workforce studies. Descriptions of these tasks are found in CHAPTER 4: DEFINING THE PROBLEM.

. PLAN the workforce study. This will normally require the performance of all of the tasks listed under PLAN in Figure 2.2 except for preparing a project proposal. Descriptions of these tasks are found in CHAPTER 5: PLANNING THE STUDY.

. At the CONDUCT stage of the study, it will be necessary to manage consultants and monitor progress of the study. All the other tasks listed under CONDUCT in Figure 2.2 would normally be performed by the commissioned consultants. While managing consultants and monitoring the progress of the study does not require a detailed knowledge of the various research methods available, it does require a knowledge of the types of tasks to be performed and the range of methods available. Information on managing consultants and the types of tasks to be performed by consultants is given in CHAPTER 6: CONDUCTING THE STUDY. Information on the range of methods available is given in:

- CHAPTER 7: CONDUCTING INDUSTRY ANALYSIS AND LABOUR MARKET ANALYSIS

- CHAPTER 8: CONDUCTING OCCUPATIONAL ANALYSIS AND TRAINING NEEDS ANALYSIS

. At the REPORT stage of the study, either the research commissioner or the consultant(s) will need to perform all or some of the tasks listed under REPORT in Figure 2.2. Descriptions of these tasks are found in CHAPTER 9: REPORTING THE OUTCOMES.
## FIGURE 2.2: TASKS INVOLVED IN WORKFORCE STUDIES FOR EACH GROUP

<table>
<thead>
<tr>
<th>STAGE</th>
<th>TASK</th>
<th>RESEARCH COMMISSIONERS</th>
<th>COMMISSIONED CONSULTANTS</th>
<th>IN-HOUSE RESEARCHERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEFINE (Chapter 4)</td>
<td>Recognise that a problem or issue needs to be addressed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identify possible causes or underlying factors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Consider the range of possible solutions or responses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Establish a priority among the issues</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prepare a statement of the research issue(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLAN (Chapter 5)</td>
<td>State the research objectives and expected outcomes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select the type(s) of study</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prepare a project brief</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prepare a project proposal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Establish a project committee</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select a consultant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONDUCT (Chapter 6)</td>
<td>Manage consultants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Review literature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prepare research design</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Define population</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select sample</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Develop data collection instruments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Collect data</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Process and analyse data</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONDUCT AN INDUSTRY ANALYSIS OR LABOUR MARKET ANALYSIS (Chapter 7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONDUCT AN OCCUPATIONAL ANALYSIS OR TRAINING NEEDS ANALYSIS (Chapter 8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REPORT (Chapter 9)</td>
<td>Identify target audiences</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select formats</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Disseminate information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPECIFY TRAINING AND NON-TRAINING RESPONSES (Chapter 10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:**
- Indicates that this task is usually undertaken
- Indicates that this task may be undertaken in certain circumstances
2.3.2 Conducting research - commissioned consultants

Before commencing the project the commissioned consultant should undertake some important preliminary steps. In addition, it is necessary during the study for the commissioned consultant to liaise with whoever commissioned the study. The following procedure is suggested:

- The commissioned consultant would not normally DEFINE the workforce problem or issues to be studied. Whoever commissioned the study should undertake this process. However, the commissioned consultant may need to clarify, confirm, and provide detail on the issues of concern. Information relating to this area may be found in CHAPTER 4: DEFINING THE PROBLEM.

- The commissioned consultant would normally undertake only one of the tasks needed to PLAN the study, as listed in Figure 2.2. The normal planning task for the commissioned consultant is the preparation of a project proposal. The other planning tasks are normally performed by the research commissioner. CHAPTER 5: PLANNING THE STUDY provides information for this stage.

- The commissioned consultant will need to CONDUCT the study. Most of the tasks listed for CONDUCT in Figure 2.2 normally would be performed by the consultant. Some guidelines on research design and how to conduct the study, are provided in CHAPTER 6. CHAPTER 7 deals with INDUSTRY AND LABOUR MARKET ANALYSIS. CHAPTER 8 deals with OCCUPATIONAL AND TRAINING NEEDS ANALYSIS.

- At the REPORT stage of the study, either the consultant or the research commissioner will need to perform all, or some of the tasks, listed under REPORT in Figure 2.2. Descriptions of these tasks are found in CHAPTER 9: REPORTING THE OUTCOMES.

2.3.3 Conducting research - in-house researchers

In-house researchers need to perform a wide range of tasks. In fact, most of the tasks performed by both research commissioners and commissioned consultants need to be performed by in-house researchers. The tasks to be performed in-house may be performed solely by a researcher or allocated to different people within the organisation, depending on organisation structure and management style.
The following procedure is suggested for those who conduct research as in-house researchers:

- **DEFINE** the problem or workforce issues to be addressed. This is probably the most important step in the whole process! As with research commissioners, there is a need to perform all the tasks listed under DEFINE in Figure 2.2. Descriptions of these tasks are found in **CHAPTER 4: DEFINING THE PROBLEM**.

- **PLAN** the workforce study. There normally would be a need to perform all of the tasks listed under PLAN in Figure 2.2 except for preparing a project brief and selecting consultants. In most organisations, the in-house researcher needs to prepare a research proposal to obtain internal approval to proceed with the research. Descriptions of these planning tasks are found in **CHAPTER 5: PLANNING THE STUDY**.

- **CONDUCT** the study. Guidelines on which methodology may be selected, and how to conduct the analysis, are provided in **CHAPTER 6. CHAPTER 7 deals with INDUSTRY AND LABOUR MARKET ANALYSIS. CHAPTER 8 deals with OCCUPATIONAL AND TRAINING NEEDS ANALYSIS**.

At the **REPORT** stage of the study, there will be a need to perform the tasks listed under REPORT in Figure 2.2. Descriptions of these tasks are found in **CHAPTER 9: REPORTING THE OUTCOMES**.
CONCEPTS
AND TERMS
3.1 PRELIMINARY ANALYSIS

All issues believed relevant to the workforce area of concern should be considered at the preliminary analysis stage. The preliminary analysis stage therefore involves exploratory research during which time a wide range of issues are considered. For example issues that could be considered initially include:

- industry activity and performance;
- availability of required occupations and skills;
- adequacy of training;
- job design;
- work organisation;
- job performance;
- impact of new technology.

3.2 THE FOUR TYPES OF STUDY

If, after the preliminary analysis stage, it becomes clear that further detailed information is required in a range of areas listed above, then there may be a need for a comprehensive workforce study covering all four types of analysis:

- industry analysis;
- labour market analysis;
- occupational analysis;
- training needs analysis.

However, in most cases it will be clear following the preliminary analysis that a range of issues can be addressed by one of the four types of analysis listed above. The approach where only one type of analysis is required, is termed FAST STREAMING.
If an **industry analysis** is to be conducted, refer to Chapter 7. In this manual industry analysis is defined as involving:

- determining the boundaries of the industry under consideration;
- examining determinants of the industry's activity levels; and
- assessing likely future industry activity and employment levels in light of expected movements in these determinants.

If a **labour market analysis** is to be conducted, refer to Chapter 7. Labour market analysis is defined as:

The assessment of the numbers in each occupation or job, in terms of the current and predicted requirement (demand) for personnel compared with the current and predicted availability (supply) of qualified people to fill such positions.

If an **occupational analysis** is to be conducted, refer to Chapter 8. Occupational analysis is defined as:

The identification of the current and likely future jobs within an occupation, and the duties and tasks which comprise each job, together with other relevant job information.

In this definition the terms *occupation* and *job* are hierarchical. That is, an occupation (e.g. electrical engineer) may consist of a group of jobs (e.g. electrical generation engineer, power transmission engineer, electrical equipment engineer, electrical services engineer). Definitions of *occupation* and *job* are given in **APPENDIX A: GLOSSARY**

**Training needs analysis** is covered in Chapter 8. A training needs analysis is defined as:

The assessment of the difference between the actual condition (what is) and the desired condition (what should be) in performance within an organisation (or group of organisations) in terms of knowledge, skills and attitudes.
3.3 OVERVIEW OF RESEARCH PROCEDURE

To ensure that the optimum training and non-training response to any workforce problem is obtained, the procedure outlined in Figure 3.1 is recommended. Brief descriptions of these four stages follow. Further details are provided in later chapters of this manual.

FIGURE 3.1: STAGES INVOLVED IN A WORKFORCE STUDY

- DEFINE the problem
- PLAN the study
- CONDUCT the study
- REPORT the outcomes
3.3.1 Define the problem

The first stage in any workforce study should be a preliminary analysis in which the workforce problem or issues of concern are identified as far as possible. This approach is necessary when:

- responding to a particular problem; or
- adopting a medium to long-term planning approach.

In either case, there is a need to define adequately the problem or the issues of concern.

This stage of defining the problem or issues of concern is sometimes described as exploratory research (see, for example, Anderson & Jones, 1986a, p. 22-30). It involves exploring the dimensions of the problem, and looking ahead to possible solutions and likely research outputs.

At the end of this first stage, there should be a statement defining the research problem or issues. The statement should provide a formulation of the research problem or issues that is simple, clear and complete (Kerlinger, 1986, p.16).

In this manual an approach to defining the workforce problem is described which involves starting with a broad view of workforce issues and then systematically focusing on the issues of concern. The steps involved in defining the workforce problem are described in CHAPTER 4: DEFINING THE PROBLEM.

3.3.2 Plan the study

The second stage in a workforce study should be PLANNING THE STUDY. As with the first stage of defining the problem, planning the study is a vital step. If this planning step is not taken or not done properly, the workforce study may use more resources than required, or may not produce the desired result.

We suggest that this planning stage include the following main steps:

- state the research objectives and expected outcomes;
- assess the methods available;
- prepare a project brief (research commissioner) or project proposal (consultant/in-house researcher);
. establish a project committee;

. select consultants.

Each of these steps is described in CHAPTER 5: PLANNING THE STUDY.

Chapter 5 also provides a DECISION TREE to assist in deciding whether to plan:

. a study using two or more types of analysis;

. a single analysis study (FAST STREAM APPROACH);

. an alternative to a workforce study.

The decision tree provides three check points:

. What type of information is required?
  - industry information (e.g. industry performance and employment);
  - labour market information;
  - occupational information (e.g. jobs, duties, tasks);
  - training needs information (e.g. job performance).

. Is the information available from previous studies or other sources?

. Are resources available to conduct the study or studies?

After referring to the decision tree in Chapter 5, a variety of paths may be taken for the conduct of the study, and these are shown in Figure 3.2.
FIGURE 3.2: STAGES INVOLVED IN THE IDENTIFICATION AND ANALYSIS OF WORKFORCE ISSUES, SHOWING THE MULTI-ANALYSIS AND SINGLE ANALYSIS PATHS.

DEFINE THE PROBLEM

PLAN THE STUDY (choosing between the paths below)

COMPREHENSIVE APPROACH: MULTI-ANALYSIS

FAST STREAM APPROACH: SINGLE ANALYSIS

CONDUCT THE STUDY

INDUSTRY ANALYSIS

LABOUR MARKET ANALYSIS

OCCUPATIONAL ANALYSIS

TRAINING NEEDS ANALYSIS

REPORT THE OUTCOMES
3.3.3 Conduct the study

Important tasks involved in conducting a workforce study include:

- literature review;
- prepare research design/select methodology;
- define population;
- select sample or take census;
- develop data collection instruments;
- collect data;
- analyse data.

Each of these steps is described in Chapter 6.

3.3.4 Report the outcomes

Presentation of the results of a workforce study needs careful planning. It is important for organisations commissioning workforce studies to:

- identify target audiences;
- select the formats of the report;
- disseminate information.

An integral part of the workforce study should be the development of recommendations which specify appropriate:

- training responses;
- non-training responses.

These recommendations should be based on the results of the analysis.
FIGURE 3.3: FLOW CHART OF THE TASKS INVOLVED IN A WORKFORCE STUDY

DEFINE

- Recognise that a problem or issue needs to be addressed
- Identify possible causes or underlying factors
- Consider the range of possible solutions or responses
- Establish a priority among the issues
- Prepare a statement of the research issues

PLAN

- State the research objectives and expected outcomes
- Select the type(s) of study
- Prepare a project brief
- Prepare a project proposal
- Establish a project committee
- Select a consultant

CONDUCT

- Prepare research design
- Define population
- Select sample
- Develop data collection instruments
- Collect data
- Process and analyse the data

REPORT

- Identify target audiences
- Select formats
- Disseminate information

NOTES: 1. Not all steps are performed by either research commissioners or consultants, as indicated in Figure 2.2
2. Each step may require a number of sub-steps, and these are described in the later sections
3.4 SUMMARY

It has been suggested that a workforce study should involve four major stages as shown in Figure 3.1. These are:

. define;
. plan;
. conduct;
. report.

Each of these stages involves a number of tasks. These tasks are described in the following chapters of this manual. The roles of research commissioners and those who conduct the research are also described. Figure 3.3 provides an overview of the main tasks involved in a workforce study, according to the four major stages.

REFERENCES AND FURTHER READING


DEFINING THE PROBLEM
4.1 WHY DO THIS STEP?

The first stage in any workforce study should be to define the workforce problem or issues of concern. There may, for example, be a need to:

- respond to a particular problem; or
- adopt a medium to longer term planning approach.

In either case there is a need to define adequately the problem or issues of concern.

An adequate statement of the problem is one of the most important elements of research. The statement should provide a formulation of the research problem or issue that is simple, clear and complete (Kerlinger 1986, p.16).

4.2 THE ROLES OF RESEARCH COMMISSIONERS AND THOSE WHO CONDUCT THE STUDY

It is suggested that in-house researchers and research commissioners undertake the steps described in this chapter to assist in the definition of the problems or issues of concern.

For consultants who have been commissioned to undertake a workforce study, if the problem and issues of concern are not clear, it is suggested that the steps described here be followed to clarify, confirm and provide details on the issues of concern.

4.3 THE ‘ART’ AND ‘SCIENCE’ OF EXPLORATORY RESEARCH

This stage of defining the problem or issues of concern is sometimes described as exploratory research (see, for example, Anderson & Jones 1986a, p. 22-30). It involves exploring the dimensions of the problem, and looking ahead to possible solutions and likely research outputs.
Successful exploratory research is something of an art form as well as a science. It requires a combination of creative thinking and systematic analysis. Part of the art of exploratory research involves the researcher's ability to:

- engage key informants in open ended discussions;
- use questions that probe the important dimensions;
- reflect on the significance of information obtained;
- analyse data and draw conclusions.

The approach outlined in this manual to defining the workforce problem involves considering a wide range of workforce issues at first, and then systematically focusing on the issues of concern. This means that all workforce issues (such as industry activity and performance, labour market issues, job design and job performance) should be considered in this exploratory stage. The suggested approach involves five steps as summarised in Figure 4.1. The five steps are:

- recognise that a problem or issue needs to be addressed;
- identify possible causes or underlying factors;
- establish a priority among the issues;
- consider the range of possible solutions or responses;
- prepare a statement of the research issue(s).

A description of each of these follows.
FIGURE 4.1: STEPS INVOLVED IN DEFINING THE WORKFORCE PROBLEM OR ISSUE OF CONCERN

1. Recognise that a problem or issue needs to be addressed
2. Identify possible causes or underlying factors
3. Consider the range of possible solutions or responses
4. Establish a priority among the issues
5. Prepare a statement of the research issue(s)
4.4 Recognise that a problem or issue needs to be addressed

A workforce study may be proposed because:

- medium to longer term workforce planning for the industry or an enterprise (the PROACTIVE approach) is seen as desirable, or;

- regular monitoring and review indicates a workforce problem may exist (the REACTIVE approach).

Both the proactive and the reactive approaches are useful, and in some situations it may be useful to adopt both approaches.

4.4.1 The proactive approach

In the PROACTIVE approach, workforce information provides the basis for planning and policy formulation within government, educational institutions and private organisations. In the process of corporate planning, future workforce problems (such as shortages of particular skills) may be identified.

For broad policy decisions, a wide range of workforce information is needed to plan the optimum responses. This is likely to require the conduct of all four types of study (i.e. industry, labour market, occupational and training needs analyses).

The workforce study methods described in this manual provide the basis for a medium to long term planning approach for an industry or any enterprise. However, this does not mean that a detailed prescriptive planning approach aimed principally at 'labour force requirements forecasting' should be adopted. Quantitative forecasts of occupational requirements have generally not been successful. These approaches have usually been based on some form of predictive model, encompassing broad factors such as forecast changes in industry/occupational relationships, projected levels of output and labour productivity, and demographic trends. A 'labour force plan' was then produced by assessing the adequacy of projected supply to meet the predicted demand and by preparing policy and program options designed to address any imbalances.

Important objectives for the workforce planning process outlined in this manual include the need to:

- provide reliable labour market information;
. ensure that the structure of the education and training system is consistent with economic development and future skill needs;

. identify current and potential skill imbalances, and suggest appropriate responses; and

. provide the basis for improvement in the content, relevance and quality of vocational education and training.

At the government level, planning should be directed towards ensuring that the structure of the education and training system is consistent with both Australia's longer term economic development and future skill requirements and the efficient use of education resources.

At the education/training provider level labour force studies will provide a basis for modifying the contents of courses and the number of places offered in different courses.

At the enterprise level, labour market analysis will provide information on the impact of key economic variables on work organisation, resource requirements and corporate strategies.

At the individual level, it is important that reliable labour market information is available. These considerations exert a strong influence over decisions on participation in education and training (DEIR, 1984, p.28).

4.4.2 The reactive approach

In the REACTIVE approach, action is usually initiated by a problem where this is defined as any discrepancy between performance and a predetermined standard or objective for an enterprise or industry.

In the early stage it may not be clear whether the problem is a workforce issue. For example, high material wastage may be recognised as a problem, but further investigation may be required to indicate whether it is caused by a workforce problem (e.g. better training is required) or an equipment problem (e.g. machine maintenance is required).

For an industry, recognition that a problem exists may come in many different forms. Some examples include:

. a government or industry organisation (employer, union, educational institution, industry training committee) requests a study of particular issues;
there has been:
- *technological change* in the industry which affects workforce skill requirements;
- *structural change* in the industry and its occupations;
- a poor export performance for the industry;
- low or falling productivity in the industry;
- significant changes in employment levels in the industry;
- significant shortages of skilled personnel in the industry;
- there is a change in government industry policies.

For a single *enterprise* or *organisation*, recognition that a problem exists may also come in many different forms. Some examples include:

- the firm's return on capital is low or falling;
- the firm's export performance is poor;
- loss of market share;
- the enterprise's productivity is falling or is below standard;
- accident rates are high or increasing;
- absenteeism is high or increasing;
- delays in meeting orders are excessive or increasing;
- customer complaints are excessive or increasing;
- disputes are excessive or increasing;
- labour turnover is high or increasing;
- there are difficulties in recruiting qualified people.

Besides specific factors such as those similar to the above, decisions are sometimes made on the basis of 'management intuition'.

A more proactive approach could be taken by an organisation by comparing *predicted* performance (rather than *current* performance) with the organisation's objectives.

The following example shows, using the case of a manufacturing company, how a workforce-related problem may be identified. This example will be developed in later sections of this chapter to illustrate subsequent steps in the development of a workforce study.
An Australian manufacturing company manufactures products and sells in a competitive market. Recognition of a problem occurred when the monthly financial reports revealed that return on investment was falling. The financial report was tabled at a management meeting. Closer examination showed that whilst fixed expenses remained constant, production value per day had declined throughout the period.

*Note: This example has been adapted from a case history given in Australian Institute of Training and Development (1987). Analysing Training Needs. Human Resource Development in Action, 91, April-May, p.7-14.

4.5 IDENTIFY POSSIBLE CAUSES OR UNDERLYING FACTORS

After recognising that a problem exists, there may have been a vague recognition of symptoms. It is helpful to attempt to trace the problem (or problems) back to causes or influences.

An approach using systematic questioning is often useful here. Job incumbents, supervisors, managers and other key individuals in the organisation or industry can be asked a series of questions which explore aspects of the problem. This widens the net and ensures that important aspects of the problem are not overlooked.

Depending on the nature of the problem, the questions should explore aspects related to:

- the industry;
- the organisation;
- job incumbents.

**Industry** aspects that should be examined include:

- effectiveness and efficiency of resource usage in the industry;
- role of each industry sector (e.g. what is the current and likely future role of each industry sector?);
- interactions among industry sectors (e.g. what are the current problems in the interaction between industry sector X and industry sector Y?);
- equipment capability;
- workforce morale;
- industrial relations climate;
- over-regulation of the industry;
- training arrangements for the industry.

**Organisational** aspects that could be explored, with sample questions include:

- function of each section of the organisation (e.g. what are the current problems in the interaction of sector X with sector Y?);
- labour recruitment difficulties;
- equipment capability;
- workforce morale;
- work organisation;
- industrial relations;
- adequacy of training effort;
- management style.

The case study example developed on pages 43-44 illustrates how organisation-based questions can be used to identify the possible causes of a problem.

**Individual** aspects include:

- function (e.g. what is the person's function within the organisation?);
- morale (e.g. does the person enjoy his/her job?);
- work environment (e.g. how much influence does the person have on the workplace layout?);
- relations with supervisor;
- relations with others.
For each of the above aspects relating to the individual, organisation or industry, a set of questions may be framed. This procedure, involving a set of primary questions and, at a later stage, a set of secondary questions, has been widely used in method study projects. It is described in the International Labour Office (ILO) publication: *Introduction to Work Study* (1979, p. 101-107). The set of primary questions includes:

- **What** is being done and **why?** *(PURPOSE)*;
- **Where** is it being done and **why?** *(PLACE)*;
- **When** is it being done and **why?** *(SEQUENCE)*;
- **Who** is doing it and **why?** *(PERSON)*;
- **How** is it being done and **why?** *(MEANS)*.

For example, when examining the function of each section of the organisation, the following primary questions could be asked:

- **What is the function of the section?** Why is the function necessary?
- **Where is the function executed?** Why is it done there?
- **When is the function executed?** Why is it done at that time?
- **Who carries out the function?** Why is it done by that person (or those people)?
- **How is the function executed?** Why is it being done in that way?

A summary of the suggested approach that may be used to assist the identification of possible causes or underlying factors is given in Figure 4.2. At the conclusion of this process a clearer picture of the nature of the problem or issues to be addressed should emerge. The next step should consider the range of possible solutions or responses.
FIGURE 4.2: IDENTIFYING POSSIBLE CAUSES OR UNDERLYING FACTORS

A "PROBLEM" EXISTS

EXPLORE ASPECTS OF THE PROBLEM IN TERMS OF

| THE INDUSTRY | THE ORGANISATION | THE INDIVIDUAL |

Further explore each aspect through questioning:

- What is being done and why? (PURPOSE)
- Where is it being done and why? (PLACE)
- When is it being done and why? (SEQUENCE)
- Who is doing it and why? (PERSON)
- How is it being done and why? (MEANS)
The company and how it recognized a problem is described on page 39. The management found that production value per day was declining while fixed expenses remained static.

To identify possible causes of the problem, aspects of the organisation were explored through the questioning technique. The problem appeared to concern two sections of the organisation:

- the production section; and
- the sales section.

Downtime on machines due to routine maintenance and tool changes had remained constant despite decreased throughput. However, this did not completely explain the fall in production value. To examine fully the production situation, sales (order intakes) were checked and this in turn showed a decrease. Two areas appeared to be worthy of investigation:

- downtime on machines in relation to throughput; and
- the decline in sales (order intakes).

Working in conjunction with the production manager, it was found that routine maintenance and tool changes, previously based on a fixed time period, had continued despite falling production. The problem then appeared to be one of excessive maintenance and tool changes in relation to throughput.

The order intake problem required a joint effort by the marketing and training functions. The deviation from the predicted level of sales was observable by comparison with the budget; but why? What were the changes that had taken place that could have caused this result?

Traditionally, the company had marketed products which had changed little in design over the years. However, as a result of an extensive value analysis project a revised product range which included many new products had recently been introduced.

The sales force was stable, composed of experienced personnel. Whilst the market had fluctuated over the years, these people had consistently achieved or exceeded budget.

The sales manager reported that the salespeople had experienced difficulty in getting customers to try, let alone accept new products. Assurances that the functional qualities of the new products equalled (continued next page)
or exceeded that of the old, had failed to convince the clients. An analysis of sales by product confirmed that the new products were failing to achieve the sales forecast. In addition, a range of related issues arose - for example:

- Did the new products take account of recent trends in community tastes?
- Did the job of the salesperson need to be redesigned?
- Was the morale of the company affected by poor sales?

4.6 CONSIDER THE RANGE OF POSSIBLE SOLUTIONS OR RESPONSES

A broad view of the problem should include looking ahead to possible solutions. This forward view will help in shaping the most fruitful and appropriate type of workforce study.

To obtain a range of possible solutions, it will often be necessary to move to a set of secondary questions which may be generated by using the key words ELSE and SHOULD with each of the previously listed primary questions. This can be used to generate, for example, the following set of questions (ILO 1979, p.102):

- **PURPOSE:** What else might be done? What should be done?
- **PLACE:** Where else might it be done? Where should it be done?
- **SEQUENCE:** When else might it be done? When should it be done?
- **PERSON:** Who else might do it? Who should do it?
- **MEANS:** How else might it be done? How should it be done?

The most effective solutions or responses should be established according to whether they are likely to involve:

- training responses;
- non-training responses;
a combination of training and non-training responses.

If you are a trainer, there is a possible danger that you may see all problems as requiring a training solution, when other more appropriate solutions are available. For this reason it is often advantageous to involve one or two individuals with non-training functions in the process.

Finally, it is suggested that you check whether if the effective solutions require information relating to:

- present industry performance;
- predicted industry performance;
- present numbers employed;
- predicted numbers employed;
- present job design;
- predicted job design;
- present job performance;
- predicted job performance.

This process will provide the basis for PLANNING THE STUDY at the next stage, and will be particularly helpful in using the decision tree for selecting the type(s) of study (see CHAPTER 5).

If one or more of these factors are involved, workforce problems or issues are likely to require analysis through a workforce study.
FIGURE 4.3: CONSIDER THE RANGE OF POSSIBLE SOLUTIONS OR RESPONSES

EXPLORE POSSIBLE SOLUTIONS THROUGH QUESTIONING?

- **PURPOSE:** What else might be done? What should be done?
- **PLACE:** Where else might it be done? Where should it be done?
- **SEQUENCE:** When else might it be done? When should it be done?
- **PERSON:** Who else might it do it? Who should do it?
- **MEANS:** How else might it be done? How should it be done?

ESTABLISH WHICH ARE THE MOST EFFECTIVE SOLUTIONS OR RESPONSES, AND WHETHER THEY INVOLVE EITHER:

- training responses;
- non-training responses;
- a combination of training and non-training responses.

CHECK IF THE SOLUTIONS REQUIRE INFORMATION ON:

<table>
<thead>
<tr>
<th>PRESENT INDUSTRY PERFORMANCE</th>
<th>PRESENT NUMBER EMPLOYED</th>
<th>PRESENT JOB DESIGN</th>
<th>PRESENT JOB PERFORMANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PREDICTED INDUSTRY PERFORMANCE</td>
<td>PREDICTED NUMBER EMPLOYED</td>
<td>PREDICTED JOB DESIGN</td>
<td>PREDICTED JOB PERFORMANCE</td>
</tr>
</tbody>
</table>
EXAMPLE: AN AUSTRALIAN MANUFACTURING COMPANY

The company and how it recognised a problem is described on page 39. A description of how it identified possible causes is given on page 43-44. It was found in the production section that routine maintenance and tool changes had continued on the basis of a fixed time period despite falling production. It was found in the sales section that sales were falling because of client resistance to new and improved products.

A range of possible solutions was considered through the questioning technique applied to the production manager, the sales manager and other key people in the organisation. For the first problem concerning maintenance and tool change schedules, it was agreed that the optimum solution was to change the basis of the schedules to volume of machine throughput. This solution required a management decision rather than a training response.

For the second problem it was agreed that the optimum solution was to improve the performance of sales staff in overcoming client resistance to new and improved products. It was considered that this could best be achieved by training.

Figure 4.3 provides a summary of the suggested approach to consideration of the range of possible solutions or responses.

Following this step, a clearer picture of potential problems or issues of concern and possible solutions or responses for each should emerge. In undertaking this preliminary investigation, a number of problems or issues may have been uncovered.

4.7 ESTABLISH A PRIORITY AMONG THE ISSUES

The previous steps should now have expanded what may have been a vague idea that a problem existed, into a wider examination of a number of potential issues that may be of concern, a consideration of underlying factors, and possible solutions. A wide net should be cast to collect this information. A priority should now be established from an assessment of issues.
To assist in establishing a priority, the following steps are suggested:

. evaluate the WORTH by answering the question "What and how much will the individual, the organisation or the industry gain by solving the problem or responding to the issues?";

. assess the URGENCY by answering the question "is the problem or issue of current or future concern, growing or static?";

. place a PRIORITY on the issues on the basis of these two considerations.

**EXAMPLE: AN AUSTRALIAN MANUFACTURING COMPANY**

The company (described on page 39) had recognised a problem, identified possible causes, and considered effective solutions.

After considering the worth and urgency of each problem and its solution, it was decided to concentrate immediately on two issues:

. changing routine maintenance and tool change schedules to a production throughput basis;

. improving the sales performance of the company's sales representatives, particularly in the area of new or improved products, through a training program.

### 4.8 PREPARE A STATEMENT OF THE RESEARCH ISSUES

The preceding steps should have assisted in an understanding of the nature of the problems and issues which need to be addressed in a workforce study. It is recommended that those issues to be researched are now written down in a simple, clear and complete form.

To focus the research, it is suggested that this statement be in the form of a question or a group of questions.

The statement of the research issues may serve a number of purposes:

. it provides the basis for PLANNING THE ANALYSIS (see CHAPTER 5);

. it may provide part or all of the documentation for gaining approval in principle to proceed with a workforce study;
it provides, in part, a record of the results of your exploratory research.

**EXAMPLE: AN AUSTRALIAN MANUFACTURING COMPANY**

The company (described on page 39) had recognised a problem, identified possible causes, considered effective solutions, and established a priority among the issues uncovered.

Of the two issues receiving high priority, only the second one required further investigation through a workforce study. In this case the research issue was stated as a simple question: "What are the training needs of the company's sales representative?"

The statement of the research issues is the final outcome of DEFINING THE PROBLEM, but is not the only outcome. A wealth of information and valuable insights will have been obtained during this exploratory research phase. These will prove most helpful for the next step of PLANNING THE ANALYSIS discussed in CHAPTER 5.

**REFERENCES AND FURTHER READING**


CHAPTER 5

PLANNING
THE STUDY
5.1 WHY PLAN?

It is suggested here that the second stage in any workforce study should be PLANNING THE STUDY. As with the first stage of defining the problem, planning the study is a vital step. As discussed previously, if planning is not undertaken carefully the study may use more resources than required, or may not produce the desired result.

We suggest that this planning stage involve six main steps:

1. state the research objectives and expected outcomes;
2. assess the type(s) of study available (for example, one or more of the following types: industry analysis, labour market analysis, occupational analysis and training needs analysis);
3. prepare a project brief;
4. prepare a project proposal;
5. establish a project committee;
6. select a consultant.

These six steps may be undertaken in the sequence suggested in the flow chart in Figure 5.1.

FIGURE 5.1: STEPS INVOLVED IN PLANNING THE STUDY
5.2 THE ROLES OF RESEARCH COMMISSIONERS AND THOSE WHO CONDUCT THE STUDY

Not all of the six suggested steps need to be undertaken by commissioners or those conducting workforce studies.

If you are a research commissioner, we suggest that you undertake all of the steps described in this chapter. A project proposal will usually be required if it is necessary to obtain funding approval for the project.

A consultant commissioned to undertake a workforce study will normally be required to prepare a project proposal which addresses the project brief. Additional steps will normally be undertaken by those commissioning the project. In some circumstances it may be necessary to undertake a range of specific steps - for example, if part of the study is subcontracted to another consultant.

If you are an in-house researcher conducting a workforce study, it is suggested that all of the steps described in this chapter be undertaken except for those relating to the preparation of a project brief and the selection of consultants.

Descriptions of each of the six steps involved in PLANNING THE STUDY are given in the following pages.

5.3 STATE THE RESEARCH OBJECTIVES AND EXPECTED OUTCOMES

The earlier stage of DEFINING THE PROBLEM should have generated a list of issues for potential study. These issues may in turn form the basis for the examination of more detailed questions/hypotheses.

5.3.1 Research objectives

Industry analysis may be required if industry, activity and employment levels are issues of concern. The following types of broad questions could therefore be formulated to assist in the development of research objectives:

- What is the present industry market context/activity/employment?
- What are the main determinants of industry activity/employment - including the influence of technological change?
What are the main relationships between performance levels/employment and underlying determinants?

What is the likely future level of industry activity and employment?

What are the likely main determinants of future industry activity/employment?

What are the likely changes in industry activity/employment - including technological shifts?

Within this scheme a labour market analysis may be required if numbers employed in each occupation, and labour supply and demand are issues of concern. In a similar manner the following types of questions could therefore be formulated:

- What are the estimated present numbers/supply/demand according to occupation?
- What are the main determinants of numbers/supply/demand according to occupation?
- What is the discrepancy between supply and demand in each occupation?
- What will be the likely future numbers/supply/demand according to occupation?
- What are the likely main determinants of future numbers/supply/demand?
- What will be the likely discrepancy between supply and demand for occupations?

An occupational analysis may be considered if occupational structure (job types within an occupation) and job design (duties and tasks within each job) are issues of concern. Questions relevant to occupational analysis include:

- What are the present jobs, duties and tasks?
- What should be the jobs, duties and tasks?
- Should jobs be redesigned?
- What will be the likely jobs, duties and tasks?
- What should be the future jobs, duties and tasks?
- How should jobs be redesigned in the future?
A training needs analysis may be necessary if job performance, in terms of knowledge, skills and attitudes are issues of concern. In a similar manner the following questions could be addressed:

1. What is the required performance standard for the job or task, now or in the future?
2. What knowledge/skills/attitudes are required to perform the job or task to the required standard?
3. What is the current standard of performance?
4. What deficiencies exist in knowledge/skill/attitudes between the current and required standards of performance?
5. What should be the future knowledge, skills and attitudes required for each job?
6. What will be the likely performance deficiencies in knowledge, skills and attitudes associated with each job?

To illustrate how these broad questions can be used to generate specific workforce study objectives, an example of an analysis of electrical and electronic trade occupations is given in the box below.

**EXAMPLE: OCCUPATIONAL ANALYSIS OF ELECTRICAL AND ELECTRONIC TRADES**

**Issues of concern:** Present and predicted occupational structure, job types, and job descriptions (duties and tasks).

The types of objectives listed above that are considered to be relevant are the occupational analysis objectives of 'type 1' and 'type 4'.

When these are considered in conjunction with occupational structure, job types, and job descriptions (duties and tasks), the following research objectives can be generated:

- To identify the present occupational structure within electrical and electronic trade occupations.
- To project the future occupational structure.
- To identify the job types within electrical and electronic trades.
- To predict the future job types within electrical and electronic trades.
- To identify the duties and tasks within each job type.
- To predict the future duties and tasks within each job type.
5.3.2 Expected research outcomes

A central issue when conducting research relates to how the findings will be used. The output from any proposed research should be clearly specified. In addition, an understanding of how the findings will further the aims or activities of the commissioning organisation should also be clear.

Research is often best conducted in the reverse order to that which may be expected. That is, the end product should be specified before research design and field research is contemplated. Communication is a vital ingredient in this process.

All parties involved in commissioning and conducting the project should have a similar view of the central objectives and outcomes of the project.

5.4 SELECT THE TYPE(S) OF STUDY

As previously discussed, if a workforce study is contemplated, one or more of four types of analysis may be involved:

. industry analysis;

. labour market analysis;

. occupational analysis;

. training needs analysis.

Each of these are defined in Chapter 3, while Table 5.1 provides a summary of the main outcomes of each type of analysis. Further information on industry analysis and labour market analysis is given in Chapter 7, while information relating to occupational and training needs analysis is provided in Chapter 8.
### TABLE 5.1: SUMMARY OF THE FOUR TYPES OF ANALYSIS AND THEIR OUTCOMES

<table>
<thead>
<tr>
<th>TYPE OF ANALYSIS</th>
<th>INDUSTRY ANALYSIS</th>
<th>LABOUR MARKET ANALYSIS</th>
<th>OCCUPATIONAL ANALYSIS</th>
<th>TRAINING NEEDS ANALYSIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAIN OUTCOMES:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INFORMATION ON PRESENT OR PREDICTED:</td>
<td>activity levels</td>
<td>numbers in occupations</td>
<td>jobs</td>
<td>knowledge</td>
</tr>
<tr>
<td></td>
<td>employment levels</td>
<td>supply</td>
<td>duties</td>
<td>skills</td>
</tr>
<tr>
<td></td>
<td>main determinants</td>
<td>demand</td>
<td>tasks</td>
<td>attitudes</td>
</tr>
</tbody>
</table>

**NOTE:** Many methods of training needs analysis incorporate some elements of occupational analysis.

The previous stage of **DEFINING THE PROBLEM** provides a sound basis for assisting in the selection of the appropriate type(s) of study. Of particular use will be the information on the 'range of possible solutions'. Figure 5.2 presents a decision tree to assist in selecting the appropriate type of workforce study.

The decision tree contains four columns as follows:

- **COLUMN ONE:** industry analysis decisions;
- **COLUMN TWO:** labour market analysis decisions;
- **COLUMN THREE:** occupational analysis decisions;
- **COLUMN FOUR:** training needs analysis decisions.

Each of these columns contains three check-points:

- **CHECK-POINT ONE:** is information required on:
  - industry boundaries, main determinants, activity and employment;
  - estimated supply and demand according to occupation;
  - jobs, duties and tasks;
  - knowledge, skills and attitudes required in the job?
FIGURE 5.2: DECISION TREE FOR SELECTING THE TYPE(S) OF STUDY

STATE THE RESEARCH OBJECTIVES AND EXPECTED OUTCOMES

Is information on industry context, activity & employment needed? 
- No: Plan industry analysis
- Yes: Is information on labour market numbers, supply and demand needed? 
  - No: Plan industry analysis
  - Yes: Is information on jobs, duties and tasks needed? 
    - No: Plan industry analysis
    - Yes: Is information on knowledge, skills and attitudes required in job needed? 
      - No: Plan industry analysis
      - Yes: Is all this information available from previous studies? 
        - No: Are resources available to conduct an industry analysis? 
          - No: Plan industry analysis
          - Yes: Plan labour market analysis
        - Yes: Are resources available to conduct an industry analysis? 
          - No: Plan industry analysis
          - Yes: Plan labour market analysis
      - Yes: Are all this information available from previous studies? 
        - No: Are resources available to conduct an industry analysis? 
          - No: Plan industry analysis
          - Yes: Plan activity analysis
        - Yes: Are resources available to conduct an industry analysis? 
          - No: Plan industry analysis
          - Yes: Plan activity analysis
    - Yes: Are all this information available from previous studies? 
      - No: Are resources available to conduct an industry analysis? 
        - No: Plan industry analysis
        - Yes: Plan activity analysis
      - Yes: Are resources available to conduct an industry analysis? 
        - No: Plan industry analysis
        - Yes: Plan activity analysis

Integrate all the analyses to be conducted
- Yes: COMPREHENSIVE APPROACH
- No: FAST STREAM APPROACH

Use existing information or seek other solutions to problem

PREPARE A PROJECT BRIEF
PREPARE A PROJECT PROPOSAL
ESTABLISH A PROJECT COMMITTEE

SELECT A CONSULTANT

CONDUCT THE STUDY
CHECK-POINT TWO: is information available from previous studies or other sources?

CHECK-POINT THREE: are resources available to conduct the study or studies?

Descriptions of each of the three check-points follow.

5.4.1 Check-point one: what information is required?

In the previous stage of DEFINING THE PROBLEM (in CHAPTER 4), it was suggested that a range of possible solutions or responses be considered.

This process can provide the basis for assisting in the selection of the appropriate type(s) of study.

For example, an industry analysis could be selected if information is required on industry boundaries, present or predicted industry activity levels (and their main determinants), and aggregate industry employment. An industry analysis may often be usefully combined with a labour market analysis to provide an overview of the main issues.

A labour market analysis could be selected if information is required relating to present or predicted numbers employed according to occupation, labour supply, or labour demand. A labour market analysis may often be conducted in conjunction with an industry analysis or an occupational and training needs analysis.

An occupational analysis could be selected if information is required on present or predicted occupational structure (jobs within each occupation) and job design (duties and tasks of each job). An occupational analysis is often undertaken to support a training needs analysis.

A training needs analysis may be selected if information is required on present or predicted job performance and training responses are thought to be an important component of a proposed solution.

5.4.2 Check-point two: is existing information available?

For this step it is suggested that previous workforce studies and data be examined to assess whether they may assist. In Australia there are a number of organisations which conduct studies related to the workforce.
If there are previous studies that are relevant, it is possible that they have addressed some, but not all, of the issues of concern. For example, if a comprehensive workforce study of automotive manufacturing trade occupations in Australia is planned, it may be that an industry and labour market analysis has been conducted recently. In this case it may be preferable to concentrate on an occupational and training needs analysis.

The step of assessing available information involves searching for relevant literature (for example, a computer search of the AUSINET database) and contacting industry and government organisations. Key individuals within industry and bodies such as Industry Training Committees, Department of Employment, Education and Training, TAFE and training authorities are likely to possess knowledge of workforce studies covering the issues of concern. This step provides a starting point for a more formal literature review step.

### 5.4.3 Check-point three: are resources available?

In this early planning step, it is useful to ask the question: Are resources available to conduct a study?

If the answer to this question is yes, then the important question becomes: Which types of resources (and how many) are available? The next step: prepare a project brief provides guidelines on how to cost a project. After considering the resources available and the estimated cost of the workforce study, there may be a need to limit the scope of the study to a single type of analysis (e.g. a training needs analysis), or plan a comprehensive study to be undertaken in two or three stages (e.g. Stage 1: labour market analysis; Stage 2: occupational analysis; Stage 3: training needs analysis).

### 5.4.4 Fast stream versus comprehensive approach

At the end of the decision tree, two questions are posed which aim to determine whether:

. a workforce study would be appropriate;

. one type of workforce study is planned;

. more than one type of workforce study is planned.
If a workforce study is not regarded as appropriate this is usually because:

- existing information can be used from previous studies; or
- alternate solutions or responses are required.

If only one type of workforce study is planned, then a FAST STREAM APPROACH, using a single type of analysis, is likely to be suitable for addressing the issues of concern. This implies that:

- existing information is available which enables you to focus on a single type of study; or
- the issues of concern are narrow in focus, and so can be addressed by a single type of analysis.

If more than one type of workforce study is planned, then a COMPREHENSIVE APPROACH using two, three or four types of analysis is required. Integration of the various types of analyses into a single study is likely to produce a number of efficiencies. For example, an industry analysis and a labour market analysis could be conducted through a single survey of employers, helping to keep survey costs lower than if two separate surveys were conducted. However, it still may be appropriate to split a comprehensive study into:

- two or more components running in parallel;
- two or more stages arranged sequentially.

After selecting the type(s) of study by referring to the decision tree in Figure 5.2, the next planning step, preparation of a project brief, may be undertaken.

### 5.5 PREPARE A PROJECT BRIEF

A project brief is a statement specifying the important features of a proposed research project and the way in which the project should be conducted. It is usually prepared by research commissioners for consultants.

There are a number of steps involved in preparing a research brief. As a result of the steps outlined above it is possible to prepare:

- a statement of the research issues involved;
the main research objectives including outputs;

required study configuration (i.e. types of analysis to be undertaken).

However, before writing the brief, two additional steps should be taken:

- preparing a draft research design, making a tentative selection of one or more methodologies;
- undertaking a costing of the project.

A discussion of each of these follows.

5.5.1 Preparing a draft research design

A draft research design provides a sound basis for planning. The draft design can be varied following discussions with potential consultants, and may involve one or more methodologies. The final and more detailed research design is prepared at the commencement of the project. This is discussed in CHAPTER 6: CONDUCTING THE STUDY.

In preparing a draft research design a number of factors require consideration:

- scope of the study - is it likely to encompass industry analysis through to training needs analysis or is it likely to be more specific? The selection matrix (Figure 6.2) in Chapter 6 should help determine the scope of the study.

- depth of information required - how much detail is required?

- group to be surveyed - is the industry to be covered or is a specific sector or occupation to be covered?

- time available - if the time available for the study is limited, the demands in terms of scope, coverage and detail may need to be restricted.

- rapidity of change in the area - some areas of industry are undergoing rapid change as a result of shifts in technology and work organisation, for example. The dynamic nature of the subject area will influence the methods selected.
5.5.2 An approximate costing

Before preparing a brief, a budget must be secured for the project and the study designed to fall within the available resources.

The costing of a research project is a complex activity. A number of assumptions are required to be made. It is important, however, that the project commissioner be able to make a reasonable estimate of the cost. One way to secure a cost estimate is to approach a number of potential research agencies and seek a quotation based on the proposed research design.

In costing a project, it is important to realise that field work is just one part of the necessary activities. A project is not simply the drafting of a few questions and the conduct of interviews. When costing a project, ensure that all the main cost elements are addressed. These elements are listed in Figure 5.3.

5.5.3 Writing the brief

The brief aims to provide those who may wish to tender for the project with sufficient information to undertake the project. On the other hand the brief should probably not be so detailed that it restricts those tendering for the project to one method. Those tendering should be left sufficient leeway to suggest potentially valuable ideas.

A brief should contain the following information (adapted from Turney & Robb 1971, p.22-24).

- A Title
  This should be clear and concise, conveying the main features of the study.

- A General Statement of the Problems and Issues
  This should be available from exploratory research undertaken to define the problem or issues of concern as described in Chapter 4. Details relating to other relevant studies should also be provided. Future research could also be foreshadowed.

- The Project Objectives and Expected Outcomes
  The step which involves stating the project objectives and expected outcomes was described earlier in this chapter. The objectives should be clear and concise. They should be consistent with any proposals made relating to methodology(ies).
FIGURE 5.3: COSTING A PROJECT (Adapted from AGB: McNair, 1987)

**OVERHEADS**
- Electric / Rent
- Superannuation
- Taxes

**DESIGN COSTS**
- Exploratory Research
- Literature Reviews
- Consultation
- Preparation & Design
- Communications

**"EXPERT COSTS"**
- Project Management
- Sample Frame Design
- Sample Selection
- Staff Training
- Computing & Analytical Skills
- Report Writing

**IN-FIELD COSTS**
- Testing Activity
- Staff Salaries
- Travel Costs
- Travel Expenses
- Supervision Costs

**IN-OFFICE COSTS**
- Clerical & Secretarial
- Office Supervision
- Communications
- Coding / Data Entry
- Editing & Printing
- Software Design
- Computer Processing Time
. **Definition of Terms**
Terms should be clearly defined.

. **The Research Design/Methodology**
The research design(s) and method(s) and sources of information the successful tenderer is expected to consider should be presented under this heading. Details should be provided on each of the individual steps of the project. Particular sources of information which are relevant to the study should also be listed. Any aspect of the methodology requiring particular attention should be emphasised.

. **Study Time Lines**
Guidelines relating to starting and finishing dates for the study should be clearly detailed. Critical dates within the study period should be flagged to indicate when important stages of the project are to be completed.

. **Funds Available**
An indication of the funds available to complete the project should be included. The amount of funds available should be consistent with the objectives of the project and the proposed methodology.

. **Reporting Requirements**
Indicate to whom (an individual, a committee, a steering or advisory group) the successful tenderer will be expected to report. Indicate how often interim reports are required and suggest the form(s) in which any final report(s) are expected - for example, is a full written report required along with a separate summary report? How many copies of the report(s) are required and who (the commissioner or tenderer) is expected to arrange and pay for their printing? In short, what are the reporting requirements?

. **Details About Tendering**
Indicate when the tenders close, to whom they should be sent and provide the name of a person or persons for potential tenderers to contact.
5.6 PREPARE A PROJECT PROPOSAL

A project proposal should provide a statement of the important features of a proposed research project. It is usually prepared by the person or organisation proposing to undertake the research. Its purpose is either:

. to provide a tender for research to a research commissioner; or
. to gain 'in-house' approval to commence the research project and/or release funding for the project.

Project proposals should include the main features of project briefs described previously. In addition, project proposals submitted for tendering usually include:

. details of the tenderer and/or the tenderer's organisation;
. previous clients and research projects completed; and
. names and addresses of referees.

5.7 ESTABLISH A PROJECT COMMITTEE

An in-house researcher or consultant conducting a workforce study would normally need, at critical points in the study, to seek advice from colleagues or external advisors. For medium to large studies this may be formalised by the establishment of a project committee to advise the researcher or consultant. Two main types of project committee may be identified:

. an advisory committee;
. a steering committee.

An advisory committee's main function is to provide advice to the researcher or consultant, whereas a steering committee's functions are to:

. provide advice;
. manage the project;
. oversight and authorise progress payments to the consultant(s).
A project committee should convene at critical points during the conduct of the project. As a minimum the project committee would normally convene at three points in the project to undertake the following activities:

- to discuss the proposed research design at the commencement of the project;
- to select consultant(s) (if the research is to be commissioned);
- to discuss the draft report and outputs from the project.

The project committee should consist of representatives of major interested parties. For example:

- groups forming the target audiences for the research report(s);
- those involved in implementing recommendations or conclusions from the report.

The project committee for a workforce study for example could consist of some, or all of the following:

- a representative of the research commissioning/funding organisation;
- the researcher/consultant;
- an employer representative;
- an employee representative;
- a research expert;
- an industry expert;
- a representative of education institutions.

Meetings of the committee may be formal or informal. However as a minimum, a chairperson should be appointed and meeting minutes taken.

For smaller workforce studies it may not be necessary to establish a formal group. However, the researcher/consultant may still seek advice from an informal network of experts. In addition, major stakeholders should be consulted and kept informed of progress.
5.8 SELECT A CONSULTANT

In planning a workforce study, the main options available are:

- do the study yourself;
- do part of the study yourself, with other parts undertaken by colleagues or consultants;
- commission a consultant to undertake the study;
- segment the study into parts and commission consultants to do each part.

Some areas of the proposed research project may be relatively skill intensive while other parts may be more labour intensive. It may often prove cost-efficient to commission the labour intensive parts of the study to a consultant. For example, preparing envelopes for a mail survey usually can be performed more efficiently by a specialised mail service consultant.

Consideration should be given to commissioning consultants when either the time or expertise is not available in-house to undertake part or all of the study.

It is essential that the duties required of the consultant be clearly specified in the project brief and/or at the first project committee meeting. Clear specification will reduce misunderstanding and potential conflicts during the latter stages of the project.

The process of selecting consultants to undertake all (or a major part) of a workforce study should involve the following steps:

- prepare project brief;
- establish selection criteria;
- obtain expressions of interest;
- short list the applicants;
- call for detailed submissions;
- examine submissions;
- interview candidates;
- make the final selection.
For small projects the selection process may be shortened by omitting some steps. For example, the second and third steps could be omitted.

The full process is summarised in the flow chart in Figure 5.4. The first step of preparing a project brief was discussed in Section 5.5. The remaining steps are discussed below.

**FIGURE 5.4: MAIN STEPS INVOLVED IN SELECTING A CONSULTANT**

- Prepare project brief
- Establish selection criteria
- Obtain expressions of interest
- Short list the applicants
- Call for detailed submissions
- Examine submissions
- Interview candidates
- Make the final selection
5.8.1 Establish selection criteria

The commissioning/funding agency or the appointed selection committee should establish selection criteria to guide the process of selecting consultants.

While the criteria to be used will depend on the particular requirements of each workforce study, an example of commonly-used criteria are:

- high level of analytical and methodological competence in type(s) of analysis to be undertaken;
- experience in performing type of analysis required;
- logistical resources to carry out the required survey work;
- experience in processing survey results;
- previous research record (which should be checked through referees who are past clients);
- independence of the consultant(s) (this may be important when issues sensitive to the major stakeholders are to be researched);
- quality of the research proposal;
- tender cost.

Tender cost should be assessed in relation to the quality of the research proposal.

5.8.2 Obtain expressions of interest

Rather than seeking tenders from a large number of consultants, it is often useful to obtain expressions of interest as a preliminary step. A smaller number of applicants can then be invited to submit more detailed tenders. This has the following advantages:

- the commissioning agency avoids the need to process a large number of lengthy tenders;
- consultants/researchers avoid preparing detailed tenders, which involve significant time and effort;
the commissioning agency is able to canvas the widest possible range of consultants.

However, obtaining expressions of interest has the following disadvantages:

- suitable consultants may be discarded on the basis of a short (and perhaps poorly presented) expression of interest;
- the selection process is lengthened by this additional step.

It is suggested that the step of obtaining expressions of interest should usually be taken when medium to large projects are to be commissioned.

To obtain expressions of interest, advertisements are normally placed in a nationally-circulated newspaper, magazine or journal depending on the type of research project involved. Specialised publications should also be considered.

In addition to advertising, consultants known to the commissioning agency should be invited to apply.

Expressions of interest should be a maximum of one to two pages in length and should contain, as a minimum, information on:

- the consultant and the consultant's organisation;
- the consultant's qualifications and experience relevant to the project;
- suggested methods of achieving the project objectives.

5.8.3 Short list the applicants

Short listing may be performed by the project commissioner or the full project committee. It may be performed in two stages if expressions of interest have been sought. How and when short listing may be performed is illustrated in the example given on page 74.

5.8.4 Call for detailed submissions

If the previous two steps in the selection process have been undertaken, then the short listed applicants can be contacted and invited to provide detailed submissions. If the previous two steps have been omitted, then a general invitation to provide detailed
submissions should be issued through press advertisements. In both cases, applicants should be provided with a project brief (as described earlier in this chapter) to guide the preparation of submissions.

5.8.5 Examine submissions

This step involves evaluating the submissions received and may include a further short listing of the submissions. It may be performed by the project commissioner or the full project committee.

5.8.6 Interview candidates

If a project committee has been established, this should be used to assist the selection interview process. The interaction between consultants and committee members often helps to illuminate the nature of the project and to clarify the respective roles of the committee and the researcher.

The interview should be used to:

- clarify aspects of each candidate's submission;

- confirm the nature of the project and respective roles of the project committee and the researcher;

- evaluate the suitability of each applicant to undertake the project.

5.8.7 Make the final selection

The final selection process may be varied to suit the circumstances. The selection may be performed by:

- a group selecting through a group process.

- a group of individuals selecting independently;

- a single person (usually the research commissioner).

The first case is recommended for most situations.

The selection may be made on the basis of either:

- the written proposals only; or

- the written proposals and an interview.
EXAMPLE OF SELECTION PROCESS: A WORKFORCE STUDY COMMISSIONED BY AN INDUSTRY TRAINING COMMITTEE

- an Industry Training Committee (ITC) obtains expressions of interest for a project through national advertising;

- thirty six expressions of interest are received;

- a project committee is established;

- a project brief is prepared;

- the Training Development Executive (TDE) of the ITC establishes selection criteria;

- the TDE short lists five consultants;

- the five consultants are invited to submit project proposals, based on the previously prepared project brief;

- five proposals are received;

- the TDE short lists three of the five proposals;

- the three short listed consultants are invited to be interviewed by the project committee;

- the project committee meets to:
  - discuss selection criteria;
  - determine interview format and content;
  - interview the three applicants;
  - contact referees;
  - recommend final selection.

- the selection is ratified by the ITC.
REFERENCES AND FURTHER READING


CONDUCTING THE STUDY
6.1 INTRODUCTION

In previous chapters the importance of DEFINING THE PROBLEM and PLANNING THE STUDY has been emphasised.

CONDUCTING THE STUDY requires specialised research skills. One or more of a wide variety of research methodologies may be used in the conduct of a workforce study. Consultants are often engaged to undertake this part of the study. In such cases it may be appropriate to engage more than one consultant to undertake different parts of the study.

CONDUCTING THE STUDY usually involves the following tasks:

. manage consultants;
. prepare research design;
. review literature;
. define population;
. select sample;
. develop data collection instruments;
. collect data;
. process and analyse data.

The stage of REPORTING THE OUTCOMES is described in CHAPTER 9. Figure 6.1 lists the tasks involved in CONDUCTING THE STUDY and suggests a likely sequence.
FIGURE 6.1: STEPS INVOLVED IN CONDUCTING THE STUDY

1. Manage consultants
2. Review literature
3. Prepare research design
4. Define population
5. Select sample
6. Develop data collection instruments
7. Collect data
8. Process and analyse data
This chapter provides an introduction to conducting a workforce study, describing each of the eight tasks and the time and resources required for each. Details specific to each type of study are described later in Chapters 7 and 8. For further operational details on how to conduct a study, the reader is referred to appendices at the end of this manual or suitable texts and reports.

6.2 MANAGE CONSULTANTS

Organisations which contract out workforce studies sometimes report difficulties in dealing with their consultants. Common reasons given for dissatisfaction with consultants are:

- failed to meet deadlines;
- exceeded budget;
- ignored directives;
- used faulty methodology;
- did not communicate adequately; and
- did not come up with what was expected.

In most cases, these types of problems can be avoided by (a) judicious selection and (b) careful management of the consultant.

Sometimes the difficulties may be caused by the organisation commissioning the research. Common reasons given for dissatisfaction with research commissioners are:

- changes in objectives by commissioners;
- inability of commissioners to facilitate data collection;
- preconceived findings and/or recommendations by commissioners.

Commissioners of research should never leave consultants entirely to their own devices expecting the task to be completed exactly as envisaged. Some useful hints for minimising potential difficulties include:

- prepare a detailed project brief which states the research objectives and required project outputs (for details, see Chapter 5);
form a project committee: this should not be too large and one member should be nominated to undertake most of the liaison with the consultant (for details, see Chapter 5);

require a consultant to prepare a detailed project proposal with flow charts setting out the key tasks, deadlines, budget and reporting requirements (for details, see Chapter 5);

unless the project is relatively small and inexpensive, arrange for payment in stages: e.g. (1) upon completion of research design/methodology, (2) on production of survey data or draft report, (3) on completion of final report;

avoid unnecessary changes to the project brief after the project has started. If changes are necessary, they should be discussed with the consultant and formally agreed to;

maintain adequate records of meetings, payments and project progress and ensure that the consultant keeps adequate records of expenditure and time spent;

be prepared to accept advice from your consultant: e.g. reasonable changes to timings, budget, methodology, reporting formats;

if a consultant consistently fails to perform, terminate the contract swiftly.

When problems arise in a project, they are often the result of the research commissioner not adequately briefing or supervising the consultant. If the suggestions given in the above list are followed by research commissioners, problems are much less likely to occur.

6.3 PREPARE RESEARCH DESIGN

6.3.1 Introduction

One of the earliest stages of conducting a study usually involves the development of a detailed research design. The design itself should be based on:

- the original project brief;
- the tender documents used to obtain the contract (or, for an in-house researcher, the research proposal);
detailed discussions between the research commissioner and the selected consultants;

consultation with the project committee.

The research design is pivotal to the project for it should establish, in detail, the way in which the project will proceed.

For the consultant and project committee alike, the research design is a valuable working document. As such, the research design may be used as:

- a key point to suggest the release of the first payment of project funds;
- an important item on the agenda for an early meeting of the project committee;
- an opportunity to approve (or modify) the research design produced by the consultants.

For consultants the research design represents their 'game plan' for the project.

Both commissioners and consultants should use the research design as a vehicle of reaching an initial agreement about how the study should proceed. In particular, the design may consider:

- what information sources will be used;
- how the study population will be defined;
- what methods for collecting information will be employed;
- what data collection instruments will be developed;
- how the data collection instruments will be administered;
- how the information collected will be processed and analysed;
- the project timelines;
- resource costs.
6.3.2 Selection of methodology

A number of factors will help to determine whether a chosen technique(s) is viable. Each factor can be represented as a question which needs to be considered by the consultants/in-house researchers as they are developing the detail of the research design and by the commissioner and/or project committee when they are reviewing the submitted design. A check-list for use in assessing the research design is presented below. This check-list has been adapted from Brinkerhoff et al. (1983).

6.3.3 Check-list for a research design

1. Clarity of design focus

1.1 Is there an adequate description of what (industry, labour force, occupation, job, training need) is to be researched?

1.2 Are the reasons for doing the research clearly specified?

1.3 Are all relevant audiences for the research described?

1.4 Is the setting conducive to, or supportive of, the research?

2. Research questions

2.1 Have key stakeholders' needs and expectations been identified?

2.2 Are questions sufficiently comprehensive? If addressed, would they meet the research purpose(s)?

3. Information collection

3.1 Are the procedures to be used clearly specified?

3.2 Are the kinds of information to be collected logically related to the information needs?

3.3 Are the information collection procedures appropriate for the kinds of information sought?

3.4 Is the research likely to provide accurate information?

3.5 Is the research likely to provide timely information?
3.6 Will the cost of any procedure be worth it, given the amount and kind of information it will provide (i.e. staff time, costs in gathering etc.)?

3.7 Are there any superfluous procedures?

3.8 Is maximum use being made of existing information?

3.9 Will information collection be disruptive to those from whom it is collected?

4. Analysis and interpretation

4.1 Are information organisation and storage procedures appropriate for the information to be collected?

4.2 Are analysis procedures specified and appropriate?

4.3 Will the analysis yield credible answers to the research questions posed?

4.4 Will the processing and storage system maintain confidentiality and ensure the data are secure from unauthorised use?

4.5 Are there methods to ensure that the information stored is an accurate reflection of the information collected?

5. Management

5.1 Have all the major research tasks been listed in the design?

5.2 Does the design provide for adequate protection of confidentiality?

5.3 Are personnel roles specified and related to management requirements?

5.4 Have sufficient resources been allocated for the various research stages (instrument development, data collection, analysis, reporting, management)? Can the research be completed in the time available?

5.5 Are personnel qualified to carry out assigned responsibilities?
5.6 Are intended data resources likely to be available and accessible?

5.7 Are there adequate procedures planned to evaluate the quality of the research design, progress and results? Are there provisions for modifying the research design if necessary?

5.9 Will the design, if implemented, achieve the purposes of the research project?

6.3.4 Time and resources required

The time and resources required to prepare the research design depends largely on:

- how much detail on research design was provided in the project brief and/or project proposal;
- how complex the project is;
- how much consultation (e.g. with the project committee or individual stakeholders) is required on research design.

With little previous preparation, a workforce study of average complexity would usually require about 5 to 10% of the researcher's total time on the project.

6.4 REVIEW LITERATURE

If a workforce study is to be conducted for a whole industry, it is likely that a reasonable amount of literature relevant to the issues of concern is available. A literature review in this case should be considered an essential part of the study.

If a workforce study is to be conducted for a single enterprise, it is likely that the literature is relevant to only some of the broader issues of concern (that is, those issues common to your enterprise and other enterprises in your industry). However, even in such cases, a literature review is likely to be helpful.
6.4.1 How to go about it

A full scale literature review requires considerable time and effort.

Literature may be searched via:

- library catalogues;
- on-line data-bases (for example, access to the Australian Bibliographic Network (ABN), the Australian Education Index (AEI), and the US National Technical Information Service (NTIS) may be obtained through most major libraries in Australia);
- bibliographies;
- abstracts;
- government departments and agencies;
- other likely sources (e.g. the National TAFE Clearinghouse).

Further information on how to undertake a literature review may be found in research texts (see, for example, Turney & Robb 1971).

6.4.2 Time and resources required

The time and resources required for a literature review will vary greatly depending on the particular study. As a guide, a full scale literature review for an INDUSTRY ANALYSIS would require about 8 to 14 weeks to complete for one person working half-time (about 4 weeks for collection of material and 4 to 10 weeks for reviewing and reporting).

6.5 DEFINE POPULATION

Regardless of whether the research design involves a group method or a large survey of industry establishments, it is important in any data collection activity to accurately define the target population. A comprehensive definition of the workforce problem (discussed in CHAPTER 4) should provide the basis for the definition of the target population. The population definition in turn provides the basis for the development of the population register (See Section 6.5.2)
6.5.1 Population definition

Workforce studies are usually concerned with two main types of population:

- establishments, classified by type of industry;
- employees, classified by type of occupation.

To define a population of establishments, an accurate definition of which types of establishment are eligible for inclusion within an industry population is required. A population of establishments may be based only on ASIC (Australian Standard Industry Classification) codes (ABS 1983). However, some industry studies may require a different definition. Guidelines are given in Chapter 7 in the section dealing with identification of industry boundaries.

To define a population of employees, a definition of which occupations or job types are eligible for inclusion within the population is also required. A population of employees may be based on ASCO (Australian Standard Classification of Occupations), and these codes are listed in the 1986 ASCO Dictionary (DEIR & ABS 1986). For both employee and establishment populations, it is useful to obtain information on the main statistical characteristics of the population of interest (e.g. distribution by state/territory, size of establishment and industry type). This may guide the sampling procedure. Such information may be available from the Australian Bureau of Statistics.

Figure 6.2 provides an example of the two main population types encountered within workforce studies - establishments classified by type of industry and employees classified by type of occupation. This Figure illustrates the notion that a population of employees, defined by occupation, may cross a wide range of industries. Also, a single industry may employ personnel in a wide range of occupations.
FIGURE 6.2: THE TWO MAIN TYPES OF POPULATION FOR WORKFORCE STUDIES

<table>
<thead>
<tr>
<th>INDUSTRY (ASIC codes*)</th>
<th>OCCUPATION (ASCO codes*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A B C D E F G H I J K L M</td>
<td>1 2 3 4 5 6 7 8</td>
</tr>
</tbody>
</table>

- a simple population of establishments (and all employees within these establishments) classified by industry type

- a simple population of employees classified by occupation type

NOTE: The full ASCO codes for occupation are six digit numbers.
The full ASIC codes for industry are four digit numbers.

6.5.2 Population register

A population register is a list of names and addresses of all known members of a population. The list may include additional information on each member of the population, and may be in hard copy format or on computer disk or tape.

For workforce studies two types of population register may be used:

. an industry register (for establishment populations);

. a workforce register (for employee populations).
The preparation of an *industry register* may be undertaken in preparation for an industry survey. An industry register is a register of all known establishments within the definition of the industry under consideration. Information on how to prepare an industry register is given in Chapter 7 and Appendix C.

### 6.5.3 Time and resources required

Preparing a definition of the target population requires consultation with those possessing extensive knowledge of the industry or occupations under consideration.

Considerable resources are required to prepare a population register corresponding to the definition which has been adopted. Resources required depend on:

- the size of the population; and
- the quality and relevance of existing lists.

### 6.6 SELECT SAMPLE

Two main approaches are available for data collection:

- CENSUS SURVEY, where data is collected from *all* members of the target population; and
- SAMPLE SURVEY, where data is collected from *selected* members of the target population.

In most cases it is neither practical nor economical to collect data from the whole target population, so a sample is usually obtained. In such cases, it is important to obtain a sample that accurately represents the target population.

### 6.6.1 Sampling procedures

A range of procedures are available to ensure that the sample accurately represents the target population. These procedures are described in numerous texts (see for example: Kerlinger 1986; Moser & Kalton 1985; Rossi et al. 1983; Warwick & Lininger 1975). Methods described in these texts include:

- simple random sampling;
- proportionate stratified sampling;
Sampling procedures for industry surveys are described in Chapter 7.

6.6.2 Sampling error and sample size

If it is intended to use data obtained from a sample to estimate characteristics of the target population, then the likely error range associated with the estimates should be calculated from formulae (given in most statistics texts).

In general, the larger the sample, the more accurate is the estimate of population characteristics. However, larger samples cost more! The graph in Figure 6.3 illustrates the relationship between sampling error and sample size when the sample is a simple random sample. This graph indicates that the reduction in sampling error becomes smaller as sample size is increased. The gains in accuracy from increases in sample size above a few hundred units are only marginal. In workforce studies, other sources of error such as poor questionnaire design are likely to be greater provided a minimum sample size of a few hundred units has been obtained.

FIGURE 6.3: GRAPH SHOWING THE RELATIONSHIP BETWEEN SAMPLING ERROR AND SAMPLE SIZE
6.7 DEVELOP DATA COLLECTION INSTRUMENTS

Whatever the research methodology used, some type of instrument (such as a questionnaire or interview schedule) needs to be developed to collect the data. Time and skill are needed to develop a high quality instrument. Errors in the data associated with the design of the instrument are often larger than errors associated with sampling.

Data collection instruments used for workforce studies include:

- 'self-completion' questionnaires;
- interview schedules;
- observation charts;
- group process session plans or agendas.

Considerable skill and resources are required for the development of self-completion questionnaires and interview schedules. A number of drafts are usually required to establish:

- structure;
- scope;
- wording of instructions;
- wording of questions;
- number coding;
- layout and presentation.

Questionnaire development and design should proceed at the same time as sample selection and sample design. The questionnaire is the survey instrument and as such, is the communication medium through which information about the industry is received. The usefulness of the collected information is therefore directly related to the design and validity of the questionnaire. It is therefore necessary that industry expertise be used to help develop the questionnaire.

When a final draft version is obtained, the instrument should be PRE-TESTED with a small sample of respondents.
Most texts on survey research provide practical advice on how to develop questionnaires or interview schedules (see for example: Moser & Kalton 1985; Bradburn et al. 1979; Sudman & Bradburn 1982). Further advice on the development of data collection instruments for workforce study applications is given in CHAPTER 7 and CHAPTER 8.

6.8 COLLECT DATA

6.8.1 Overview

The method of collecting data distinguishes the various research techniques. Some of the more common techniques for workforce studies include:

- mail survey;
- personal interview;
- telephone interview;
- group process;
- observation.

The basic aim of this phase is to obtain as much accurate, relevant and high quality information as the project resources allow. At the same time it is important to preserve the confidentiality of those providing the information if this is their wish. It is desirable that the respondents be informed of the purpose of the research.

Further discussion relating to data collection is provided in CHAPTER 7 and CHAPTER 8.

6.8.2 Time and resources required

The resources required for data collection may vary considerably, depending on the method used to collect data.

A group process method may take only one day, whereas a large mail survey may take up to about two months to distribute and collect the survey forms.
6.9 PROCESS AND ANALYSE THE DATA

6.9.1 Overview

The information collected via the previous step will require analysis to enable conclusions to be drawn. In some group process and observation techniques, the data is collected and interpreted as part of the same process, so no further analysis is required. However, in most techniques a separate data analysis step is required.

For surveys, analysing the data usually requires the following sub-steps:

1. coding - converting words into numeric or alpha-numeric data;
2. data entry - converting data into magnetic form, by entering into computer;
3. data checking - checking the accuracy of the data entered;
4. statistical analysis - analysis of data and the drawing of statistical inferences.

Depending on the nature of the information collected, two main types of analysis may be undertaken once the data processing stage has been completed:

1. qualitative analysis (for data consisting of words rather than numbers);
2. quantitative analysis (for data consisting of numbers or a combination of numbers and words).

For examples of texts dealing with qualitative analysis, see Miles & Huberman 1984; for quantitative analysis, see for example Siegel & Castellan 1988, and Hoel 1986.

These tasks may be contracted out to one or more data entry/data analysis consultants.

Operational details on data analysis for industry surveys are given CHAPTER 7.
6.9.2 Time and resources required

The time and resources required for coding, data entry and data checking depends on:

- the number of questions requiring coding;
- the number of questions in the survey;
- the number of respondents.

The time and resources required for statistical analysis depends on:

- the number of data tables/charts to be prepared;
- the number of statistical tests to be performed;
- the number of variables and the sample size.

6.10 SUMMARY

In summary, it is essential before embarking on a workforce survey to:

- state the research objectives;
- define the population;
- determine the survey objectives;
- define the sample units;
- set the sample size;
- design the survey;
- decide the data collection method;
- design the questionnaire;
- undertake a pilot test of the survey;
- determine the processing requirements;
- plan the method of dealing with non-response;
- estimate the survey costs.
A useful check-list of points to be considered in each of the above areas is given in Appendix B.

REFERENCES AND FURTHER READING


CONDUCTING INDUSTRY ANALYSIS AND LABOUR MARKET ANALYSIS
7.1 INTRODUCTION

This chapter, dealing with industry analysis and labour market analysis, comprises the following sections:

- difficulties with existing approaches to industry and labour market analysis;
- development of an Industry Studies Framework;
- industry analysis
  - identification of industry boundaries;
  - preparation of an industry register;
  - value of an industry register;
  - estimation of industry activity levels in the short and medium term;
  - projection of aggregate industry employment levels over the short to medium term;
- labour market analysis
  - translation of forecast aggregate industry employment levels into occupational employment forecasts;
  - assessment of occupational outlook;
- conduct of an industry studies framework survey;
- summary.

The approach described here was refined through a study of the plastics industry, so many points will be illustrated by examples from the plastics industry study.

7.2 DIFFICULTIES WITH EXISTING APPROACHES TO INDUSTRY AND LABOUR MARKET ANALYSIS

An important weakness associated with a number of labour force planning techniques has been that forecasts of industry employment have been derived independently of the factors affecting the industry's activity levels. As a result, such employment forecasts often assume industry economic conditions are those that exist at the time the forecasts were made. The accuracy of such forecasts therefore may quickly deteriorate as the economic conditions and outlook which affect industry change.
Additional contributing reasons for broad failures have been because:

- many of the techniques adopted were not capable of adequately and clearly representing the complex processes involved in labour force planning;
- techniques lacked an adequate theoretical construct; and
- data requirements could not be satisfied.

Ahamad & Blaug (1973) for example, argue that the central thrust of labour force planning should be to ensure that labour supplies are available at the same time requirements for labour materialise. The authors outline the standard approach to labour force planning where the requirements for labour are obtained by the fixed co-efficients (input-output) method. Forecasts of labour availability are derived via a demographic model. This methodology is used by Fullerton & Prescott (1975) and by Wabe (1974). However, as Jensen et al. (1979) have indicated, there is a large expenditure in resources, time and effort required to assemble the necessary data using these techniques.

Problems of data availability are of even greater concern in regional or industry studies. Data are often not available from government agencies - leaving analysts to collect their own or establish means of estimation.

### 7.3 DEVELOPMENT OF AN INDUSTRY STUDIES FRAMEWORK

The major rationale underlying the Industry Studies Framework is that estimates of short (12 months) and medium term (2-3 years) aggregate industry employment and occupational structures need to be more adequately linked to likely industry activity levels over these periods. Perceived activity levels in turn, need to be related to the major factors (or determinants) affecting industry performance (Fuller 1984).

In contrast to existing approaches to industry and labour market analysis, the central strength of the Industry Studies Framework is that it links employment/occupational estimates to industry activity levels using viable and pragmatic estimation procedures. Estimates can be modified as future activity levels change. Another major advantage of the Framework is that it provides those interested in workforce issues within a particular industry, with an increased understanding of the factors which affect industry performance and the various linkages between skills development and improved industry performance. As a result, the Industry Studies Framework provides a firm basis for influencing skill formation decisions, both within industry and with regard to external education and training providers.
The Industry Studies Framework (Fuller & Oxley 1986) has been developed to provide a methodology for performing industry analysis and labour market analysis. Both steps are important in assessing education and training needs within industry. As discussed previously these steps can be performed sequentially or alternatively, it may be decided to proceed independently with either industry analysis or labour market analysis.

More specifically, the Framework aims to provide industry and other users with a means of improving their understanding of the:

- boundaries and main sectors of their industry of concern;
- main factors affecting the performance of the selected industry;
- effect of these factors on likely future employment levels and occupation structures in the industry;
- education and training requirements of the industry given the identified occupational demand and skill requirements.

Much of the data for the Industry Studies Framework is collected through an industry survey. Details of procedures for Industry Studies Framework surveys are given in Appendix C.

The major advantages of the Industry Studies Framework are that:

- it provides a labour force data base which can be used to guide policy responses in education and training;
- it provides a pragmatic and workable mechanism for conducting industry studies, and in particular:
  - it seeks to involve both sides of industry actively in the process, which is seen as essential to increasing the effectiveness of planning;
  - it places industry analysis in a comprehensive framework which focuses on trends in supply and demand and their underlying determinants;
  - it does not depend on precise numerical forecasting, but rather on a broader, more flexible approach emphasising outcome ranges and the role of appropriate skills formation in improving industry performance.
The results obtained from application of the Industry Studies Framework can be used as a basis for initiating action in a number of areas which are vital to improving industry efficiency and growth prospects. In particular the results can be used:

- as a basis for identifying occupations/skills central to industry development in the medium and longer term;

- for identification of any significant short term imbalances in the supply of skills;

- as a source of data which aims to ensure that the structure of the education and training system is consistent with both Australia’s longer term economic development and future skill requirements and the efficient use of education resources;

- as a means of improving the content, relevance and quality of vocational education and training provided by industry and external sources;

- as a demonstration of the importance of skills formation to industry performance (Fuller & Oxley 1987a & 1987b).

The Industry Studies Framework consists of two distinct but closely interrelated procedures, that of:

- Industry analysis; and

- Labour market analysis.

Industry analysis is defined here as the identification of industry boundaries and assessment of likely current and future activity levels and the key factors affecting industry activity and assessment of aggregate employment levels.

Labour market analysis which often follows industry analysis focuses on the estimation of the current and future demand requirements for each occupation and the factors affecting this demand. This is then compared to the current and predicted numbers of qualified people available to fill positions and the factors affecting this supply. Labour market analysis provides an overview of current and medium term labour market conditions for occupations within the industry and also provides a means of assessing what factors can be addressed to overcome a current or forecast occupational imbalance. Labour market analysis may also serve as the basis for selection of particular occupations for further detailed assessment, using for example, occupational analysis and/or training needs analysis.
7.4 INDUSTRY ANALYSIS

The process of industry analysis involves a series of interrelated steps which appear in boxes 1-3 of Figure 7.1. These steps include:

- Identification of industry boundaries;
- Identification of key demand indicators and projections of movements in these indicators;
- Estimation of industry activity levels in the short and medium term;
- Projection of aggregate industry employment ranges in the short and medium term.

7.4.1 Identification of industry boundaries

(Box 1: Fig 7.1)

The identification of which industrial or commercial activities fall within the scope of the industry under examination (industry definition) is an essential prerequisite to further analysis. This is because:

- it provides an accurate picture of the industry to be studied;
- it clearly describes the different sectors of the industry;
- it provides a basis for gathering aggregate estimates of important economic indicators such as employment, income, growth and export performance.

It is necessary that the definition of an industry be consistent with the industry definitions adopted by other important organisations (e.g. the Australian Bureau of Statistics (ABS)), to facilitate the compatibility of statistics and information. It is also important that the industry definition conform to and integrate with the definitions of associated industries to prevent duplication and double counting of economic and statistical information.

In addition to the need to take account of definitions that have been structured to promote the comparability and integration of economic information, there are likely to be various alternative opinions relating to the position of industry boundaries - held by, for example, employers, unions, employees or other interested organisations. However, it should be stressed that these opinions should be carefully weighed against the need to maintain a legitimate set of industry definitions.
FIGURE 7.1: OVERVIEW OF THE INDUSTRY AND LABOUR MARKET ANALYSIS FRAMEWORK

1. IDENTIFICATION OF INDUSTRY BOUNDARIES

2A. IDENTIFICATION OF KEY DEMAND INDICATORS AND PROJECTIONS OF MOVEMENTS IN THESE INDICATORS OVER THE SHORT AND MEDIUM TERMS

2B. DETERMINATION OF INDUSTRY ACTIVITY LEVELS IN THE:
   - SHORT TERM (12 MONTHS)
   - MEDIUM TERM (3 YEARS)

   This is achieved by analysis of current levels of demand and anticipated shifts in demand over the short to medium term.

3. USING THE ABOVE INFORMATION PROJECTION OF AGGREGATE INDUSTRY EMPLOYMENT LEVELS OVER THE SHORT TO MEDIUM TERM

4A. DETERMINATION OF TECHNOLOGICAL CHANGES AND THE IMPACT OF SUCH CHANGES ON OCCUPATIONAL DEMAND AND SKILL REQUIREMENTS

4B. DETERMINATION OF THE SHORT TO MEDIUM TERM EMPLOYMENT OUTLOOK FOR EACH OCCUPATION

5. SELECTION OF PARTICULAR OCCUPATIONS/OCCUPATIONAL GROUPS FOR DETAILLED ASSESSMENT.

   Basis of selection for example may be occupations which are important in terms of training requirements and resources, the degree of labour market imbalance and the importance of overseas migration.

   FOR EACH OF THE SELECTED OCCUPATIONS/OCCUPATIONAL GROUPS EXAMINATION OF DATA UNDER EACH OF THE FOLLOWING HEADINGS.

6. OCCUPATIONAL ANALYSES
   - Determination of the range of jobs within each occupation.
   - Description of duties and tasks for each job.

   (See Chapter 8)

7. STRUCTURAL DATA
   - Total employed labour force size
   - Employed labour: disaggregated by - age - sex - full/part time

8. SUPPLY
   - Training
   - Institutions
   - Training courses
   - Annual graduation levels
   - Adequacy of training

9. DEMAND
   - Determination of demand trend by reference to boxes 2-4
   - Replacement demand

10. LABOUR MARKET SITUATION AND OUTLOOK
    - Matching of supply and demand
    - Identification of skills which are likely on the basis of boxes 3, 4, 8 and 9 to be in short supply

   FOR THOSE OCCUPATIONS/OCCUPATIONAL GROUPS FOR WHICH A SKILL IMBALANCE EXISTS OR WHICH, ON THE BASIS OF THE PRECEDING ANALYSIS IS LIKELY TO DEVELOP IN THE NEXT 5 YEARS

11. SPECIFICATION AND NEGOTIATION OF TRAINING RESPONSES
    - Knowledge and skills for which training should be provided
    - Ways in which training should be structured.

    (See Chapter 10)

12. SPECIFICATION OF NON-TRAINING RESPONSES
    - Public sector macro and micro policies
    - Industry responses

    (See Chapter 10)
The standard and accepted definition of industry boundaries is that adopted by the Australian Bureau of Statistics (ABS) and is called the Australian Standard Industrial Classification (ASIC). This arrangement classifies an establishment (for definition see the APPENDIX A: GLOSSARY) to a particular ASIC class on the basis of the predominant activity, measured in terms of the gross turnover of the establishment. (ABS 1983, p.1-2). Thus for example, if an establishment involved in the manufacture of motor vehicles also manufactures plastic products, the establishment will be classed as part of the industry class Motor Vehicles and Parts rather than Plastics and Related Products, since the predominant manufacturing activity in terms of value and turnover is, in fact, motor vehicles and parts.

Given that many establishments are involved in producing more than one product on site, it may be thought unreasonable to compress all production to the industry classification of the dominant product. However, the problem of failing to establish such a definitional classification would jeopardize any attempt to construct economy-wide statistics and information by leading to wide-ranging duplication and double counting.

Nevertheless, at the specific establishment it may be thought prudent to include the minor activities of one or more establishments within an alternative industry classification - particularly if such activities are fairly substantial. In this case sufficient information should be collected from an establishment relating to production details, thus enabling the establishment to be classified to the relevant ASIC class, as well as some variant should it subsequently be decided to construct an alternative classification.

Depending upon the level considered, some industries are likely to be more complex and embrace a wider range of activities than others. In such cases it is often helpful to establish definitions on a sectoral or lower level basis. For example, the rural industry according to ASIC consists of the following sectors:

- poultry, fruit, vegetables, cereal grains, sheep, cattle, pigs, peanuts, tobacco, cotton, sugar cane and nurseries.

Depending upon a number of factors previously discussed, it may be thought prudent to target particular industry sectors rather than the industry as a whole. Such sectors should be chosen according to certain criteria, for example the:

- objectives of the study;
- resources available for the analysis;
...significance of the sector in terms of employment, gross value of turnover, export performance, investment; and

...importance of the sector in terms of the need for training programs.

In the case of the plastics industry, a core of establishments with plastics processing as their primary activity was relatively easy to secure. However, the plastics industry was found to be highly diverse, suggesting a broader approach to industry definition which would include those establishments having only a minor, but still substantive part of their productive capacity associated with plastics processing.

The determination of industry boundaries or, industry definition, requires informed decision-making by the investigator. The decisions impact directly on the first stage of industry analysis/labour market analysis methods, and in particular, the construction of an industry register of establishments. Further information on identification of industry boundaries is given in Appendix C.

### 7.4.2 Preparation of an industry register

Following the identification of industry sectors for inclusion within the study it is then possible to construct an industry (or sectoral) register based on the accepted definition.

Before field research can begin, it will be necessary to produce a comprehensive list of the target population encompassed by the industry definition. Such a list should consist of the name, address (including postcode for computer sorting purposes) and employment size of the establishment involved in the industry, as well as the particular sector of the industry in which the establishment is principally involved. A contact name with telephone number is also desirable. This list is known as the industry or population register. An example of part of the register established for a survey conducted in a recent major employment and training study of the plastics industry is provided in Appendix C. It is from such a register that a sample of establishments to be surveyed may be selected. Alternatively the list can provide the basis for an industry census. Details about how to construct an industry register are presented in Appendix C.

An industry register can be used for a wide range of valuable purposes. For an ITC for example, the register provides valuable base data on the main characteristics of the industry, including:

- client group;
- employment size according to establishment;
activity types according to establishment;

geographical distribution of industry.

While the register is certainly a most valuable source of information in its own right, it is also essential for more extensive data collection exercises that may be directed at the industry - either via a completely enumerated census of all establishments, or by a scientifically designed stratified sample survey.

7.4.3 Estimation of industry activity levels in the short and medium term (Box 2A and 2B: Fig 7.1)

The estimation of the levels of industry activity in the short and medium term involves assessing the main determinants of industry demand, the relative importance of these demand determinants and the likely changes in the level of these determinants in the short and medium term.

This requires the identification of the factors having the most impact on the demand for the industry's outputs. For example, consideration needs to be given to changing levels and rates of expenditure which impact upon the industry under several categories. These include consumption, investment, government and export expenditure, expenditure on imports and expenditure by other industry sectors on the outputs of the industry under examination.

Consideration also needs to be given to the effect of technological and structural changes on the industry under study. Changes in, and prices of complementary and substitute products, changes in cost structures, and the influence of cyclical, seasonal and irregular factors on demand e.g. the economic cycle, climatic factors and changing import prices of strategic products, also need to be taken into account.

The main practical difficulty here lies in attempting to collect data which will serve either as direct measurement(s), or as reasonable proxies for the determinants. Thus, while investment expenditure can be measured reasonably easily as an expenditure component directly incurred by firms, the impact of domestic consumption expenditure upon industry activity levels is extremely difficult, if not impossible, to measure directly. In this case it is clear that proxies are required. Appendix C deals with how questions may be framed to capture proxy data.
7.4.4 Projection of aggregate industry employment levels over the short to medium term (Box 3: Fig 7.1)

Once forecasts of short and medium term activity levels have been derived, the final stage of industry analysis involves translating these activity levels into projections of aggregate industry employment. These projections should seek to provide a range of outcomes rather than a precise figure. Such information is useful in assessing the overall magnitude of the education and training effort required to meet the industry's skill requirements.

In moving from forecast industry activity levels to projections of aggregate employment outcomes, historical data on linkages between activity levels and employment levels is particularly useful. However, it must be kept in mind that factors such as the introduction of labour saving technology, may mean that historical relationships between activity levels and aggregate employment may change. Thus, whereas historically a 5 percent increase in industry activity may have led to a corresponding increase in industry employment, new technology may result in a similar increase in output but leading to only a 1 percent increase in employment.

It is important therefore, that the industry survey obtain information on expectations about the impact of technology on employment levels. It is also useful in the industry survey to ask employers directly about their expectations regarding movements in the workforce over the short and medium term. Such questions should seek information with regard to the direction, and general magnitude of change, rather than precise numerical forecasts.

Having arrived at projections of aggregate industry employment the industry analysis phase of the Industry Studies Framework is complete. The next stage focusses on an assessment of the demand and supply conditions for occupations within the industry. This stage is termed labour market analysis.

7.5 LABOUR MARKET ANALYSIS

Labour market analysis is concerned with examining the various factors affecting the demand and supply for a particular occupation and assessing the outcome of the interaction of these factors in terms of whether they are likely to lead to a balanced labour market, or one in which there is an excess demand or supply for the occupation. Labour market analysis may therefore form the basis for action aimed at removing, or avoiding, a disequilibria within occupational labour markets.
The labour market analysis stage of the Industry Studies Framework is aimed at providing the information necessary to avoid occupational/skill shortages in the short and medium term and provide a basis for an efficient allocation of education and training resources. Achievement of the former goal can significantly enhance industry's economic growth and employment levels. It should be noted that occupational/skill shortages may involve a number of situations, namely:

- where demand (requirements) for an occupation exceeds available supply (availability);

- where demand for a particular skill exceeds availability of the skill;

  - this may occur even when occupational demand and supply are in balance and indicates that the content (quality) of education/training for the occupation is not meeting current skill requirements;

- where, despite no evidence of a shortage in either of the two instances outlined above, there is insufficient employment of an occupation/skill to maximise an industry growth potential;

  - this suggests an undervaluation by employers of the productive potential of a particular occupation or skill.

Boxes 4 to 5 of Figure 7.1 relate to the labour market analysis stage of the Industry Studies Framework.

**7.5.1 Translation of forecast aggregate industry employment levels into occupational employment forecasts**

(Box 4A and 4B: Fig 7.1)

The basis for projections of changes in industry demand for different occupational/skill categories is a survey of industry employers. If the labour market analysis is to be conducted in conjunction with an industry analysis the same industry survey can be used to assess the effect of changing industry circumstances on both aggregate industry employment and the occupational/skill distribution of employment. The plastics industry questionnaire in Appendix D provides an example of how questions may be framed to capture employer expectations of changes in the demand for particular occupations and skills, as well as the factors underlying these expected changes.

Once data sources have been assessed, the researcher is in a position to identify those occupations likely to experience an increase or decrease in industry demand over the short to medium term. In addition, it is possible
to project the likely magnitude of such changes in fairly general terms e.g. according to percentage changes. The researcher will also be able to assess those occupations likely to be subject to the largest changes in terms of duties performed and skills required.

The analysis requires that particular attention be given to the impact of technological change on occupational/skill demand patterns. Technology has a major impact on skills requirements by creating demand for new occupations, changing the demand for existing occupations and altering the skills requirements of others.

However in looking at future occupational/skill requirements within industry, it is important to recognise that technology is only one of a number of determining factors. Other important factors that need to be taken into account are the impact of changes in:

- product mixes;
- relative wage levels;
- job design and work organisation; and
- occupational wastage rates.

### 7.5.2 Assessment of occupational outlook (Boxes 5-10: Fig 7.1)

The previous stage of the analysis provides information on industry demand for targeted occupational categories, in the short and medium term. To assess the labour market outlook for these occupations it is also necessary to:

- examine the sources of supply (for example, the main training providers) of the relevant occupations and estimate likely outputs from these sources over the short to medium term;
- undertake an assessment of the likely balance between occupational demand and supply for occupations within the industry, in both the short and medium term.

Appendix C provides a check-list of the various elements that should be considered when undertaking a more detailed demand and supply assessment for a particular occupation.
7.6 CONDUCTING AN INDUSTRY STUDIES FRAMEWORK SURVEY

To collect the information required for both the industry analysis and labour market analysis stages, an industry survey is required. General principles on conducting survey research are outlined in Chapter 6, and more specific operational details on conducting an industry/labour market survey are given in Appendix C. The procedure is illustrated with examples from the plastics industry survey, given in Appendices D and E.

Details of each of the following steps involved in an Industry Studies Framework survey are given in Appendix C:

. development of hypothesis for investigation;

. industry definition;

. industry register;

. target questionnaires to the industry;

. joint report procedures with ABS;

. selection of consultant;

. establishment of consultative mechanisms;

. field testing of questionnaires;

. sample selection;

. development of mechanisms for control/monitoring of consultant tasks;

. training of interview team;

. conduct of surveys;

. analysis;

. reporting.

While the first Industry Studies Framework survey in a particular industry will usually require considerable time and resources to plan and conduct, subsequent updating of information will be much more economical. For example, every two to three years a shorter survey confined only to those variables that are particularly time-sensitive could be planned.
7.7 SUMMARY

This chapter has outlined the conceptual framework for the industry analysis and labour market analysis stages of workforce studies. Appendix C deals with implementation of industry analysis and labour market analysis from an operational context.

In summary an industry analysis provides:

. a definition of the industry of concern;
. a register of all establishments within this industry definition;
. an understanding of the main factors linked to industry performance and activity levels;
. projections of likely changes in these determinants;
. forecasts of industry activity levels in the short and medium term; and
. projections of the likely range of aggregate industry employment in the short and medium term.

The major benefits from undertaking a Labour Market Analysis are that it provides:

. an overview of occupations employed within the industry;
. a means of identifying likely industry demand and supply conditions for different occupations in the short and medium term;
. a means of identifying in a broad sense changing skill requirements within occupations;
. an assessment of those occupations/skills likely to be in shortage (quantity/quality) unless remedial action is undertaken;
. a basis for selecting key occupations for more detailed analysis.

Performed sequentially, industry analysis and labour market analysis provide a systematic and efficient means by which organisations and individuals can gain an effective understanding of the role skills formation plays in enhancing industry performance. The methods serve to provide a data frame for industry to more effectively plan training activities. The information assembled via the methods described, will also prove extremely valuable to external education and training providers. Finally, valuable information will be revealed relating to important factors not necessarily requiring a
training solution in the first instance, (e.g. relating to the mix of resources used by industry or the relative cost of resources and strategies that could be adopted to improve industry or firm performance) (Fuller & Oxley 1987b).

The steps involved in industry analysis and labour market analysis are discussed in more detail in Appendix C.

REFERENCES AND FURTHER READING


CONDUCTING OCCUPATIONAL ANALYSIS AND TRAINING NEEDS ANALYSIS
8.1 INTRODUCTION

This chapter, dealing with occupational analysis and training needs analysis, is divided into the following headings:

- introduction;
- occupational analysis and training needs analysis - when are they required?
- occupational analysis;
- training needs analysis;
- range of techniques;
- selection of technique;
- questionnaire-based methods;
- interview methods;
- group process methods;
- observation methods;
- descriptive methods.

8.2 OCCUPATIONAL ANALYSIS AND TRAINING NEEDS ANALYSIS - WHEN ARE THEY REQUIRED?

If following the procedures described in this manual, the researcher who is about to undertake an occupational analysis or a training needs analysis would already have DEFINED THE PROBLEM (CHAPTER 4) and PLANNED THE STUDY (CHAPTER 5). If a comprehensive approach is being followed, then INDUSTRY ANALYSIS and LABOUR MARKET ANALYSIS would have been undertaken. If a fast stream approach is being followed, then the researcher would come directly to OCCUPATIONAL ANALYSIS or TRAINING NEEDS ANALYSIS after defining the problem and planning the analysis. The flow chart in Figure 8.1 shows the paths to occupational analysis and training needs analysis for both approaches.

Occupational analysis may be undertaken as part of a comprehensive approach to workforce study, or as part of a fast stream approach. The
FIGURE 8.1 FLOW CHART OF 'ENTRY AND EXITS' INTO OCCUPATIONAL ANALYSIS AND TRAINING NEEDS ANALYSIS

FAST STREAM APPROACH

INDUSTRY ANALYSIS

LABOUR MARKET ANALYSIS

OCCUPATIONAL ANALYSIS

TRAINING NEEDS ANALYSIS

SPECIFY NON-TRAINING RESPONSES

SPECIFY TRAINING RESPONSES

IS AN ACCURATE OCCUPATION OR JOB DESCRIPTION AVAILABLE?

yes

no

DO THE REQUIRED KNOWLEDGE, SKILLS AND ATTITUDES NEED TO BE IDENTIFIED?

yes

no

ARE THERE ANY DEFICIENCIES BETWEEN THE REQUIRED KNOWLEDGE, SKILLS AND ATTITUDES AND THOSE AVAILABLE?

yes

no

120
Flow chart in Figure 8.1 indicates that occupational analysis would be undertaken if an accurate occupation or job description is not already available. A single job may be of concern here or an occupation comprising a group of associated jobs (see definitions in Chapter 3). The outcome of the occupation (or job) analysis is a description of the job(s) of concern, in terms of duties and tasks to be performed.

Training needs analysis also may be undertaken as part of a comprehensive approach or as part of a fast stream approach. The flow chart in Figure 8.1 indicates that training needs analysis would be undertaken if deficiencies in knowledge, skills and attitudes need to be identified. To address this issue, the following information would be required:

- an accurate job description;
- a definition of the required performance standard in terms of knowledge, skills and attitudes for the job;
- the current job performance.

The first item of information listed could be obtained from a job (or occupational) analysis, while the other information would be collected during the training needs analysis. The main outcomes of the training needs analysis are a description of the deficiencies in knowledge, skills and attitudes, and/or a description of desirable changes to performance standards and job design.

Depending on the outcomes of the training needs analysis, subsequent action would involve one of the following:

- specification of appropriate training responses;
- specification of appropriate non-training responses (e.g. changes to performance standards or job design);
- specification of both training and non-training responses.

Though not included in the flow chart in Figure 8.1, REPORTING OF OUTCOMES could be undertaken at various stages. A report could be prepared at the completion of each of the four types of analysis, or after specifying training and/or non-training responses, depending on the scope of the workforce study.

In this section the focus has been on when to conduct occupational analysis and training needs analysis. The following sections of this chapter focus on the how, with overviews of some specific techniques.
8.3 OCCUPATIONAL ANALYSIS

8.3.1 Definition of occupational analysis

Occupational groups or individual occupations may be broken down into their related jobs. The jobs, in turn, may be examined in terms of their individual duties and tasks.

Thus occupational analysis is a process which is concerned with breaking an occupation or job down into its major component elements and looking at each of the elements critically to determine their make-up and the relationship between the elements (Carlisle 1986). Depending on what the analysis is aiming to do, the outcomes of this process may be concerned with describing what is or what could be. However the US Department of Labour (1972) suggests that jobs or occupations should only be analysed as they exist. Hayton and Guthrie (1987) believe that this view is appropriate in relatively stable occupations. However, in occupations which are undergoing significant change it is unwise to concentrate solely on the current situation. An industry analysis may identify the broad nature of such occupational changes brought about by factors such as the adoption of new technology. Occupational analysis and training needs analysis may then infer the likely future impacts on occupational structure and knowledge, skills and attitudes required.

In Appendix F, Guthrie (1987) has provided a critical review of the literature on occupational analysis and the various definitions used. The definition of occupational analysis to be used in this manual is similar to that provided by Guthrie, but has been adapted to include the possibility of analysis of the likely future jobs, duties and tasks. The adapted definition is:

Occupational analysis is the identification of the current and likely future jobs within an occupation, and the duties and tasks which comprise each job, together with other relevant job information. (Guthrie 1987, p.12)

This definition includes the identification of jobs within the occupation. Information on the jobs within an occupation is particularly important when there is little prior knowledge of the range of jobs within an occupation.
8.3.2 Occupational analysis procedure

The occupational analysis procedure will be influenced by a number of factors, including whether:

. industry analysis and labour market analysis has been undertaken;

. occupational (or job) analysis is to be undertaken as a precursor to training needs analysis;

. the scope is a single job (and thus a 'job analysis') or an occupation comprising a group of jobs;

. substantial preliminary work has been undertaken to DEFINE THE PROBLEM (CHAPTER 4).

If a full occupational analysis is required and little previous work has been done, the following five steps will be involved:

. define the boundaries of the occupation and structure of the occupation of concern;

. identify the context of the occupation;

. identify the range of duties and tasks for all jobs within the occupation;

. determine the duties and tasks required for each job and other relevant duty and task data;

. confirm the occupational structure in terms of relationships among jobs within the occupation.

Each of these steps should be concerned with the present situation and the expected future situation, particularly if the occupation is known to be changing (e.g. because of technological or work organisation changes).

The steps should be performed in the sequence shown in the flow chart in Figure 8.2. A description of each step follows.
DEFINE OCCUPATIONAL BOUNDARIES AND STRUCTURE

Chapter 4 describes the first stage of a workforce study: DEFINING THE PROBLEM. In defining the problem using an exploratory research approach, occupational boundaries should be defined. The definition could include the following aspects (Hermann 1987, p.9):

- name(s) of occupation;
- range of jobs within occupation;
- structure of jobs within occupation;
- typical career paths;
- major job functions;
- industries;
- occupational trends.

Techniques for collecting this information include:

- literature review (see Section 6.4);
- questionnaires (see Section 8.7);
- interviews (see Section 8.8);
- Delphi technique (see Section 8.7);
- nominal group technique (see Section 8.9);
- search conference technique (see Section 8.9);
- observation techniques (see Section 8.10).

IDENTIFY OCCUPATIONAL CONTEXT

Occupational context includes the following aspects (Hermann 1987, p.9):

- overlap with related occupations;
- industry trends;
- number of people employed;
FIGURE 8.2: FLOW CHART OF OCCUPATIONAL ANALYSIS

DEFINE OCCUPATIONAL BOUNDARIES AND STRUCTURE

IDENTIFY OCCUPATIONAL CONTEXT

IDENTIFY RANGE OF DUTIES AND TASKS

DETERMINE DUTIES AND TASKS REQUIRED FOR EACH JOB

CONFIRM OCCUPATIONAL STRUCTURE
age distribution;
labour turnover;
pattern of entry and exit points for the industry;
education and training;
legal requirements.

This information would be obtained through an INDUSTRY ANALYSIS and LABOUR MARKET ANALYSIS if a comprehensive approach has been used. If a fast stream approach is being used, this information should be collected as part of the occupational analysis. For collecting this information the same techniques may be used as those for the first step where the occupational boundaries and structure are defined; this step may be combined with the first step.

IDENTIFY RANGE OF DUTIES AND TASKS

All the duties and tasks that are performed should be listed. Possible future duties or tasks required may also be listed.

For listing the existing duties and tasks, the following techniques may be used:

- literature search (see Section 6.4);
- interviews (see Section 8.8);
- DACUM (see Section 8.9);
- observation techniques (see Section 8.10);
- critical incident technique (see Section 8.11).

For listing the possible future duties and tasks required, the following techniques may be used:

- literature search (see Section 6.4);
- interviews (see Section 8.8);
- Delphi technique (see Section 8.7);
- Search conference technique (see Section 8.9).
DETERMINE DUTIES AND TASKS REQUIRED FOR EACH JOB AND OTHER TASK LEVEL DATA

An important part of occupational analysis is determining which duties and tasks and other task level data (such as relative time spent on each task) are required for each job.

The researcher may use one or more of a wide range of task variables as follows:

(a) primary variables (extent of performance):

- not performed/performed;
- relative time spent on task;
- frequency of performance;
- actual time spent on task;

(b) secondary variables:

- contribution of task to job;
- importance of task;
- consequences of inadequate performance of task;
- difficulty of learning task.

Data on primary variables should be obtained from job incumbents, while data on secondary variables may be obtained from job incumbents and/or supervisors (Hayton 1988; Hermann 1987; Christal 1973). One or more of the following techniques may be used to obtain task data:

- interviews (see Section 8.8);
- questionnaires (see Section 8.7);
- CODAP technique (see Section 8.7);
- DACUM technique (see Section 8.9);
- observation techniques (see Section 8.10).
CONFIRM OCCUPATIONAL STRUCTURE

Information on occupational structure collected in the first step can be confirmed or revised by analysing the information collected in subsequent steps. In particular, task level data collected in the previous step may be analysed by the CLUSTER ANALYSIS method to identify the jobs types within the occupation. Cluster analysis sorts job incumbents into sub-groups on the basis of similarity in tasks performed (Hayton 1986b and 1988).

The only occupational analysis technique that incorporates cluster analysis is CODAP (see Section 8.7).

8.4 TRAINING NEEDS ANALYSIS

8.4.1 Definition of training needs analysis

Training needs analysis may be defined from two viewpoints: one could be described as a 'macro' view of the process; the other is a 'micro' view. The 'macro' view is concerned with training requirements in the wider context of needs and problems. The 'micro' view is concerned with the identification of performance deficiencies and their rectification through training.

The macro view of training needs analysis involves a recognition that training is merely one of many potential solutions to solving problems. An example of the macro approach to training needs analysis is provided by Boydell (1973). He describes a 10-step plan for systematic training. The first step in the process is the identification of training needs and priorities which involves posing the following questions:

- For which occupations will planned training be required -
  (a) because of current weaknesses?
  (b) to cater for future developments?

- How many people will need training for these occupations?

- Decide priorities -
  (a) What are the most critical areas?
  (b) Where will planned training bring the biggest and/or quickest return?
  (c) What resources/constraints will affect these decisions?

A review of the macro and micro approaches to the definition of training needs analysis is provided by Guthrie (1987).
This manual has adopted a micro view of training needs analysis (see Hayton and Guthrie, 1987). It is seen as one of four types of analysis that may be conducted to analyse workforce problems. All four types of analysis should be conducted to provide the macro view of training (and non-training) needs. The four types of analysis are:

- industry analysis;
- labour market analysis;
- occupational analysis; and
- training needs analysis.

Each of these have been defined in Chapter 3. All four types of analysis may be conducted at an industry level, or sector of industry level. At an organisation level, all except industry analysis might be conducted. Thus the four types of analysis represent a way of progressively focusing on workforce problems. As the focus is sharpened, the amount of information gathered about that aspect of the problem progressively increases in amount and detail.

The type of analysis that should be conducted depends on the nature of the workforce problems identified. For example, a problem in the quality of performance suggests that a training needs analysis might need to be conducted. It is important therefore to identify the nature of the workforce problem clearly before any training needs analysis is undertaken. It is also important to note that workforce problems often require two or more types of analysis to provide the optimum solution to the problem. Finally, not all problems can be solved through the provision of training. Procedures for identifying the nature of workforce problems and planning the appropriate type(s) of analysis have been described in Chapters 4 and 5.

Definitions of training needs analysis in the literature often state or assume that the analysis is conducted for a single organisation. A number of the definitions refer to 'gaps' or 'discrepancies' between the present levels of knowledge, skills and attitudes of individuals or groups and desired levels of knowledge, skills, and attitudes.

The definition of training needs analysis used in this manual is:

Training needs analysis is the determination of the differences between the actual condition (what is) and the desired condition (what should be) in human performances within an organisation or group of organisations in terms of human knowledge, skills and attitudes. (Guthrie 1987, p. 13 in Appendix F)
This definition is based on that of Morrison (1976), Romiszowski (1981) and Laird (1985), but has been extended to include analysis across a group of organisations which may represent an industry or industry sector. Training needs analysis across a group of organisations is more complex than analysis within a single organisation because of likely variation in the desired conditions among organisations, even for the same job. This is illustrated in Figure 8.3 where five people are performing the same (or similar) jobs in two different organisations. Performance gaps in organisation 1 are not directly comparable with performance gaps in organisation 2, because of a different desired level of performance. A training needs analysis of these people should determine the gaps in performance of individuals and the desired standards of performance in the organisations. However, for the design of entry level courses the focus for the analysis would be determining of the experienced worker performance standards.

**FIGURE 8.3: DIAGRAMMATIC REPRESENTATION OF TRAINING NEEDS ACROSS TWO ORGANISATIONS**

<table>
<thead>
<tr>
<th>ORGANISATION</th>
<th>JOB</th>
<th>PERSON</th>
<th>ACTUAL CONDITION</th>
<th>DESIRED CONDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisation 1</td>
<td>Job 1</td>
<td>Person 1</td>
<td>A gap 1</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Person 2</td>
<td>A gap 2</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Person 3</td>
<td>A gap 3</td>
<td>D</td>
</tr>
<tr>
<td>Organisation 2</td>
<td>Job 2</td>
<td>Person 4</td>
<td>A gap 4</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Person 5</td>
<td>A gap 5</td>
<td>D</td>
</tr>
</tbody>
</table>

Notes: 1. A = actual condition of individual
2. D = the organisation's desired condition for people in the particular job
3. Assume job 1 is similar to job 2.

Thus, at the industry or industry sector level, the gaps and the desired standard performance have to be determined, and to maximise the match between what is and what should be, more than one level of training may be required. In practice, it may not be necessary to achieve total mastery of all job functions and it may prove possible to develop appropriate sub-sets of training catering to the various performance levels. If this is not possible it is considered preferable to overtrain a minority rather than fail to fully meet the needs.
8.4.2 A comparison of training needs analysis and occupational analysis

The essential difference between training needs analysis and occupational analysis is that the former is concerned with knowledge, skills and attitudes, while the latter is concerned with jobs, duties and tasks.

Training needs analysis proceeds one step further than occupational analysis by examining the skills which underlie individual tasks, duties and jobs. The 'skills' here are concerned not only with manual skills. Training needs analysis should be concerned with the knowledge base underlying an occupation or job. In addition attitudes which will contribute to this process, and to effective training, need to be understood so that they can be appropriately developed or enhanced when training is specified and, later, when a training program is designed.

While these definitions might appear to provide a clear boundary between occupational analysis and training needs analysis, the boundary is often blurred by actual studies which combine the two types of analysis into one study. A further confusion between the two may occur when an occupational analysis is conducted for the purpose of specifying training responses, without a training needs analysis being performed. Some studies specify education and training programs directly from occupational analysis information.

8.4.3 Training needs analysis procedure

The central part of training needs analysis is identifying job performance deficiencies in terms of knowledge, skills and attitudes. Before this question can be addressed, a number of questions need to be answered. This is shown in a flow chart of training needs analysis in Figure 8.4. This flow chart has been adapted from that given in the Australian Institute of Training and Development's paper Analysing Training Needs (AITD 1987).

If the approach described in this manual is being followed, then before any detailed analysis is begun the preliminary stages of DEFINING THE PROBLEM (CHAPTER 4) and PLANNING THE STUDY (CHAPTER 5) would be undertaken. As mentioned in Section 8.2, the researcher may come to training needs analysis from one of two main approaches:

- fast stream approach; or
- comprehensive approach, where industry analysis and labour market analysis would be undertaken first.
FIGURE 8.4: FLOW CHART OF TRAINING NEEDS ANALYSIS
(Adapted from Figure Three in 'Analysing Training Needs' by the
Australian Institute of Training and Development, 1987)

1. Is an accurate occupation or job description available?
   - yes: Do occupational analysis or job analysis
   - no: Do occupational analysis or job analysis

2. Have the job performance standards been decided?
   - yes: Set job performance standards
   - no: Analyse the knowledge, skills and attitudes required for each task and write personnel specification

3. Has the expertise required to get the work done been defined?
   - yes: Set job performance standards
   - no: Analyse the knowledge, skills and attitudes required for each task and write personnel specification

4. Have the task performance standards been decided?
   - yes: Set task performance standards
   - no: Set task performance standards

5. Is the job currently being done?
   - yes: Recruit
   - no: Recruit

6. Can the standards be met?
   - yes: No problem
   - no: Should the standards be: re-assessed, revised, re-arranged, modified?
     - yes: Where are the deficiencies
     - no: Determine required alterations and effects

7. Identify actual deficiencies
8. Determine appropriate training and non-training responses

individual
job design

Where are the deficiencies

Determine required alterations and effects
In both cases, the following question should be asked before starting training needs analysis:

"Is an accurate occupation or job description available?" (This is the first question in the flow chart.)

If the answer is "no", then an occupational analysis (or 'job analysis' if only a single job is of concern) should be undertaken as a precursor to training needs analysis. The job needs to be defined before job performance can be considered.

Details of the procedure in each of the steps indicated in the flow chart in Figure 8.4 are given in a monograph on training needs analysis (Hayes and Hayton 1988), and most of the techniques listed in Sections 8.7 to 8.11 may be applied to training needs analysis.

The flow chart indicates that one or more of a number of outcomes are possible from a training needs analysis, as follows:

. recruit staff to personnel specification;
. performance standards changed;
. job design changed;
. training to correct individual deficiencies is specified;
. no action is required because standards can be met.

8.5 THE RANGE OF TECHNIQUES

Occupational analysis and training needs analysis techniques may be similar, and sometimes the same techniques can be used for both types of analysis. For example, questionnaires may be used for both occupational analysis and training needs analysis. For occupational analysis, the questions would be concerned with the tasks performed. For training needs analysis, the questions would be concerned with the knowledge, skills and attitudes required to perform the job to the desired standard. Additionally, many training needs analysis techniques derive this data by first defining the occupational context and content as a precursor to analysing the knowledge, skills and attitudes required. Users should select one or more techniques on the basis of particular need and available resources.
Some of the methods described here are straightforward and relatively easy to undertake, while others are complex and require special expertise and experience. For instance, many structured interview techniques can be conducted by relatively inexperienced investigators whereas a CODAP study which uses questionnaires and a battery of sophisticated computer programs would require the services of a specialist consultant. Surveys require particular skills in the construction of questionnaires and for the interpretation of the results.

Organisations such as TAFE, Industry Training Committees and larger companies, all of which need to conduct detailed planning, usually are required at some stage to employ formal techniques of occupational analysis and training needs analysis.

Fortunately there is a range of proven occupational analysis and training needs analysis methods to suit most needs and budgets. In some cases the choice will be clear: time, money or particular need will determine the method(s) to be used. In others, the researcher will need to select from a number of methods or perhaps opt to seek answers elsewhere (e.g. from a previous study), depending on the nature of the problem to be addressed.

People conducting a training needs analysis should have knowledge of the industry, firms, jobs and workers under study. Lack of adequate information about any of these may well indicate the need to conduct industry and/or occupational analyses prior to the training needs analysis. Inadequate information about an occupation, for example, could lead to a training needs analysis overlooking key duties.

The Report on Survey of Methods of Occupational and Training Needs Analysis (Williams & Hayton 1987) provides a useful analysis of the extent of use of the types of occupational analysis and training needs analysis methods currently employed in Australia. Of the 171 organisations surveyed, 68 indicated that they had conducted a total of 128 separate studies over the past two years. These comprised: 27 occupational analysis studies, 71 training needs analysis studies and 30 combined occupational analysis and training needs analysis studies. Training needs analysis studies were most popular across the range of Industry Training Committee and industry groupings, while TAFE authorities favoured occupational analysis or combined studies. Perhaps this reflects the view of industry researchers that their principal objective is to address performance deficiencies.

The most favoured methodologies were general mail surveys and general interviews. These accounted for 48% of all reported methods. Task Analysis (14%), CODAP (10%) and DACUM (9%) were the next most favoured techniques. Delphi, Critical Incident and Force Field Analysis were
each only reported once. All these methodologies will be discussed in detail later in this section.

Examination of the average cost for each method showed a range from $28,300 for Occupational Survey Data Analysis System (OSDAS) to $6,100 for Task Analysis. Average time for each study method ranged from 2 months for Force Field Analysis to 14 months for OSDAS.

For convenience, the methods of occupational and training needs analysis have been grouped under five broad categories:

1. questionnaire-based methods (includes mail surveys and other self-completion questionnaire surveys such as CODAP and Delphi);

2. interview methods (structured and unstructured);

3. group process methods (includes DACUM, Nominal Group Technique and Force Field);

4. observation methods (includes Task Analysis);

5. descriptive methods.

These methods are described in Sections 8.7 to 8.11.

8.6 SELECTION OF TECHNIQUE

It has been suggested that a range of techniques may be required to help solve a workforce problem. However, how is the most suitable technique or techniques to be selected? What criteria can be used to select the best technique(s) for the research problem? This section will address these questions.

A number of factors will help to determine which method (or methods) is chosen. Each factor can be summarised in a question which may be considered before choosing how the study will be undertaken. Before moving to the specific questions associated with each factor, it may be useful to recall the two over-riding questions dealt with in Chapter 4 and Chapter 5:

- What is the problem to be addressed?  
  (CHAPTER 4: DEFINING THE PROBLEM);

- What are the objectives of the study?  
  (CHAPTER 5: PLANNING THE STUDY).
The answers to the above two questions should provide guidelines for answering the following specific questions:

- How specific will the study be?
- What will the scope of the study be?
- What depth of information is needed?
- How large is the group that has to be surveyed?
- How rapidly is the area under study changing?
- How much time is available to do the study?
- How much money is available to undertake the study?
- What special requirements, if any, does the study have?

It will be necessary to consider the importance of each of these questions. Some will be more important in particular circumstances; others will have little relevance and importance. Thus there will be a need to apply a 'weight' or importance rating to each of the questions.

8.6.1 How specific will the study be?

Some studies may be concerned with the training needs only within part of an organisation, others with the training needs of an entire industry. Thus some studies may be highly specific while others are more general. Some may deal with the very specific needs of a particular firm: e.g. training needs for flight attendants on a new aircraft. Conversely, others may be large in scale because they are trying to address the needs of a whole industry - or even training needs across industries: e.g. training needs for computerization in banking and finance.

8.6.2 What will the scope of the study be?

Not only do studies vary in terms of their specificity, they may vary in their scope as well. While some may be concerned purely with local needs and hence confined to a single organisation, (or part of an organisation) other studies may be regional, state-wide or national.
8.6.3 What depth of information is required?

Some techniques are suitable for gathering information in depth to help define a training need or describe an occupation or job. Other methods of gathering occupational data are more general.

In-depth information involves assessing the detail of what a job or occupation entails and how it is done. In this way, training needs can be specified. Other techniques are more superficial in that they may help to establish what sorts of duties or tasks the worker performs, but do not really get at the underlying "essence" of what a person performing that job does - in other words how the duties and tasks interact, and the ways in which the knowledge, the skills and the attitudes people bring to the job combine to ensure its adequate performance.

8.6.4 How large is the group that has to be surveyed?

The group size (that is, population size) bears some relation to the scope and depth of the study. The size of the industry, sector of industry, occupational group or organisation under study will help to determine the types of survey method used. Studies with a broad scope will generally require a larger group to be sampled. For such groups (say, an industry or a sector of industry), surveys or other quantitative methods are usually employed. If in-depth information is required, observation, interview and group process methods may be necessary. If a large population is involved but a group process is required, repeated group sessions could be planned.

8.6.5 How rapidly is the area under study changing?

A rapidly changing area, in which technology and other factors are dynamic, may demand different analysis techniques from one where the occupation or training need is relatively stable. Some techniques are designed to find out 'what is' rather than what 'will be'. If change is likely, but has not yet taken place, 'what is' techniques will not reveal these changes. Thus the analysis will date quickly if change comes rapidly. Stable situations suggest processes such as surveys, observation or DACUM. Where change is more rapid, techniques such as Delphi, Nominal Group Technique and Search Conferences are valuable ways of exploring future trends. Interviews may be useful in either stable or changing circumstances.
8.6.6 How much time is available to undertake the study?

Timelines are an important consideration when deciding upon techniques to be adopted. The shorter the time, the more the study will have to concentrate on limiting the group size, focusing instead on the important issues. The scope of the study is necessarily limited when time is short. Shorter timelines suggest group process methods and limited consultation and involvement. Longer timelines suggest more extensive consultation and sampling, and a broader scope. Surveys generally take longer than group process methods.

8.6.7 How sensitive are the findings of the study likely to be?

Some analyses have a number of potentially sensitive issues associated with them. For example, if the outcomes of the analysis affects an industrial award or involves job redesign, it could lead to some form of dispute. In general, interview or group process methods are better techniques to use if sensitivity is likely to be an issue. This is because the issues can either be contained within the interview or talked through during group discussions. A mixture of techniques can be used to deal with sensitive issues.

It is a good idea to allow extra time to complete studies involving sensitive issues. Often the process of gaining consensus and acceptance of the outcomes will take many months.

8.6.8 How much money is available to undertake the study?

The cost of analyses varies a great deal. The cost depends not only on the size of the study, the depth and the time available, but also on the costs actually accounted for. As an example, some costs are never formally incurred because they are hidden or, although incurred, are met from other sources. For example, computer time and the salaries and expenses of those attending a DACUM meeting are often not charged. However the golden rule is to limit the scope and depth of the study if limited money is available. Do not try to do too much if your resources are few. The items typically included in a costing are discussed in Chapter 5.
8.6.9 Some other important questions to ask when choosing your method

There are a number of other questions to consider when a technique is chosen. These include:

- **Is the necessary expertise available?** - that is, are there people available who are familiar with the chosen technique and how to use it?

- **Is the analysis method acceptable to those involved in the study?** - an important issue is whether those who commission analyses as well as those who participate in the study or use its findings have confidence in the methods used. In short, does the analysis method chosen have credibility with the people who will have to act on the findings? Does it have credibility with those affected by the information gathered? Invariably some methods have higher credibility with certain groups than others.

- **What information is already available?** - careful research may reveal that a considerable amount of work has already been done in analysing an occupation or defining the training need. This information should be compiled and examined to establish the amount and type of information already available and to determine what further information may be needed to fill any gaps. For example, a recent occupational analysis may provide the duties and tasks involved in a job. However information may not be available on how these duties and tasks are related, and what knowledge, skills and attitudes are required. It may not be clear how the job is actually done in the workplace.

8.6.10 A method selection matrix

Using these questions as a basis, a matrix has been prepared to assist in choosing the methods which will best suit particular requirements. This matrix is presented in Figure 8.5. Each of the methods has been rated in the matrix so that these requirements can be easily matched with the attributes of each methodology.

To illustrate the use of the method selection matrix, two examples are given as follows:

- a simple example of a quality problem in a small metal manufacturing firm (see EXAMPLE ONE box below and Figure 8.6);

- a more complex example of an occupational and training needs analysis for a trade occupation in an entire industry (see EXAMPLE TWO box below and Figure 8.7).
EXAMPLE ONE: A QUALITY PROBLEM IN A SMALL METAL MANUFACTURING FIRM

A small metal manufacturing firm wishes to quickly investigate an intermittent quality problem with one of its machining centres. Only four workers operate the centre over two shifts and the firm is prepared to spend up to $5,000 on the study.

The results of using the method selection matrix are shown in Figure 8.6. CODAP is immediately ruled out (study time frame unsuitable) and General Survey Questionnaire rates poorly. On the other hand, Interview and Nominal Group Technique appear to be the most suitable. Having narrowed down the options, a final choice could be made on the basis of comparative benefits such as exact time or cost.

EXAMPLE TWO: A STUDY OF A TRADE OCCUPATION IN AN ENTIRE INDUSTRY

An entire industry has decided to sponsor the development of a new national core curriculum for apprentices in a major declared trade occupation. This decision has been prompted by rapid introduction of new technology into the industry. The industry currently employs 40,000 tradespersons and 5,000 apprentices in 6,000 firms. The study is likely to produce findings with sensitive industrial relations implications and must involve close consultation with employer bodies, unions and State TAFE authorities (Figure 8.7 includes additional weightings for these special features.) A sum of $50,000 is available for the investigation which is planned to be completed over a 12 month period.

The selection matrix of Figure 8.7 shows that all but three techniques are eliminated. The remaining techniques: General Survey Questionnaire, Delphi and Interview all have similar, high ratings. As studies of this scope normally require the use of more than one methodology, it is likely that some combination of these would be selected: e.g. General Survey Questionnaire and Interview, or Delphi and Interview.
### FIGURE 8.5: METHOD SELECTION MATRIX

<table>
<thead>
<tr>
<th>FACTOR VALUE</th>
<th>YOUR REQUIREMENTS</th>
<th>TECHNIQUE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>General Survey questionnaire</td>
<td>CODAP</td>
</tr>
<tr>
<td>part of organisation</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>whole organisation</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>sector of industry</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>industry wide</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>across industries</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>regional</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>state/territory wide</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>national</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>small (less than 100)</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>medium (100-1000)</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>large (1000 +)</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>medium</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>fast</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>medium (4-9 months)</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>long (9 + months)</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>medium</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>high</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>low(- $2000)</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>moderate ($2000-5000)</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>high ($5000-20000)</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>very high ($20000 +)</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
</tbody>
</table>

**List your special requirements:**

```

```

The special features of each technique are given in Chapter 8 of the manual.

### TOTAL MATCHING

**Note:** ● ● = highly suitable ● = suitable X = unsuitable
### Figure 8.6: Selection Matrix for Example One:
A Quality Problem in a Small Metal Manufacturing Firm

<table>
<thead>
<tr>
<th>Factor Value</th>
<th>Specificity</th>
<th>Score of Study</th>
<th>Depth of Information</th>
<th>Size of Population</th>
<th>Pace of Change</th>
<th>Study Time Frame</th>
<th>Study Sensitivity</th>
<th>Cost</th>
<th>Special Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part of organisation</td>
<td>✓</td>
<td>Regional</td>
<td>in depth</td>
<td>Small (less than 100)</td>
<td>✓</td>
<td>Short (&lt;4 months)</td>
<td>Low</td>
<td>Low ($2000)</td>
<td>MATCH?</td>
</tr>
<tr>
<td>Whole organisation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sector of industry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry wide</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Across industries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATCH?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: • = highly suitable  • = suitable  X = unsuitable

Total Matching: 8 x 11 14 15 13 13 13 11 11

The special features of each technique are given in Chapter 8 of the manual.
### Figure 8.7: Selection Matrix for Example Two: A Study of a Trade Occupation in an Entire Industry

<table>
<thead>
<tr>
<th>SPECIFICITY</th>
<th>FACTOR VALUE</th>
<th>YOUR REQUIREMENTS</th>
<th>TECHNIQUE</th>
<th>General Survey questionnaire</th>
<th>CODAP</th>
<th>Delphi</th>
<th>Interview</th>
<th>Nominal group</th>
<th>DACUM</th>
<th>Force field analysis</th>
<th>Search conference</th>
<th>Task analysis</th>
<th>Critical Incident technique</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>part of organisation</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>whole organisation</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>sector of industry</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>industry wide</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>across industries</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>CONTENT</td>
<td>local</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>regional</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>state/territory wide</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>national</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>SCOPES OF STUDY</td>
<td>in depth</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>superficial</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>DEPTH OF INVESTIGATION</td>
<td>small (less than 100)</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>medium (100-1000)</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>large (1000+)</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>SUIT OF POPULATION</td>
<td>slow</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>medium</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>fast</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>RAGE OF CHANGE</td>
<td>short (&lt;4 months)</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>medium (4-9 months)</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>long (9+ months)</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>STUDY TIME FRAME</td>
<td>low</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>medium</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>high</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>SENSITIVITY</td>
<td>low</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>medium</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>high</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>COST</td>
<td>low: ($2000)</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>moderate: ($2000-5000)</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>high: ($5000-20000)</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>very high: ($20000+)</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>SPECIAL FEATURES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**  
- **= highly suitable  
- _= suitable  
- _= unsuitable
8.7 QUESTIONNAIRE-BASED METHODS

Survey methods of research are commonly used in occupational analysis and training needs analysis. They are used to collect quantitative data on occupations (including duties and tasks performed) and training needs (including knowledge, skills and attitudes required). The principles applying to survey methods are general, and have been dealt with in Chapter 6 under the headings of:

- define population;
- select sample;
- develop data collection instruments;
- collect data;
- process and analyse data.

Survey methods may be divided into two broad categories:

- questionnaire-based methods including mail surveys and other self-completion questionnaires; and
- interview methods, including structured and unstructured interviews.

While many principles are common to both, some principles are specific to each method. Survey questionnaire-based methods are discussed here while interview methods will be discussed in the following section.

Questionnaire-based methods, like other methods, have a number of strengths and weaknesses. A single study may therefore combine two or more methods to yield optimum results. For example, a survey conducted by mail may be integrated with a set of interviews. The interviews could be used to refine the mail questionnaire in a pre-test phase, and/or the interviews could be used to supplement the quantitative data from the mail survey with qualitative data.

If a survey questionnaire method of occupational analysis and/or training needs analysis is chosen, a further choice is required between:

- a general questionnaire-based method; or
- a specific method.
By definition, the general questionnaire-based method is adaptable and may be applied to almost any research problem, whereas the specific methods are more restrictive and are usually applied to standard occupational analysis or training needs analysis research problems. The specific methods have the advantages of a proven usefulness in occupational analysis or training needs analysis, and are usually supported by a body of specialised literature.

General questionnaire-based methods and two specific methods, CODAP and Delphi, are described here. A number of other specific survey techniques are generally recognised and there is a considerable body of knowledge and literature concerned with their development, use and outcomes. Major techniques include the Work Performance Survey System (WPSS) which is described by McCormick (1979) and Gael (1983); Position Analysis Questionnaire (McCormick et al. 1972, Smith & Hakel 1979); the Job Components Inventory (JCI) discussed by Banks et al. (1983); the Occupational Survey Data Analysis System (OSDAS) described in AAITC (1985); and finally Functional Job Analysis (Fine 1973; Weissman 1983).

8.7.1 General questionnaire-based methods

In questionnaire-based methods, individuals provide written answers to specific questions contained in the questionnaire. The questionnaire is distributed to each individual personally by the researcher or by post, and the completed questionnaire is collected by the researcher or returned by post. The key feature of this method is that the questionnaire is designed for self-completion, that is, completion by individual respondents without the presence of the researcher.

For an occupational analysis, workers within the occupation of interest are usually surveyed and the questionnaire may contain three main groups of questions:

- questions concerned with the organisation (e.g. numbers of employees in organisation, main activities of organisation, training policies of organisation);

- questions concerned with the individual respondent (e.g. age, sex, education and training received, career path, present salary);

- questions concerned with the individual respondent's present job (e.g. main job functions, duties and tasks performed, task frequency or relative time spent).
For a training needs analysis, workers within the occupation of interest, or their supervisors, may be surveyed and the questionnaire may contain three groups of questions as follows:

. questions concerned with the organisation;

. questions concerned with the individual respondent;

. questions concerned with the individual (or group) training needs (e.g. present knowledge, skills and attitudes, knowledge skills and attitudes required for the job, perceived gaps in knowledge, skills and attitudes).

**Strengths and weaknesses**

Questionnaire-based methods have a number of strengths:

. Information can be collected economically from a large number of people in a relatively short period of time, although sufficient time should be allocated to development of the questionnaire;

. Well designed questionnaires provide consistent interpretation of questions and easy analysis of the data;

. Occupational survey questionnaires have the advantage of being capable of producing candid and reliable responses because those surveyed can spend time pondering the questions and because their responses can be anonymous. (Carlisle 1986, p.12)

Questionnaire-based methods suffer from a number of weaknesses:

. Unless the whole population (i.e. all workers in the occupation of interest) is surveyed, a sample must be taken and it is often difficult to obtain a representative sample;

. Survey questionnaires, particularly mail surveys, are notorious for low return rates, with figures of 40 or 50 percent return rate considered acceptable (Warwick & Lininger 1975, p.129);

. Some questions may not be clear to every respondent or interpreted in the same manner;

. Questions often require expressions of opinion rather than statements of fact, so data based on such questions may require further validation;

. Some questions may restrict the responses unnecessarily so that problems and solutions may be overlooked.
General principles

As discussed in Chapter 6, a number of important steps should be followed when using survey methods. For example:

. care should be taken to define the population accurately;

. scientifically-designed methods should be used to obtain a representative sample;

. the expected outcomes of the survey should be identified beforehand to provide a basis for design of the questionnaire;

. an explicit rationale is required for each item in the questionnaire. This should cover why the question will be asked and how the information will be reported;

. the questions should be ordered logically;

. leading questions and value-laden wording should be avoided;

. the questionnaire should be pre-tested;

. a covering letter and a self-addressed return envelope should be used for mail surveys;

. experienced and trained editors and coders should be used to process completed questionnaires;

. principles of statistical inference in reporting results should be used;

. tables and diagrams to present numerical data as clearly as possible should be used.


A considerable body of literature on survey techniques has also been produced by the armed services in the U.K., U.S. and Australia - for example the training manuals produced by the Royal Australian Navy (1978).
8.7.2 CODAP method

CODAP stands for Comprehensive Occupational Data Analysis Programs. Although CODAP refers specifically to a suite of 50 computer programs, the term is also used to describe the associated data gathering methods. These methods involve a survey using a task inventory.

CODAP studies may vary considerably in size, but compared to other methods, CODAP generally requires a moderate to large amount of time and resources. The most time-consuming stages of a CODAP study include the development of the task inventory and the administration of the survey.

However, CODAP is very useful when a detailed analysis of the work of 50 or more workers is required. A CODAP study will:

- determine existing job groups, each job group consisting of workers having similar job profiles;
- provide a job profile on each job group;
- provide a general profile on each job group using variables such as age, sex, job experience, education and location.

The CODAP method may be used for any occupations which may be broken down into a number of tasks. Thus, it is particularly applicable to manual occupations, but may also be used for almost any technical, clerical or managerial occupation.

There are two main options available if a CODAP study is to be performed. The first option is to commission a consultant experienced in CODAP studies to undertake the entire study. As there are already a number of experienced CODAP researchers available in Australia, this option is attractive provided an organisation is prepared to commit the necessary funding.

As a second option the CODAP study may be conducted by an in-house researcher, a feasible option if researchers exist with experience in survey methods of research. Even with this approach, however, it is recommended that an experienced consultant be used for the computer analysis stage of the project.
Strengths and weaknesses of CODAP

The main strengths of CODAP methodology are:

- it is a well established and well documented occupational analysis method;
- aspects of CODAP methodology have been refined and validated by many years of research;
- through its cluster analysis program it is capable of systematic classification of job types;
- it is useful for large and diverse populations;
- the computer printout format is designed for occupational analysis reports.

The main weaknesses of CODAP methodology are:

- like other task inventory methods of occupational analysis, CODAP is based on the concept of dividing jobs into tasks, and for some jobs this may be an imperfect representation of the job;
- CODAP studies require a moderate to large amount of time and are moderately to very expensive to conduct, relative to studies using other methodologies;
- the CODAP programs require a mainframe computer and an expert to run the programs;
- the data is virtually inaccessible to the client;
- lack of future orientation.

Resources

A large number of technical papers on CODAP methodology have been produced, though most have been distributed through the defence services in the United States. A selection of such papers includes Archer 1966; Phalen & Christal 1973; Christal 1973, 1979; Melching & Borcher 1973; Hayton 1986b. General descriptions of CODAP are provided by Goody 1982; Hayton 1986a, 1988; Fugill undated. Examples of recent studies based on CODAP include Hayton 1984, 1986a, 1987a; National Retail Industry Training Committee 1986, National Printing Industry Training Committee 1986.
8.7.3 Delphi method

The final survey technique to be discussed here is Delphi. This technique forms a bridge between survey techniques and group process methods. The Delphi method assumes that society is directed towards goals and that these goals are determined by the actions of various interested groups (Anderson & Jones 1986a). The methodology employed by this technique is based on an examination of future trends, using a series of questionnaires to draw information about the pattern of likely or "desirable" future events from a selected panel of experts.

Delphi method links survey and group process methods because it is conventionally a survey technique, but it may also be run as a conference process. It has 4 phases. In its survey form the process can be accomplished in as little as 45 days (Delbecq et al. 1975). Group size may vary between 10 and 30 but if the responses of sub-groups are to be identified, larger group sizes should be obtained. In the survey of methods of occupational and training needs analysis in Australia (Williams and Hayton 1987), only one Delphi study was conducted in 128 studies surveyed. This study cost $25,000, took six months to complete during which time 250 people were contacted only 50 of whom responded. Only some of the objectives of the study were achieved.

Strengths and weaknesses of Delphi

The main strengths of Delphi are:

- futures orientated, suitable where change is rapid;
- relatively fast, especially in conference format;
- focuses on the main issues.

It's main weaknesses are:

- low response rate in survey form;
- a limited range of responses;
- relatively expensive.

Resources:

8.8 INTERVIEW METHODS

Interviews are the most easily applied occupational analysis and training needs analysis methodology. The informal, unstructured one-to-one interview is useful for obtaining information quickly and inexpensively, provided that the interviewees are few in number and readily accessible. Formal, structured interviews involving a large number of geographically dispersed respondents, however, can be expensive and time-consuming. Telephone interviewing may be a less expensive alternative, but requires special interviewer skills.

8.8.1 The unstructured interview

Because of its frequent informal application, this is probably the most common of all occupational and training needs analysis methods. It is characterised by the use of flexible open-ended questions, non-judgemental responses and prompting. It is employed when the researcher needs to get quick first-hand occupational or training needs data, PLUS background information on sensitive issues such as attitudes, personalities and industrial relations matters.

Strengths and weaknesses of the unstructured interview

The advantage of this approach is its ability to explore broad issues and its ability to provide a situation where issues can be explored in a non-directive, non-threatening manner. The interviewer should be able to create a climate in which the respondent freely offers candid information.

The main problems with this approach relate to its:

- generation of opinion rather than fact;
- lack of consistency when applied to larger populations;
- lack of consistency in interview methods.

To minimise potential difficulties, the researcher can use the unstructured interview in conjunction with a more rigorous method and in addition ensuring that interviewers are trained to a consistent standard.

8.8.2 The structured interview

The introductory comments and questions are similarly applicable to this technique.
Its strength therefore is its ability to give more consistent outcomes than its unstructured counterpart, especially when administered by different interviewers. Responses to a structured interview will normally be easier to quantify and interpret, since uniform questions tend to yield a narrower range of responses.

Its drawbacks are that:

- it usually takes longer to prepare; and
- it may fail to yield the full range of possible outcomes.

While precautions should be taken to "debug" questions (e.g. remove ambiguity, explain terminology), the interviewer nevertheless has the opportunity to deal with respondents' difficulties.

### 8.8.3 Conducting the interview

The following points should be addressed if an interview-based survey is contemplated.

1. **Preparation:**

   - Obtain available background information about the industry, firm, job, personnel, etc. If appropriate, obtain samples of the work, job descriptions and any other material to give the interviewer a "feel" for the respondents' situation.

   - Devise an introduction to the interview and the questions. If at all possible, test them on a person who typifies the interviewees. Get someone to test it out on YOU! Anticipate problems and objections that the respondents may raise and devise strategies for handling them.

   - Inform the respondents in advance of the time, place and purpose of the interview. This is especially important if the respondents need to obtain data in advance. It may be useful to send out a copy of the structured interview schedule prior to the meeting.

   - Arrange a suitable location: i.e. one that is private, quiet and free from interruptions.

   - Arrange the meeting place in a manner that will facilitate rather than inhibit the flow of information.

   - Choose an appropriate time, e.g. late Friday or payday may NOT be the best time for a long interview!
2. Conducting the interview

. Ensure the respondent is relaxed and not apprehensive. You may need to reassure the person that their answers will be treated confidentially.

. Explain clearly the purpose of the study. Be prepared to explain to the respondents the advantages of answering the questions, e.g. better use of their skills, work made easier or safer, company made more competitive.

. Discuss any general questions relating to the survey at the commencement of the interview. Deal with further points of clarification as they arise.

. Listen actively. Prompt only when necessary. Use silence effectively, don't rush the respondent into an answer.

. Distinguish between FACTS and OPINIONS, accept opinions (including criticism) with candour.

. Keep control over the direction of the interview. It is easy to get sidetracked onto unimportant issues.

. Go over any issues which require clarification. If summarising a lengthy discussion, read the summary back to the interviewee to ensure notes have faithfully captured the essence of their comments.

. At the end THANK the respondent and indicate whether any feedback will be provided.

8.8.4 The telephone interview

This method is most cost-effective when respondents are geographically dispersed or difficult to contact during normal business hours. It is more suited to non-complex studies or as a means of following up on a previous face-to-face interview or mail survey.

Its advantages include, savings on travel costs, more personal than a mail survey but less confronting than a face-to-face interview, and speed. It will usually produce a better response rate than a mail survey and may cost no extra if the numbers interviewed are small (say <50). Its drawbacks are: harder than a face-to-face interview to gain respondents' co-operation over the telephone, harder to ensure the availability of the chosen respondent (may require several return calls) and explanations may take longer. Many interviewees may wish to
carry the conversation well beyond the boundaries of the formal interview. In addition only those who have access to a telephone can be interviewed!

Telephone interviewers must be trained. Handling respondents' questions and objections on the phone requires special skills.

The telephone interview is well worth considering for shorter, simple investigations. It is often a good way to begin a study, rather than proceeding immediately into the field. Sometimes it may be the ONLY method whereby information can be obtained from very busy or isolated people.

8.9 GROUP PROCESS METHODS

This set of occupational analysis and training needs analysis methods contains some very fruitful techniques for obtaining information. They are all loosely based on the technique of brainstorming and are characterized by two distinct processes:

- idea generation;
- idea evaluation.

Since the dynamics of groups are not always conducive to the free flow of ideas, skilled facilitators are usually required. The facilitator's role is to make it easier for group members to contribute their ideas. For example, this may involve protecting and encouraging shy or reticent members, subtly curbing over-zealous or long-winded members and summarizing diverse opinions.

It takes training and experience for a researcher to develop the interpersonal skills necessary to achieve effective contributions by the entire group. Essential characteristics of an effective facilitator are open-mindedness, tact, knowledge of group dynamics, good humour and the ability to synthesize and summarise information.

Strengths and weaknesses

Generally speaking, group methods give detailed qualitative data and can generate creative solutions to problems. They can be time-consuming if not well managed and can yield biased outcomes if certain group members are allowed to dominate proceedings.
8.9.1 Brainstorming

This is a technique of small group discussion designed to encourage the generation of an unrestricted flow of ideas. Often certain members of a group lack the confidence to put forward good ideas whereas dominant members are able to impose their point of view irrespective of value. Brainstorming is designed to overcome this problem by removing inhibiting factors and improving interaction and contribution.

This technique works most effectively with a group of 5 to 12 people and is ideally suited to consideration of issues like job performance and job design deficiencies, quality control and problem solving.

Brainstorming is a simple process but does require a skilled chairperson. The group appoints a chairperson and a secretary. The issues to be considered are clearly defined by the group while the secretary writes down ALL ideas since brainstorming operates on the principle that quantity is a prerequisite of quality.

Criticism or debate on contributions is forbidden and the chairperson/facilitator actually encourages lateral thinking and development of previous ideas. Extreme suggestions are welcomed in an attempt to maximise the number of ideas and adverse judgements are suppressed. At the end the group may choose to evaluate the outcomes by prioritising, combining or editing the contributions.

Although this technique produces inconsistent results (Shaw 1981) brainstorming usually elicits more ideas than individuals working alone. Successful results, cannot be guaranteed by this method, especially if group members do not have suitable ideas (Applbaum et al. 1974). With knowledgeable and experienced people, however, creative outcomes can be produced within very short periods of time (e.g. 1 hour or less). Furthermore, it is an inexpensive technique when used in-house or where the cost of getting the group together is minimal. The chairperson should be trained or at least have prior experience in brainstorming.

Strengths and weaknesses

The strengths of brainstorming are that it is:

- fast;
- creative;
- inexpensive.
The weaknesses of brainstorming are that it:

- gives inconsistent results;
- is reliant on group members' knowledge;
- is difficult to control.

Some tips for brainstorming:

- Write up the issue or problem being considered.
- Work in a circle.
- Set a time limit and target: e.g. 30 ideas in 30 minutes.
- Swap the role of secretary to maximise contribution.
- Suppress killer phrases: e.g. "It won't work", "We've tried that before" or any other hint of criticism.
- Praise quantity rather than quality.
- Don't settle for just the obvious ideas, seek out the wild ones.
- Encourage "piggy-backing": i.e. the improvement, extension and modification of a previous suggestion.
- Record every contribution. Failure to do so will imply a criticism and may stifle further ideas from that member.
- When ideas have dried up, move on to evaluation.

Resources

Brainstorming is described in Anderson & Jones (1986a, 1986b), Applbaum et al. (1974), and Shaw (1981).

8.9.2 Nominal group technique

This is a structured form of brainstorming which involves individual silent work prior to group members sharing their ideas. After the group has decided on the topic, the facilitator imposes strict control over verbal interaction while each member writes down ideas.

Discussion is actively curtailed to prevent any prejudgement of an idea or group pressure inhibiting any individual's contribution.
After a short time (say 10-15 minutes), each member then presents one idea in turn (i.e. round robin listing) while the facilitator records all ideas on a flip-chart visible to the whole group. Some general points to be observed during this phase are:

- Ideas are presented in brief words or phrases.
- Ideas are taken one at a time from each member.
- Individual member's ideas are not altered.
- When a member runs out of ideas, they just say "pass". They can re-enter later, if they think of a new idea.
- The facilitator should write quickly.
- Arguments are avoided by allowing no discussion in this phase.
- "Hitch hiking" or "piggy backing" on ideas should be encouraged.
- No criticism is allowed.

With the agreement of the group the items listed are then merged, simplified or organised as needed. Again, discussion is limited to clarification and the facilitator should ensure that no member is forced to be the sole person responsible for clarifying his/her item.

Next, preliminary voting takes place to establish a priority on items. This can be done privately on index cards and shuffled, if anonymity is an issue.

Discussion on the items takes place for further clarification, support or non-support from individual members and further additions and merging. Ideas developed from other peoples' ideas and generation of new ideas should be actively encouraged. A final vote on the cumulation of ideas is taken. Each member votes individually, ranking items according to their own preference. These votes are then collated to produce a group decision. (Maddock 1987).

The Nominal Group Technique is preferred to simple brainstorming in these situations where members may be inhibited from producing creative solutions by conforming to the group norms or narrow-mindedness.

**Strengths and weaknesses**

The strengths and weaknesses of the Nominal Group Technique are similar to those of brainstorming. The technique sacrifices creativity but there is greater control by the facilitator.
8.9.3 DACUM method

DACUM is an acronym for Design (or Develop) a Curriculum. This is another group-centred approach which uses brainstorming to produce a set of behavioural objectives plus a skill inventory for a given occupation or range of jobs. It works best with a group of 8 to 14 participants, producing initial information in one to three days. In Australia, DACUM is mainly used by TAFE to involve industry personnel in curriculum development for vocational training courses.

A DACUM conference usually consists of 5 phases:

1. Introduction and orientation.
2. Clarification of the occupation/jobs to be analysed.
3. Identification of general areas of competence.
4. Identification of tasks within each occupation/job.
5. Analysis of data.

The technique requires a skilled facilitator, a recorder and a quiet venue, free of interruptions. Participants should be carefully selected on the basis of their occupational knowledge, open-mindedness, industry background and availability for the duration of the process.

DACUM's success relies on the ability of the group members to generate new ideas creatively. All competencies identified are written on index cards by the recorder and placed in sequence on a wall facing the group. During the analysis stage the contributions are given to two or three teaching specialists for comment and an estimate of the instruction time required to cover each subject. The competencies are then regrouped into the order that they would normally be found in a job situation. Finally a draft sequence of topics is developed and submitted to the training provider.
Strengths and weaknesses

The main advantages of DACUM are:

- the speed of initial information gathering;
- that group discussion is more likely to achieve consensus;
- that there is more control over input than in questionnaire approach;
- that outcomes are behaviour orientated rather than information orientated;
- that issues are assessed and analysed at the discretion of the participants, rather than the researcher;
- that positive feedback is provided to participants who can see how their input is utilised throughout the process.

Problems may occur if:

- the facilitator is not adept in managing group processes or fails to suppress personal biases. (This can be prevented by using two facilitators.)
- the participants are not truly representative of industry or lack the ability to articulate their ideas clearly.

The cost of using DACUM will vary according to the scope of the study, the number of participants involved and the time taken for the conference and follow up analyses.

Resources

The method is described by Fryckland (1970), Sinnett (1974), Adams (1975), Jula (1979), Queensland Dept of Education (1983), Shears (1985), Anderson & Jones (1986a, 1986b) and Hermann (1987). The TAFE National Centre for Research and Development has also sponsored the production of a video tape with accompanying notes on DACUM. This tape was produced with guidance from the W.A. Department of Education, TAFE Division.
8.9.4 Force field analysis

Whenever there is a need for change there will always be arguments for and against. This situation can be tackled by using force field analysis, which analyses the forces working for and against change.

Thus it is unlikely to be used for occupational analysis or training needs analysis but could be used to facilitate implementation of the outcomes of a training needs analysis.

Force field analysis helps to reduce the forces against change and increase the forces for change. Therefore force field analysis may improve the chances of bringing about the changes desired. The activity can be undertaken individually, in pairs or in groups. (NPITC 1984).

The steps in conducting a force field analysis in a small group setting are:

1. List on a large piece of paper both the beneficial and constraining forces. It is often helpful to consider the traditional "5 ms", or resources of management: i.e. manpower, machinery, methods, materials and money. You may wish to add a 6th "m" representing minutes, which would reflect your recognition that time is also an important resource. Other groups, such as quality circles, typically exclude "money" since it is not a direct factor in determining causes of defects in a product or the malfunctioning of a system or procedure.

2. Rank the forces according to the importance of the effect on the present situation. Some groups do this graphically; others use a scale of 0-10.

3. Rate the forces according to how easily they can be increased or decreased. Consideration should be given to enhancing the beneficial forces or alternatively to removing or diminishing the importance of the constraining forces; or even whether a combination of the two is feasible.

4. Then take the forces which are easiest to change, and with the greatest likelihood of success, and develop goals and plans to undertake this change. This will involve deciding what needs to be done, who needs to do it, when it needs to be done and what resources are required.

5. Then tackle the more difficult forces, using the same approach as used in the previous step. (Maddock 1987).
Strengths and weaknesses

The strengths of the technique are that it is simple, quick and inexpensive. However, its weaknesses are that it tends to ignore interaction between forces. In addition, individuals and small groups through inexperience with the technique may overlook crucial forces; furthermore, difficulty is often experienced gauging the relative importance of various forces.

Resources

The process is described in Eiben (1976), Sanders (1977), Utt (1977), Brandt (1982) and the Curriculum Branch, Education Department of Victoria (1985).

8.9.5 Search conference

Search conferences represent another form of structured brainstorming. As the name implies, a conference or group of people searches for information or solutions. It is a technique which emphasises and anticipates future trends and is useful for assessing the current situation, proceeding to predict future needs and trends.

The search conference works well with groups of 15 to 30 members who possess knowledge and experience in the field under discussion. A trained facilitator is needed to control the process whereby members interact in small groups of 5 to 10 before reporting back to plenary sessions of the conference. The process usually takes from 1/2 to 2 days depending on the number and complexity of the issues involved.

Typically, a search conference commences with a statement of both the organisation's main objectives (e.g., to have well-trained workers) and the conference's specific objectives (e.g., to determine the training needs). Each group's findings are recorded and reported back to the conference where the issues are synthesised and perhaps referred back to the groups for further clarification. When the conference has agreed on the organisation's future needs, strategies are then developed for filling those needs. Finally, an attempt is made to predict the outcomes and impact of those strategies.

Guidelines for conducting search conferences are similar to those for brainstorming. The search conference has been used extensively for generating labour force requirements from corporate objectives (Emery 1976). Like other group processes, this method cannot be relied upon to produce totally accurate or unanimous forecasts. The quality of the information generated can be directly related to the calibre of the participants, especially the facilitator. It is, however, relatively inexpensive in terms of time and cost when all participants are in the one location.
Strengths and weaknesses

The strengths of the technique are that it:

1. is a quick and useful technique where change is rapid;
2. is relatively inexpensive;
3. allows for the clarification of issues.

The weaknesses of the technique are that it is:

1. particularly reliant on the skill of the facilitator;
2. not suitable for large groups (>30);
3. often difficult to synthesise the inputs.

Resources

Search conferences are discussed in Emery (1982), Nitish (1984), Crombie (1985) and Dick (1985).

8.10 OBSERVATION METHODS

These observation methods are based on work study techniques (see, for example, ILO 1979). To many people this conjures up an image of the officious white coated snooper armed with clip board and stopwatch! Modern observation techniques, however, should be so unobtrusive that they have no effect on the work under study.

8.10.1 Task analysis

A task can be regarded as a hierarchy of operations and sub-operations. While a description of the execution of a task will include information about the training requirements for that task, it will also include many other things. There are few rules to guide the researcher on the information required for training purposes and the amount of detail to collect. (Annett & Duncan 1969).

Many task taxonomies are based on the premise that optimum learning takes place when different components are learned separately (i.e. different tasks are best learned in different ways and under different conditions). For example, if training is attempted across several levels in the hierarchy simultaneously, delays will be likely if mastery at each level depends on prior mastery at a lower level.
The analysis then normally proceeds to divide the specific task into cognitive (knowledge), psychomotor (skill) and affective (attitude) components.

Although task analysis is popular because of its low cost, relative speed and apparent simplicity, it is a much more complex method than many researchers realise.

8.10.2 Informal observation

Training needs can be readily determined by astute observation in the workplace. To ensure validity, the researcher should be unobtrusive and careful to document observations objectively. Clearly the success of this method will depend on the experience and perceptual ability of the observer. A larger number of observations taken over a longer period of time will increase the reliability of the findings.

Informal observation will suit many companies with limited objectives and research capabilities.

8.11 DESCRIPTIVE METHODS

8.11.1 Record analysis

Much valuable information about jobs and training needs can be derived from the examination of well kept historical records such as diaries and log books, especially if they are maintained for this purpose. The Critical Incident Technique examines significant events in the production process (e.g. accidents, spoiled work, outstanding achievements) that may reveal the need for training, job redesign, or method improvement. As in the case of informal observation, the value of this method relies almost entirely on the individual recording the information. The Critical Incident Technique is described in Flanagan (1954), Zemke (1977, 1979 in Zemke et al. 1981), Romiszowski (1981), Zemke & Kramlinger (1982), Uschak (1983), Anderson & Jones (1986a, 1986b) and Carlisle (1986).

First line supervisors are often ideally placed to maintain these sorts of records over a long period of time and as such should not be overlooked as key resource people when conducting an occupational analysis or training needs analysis. Diary or daily log techniques are described in Ferries (1968), Romiszowski (1981) and Carlisle (1986).
While the use of daily logs or diaries is in itself an inexpensive process, the records need to be maintained for a relatively long time span and the results will generally be subjective and more difficult to quantify.

A recent source of historical data is that generated by computerised production records. Many workers and machines now enter production details directly into computers. Analysis of these records is relatively easy since the data is usually already quantified and readily accessible. There is of course an ethical issue about the use of such information and some organisations may be uneasy if individual workers or groups of workers are identified in such an analysis.

8.11.2 Other methods

Training needs may be described by a variety of methods such as:

- panels of experts;

- commissions of enquiry empowered to call witnesses and collect evidence;

- peer or self-appraisal.

The cost of these descriptive methods tends to be high and their outcomes vary in quality. Usually they are only employed by larger private companies and by government agencies.

8.12 SUMMARY

This chapter has been concerned with the processes used to gather accurate, inclusive and useful information to help solve workforce problems. It has been demonstrated that there are many different ways in which the information can be gathered. The technique used will therefore depend both on context and circumstances. The discussion has focussed on some of the more important elements associated with training needs analysis and occupational analysis. It has also examined these analysis processes in the wider context of the information needed to solve workforce problems in industry and within individual enterprises. This information may be gathered using industry analysis and labour market analysis.

Training needs analysis has been considered both in a 'macro' and 'micro' sense. The macro sense of the term encompasses the full spectrum of human resource analyses, ranging from industry analysis at
the one end, to task analysis at the other end. In effect, this means most forms of analysis are considered to be a component of training needs analysis, whether or not such a need exists. Hayton and Guthrie (1987) have argued that other analysis procedures (industry, labour market and occupational analysis) may identify a need for training. Training needs analysis identifies that need so that a suitable training program can be specified and designed. Thus, it is a fairly specific and detailed analysis procedure. It has much in common with occupational analysis and shares many of the techniques used by occupational analysts. Nevertheless, it is a process which is concerned with the nature of work - the knowledge, skills and attitudes needed to do a job or task. It is very much concerned with the context in which work takes place and the gaps between the present state of affairs and the desired state, that is, what is as opposed to what should be.

To analyse a training need, a number of techniques can be used. Five main categories have been identified. These are:

- survey techniques;
- group process methods;
- descriptive techniques;
- observation methods; and
- other techniques.

A short summary of the techniques has been provided in each of these categories and further reference sources provided to assist the reader requiring greater detail.

REFERENCES AND FURTHER READING


CHAPTER 9

REPORTING THE OUTCOMES

173
9.1 INTRODUCTION

Presentation of the results of a workforce study needs careful planning. Even the most professionally executed piece of research can fail to communicate its findings to the audience if it is not presented clearly. It is important for organisations commissioning workforce studies to:

- identify target audiences;
- select appropriate formats for the report;
- plan the distribution of the report.

FIGURE 9.1: STEPS INVOLVED IN REPORTING THE OUTCOMES

Key questions to be answered include:

- **WHO** will read the report?
  e.g. Managers, academics, trade union officials, politicians, trainers, general public.

- **WHAT** will be contained in the report?
  e.g. summary points, sensitive material, statistical tables, detailed analysis.

- **WHY** report findings?
  e.g. improve productivity, change attitudes or work practices, raise awareness, initiate debate.

- **WHEN** to report findings?
  e.g. rapidly, gradually, before new financial year for planning purposes.

- **WHERE** to send report?
  e.g. restricted distribution, selective distribution, widespread distribution.

- **HOW** to distribute report?
  e.g. post, live presentations, media, subscription, sales outlets.
Answers to the above will influence the size, quantity, quality, layout, wording and distribution of the reports.

9.2 IDENTIFY TARGET AUDIENCES

The audience for presentation of the results of a workforce study could include one or more of the following groups:

- chief executives and senior managers in the public and private sector;
- researchers and academics;
- training and personnel professionals with firms;
- teachers and curriculum developers in education and training institutions;
- the general public.

Because of the different needs of each group, different formats are likely to be more effective for each group.

Chief executives and senior managers in both the public and private sectors seldom have time to read lengthy reports. For these individuals, a concise summary should be prepared consisting of:

- the main aims and objectives of the research;
- an outline of the methodology;
- the main findings, with any statistical information shown in tabular or diagrammatic form;
- recommendations or action-plans in priority order.

An executive summary is normally included at the beginning of the main report. It may also be printed as a separate section, allowing for higher quality presentation: e.g. better paper, extra colours, more sophisticated art-work.

A useful executive summary will provide readers with basic knowledge of the essential issues in a clear, non-technical manner.

Researchers and academics usually require the full report, and all additional appendices of statistical data, blank survey instruments and further readings on the methodology.
In order to cater for these groups, it is useful to cross-reference the main report with the appendices. Where the appendices are lengthy and likely to be of interest to only a relatively small audience, it will normally be more economical to reproduce these separately.

Provided that survey data are not confidential, other researchers should be offered access in order to facilitate further investigation. Since the supply and storage of data in digital form is often more useful, a decision should be taken on the format to ensure reasonable compatibility in terms of computer software and operating systems. Commercial data-base programs for microcomputers that allow importation of files and statistical analyses are preferable to those programs which run only on more expensive mini and main frame systems.

**Training and personnel professionals** within industry will appreciate a format that is less detailed and academic, yet more comprehensive than an executive summary. It may be necessary to produce an edited version of the main report, with special treatment of the training and personnel implications of the investigation. For example, a comprehensive occupation and training needs analysis may contain recommendations for job re-design, job reclassification and retraining. Such findings could have major ramifications for personnel and training managers with responsibility for implementing change at the organisational level.

More detail may be requested on issues such as the industrial relations or occupational health and safety implications of the research findings. Since information of this nature is often sensitive, it may be necessary to provide it only on a restricted basis.

Although the **general public** will rarely need to be informed of the outcomes of workforce studies, specific recommendations or initiatives may require broad distribution: e.g. establishment of the Australian Traineeship Scheme. In these cases a professional public relations firm or an advertising agency should be engaged to design the means of distribution. These could include quality brochures produced in large volumes, media advertising, press releases and audio-visual material.

### 9.3 SELECT FORMATS

The format covers the layout, visual appeal, expression and style, amount of technical terminology, depth and detail and physical size of the report. In general, written reports should avoid jargon words; technical terms should be used only when necessary (Gowers 1988; Murray-Smith 1987; Ohmart 1988). Technical terms and acronyms likely to be unfamiliar to readers should be defined in the report. With
respect to depth and detail, raw data may be unintelligible to all but an experienced statistician; on the one hand, broad generalised findings may be too bland to prove helpful.

Provision of an executive summary is generally useful when the report is lengthy. It should contain essential information, leaving the detail to the main report and statistical appendices. Different recipients within a firm may require information in different formats. For example:

- the chief executive - an executive summary;
- the personnel manager - details on how outcomes affect job classifications;
- the training manager - information on the training implications.

Statistical information may need to be retained for further analyses, such as a comparison with the outcomes of future studies. Magnetic tape or disk will usually be a satisfactory storage medium for large amounts of quantitative data.

In many cases workforce studies are commissioned with quite definite purposes in mind. While it would be self-defeating to allow preconceived ideas to influence the objectivity of research, it should be recognised that the reporting format will often be influenced by the desired outcomes. This is particularly relevant in the case of action-centred research projects. For instance, if the purpose is to provide information for development of a TAFE curriculum, the format and content of the presentation would need to be developed with this purpose in mind. On the other hand, if the intention of the study is to stimulate debate throughout the wider community on broad issues such as skills formation or government policy, the format would need to be detailed, yet easily accessible and stimulating. It may even be appropriate to produce audio-visual material for use by the electronic media or for group presentations.

Major studies often attract the attention of vested interest groups and the media. It is important to avoid ambiguity in reporting that may lead to misrepresentation of the outcomes. Organisations commissioning research should ensure that stakeholders (e.g. unions, employers, governments) are briefed of the project's progress and are informed of the outcomes first-hand.

Table 9.1 gives, for each of the types of analysis, the likely reporting formats, target audiences, and desired outcomes.
<table>
<thead>
<tr>
<th>TYPES OF ANALYSIS</th>
<th>TARGET AUDIENCES</th>
<th>REPORTING FORMATS</th>
<th>TYPICAL DESIRED OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>INDUSTRY ANALYSIS AND LABOUR MARKET ANALYSIS</td>
<td>industry</td>
<td>brochure</td>
<td>raise industry awareness</td>
</tr>
<tr>
<td></td>
<td>trade unions</td>
<td></td>
<td>greater integration of skills formation and industry policy</td>
</tr>
<tr>
<td></td>
<td>govt. departments</td>
<td>summary report</td>
<td>greater responsiveness of education sector</td>
</tr>
<tr>
<td></td>
<td>education &amp; training providers</td>
<td>full report</td>
<td></td>
</tr>
<tr>
<td></td>
<td>general public</td>
<td>software package</td>
<td></td>
</tr>
<tr>
<td>OCCUPATIONAL ANALYSIS AND TRAINING NEEDS ANALYSIS</td>
<td>industry</td>
<td>brochure</td>
<td>formal on-the-job instruction</td>
</tr>
<tr>
<td></td>
<td>trade unions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>govt. departments</td>
<td>summary report</td>
<td></td>
</tr>
<tr>
<td></td>
<td>education &amp; training providers</td>
<td>full report</td>
<td></td>
</tr>
<tr>
<td></td>
<td>general public</td>
<td>software package</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9.4 DISSEMINATE INFORMATION

While decisions about dissemination of the outcomes may be largely determined by the target audience and/or format of the report, commissioning organizations should consider the following points:

- **Cost of distribution**: Large reports can be costly to post. Do you sell the report? Do you use an agent? Cost of advertising and publicising report?

- **Timing of distribution**: Are particular times preferable? Will it be available before crucial deadlines? Will the information be out-of-date?

- **Stocks**: Do you keep a large supply of reports, or simply copy on order?

- **Libraries**: Should you supply a copy to the National, State and tertiary education libraries?

- **Is feedback expected or invited?** How is this best handled: by mail, meetings, telephone?

REFERENCES AND FURTHER READING


CHAPTER 10

TRAINING AND NON-TRAINING RESPONSES
10.1 INTRODUCTION

When an organization has completed a workforce study and presented its findings, there are often additional tasks. These may include:

- specifying training and non-training responses;
- designing training and non-training responses;
- implementing training and non-training responses;
- evaluating the effectiveness of these responses by conducting further workforce studies.

These steps follow the reporting of the outcomes of a workforce study and are shown in the flow chart in Figure 10.1

FIGURE 10.1: THE NEXT STEPS
While consideration of these tasks is beyond the scope of this manual, it is worth giving some attention to the ways in which training and non-training responses may be specified since they often appear in the 'Recommendations' section of workforce studies or are logical extensions of their conclusions. Often it is appropriate to conduct a separate project to develop training and non-training responses after the completion of a workforce study.

10.2 SPECIFYING TRAINING AND NON-TRAINING RESPONSES

Some training practitioners unwisely pre-empt training needs analysis by developing training courses and products and then conducting the needs analysis. Usually this results in the training needs analysis 'discovering' a training need, simply to justify the earlier training response.

There are often far more non-training responses to performance deficiencies than expected. In this context it is useful to reflect on Rummler's classification as outlined by Peters (1986):

For the most part, human performance deficiencies can be classified as deficiencies of knowledge, which result from an employee not knowing what to do, how to do it, or when to do it; or as deficiencies of execution, which result from an employee failing to perform because of a factor in the work environment; or as some combination of the two.

Rummler goes on to identify five components of performance which the researcher should examine:

1. **The Job Situation**: perhaps the worker is unaware of the action a particular situation demands. A communication problem.

2. **The Worker**: the worker may not be mentally and/or physically capable of performing the required tasks: maybe a personnel selection problem.

3. **The Response**: the worker lacks the tools or material to respond even though he/she knows what to do.

4. **The Consequence**: if there are no consequences for non-performance, some workers will choose not to perform: a motivation or attitudinal issue.
5. **Feedback**: if workers never receive information about their performance, how do they know whether it's adequate or how to improve?

None of these categories necessarily indicates the need for a training response.

**FIGURE 10.2: PERFORMANCE DEFICIENCY ANALYSIS MODEL.**
(Adapted from Herem, 1979).

The model adapted from Herem (1979), given in Figure 10.2, suggests that performance deficiencies are caused by one of any combination of five problems:

- Organisational constraints: e.g. lack of data or material, job standards or policies and procedures not clearly defined, poor management structure.
Environmental constraints: e.g. poor equipment and facilities, regulations and laws.

Person/job mismatch: e.g. person assigned to inappropriate job... ‘square peg in round hole’.

Undeveloped competency: e.g. worker lacks skills or knowledge.

Incompatible attitude or low motivation: e.g. personal values, priorities and life style conflict with job.

Although Peters (1986) correctly states that a training program should be a response to a need, rather than a reaction to such problems, many training professionals automatically opt for training responses. But even if training provides a solution, it is possible that a cheaper non-training response would have worked just as effectively. Mager & Pipe (1984) also offer some useful guidelines for distinguishing between training and non-training responses by focusing on the fundamental question: "Is it strictly a skill/knowledge deficiency?"

An organisation may be tempted to choose (or reject) a training option on the basis of cost alone. It is important to set out both the costs and benefits of any proposal in order to assess the overall value. Sometimes training appears to be the soft option, especially when compared to, say, a major equipment purchase. Alternatively, it may seem expensive compared to the cost of recruiting new staff.

Management philosophy too will influence the choice of options: some companies are committed to the ongoing development of their workers while others assign training a low priority.

An industry may make choices based on ease of implementation or other factors, rather than the optimum combination of the training and non-training responses for the industry. Most responses at an industry-wide level require the co-operation of employers, unions and government. In situations where the co-operation of all the major stakeholders is required, the way in which the workforce study is conducted can be crucial to success in implementing the optimum responses. Success could partly depend on each of the major stakeholders being involved in the workforce study in some way, so that there is a sense of ownership of the outcomes of the study.

An appropriate forum for the major stakeholders after the conduct of the workforce study could also be considered. The forum could be a national conference, a task force, an existing committee, or other models (Woolmington & Proudford 1988). Such a forum could assist in the specification, design, and implementation of training and non-training responses.
In most cases a combination of training and non-training responses will provide the best solution to human performance problems. Some of the typical options include:

**Training responses**

1. Formal on-the-job instruction.
2. Retraining existing workers.
3. Developing a curriculum.
4. Team building.
5. Safety training.
7. Communications training.
8. Trainer training.

**Non-training responses**

1. Simplifying of work method.
2. Change of working arrangements.
3. Recruiting of recently trained workers.
4. Update of machines.
5. Review of wages policy.
6. Provision of barriers or guards for machines or impose fines for breaches of safety rules.
7. Varying of industrial awards.
8. Issuing of more written instructions.
10.3 A FINAL WORD

The techniques outlined in this manual are not substitutes for managerial decision-making. Used wisely they can provide a sound basis for planning effective training and non-training responses by providing more objective information on industry, labour market, occupations and job performance. Ultimately however, managers and policy makers must draw on their industry experience to decide the mixture of responses which will best serve the needs of the industry and/or their organisation.

REFERENCES AND FURTHER READING


APPENDIX A: GLOSSARY

**Attitude**

An attitude is an organised predisposition to think, feel perceive and behave towards situations, objects, events, or beliefs, institutions or people with particular characteristics. It is an enduring structure of beliefs that predisposes the individual to behave in a particular way.

**Brainstorming**

A small group technique for the generation of creative ideas where all contributions are expressed without regard to quality and evaluation is withheld until the end of the group session. Elaboration of one person's ideas by others is encouraged.

**CODAP (Comprehensive Occupational Data Analysis Programs)**

(1) An occupational analysis methodology involving a survey based on a task inventory.

(2) A suite of approximately 50 computer programs designed to analyse occupational information from task inventory surveys.

**Critical incident technique**

Identification of key incidents in a production process or task, especially when these affect the quality or quantity of the product, the machinery or the operator.

**DACUM (Design or Develop a Curriculum)**

A group-centred approach which uses brainstorming (see above) to produce a set of behavioural objectives and a skill inventory for a given occupation. Curricula are then developed from these.

**Delphi**

May be conducted as a survey or in a group setting and uses a series of questions to sample experts on likely or future trends.
Descriptive methods

Descriptive methods refer here to techniques of occupational, job, task and training needs analysis. They involve individuals describing the nature of the work done and how it is done. A variety of techniques can be employed.

Duty

The broad subdivision of an occupation or job which is composed of a group of tasks which are related because of the nature of the work or behaviours involved (Gael 1983)

Establishment

The following three establishment definitions are used by the Australian Bureau of Statistics in the Australian system of integrated economic statistics:

- single location (SL) establishment: a unit covering all the operations of an enterprise conducted at, or from a single location;
- enterprise/state/industry (ESI) establishment: an enterprise with locations within a state/territory;
- enterprise/industry (EI) establishment: an enterprise with locations within Australia.

(Adapted from ABS 1983, p. 46)

Force field analysis

Identification of all the forces working for, and against change in a specified circumstance.

Group process methods

Group process methods describe the techniques used when a group, composed of representative individuals with relevant expertise and experience, is formed and comes together on a specific issue, question or problem.

Industry analysis

Industry analysis involves:

- determining the boundaries of the industry under consideration;
- examining the main determinants of the industry's activity levels; and
assessing likely future industry activity and employment levels in light of expected movements in these determinants.

**Job**

A job is defined as the amalgam of the duties performed by individual employees. When the same group of duties is performed by a set of employees, they are said to have the same job. (Adapted from Gael 1983).

**Job analysis**

See Occupational analysis

**Job design**

Job design is the specification of the composition and sequence of duties and tasks to be performed by an employee.

**Job performance**

Accomplishment of work-related tasks or skills by an employee or trainee. It may refer to specific skills or overall performance and may also be concerned with the factors associated with success or failure in job situations.

**Job specification**

See Job design

**Knowledge**

Knowledge involves the recall of specifics and universals, the recall of methods and processes or the recall of a pattern, structure or setting.

**Labour force**

See Workforce

**Labour market analysis**

Labour market analysis involves the assessment of the numbers in each occupation or job in terms of the current and predicted requirement (demand) for personnel compared with the current and predicted availability (supply) of qualified people to fill such positions.
Method study

Method study is the systematic recording and critical examination of existing and proposed ways of doing work, as a means of developing and applying easier and more effective methods and reducing costs. (ILO 1979, 75).

Nominal group technique

The pooling of ideas generated by group members who have worked alone and in silence prior to sharing and evaluating their contributions.

Observation methods

Observation methods involve the direct observation of the work process by individual(s) conducting the analysis of an occupation, job, task or training need.

Occupation

A category of job or work specialisation, as characterised by occupational conditions and attributes, professional and societal relations, career lines, roles and responsibilities - includes duties, skill levels, status, pay or distinguishing factors (Lavender and Findlay 1984). It may also refer to a collection of broadly similar jobs.

Occupational analysis

Occupational analysis involves the identification of the current and likely future jobs within an occupation, and the duties and tasks which comprise each job, together with other relevant job information.

Record analysis

Examination of existing information such as production and accident records to infer duties or training needs.

Search conference

Search conference is a group process method for the development of action plans through a structured series of large group and small group sessions, at least one of which involves the indentification of 'desirable' futures by the group.
Skill

A skill is an organised and co-ordinated pattern of activity in relation to an object or other display of information. It is built up gradually in the course of repeated training or other experience. It is sequential, each part being dependent in the previous part and influencing the next.

Task

A discrete organised unit of work, with a definite beginning and end, performed by an individual to accomplish the goals of a job. (Gael 1983).

Task analysis

A task analysis is the systematic analysis of the behaviour required to carry out a task with a view to identifying areas of difficulty and the appropriate training technique necessary for successful instruction.

Task inventory

A task inventory is a list of duties and tasks for an occupation or job and is used in the gathering of information for occupational or job analysis.

Training needs analysis

Training needs analysis involves the assessment of the difference between the actual condition (what is) and the desired condition (what should be) in performance within an organisation (or group of organisations) in terms of knowledge, skills and attitudes.

Workforce

SYNONYMS: Manpower; labour force.

Those persons aged 15 and over who, during a particular week, are either employed or unemployed. The total official supply of labour available to the labour market during a given week (ABS 1985).

Workforce study

A workforce study is any study of the workforce which involves one or more of the following:

- industry analysis;
- labour market analysis;
occupational analysis;

training needs analysis.

**Work measurement**

Work measurement is the application of techniques designed to establish the time for a qualified worker to carry out a specified job at a defined level of performance. (ILO 1979, 211).

**Work study**

Work study is a generic term for those techniques, particularly method study and work measurement which are used in the examination of human work in all its contexts, and which lead systematically to the investigation of all the factors which affect the efficiency and economy of the situation being reviewed, in order to effect improvement. (ILO 1979, 35).

**REFERENCES**


A useful checklist of the main points which should be considered before embarking on a workforce survey include:

1. **STATE THE RESEARCH OBJECTIVES**
   - State clearly and explicitly the objectives of the investigation and the reasons for undertaking the study.

2. **DEFINE THE POPULATION**
   - What is the target population for which information is needed? What are the limits on this population imposed by space (Australia? each state? Sydney statistical division? Country areas?), time (a reference period may be the last 12, 6 or 3 months or only one week), and category.
   - Are there suitable frames (i.e., lists, registers) relating to the target population which are available, or which can be constructed, from departmental sources, the ABS, other government agencies or commercial organisations?
   - How complete and free of duplication are the potential frames? What additional information and how up-to-date is the information about the population held on these frames?
   - How well can data obtained from a sample of the population be generalised to the population?
   - In the absence of suitable frames is it worthwhile continuing with the plan to undertake a representative sample survey? Would a case study approach be more appropriate?

3. **DETERMINE THE SURVEY OBJECTIVES**
   - What exactly is to be measured or tested? The inferences achievable from a survey will be limited by the coverage and quality of the frame used and the nature of the sample unit.
   - Is any/some/all the information sought already available through some other investigation or as an administrative by-product?
In the event that a survey is conducted will the information obtained be too out-of-date to be useful by the time the survey is completed?

Which types of estimate will the survey provide? Will the estimates be totals, proportions, means (averages), totals or means of subgroups, ratios, products?

Have blank output tabulations been prepared to assist in describing what is to be estimated in the survey?

What is the smallest sub-group within the target population for which estimates are required and from which inferences will be made?

What degree of reliability is required for the survey estimates down to the level of the smallest sub-groups? (All estimates from sample surveys should be accompanied by measures of reliability in order to guide the analyst in the interpretation of results).

4. DEFINE THE SAMPLE UNITS

Is there a difference between the sample units (units on the frame selected in the sample) and reporting units? (e.g. the sample unit may be a dwelling (household) but the reporting unit may be unemployed persons aged 15-24).

How are the sample units defined and limited in space and time? (see also 2)

Is the sample unit chosen appropriate to the objectives of the investigation? Have other possible sample units been evaluated?

5. SET SAMPLE SIZE

Are any estimates available of the likely variability of the population for the sample units to be used in the survey? (see also 9)

For each stratum (e.g. state * industry * size; or sex * age * labour force status) are the number of units in the population known? (see also 2)

Are there any sections of the population that are of greater interest and are likely to require a sample that is larger than proportionate?
What limits may be imposed on sample size? (e.g. the survey may take too long to complete if it is bigger than a specified size)

What limits may be imposed by costs?

If the budget does not allow a large enough sample to satisfy the accuracy requirements of the survey (see also 3) and there is no means of otherwise increasing the sample size to achieve results of acceptable reliability, then it may not be worthwhile proceeding with the survey. In this instance a case study may provide to be more cost-effective.

6. DESIGN SURVEY

Are the benefits from the use of a sample minimal compared with a complete census enumeration?

If the survey population is only a small proportion of the total population or there are serious deficiencies in the frame from which the sample will be selected, it may not be worthwhile proceeding with the survey as planned.

If a survey is to proceed, a quota sample or a probability sample may be more appropriate if there are resource constraints.

Is the population structured in a way that is important for the sample design?

Type of sampling to be used? Simple Random Sample? Systematic Sample? Multi-stage Cluster Sample?

What auxiliary variables or attributes are known about units in the population which may be used for stratifying the population, calculating ratios or basing selection on probability proportionate to size?

Are any sample selection procedures likely to introduce bias into the survey results?

Is the survey a ‘one-off’ or is it expected to be repeated? At what frequency? Are estimates of period-to-period change an important requirement?
7. DECIDE THE DATA COLLECTION METHOD

- Telephone - cheap, quick, covers businesses well but only households with telephones. Non-response is higher than with personal interview.

- Mail - cheap, allows respondent time for considered response, long lag between initial dispatch and close off. Follow-up reminder or query action is slow but can be undertaken by telephone.

- Personal interview - expensive to recruit, train interviewers and additional costs of travel etc. Strict procedures are required to minimise interviewer bias.

8. QUESTIONNAIRE DESIGN

- For each sample unit the variables or attributes to be measured or counted require precise definition.

- Are the measurements included in the questionnaire meaningful and relevant to the objectives of the investigation?

- Do the questions in the questionnaire actually measure the defined variables or attributes?

- Are all the questions in the questionnaire really necessary?

- Are any of the questions ambiguous, misleading, too convoluted, or leading? Is the language simple and avoiding jargon and technical terms (unless essential for the purpose of the investigation)?

- Are any questions difficult to answer. Do they lead to difficulties in gaining accurate responses? (e.g. financially sensitive, personally embarrassing, lengthy recall without reference to records.)

- Beware of possible adverse effects resulting from the ordering of questions and the ordering of response categories with a question.

- Is the burden on the respondent likely to risk a tapering off of response later in the questionnaire?
9. PILOT TEST

In almost every instance of a survey being conducted for the first time a pilot test will be necessary in order to:

. Determine the likely variability of the population (for aid in determining sample size and survey design);

. Test the design(s) of the questionnaire;

. Gauge respondent attitudes to the survey, questions and hence likely response rates;

. Test the possible efficiency of different types of stratification;

. Test the sample selection and estimation procedures;

. Test processing procedures/system, especially if processed by computer;

. Refine the preliminary costing estimates for the survey.

It cannot be emphasised too strongly the importance of testing the questionnaire and procedures adequately. Should a pilot test delay the main survey beyond what has been assessed as an acceptable date there is a grave risk of sacrificing the pilot on the grounds of expediency. If a pilot test is omitted, the value of a potentially expensive survey is questionable, particularly since many of its elements may lead to spurious findings.

10. PROCESSING REQUIREMENTS

. Editing of data for internal consistency and to detect coding and transcription errors;

. Manual processing? Clerical staff available to undertake editing, coding, etc., queries and tabulation;

. Computer processing? Any special programming to be undertaken?

11. NON-RESPONSE

. Bias introduced by non-response (including refusals, misplaced questionnaires, changed address, changed business etc.)
Ways of minimising bias in non-response for example by intensive follow-up.

12. SURVEY COSTS

- Obtaining or constructing a suitable frame;
- Survey design and sample selection;
- Design, printing and testing of questionnaires;
- Pilot test;
- Survey operations (stationery, telephone, postage; recruitment, training of interviewers, payments to interviewers including travel costs and expenses);
- Preparation of the collected data for processing (e.g. coding of certain responses);
- Computing costs, including costs of writing any special programs;
- Editing of data.
APPENDIX C: PROCEDURES FOR THE INDUSTRY STUDIES FRAMEWORK SURVEY

Introduction

The following aims to provide sufficient information to assist an investigator conduct an industry survey, or alternatively to engage and manage a professional consultant for this purpose.

DEFINITION OF INDUSTRY BOUNDARIES

As indicated in the conceptual framework discussed in Chapter 7, the identification of industry boundaries is the crucial starting point of the analysis.

It is necessary to have a clear and accurate idea of industry boundaries to provide a sound and legitimate basis for gathering information on employment and training in relation to the industry. It is therefore necessary that the definition of an industry be consistent with the industry definitions adopted by other important organisations (e.g. the Australian Bureau of Statistics) to facilitate the comparability of statistics and information. In addition it is important that the industry definition conform to, and integrate with the definitions of associated industries to prevent duplication and "double counting" of economic and statistical information.

Some industries may find that the Australian Standard Industrial Classification (ASIC) classes developed by the Australian Bureau of Statistics (ABS) will provide an excellent basis for defining the industry. Under this system an establishment is classified to a particular ASIC class on the basis of the predominant activity, measured in terms of the gross turnover of the establishment.

Given that many establishments are involved in producing more than one product on site, it may be thought unfair to compress all production to the industry classification relating to the dominant product. However, the problem of failing to establish such a definitional classification would jeopardise any attempt to construct economy wide statistics and information by leading to wide-ranging duplication and double counting.

However, many industries may find that varying amounts of relevant activity occur in industry classes outside the ASIC defined industries. To exclude this "hidden" activity may greatly reduce the number of establishments able to contribute survey data and hence reduce the quality and sensitivity of the analysis that follows.
Following the definition of which industry sectors to include within the study, it is then possible to proceed to the construction of an industry (or sectoral) register based on the accepted definition.

INDUSTRY REGISTER

Introduction

Following a decision relating to industry boundaries, register construction is undertaken to record the population of establishments within the industry of concern.

This task may be completed in-house or may be contracted to an external consultant, depending on the resources available. Regardless of who undertakes register construction a number of information sources will need to be considered.

Examples of relevant information sources include:

- Australian Bureau of Statistics;
- yellow pages in telephone books;
- industry training committee membership lists;
- membership lists of employer groups;
- membership lists of unions;
- business directories;
- various private organisations with computer data bases on establishment information.

Operational details for consideration

When undertaking the construction of an industry register, the following operational details should be considered:

- The task is resource intensive and therefore potentially costly in terms of both time and money.
- Contact by telephone or mail (or both) is necessary to obtain essential information for register construction.
The basic information required is:

- full name and address of establishment;
- contact person at the establishment;
- relevant activities undertaken by the establishment;
- employment numbers.

It is highly desirable that the register be collated on to an easily accessible computer medium, capable of sorting the register against the main parameters listed above.

In the case of the register construction for the plastics industry, much of the cost was avoided through the use of the existing integrated network of national and state ITCs. If such a network exists for the industry under investigation then its use may save resources.

The register must be current and complete.

**Register construction – methodology**

Working within an agreed definition of the industry the investigator should move through a series of steps to produce a register of establishments.

1. Access may be available to the ASIC register of establishments via the Australian Bureau of Statistics (ABS).
2. ABS may provide, at cost, a print-out of firms by type of firm by local government Area.
   - this will provide a good base for the register but updating will often be required.
   - if access to the ABS register is not possible, the investigator can choose to use the services of private companies specialising in industry information.
3. In addition, the investigator can proceed through the complete list of industry information sources listed above (e.g. yellow pages, ITCs etc.).
4. When lists of establishments from all sources have been collected, they should be integrated into a single, complete list that has been checked for duplication and obvious omissions.
Having established a complete and current list of establishments for the industry, a simple questionnaire can be developed in order to obtain from establishments the following information:

- full name of establishment;
- address, including post code (useful for ADP sorting purposes);
- name of contact person and telephone number;
- number of employees, including full-time, part-time and casual.

To save time, the development of the questionnaire should be undertaken while the register construction is under way.

The information may be collected via a postal survey or using the telephone.

Postage of the questionnaire may be undertaken in-house or contracted out to the ABS mailing service or private mailing services.

Release of lists of businesses and mail-out services by ABS

The Australian Statistician is empowered under the Census and Statistics Act to release lists from the ABS integrated register of businesses and other organisations to certain government departments and authorities ("official" bodies;) for specified non-regulatory purposes. Lists may relate to establishments, legal entities, enterprises or a combination of these.

Industry training committees (ITCs) are not defined as 'official' bodies and are thus ineligible to receive this service. However, if the Department of Employment, Education and Training were to undertake a survey on behalf of an ITC, the release of a list to the Department would be possible subject to it satisfying certain conditions laid down by the ABS. (As illustrated by the release of a list to the Department for the 1987 survey of the plastics industry). Any list released to an official body cannot be re-supplied by that organisation to a third party.

Any organisation however, can take advantage of a service offered by the ABS whereby the Bureau mails that organisation's material to a selected sample of businesses in a single or range of industries or
even to all businesses in a specified industry. In providing this service the ABS does not provide names and addresses directly to clients but where mailed-out material requests a response from the addressee (e.g. completion of a survey questionnaire), the return address will be that nominated by the client. For more details about this service, including the conditions to be satisfied and costs, contact the nearest office of the Australian Bureau of Statistics.

Register construction – follow-up

A follow-up letter and/or phone call will be necessary for those establishments slow to respond:

. the letter or phone call should stress the importance of compiling an industry register as a first step to enhancing communication with the industry, particularly regarding training and associated issues.

. the letter or phone call should also make assurances regarding the confidentiality of the requested information.

Formatting the register

Once efforts have been made to elicit a response on the questionnaire the information needs to be collated and presented in the following format:

. if possible, a code representing the main activity conducted at the establishment should be constructed;

. the geographic location expressed in the postcode is also important to later stages of analysis which may wish to focus on particular geographical areas;

. the register should be formatted by state to assist with analysis by geographical area.

An example of the register established for the plastics survey is given in Figure C.1.
It should be emphasised that the entire procedure of register construction may be carried out in-house, contracted out to a private consultant, or as indicated above, parts of the procedure may be contracted out (e.g. mail-out service). The plastics industry, through their ITC state networks, were able to undertake the entire procedure of register construction in-house, with excellent results. However, industries that do not have established communication links should not hesitate to contract out the register construction to one of the many private companies that are now specialising in this type of work.

Engaging and managing a consultant in this field requires specialised attention. A guide to this procedure is provided in Chapter 6.

This phase of the industry study is very important. The industry register is the base point for further survey research and must therefore be accurate in that it represents a complete and up-to-date picture of the industry.
ENGAGEMENT OF CONSULTANTS

The actual performance of a large-scale industry survey is a highly specialised operation that may be beyond the scope of most ITCs or other industry-based investigators. Consultants specialising in industry survey research should, in most cases, be contracted to undertake this part of the analysis.

However, even though an industry research consultant may be engaged, the investigator should have a clear understanding of how the survey is to proceed. The consultant must be given clear indications of the direction and nature of the survey, and progress of the research must be monitored at regular intervals.

CHAPTER 5 provides an outline of the steps involved in selecting consultants. The guidelines presented here aim to provide further details of responsibilities in relation to the engagement of consultants and contractors for the conduct of industry analysis and labour market analysis studies.

SELECTION OF CONSULTANTS

Consultants should only be engaged where their employment is essential to efficient and economical operation, and where suitable expertise is not available within an organisation.

Normally the experience, resources and skills of at least three consultants should be considered.

An example of the selection criteria developed for selection of the consultant for the plastics survey is given in the box below.
EXAMPLE: CONSULTANT SELECTION CRITERIA FOR PLASTICS SURVEY.

ESSENTIAL

- High level of analytical and methodological competence in industry studies;
- Extensive experience in undertaking industry surveys;
- Logistical resources to carry out the required survey work;
- Experience in training and supervising interview teams;
- Ability to assist in the preparation of the proposed survey handbook for ITCs;
- Experience in developing and using coding frameworks;
- Significant experience in ADP systems and the processing of survey results.

DESIRABLE

- High level of analytical competence in the field of labour economics and education and training matters.

Contracts should be avoided with individuals or organisations having a vested interest which could affect the outcome of a project.

Regular in-progress reviews of consultancies should be conducted. The result may indicate that projects should not proceed, in whole or in part, where work is not meeting expectations, or is no longer essential.

Records of the engagement of consultants should be maintained to enable the preparation of regular reports.

PREPARATION OF CONSULTANCY PROPOSALS

Individuals utilising consultants should satisfy themselves that all proposals include:

- a set of clear and comprehensive specifications of the required assignment;
.. certification that each of the consultancy requirements (see above) has been, or will be met;

.. details of the proposed selection process including methodology and justification e.g. consideration of known contenders or advertisement for expressions of interest;

.. detailed costing including:
  - rates of remuneration;
  - expected time pattern of payments;
  - incidentals (travel and accommodation);
  - appropriate funding vote with certification of availability of funds;
  - cost-benefit statement;

.. proposed administrative arrangements:
  - name of officer in charge;
  - proposed support service;
  - details of reporting mechanism.

**ENGAGEMENT AND CONTRACTUAL ARRANGEMENTS**

The successful consultant should be notified by letter.

The description of services to be provided and the terms under which they are to be carried out should be carefully documented. It is important that provision be made for periodic assessment of progress. These assessments would normally provide the basis for progress payments.

The terms of payment should be quite explicit in the contract documentation. It should include for example, specific coverage for fees, travel and subsistence, support staff, printing and accommodation.

The main steps involved in engaging a consultant are presented in Figure 5.4 of Chapter 5.

**CENSUS OR SAMPLE SURVEY**

Once an establishment register has been compiled and the essential information collated, more in-depth industry research can proceed.
A survey of the population of establishments on the industry register provides a useful mechanism through which more detailed industry data may be collected. The survey can be of two main types, a census survey or sample survey.

A census, by definition, requires that every establishment in an industry respond to a survey and provide data for analysis. Clearly, in most industries this would create large logistical problems and in most instances the cost would be prohibitive. This is because:

1. at the small scale or marginal end of an industry, firms are continually entering or leaving the industry;
2. maintaining the register to the precise standard required in a census would be very resource intensive.

In general, a census survey, except in industries that are very small or highly concentrated geographically, is not a viable benefit/cost option. The preferred and recommended survey technique is sampling the population listed in the establishment register. Sample surveying involves the application of statistical concepts. It is not the purpose of the following section to itemize these techniques, but rather to present an introductory overview to assist in an understanding of the main elements.

SAMPLE SELECTION STRATEGY

In designing a sample for a survey of industry establishments, there are a number of requirements common for most industry-based populations.

The size of industrial establishments (usually measured by the number of employees) can vary considerably over a population. Usually there will be a large number of small establishments which will not contribute greatly to the total output for the industry as a whole, with decreasing numbers of larger establishments to a small number of very large establishments. These very large establishments may dominate the industry in terms of output and employment. In drawing a sample of establishments it is necessary to take this structure into account, thus enabling the sample to represent the industry as closely as possible. If for instance, the sample is drawn with equal probability from all establishments, it will consist almost entirely of small units while the larger ones, which make the greater contribution to output and employment, may not be represented at all.
The type of sample design also depends on the information available. The following guidelines assume that a comprehensive list of industry establishments is available with information to classify each establishment by state, industry group, number of employees. It is also assumed that each member may be contacted if selected.

**SAMPLE DESIGN**

The way in which the sample is constructed should take into account the factors mentioned above, and also the particular output requirements of the survey.

The problem of disparity in establishment sizes can be addressed in one of two ways; Selection with Probability Proportional to Size (PPS) and Stratification by Size.

PPS selection involves giving larger enterprises a greater chance of inclusion in the sample than smaller enterprises, so that an establishment with one hundred employees for example, has ten times the chance of being in the sample, compared with an establishment with ten employees.

Stratification by size involves dividing the population into several mutually exclusive strata on the basis of establishment size (number of employees), and taking independent samples from each. Selection within the strata will be with equal probability - probability proportional to size is not appropriate here as the strata are designed to be relatively homogenous with respect to size. While there may be large differences in the size distribution in the population as a whole, these will be significantly reduced within the size strata.

If this approach is used, the number of strata and the stratum boundaries must be determined. In theory, the accuracy will be maximised by having as many strata as possible, but in practice, given operational constraints and the diminishing returns of extra strata, five or six strata usually suffice. The gain in precision is insufficient to warrant the cost of extra strata. Also the stratification variable will not correlate perfectly with the variables being measured, so that stratification by size will not give the greatest possible gain in precision.

Dividing the population into strata is a relatively straightforward exercise using a simple algorithm. The sample then needs to be allocated to the strata, that is, it is necessary to determine how many units to select from each stratum given the total sample size. The allocation can be done in one of two ways:

. proportional allocation; or
optimal allocation.

The former method simply allocates the sample proportionally to the number of units in the strata, while the latter method seeks to maximise the accuracy of the estimate by increasing the sample in more variable strata.

For the plastics survey the latter method was used, with the stratum containing the largest units completely enumerated, as this stratum is the most variable and has the greatest effect on the industry as a whole.

**ADDITIONAL STRATA**

If estimates for an industry sub-group at the state level are required, these can be obtained by stratifying these variables. This introduces extra problems if the total sample size is small. For instance, in the plastics industry survey cost constraints dictated a sample of 300. There are 14 sub-groups in the industry, and if (say) five size strata are used, a total of 70 strata is given with an average sample size of four units per stratum.

The small sample size per stratum increases the sampling error and amplifies the effects of non-response. To overcome this problem the number of strata must be reduced, either by reducing the industry strata to more manageable levels, or by stratifying by industry type and selecting within industry with probability proportional to size.

**NON-RESPONSE**

In a survey not all the units selected in the sample will respond, and allowance must be made for this. In a stratified sample this is done by assuming that the units which do not respond in a particular stratum are the same as those which do respond in that stratum.

Non-respondents are assumed to be represented by the total sample. If a particular group of respondents is less likely to respond then a bias will be introduced. In practice, non-response is usually highest amongst the smaller sized establishments.

**SAMPLE SELECTION**

Once a workable definition of the industry population has been developed, the main characteristics of the population should be ascertained.
Using the survey of employment and training in the plastics industry as an example, the definition chosen implies that a firm's size (i.e. employee numbers) and principal activity (e.g. film blowing) are key characteristics. From a population of about 2,800 firms, a frequency table was produced which listed the numbers of firms by size and activity. This produced a table of about 120 cells. A sample of 500 establishments was then selected via a computer algorithm to mirror the distribution of the total population on the two parameters of size and activity.

QUESTIONNAIRE DEVELOPMENT

Questionnaire development and design should proceed at the same time as sample selection and sample design. The questionnaire is the survey instrument and as such, is the communication medium through which information about the industry is received. The usefulness of the collected information is therefore directly related to the design and validity of the questionnaire schedule. It is therefore necessary that industry expertise be brought to bear at this stage of the survey procedure.

It is useful here to turn to the questionnaires that were successfully used in the survey of the plastics industry, found in Appendix D. Clearly parts of the questionnaire (e.g. industry activities and occupations) require in-depth technical knowledge only available to an industry expert (or group of experts) with wide experience in a range of industry sectors and activities. The development of the questionnaire therefore requires close liaison between industry experts and the consultant (or in-house researcher) in order to produce a relevant and valid instrument.

The process of questionnaire development for the plastics survey can be divided into two separate but closely linked activities. The first involves question formulation and the second is focused on the questionnaire design.

QUESTION FORMULATION

As discussed in the sections relating to the conceptual framework of industry analysis and labour market analysis (Chapter 7), the basic function of the survey questionnaire is to uncover the main expenditure aggregates affecting industry activity and employment levels, and to then investigate occupational employment and training responses within the industry. These include the important aggregates of:

- domestic expenditure;
Questions therefore need to be constructed which will enable estimates of the impact of these parameters on industry activity and employment to be derived.

As will be appreciated this is a complex task, particularly given the difficulty of estimating variables which do not lend themselves to measurement and quantification. The questionnaire used in the survey of the plastics industry provides an example of how the concepts discussed in the conceptual framework (Chapter 7) can be presented in a practical and easily understood format. Clearly, the questions were formulated to suit a manufacturing industry and, more specifically the plastics industry.

However similar methods can be adopted for studies of service or primary industries.

For example, questions related to uncovering domestic consumption expenditure include questions 2 and 3 from the DIRECT INTERVIEW questionnaire and question 14 from the MAIL-BACK questionnaire, as given in Appendix D.

Examples of questions framed to capture investment expenditure include question 3 from the DIRECT INTERVIEW questionnaire, given in Appendix D.

Government expenditure - as with consumption expenditure, is particularly difficult to quantify. Questions were framed therefore to assess the impact of government activities on production and employment. For example, see question 4 from the DIRECT INTERVIEW questionnaire, given in Appendix D.

The list of occupations described in the plastics industry questionnaire is, as expected, industry specific. For example, drawing up a list of occupations requires an industry expert with wide experience across the industry. This list of occupations must be complete and efforts must be made to remove any confusion arising from the possibility of the same occupation being listed twice with a different title. The list of occupations is essential for labour market analysis of the industry. It is also important for a detailed assessment of training provision and training needs.
When developing questions concerned with detailed supply and demand assessment for particular occupations, the following checklist could be used to identify the various elements that could be considered.

WORKFORCE SIZE AND STRUCTURE (Box 7: Fig 7.1 in Chapter 7)

1. Description of occupation - includes duties, specialisations, activities or processes undertaken by workers - i.e. an evaluation of ASCO structure and content.


3. Current employment estimate - discussion of methods used to derive estimate.

4. Occupational profile and characteristics - discussion of occupational employment according to, for example, age, gender, qualifications, and occupational status.

5. Major employing industries - occupational distribution according to industry (ASIC).

SUPPLY TRENDS AND FEATURES (Box 8: Fig 7.1 in Chapter 7)

1. Formal training arrangements:
   - names/types of institutions providing training;
   - courses and qualifications to be included in assessment of supply;
   - structure and length of training;
   - new developments, innovations in training arrangements;
   - industry involvement in formal training arrangements;
   - reported deficiencies, constraints in training arrangements e.g. adequacy of funding, equipment, relevance and structure of courses, date of last curriculum review, quality of students;
   - assessment of quality of training arrangements;
   - desirable measures of improvement of training;
ongoing post-employment formal training arrangements e.g. numbers in training x type of course - includes TAFE post-trade courses, skills centres, private ongoing training provision;

- provision of group apprenticeships - significance;

- provision of trade-based employment courses - significance.

On-the-job training arrangements:

- structure, type and length of training;

- breadth of industry involvement;

- significance relative to formal training (e.g. shifts in the balance between public/private sector training effort);

- perceived adequacy of training (quantity, quality).

Training intakes:

- description and explanation of major trends;

- assessment of likely future trends;

- profile of training intakes (e.g. by age, sex, educational attainment, number and proportion of overseas students).

Training outputs:

- description and explanation of major trends;

- assessment of likely future trends;

- trends in wastage during training;

- profile of training outputs (e.g. by age, sex, educational attainment, numbers and proportion of overseas students).

Supply from immigration

- description and explanation of major trends;

- assessment of likely future trends;

- identification of net migration flows (if possible);
- separation of 'selected' (skilled) migration from family/refugee migration.

. Other supply sources (e.g. TRRA, "Cross-overs" or informal upgrading).

. Supply constraints (e.g. licensing arrangements, barriers to entry to training).

. Occupational wastage:

- gross wastage rates, and interpretation/explanation;
- net wastage rates (allowing for re-entries etc.);
- replacement demand requirements.

. Department of Employment, Education and Training labour market program activity:

- numbers trained under recent Departmental program initiatives (e.g. National Skills Shortage element of Adult Training Program);
- expected/desirable developments.

DEMAND TRENDS AND FEATURES (Box 9: Fig 7.1 in Chapter 7)

. Main determinants of activity levels within the major employing industries.

. Current level of demand and relative importance of determinants.

. Likely future level of demand in the short and medium terms taking into account:

- changes in levels and rates of expenditure i.e. consumption, investment, government expenditure and expenditure on imports and exports;
- effect of changing institutional arrangements;
- changes in working practices and arrangements (e.g. broad-banding, multi-skilling etc.);
- changes in tastes;
- technological and structural changes;
- changing cost structures;
- changes in prices of complementary and substitute products;
- influence of cyclical, seasonal and irregular factors;
- the effect of changes in government policy.

Key indicators of industry activity should be examined including:
- turnover;
- value added;
- gross fixed capital expenditure;
- new projects approved;
- industry specific indicators.

Using information from above, necessary to translate (changes in) industry activity levels to (changing) demand for particular occupations. The following sources should be utilised and discussed:
- CES estimates from relevant OCES (zones) of applicants and vacancies;
- private employment agencies;
- unions/associations;
- Skilled Vacancy Survey (SVS) and other vacancy data;
- relevant employers;
- capacity utilisation.

OVERALL ASSESSMENT (Box 10: Fig 7.1 in Chapter 7)

Historical perspective:
- previous trends in occupational labour market conditions;
- volatility assessment (e.g. sensitivity to economic/industrial conditions).
Current labour market rating:
- for new entrants (e.g. using GCCA data);
- for experienced workers;
- description and explanation of assessment.

Forward labour market ratings:
- short-term (12 months);
- medium-term (3 years);
- explanatory comments.

SUMMARY AND CONCLUSIONS

Supply overview.

Demand overview.

Labour market assessment.

Labour market outlook.

Policy implications (education, training, labour market programs, immigration etc.).

The information derived from undertaking the labour market analysis provides the basis for selecting occupations for the publication of the occupational analysis and training needs analysis techniques outlined in Chapter 7.

Factors which are important for the selection of particular occupations for further analysis include:

- Identification of a particular occupation/skill as strategic to industry performance;
- Assessment of a current or likely future occupational skill shortage;
- Occupations where technological change is seen as likely to have a significant impact on duties, tasks and skills;
- Industry perceptions of inadequacy of training arrangements for an occupation;
. Occupations which have a significant reliance on immigration to meet skill requirements;

. Occupations which are newly emerging and for which identification of skill requirements will be necessary in order to develop appropriate training curricula.

WHAT INFORMATION WILL THE SURVEY PRODUCE?

The desired output or results from the survey is also a critical consideration during questionnaire development. The major outputs expected from the plastics questionnaire are detailed in Appendix E. One of these outputs is an extensive list of tables which will form the basis for analysis of the industry. A complete list of the tables specified for the survey of the plastics industry can be found in Appendix E. This schedule of tables represents the arrangement of basic survey information into a form that exposes the elements of the industry for analysis.

Clearly, the design of a questionnaire and the type of questions asked will limit the extent and detail of the data analysis stage. It may not be possible to compare some questions with others because the underlying definition of similar terms is different, or the answer categories are not exclusive. These areas of questionnaire design should be discussed with specialists who should also be consulted on design and lay-out aspects.

QUESTIONNAIRE DESIGN

In the design of any questionnaire, a number of drafts will be required prior to testing activity. Drafts are directly influenced by the findings from the tests. Questions should not be added to a tested questionnaire without additional testing to ascertain the performance of the new questions.

With regard to the wording of questions, it is important to avoid:

. words likely to be unfamiliar to the respondent;

. negative words and formulations;

. broad concepts (e.g. advertising, the government, cost of living);

. two questions in one;
questions that offer long alternatives as a 'choice for an answer';

questions that call for significant effort by the respondent, e.g. memory-dependent questions, questions involving calculations.

The presentation of a questionnaire is most important. Provide plenty of space between questions. Do not crowd questions and detailed instructions together on one page. Answer boxes and spaces should be clearly marked. For coding purposes, all answers must be coded into numbers or characters. As such, coders require code boxes to be numbered sequentially.

QUESTIONNAIRE PRE-TESTING AND PILOT TESTING

In standard research practice, a pre-test or draft version of the questionnaire is tested on a small sample of respondents. The aim is to evaluate question performance, identify difficulties relating to individual items, layout, instructions and any other problem related to the questionnaire itself.

The findings from a project pilot test usually focus on methodological and organisation problems; for example, difficulties in contacting a respondent or problems in coding open-ended questions. The pilot test results will also indicate the adequacy or otherwise of interviewer training.

LOGISTICS

Each answer provided by a respondent has to be coded in some way. Coding is necessary if answers are to be cross-tabulated and analysed. It is common practice to code answers using numeric code boxes. The coding of multi-response and open-ended questions are labour intensive activities and will cost a good deal more to process than single answer questions.

Quality questionnaire design, layout and instructions are essential for self-completion schedules. A high standard of interviewer training and field notes are also essential for face-to-face schedules. In both cases, detailed coding instructions for coding staff are required. These instructions indicate what is to be coded and how it is to be coded.

The sample selected for the pre-test need not be scientifically designed. It should, however, be cross-sectional in character. That is, it should include a wide range of respondent types. In this way, individual questions are tested under variable conditions.
Only senior experienced interviewer resources should be utilised for questionnaire pre-testing. Interviewers should be briefed and debriefed. The debriefing session will form the basis for question assessment and modification. Recommendations and question modifications are then developed and presented to the client.

**INTERVIEWING**

A pilot, or complete "dress rehearsal" of the study is conducted following the pre-test to target any organisational inefficiencies or difficulties, problems in field control and procedures and ambiguities in editing, coding and punching.

It is essential that any proposed questionnaire be pre-tested and piloted. Pre-testing activity requires a minimum of three weeks, whereas piloting is dependent upon the methodology used.

Interviewer/field staff instructions are usually drafted prior to the pilot stage and are modified and finalised as a consequence of the testing phase. Decisions regarding extra interviewer training can be made during this time. In addition, assumptions associated with infield resource allocation and the time periods required for various activities can be evaluated as a result of pilot activity.

**INTERVIEWER TRAINING**

For studies which utilise face-to-face interviewers it is essential that the interviewers be suitably equipped and trained for the task. Such training should provide the interviewer with:

- a full understanding of the purposes of the survey; and
- the necessary confidence and skills to undertake the task.

Unless these two main objectives of training are achieved, it is likely that the level of respondent and non-sampling error associated with the study will increase significantly.

It is suggested that for experienced interviewers a 2 day formal course be the minimum allocated for a workforce study based on the plastics survey configuration. Courses should consist of three main components:

- lectures;
- practice of mock interviews in the office (role plays) and;
- interviews in the field.
The training design and process may be tested during the pilot phase of the project. Following interviewer debriefing, modifications to the training program may be undertaken.

For the plastics survey the training package utilised by ABG: McNair consisted of:

- interviewer training agenda;
- interviewer home study exercise;
- interviewer training course script and overhead slides;
- class exercises and role plays;
- interviewer field instructions;
- field manager instructions;

The package provided the following details:

- nature and purpose of the project:
  - sponsors;
  - reasons;
  - information access;
  - use;
  - how the sample was drawn;
  - McNair contacts for problems;

- a mock-up questionnaire already completed for use during role plays;

- dialogue for the role play which illustrated a typical interview with a plastics firm executive;

- interviewer instructions:
  - methodology;
  - questionnaire design;
  - field procedures;
  - non-contact issues;
  - answers to common questions;
  - workload arrangements;
  - response recording;
  - editing;
  - estimation;
Training was provided to groups of ten or less and was conducted in the form of group discussion. While working through the role play situations, each interviewer had chance to discuss each question thoroughly. The main objective was to equip interviewers with a high degree of self-confidence and sufficient knowledge to be able to cope effectively with most situations.

**SUMMARY**

The main steps then, that are involved in the implementation of the industry analysis and labour market analysis framework may be summarised as:

**Development of hypotheses for investigation**

. Necessary to determine the hypotheses which will be examined:
  
  - this will form the basis for development of the questionnaire.

**Industry definition**

. Recognition of different definitional possibilities and interest of various parties in a particular definition.

. Need to arrive at either a definition of general acceptability in both government and industry circles, or a flexible definition i.e. one that can be varied for different users on the basis of particular questions set within the questionnaire.

. Essential to liaise closely with ABS to ensure methodological validity.
Industry register

- Following industry definition it is necessary to develop a complete listing of all units in the industry.

- This register should include:
  - identification of the organisational level of the units e.g. location, establishment or enterprise;
  - a frame of units on the basis of the criterion to be used in selecting sample e.g. employment size, location and major product/service produced;
  - telephone number and relevant contacts.

Target questionnaires to the industry of study

- The "generic" questionnaires developed as the basis for data collection will need to be "targetted" to the industry under survey.

- This step will require extensive consultation with industry.

Joint report procedure with ABS

- There is a statutory requirement for government sponsored statistical collections to be approved by the ABS:
  - this is aimed at reducing respondent burden, maximising compatibility with existing ABS data and definitions, and ensuring the statistical standards of the survey.

- This procedure will require ABS involvement in industry definition and design issues.

Selection of consultant

- Need to develop a project brief outlining:
  - background to the project;
  - consultant's functions;
  - broad criteria for selection;
  - administrative arrangements.
. Placement of advertisement seeking applications from consultants.

. Distribution of project brief to applicants.

. Answering of questions from consultants and distribution of relevant background information.

. Development of criteria for selection of the consultant.

. Detailed examination of consultant applications.

. Short listing of applicants.

. More detailed specification of consultant's functions to form the basis for interview (as well as control/monitoring of task performance) of short listed consultants.

. Determination of interview team.

. Selection of consultant and written agreement on the detailed specification of functions procedures, timetable and costs.

**Establishment of consultative mechanisms**

. With industry for:

  - questionnaire preparation;
  - gaining support for survey:

    : hold seminars in each state with selected industry representatives to explain purposes of study and gain support and publicity for survey;
    : briefing for industry associations, relevant industry council and union representatives.

. With relevant government institutions, e.g. ABS, DI TAC.

**Field testing of questionnaires**

. Following the development of the questionnaires it will be necessary to field test the questionnaires with a number of establishments chosen from the register. The consultant will usually be responsible for this stage.
Once the results of field testing have been analysed, meeting(s), which include the consultant, should be held to finalise the questionnaires.

Sample selection

It will be necessary to determine the overall size of the sample taken:

- this will involve a trade-off between cost and the standard error of information collected.

Given the sample size it is then necessary to allocate the sample on the basis of the criteria previously identified in compiling the industry register.

Development of mechanisms for control/monitoring of consultant tasks

Basis for this is the detailed specification of consultant’s functions.

This specification should provide for:

- performance of tasks at satisfactory level of quality and standard;
- performance of particular tasks within a specified time frame;
- production of outputs by certain deadlines;
- opportunities for monitoring of tasks as they are performed and associated authority to change procedures deemed inadequate.

Training of interview team

Very important that people selected for interview team have appropriate qualities and receive thorough training in the subject area to be covered in the interview.

This stage should be closely monitored and will require close liaison with the consultant on:

- appropriate interview team size;
- selection of interviewers;
- selection of interviewer trainers;
- training curriculum;
- output of initial interviews.

Conduct of the surveys

. Mail survey distribution and collection.

. Setting up and conduct of direct interview.

. Procedures to increase response rates.

. Quality control procedures.

. Editing, coding and data processing of survey results.

. Provision of final outputs.

Analysis

. Will be based on survey results supplemented by information from other sources.

. Analysis will provide:
  
  - employment and training profile of industry;
  - assessment of "hypotheses";
  - provision of policy suggestions in the education and training area as well as related policy areas.
APPENDIX D : QUESTIONNAIRES USED IN THE PLASTICS INDUSTRY SURVEY

The following two questionnaires used in the plastics industry survey are presented:

. Part 1: mail-based questionnaire;

CONFIDENTIAL

AUSTRALIAN COUNCIL FOR EMPLOYMENT AND TRAINING
(ACET)/NATIONAL PLASTICS INDUSTRY TRAINING COMMITTEE (NPITC)

SURVEY OF THE PLASTICS INDUSTRY

PART 1: MAIL BASED QUESTIONNAIRE

This survey of the plastics industry is being undertaken by McNair Anderson Associates on behalf of the Australian Council for Employment and Training and the National Plastics Industry Training Committee. The purpose of the survey is to provide information on current and prospective employment and training within the plastics industry.

Your co-operation is sought in the completion of this questionnaire.

Individual company information collected in this survey will remain confidential to McNair Anderson. Only aggregate non company identifiable information will be released to the Australian Council for Employment and Training and the National Plastics Industry Training Committee.

PLASTICS OPERATION INFORMATION

| COMPANY NAME |
| ADDRESS |
| PARENT COMPANY (If applicable) |
| CONTACTS NAME |
| POSITION IN COMPANY |
| TELEPHONE NUMBER |

OFFICE USE

<table>
<thead>
<tr>
<th>Job No</th>
<th>Ref No</th>
<th>Post Code</th>
<th>ASIC Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>M A 1 7 8 4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

McNAIR ANDERSON ASSOCIATES
FEBRUARY 1987

19 - 20 CARD 01
INSTRUCTIONS

• This mail based questionnaire seeks information on the following topics:
  - profile of establishment operations
  - employment trends
  - education and training
  - past trends in plastics activity levels

• This questionnaire relates only to the operations or plant under your responsibility.

• Where questions cannot be answered precisely please provide a best estimate.

• If you have any queries regarding the questionnaire please contact the State Field Manager of McNair Anderson Associates in your State.

  The State Field Managers of McNair Anderson Associates can be contacted (quote "PROJECT PLASTIC") on the following telephone numbers:-

    Sydney  (02)  9296122
    Melbourne (03)  2676166
    Brisbane  (07)  8323400
    Adelaide  (08)  315788
    Perth     (09)  3221652

• The completed questionnaire will be collected by the interviewer who visits your establishment to perform Part 2 of the survey - the Direct Interview Questionnaire. This stage will also provide an opportunity for clarification of any problems with respect to completion of the mail based questionnaire. An appointment for an interview will be made shortly with you by a representative of McNair Anderson Associates.
Note: This questionnaire only relates to the operations or plant under your responsibility.

PROFILE OF PLASTIC OPERATIONS

1. With respect to the plastics activities outlined below, please indicate using a tick.

- which activities your operation is engaged in
  (tick as many boxes as applicable)

- the main plastics activity in your operation
  (tick one box only)

<table>
<thead>
<tr>
<th>PLASTICS ACTIVITIES</th>
<th>ACTIVITIES IN WHICH OPERATION IS ENGAGED</th>
<th>MAIN ACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Injection Moulding</td>
<td>21 [ ] -1</td>
<td>23 [ ] -1</td>
</tr>
<tr>
<td>2. Blow Moulding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Extrusion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Reinforced Plastics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Film Blowing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Urethane Processing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Toolmaking Design</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Toolmaking Maintenance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Foam Processing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Thermoforming and Fabrication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Calendering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Rotational Casting</td>
<td>22 [ ] -1</td>
<td>24 [ ] -1</td>
</tr>
<tr>
<td>13. Coatings and Laminations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Compression Transfer Moulding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Equipment Suppliers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Material Suppliers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Specialist Intellectual or Management Suppliers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Other (please specify)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

...
2. Please indicate using a tick which of the following plastics related functions are undertaken by your operation. (Tick as many boxes as are applicable)

<table>
<thead>
<tr>
<th>Plastics Related Functions</th>
<th>Functions in which Operation is Engaged</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Production of petrochemical and plastics raw materials</td>
<td>25 -1</td>
</tr>
<tr>
<td>2. Design of plastics products</td>
<td>-2</td>
</tr>
<tr>
<td>3. Manufacture of plastics products</td>
<td>-3</td>
</tr>
<tr>
<td>4. Wholesaling of plastics materials and products</td>
<td>-4</td>
</tr>
<tr>
<td>5. Retailing of plastics materials and products</td>
<td>-5</td>
</tr>
<tr>
<td>6. Product installation and equipment servicing</td>
<td>-6</td>
</tr>
<tr>
<td>7. Other (please specify)</td>
<td>-7</td>
</tr>
</tbody>
</table>

3. Please record in percentages (%) the relative importance of plastics related activities compared to non-plastics activities in output and employment for 1985-86 (actual) and 1986-87 (expected).

<table>
<thead>
<tr>
<th>ACTIVITIES</th>
<th>1985-86</th>
<th>1986-87</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Actual</td>
<td>Expected</td>
</tr>
<tr>
<td></td>
<td>Output (%)</td>
<td>Employment (%)</td>
</tr>
<tr>
<td>Plastics Related Activities</td>
<td>26</td>
<td>29</td>
</tr>
<tr>
<td>Non-Plastics Activities (e.g. production or assembly of non plastic products)</td>
<td>38</td>
<td>41</td>
</tr>
</tbody>
</table>

If non-plastics activities are recorded at zero above please proceed to Question 5.
4. Please list what products/services in sectors other than plastics you produce.

<table>
<thead>
<tr>
<th>Non-Plastics Products and Services</th>
<th>50 - 51</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
</tr>
</tbody>
</table>

5. Please indicate, using a tick, at what level your plastics activity takes place.

<table>
<thead>
<tr>
<th>Organisational Level</th>
<th>Level at which Plastics Activity Undertaken</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Company</td>
<td>52 -1</td>
</tr>
<tr>
<td>2. Subsidiary of</td>
<td>-2</td>
</tr>
<tr>
<td>Company</td>
<td></td>
</tr>
<tr>
<td>3. Section of a Plant</td>
<td>-3</td>
</tr>
</tbody>
</table>
4.

ALL OF THE REMAINING QUESTIONS RELATE ONLY TO PLASTICS ACTIVITIES. PLEASE ANSWER THE QUESTIONS ONLY IN RELATION TO SUCH ACTIVITIES. IF ALL OF YOUR ESTABLISHMENT IS INVOLVED IN PLASTICS ACTIVITIES PLEASE ANSWER QUESTIONS WITH RESPECT TO THE TOTAL ESTABLISHMENT.

EMPLOYMENT TRENDS


<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Employees</th>
<th></th>
<th></th>
<th></th>
<th>Full-Time</th>
<th>Part-Time/Casual</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M*</td>
<td>F*</td>
<td>M</td>
<td>F</td>
<td>M</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARD 02</td>
<td>1987 (E)*</td>
<td>21</td>
<td>24</td>
<td>27</td>
<td>30</td>
<td>33</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>1986</td>
<td>39</td>
<td>42</td>
<td>45</td>
<td>48</td>
<td>51</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>1985</td>
<td>57</td>
<td>60</td>
<td>63</td>
<td>66</td>
<td>69</td>
<td>72</td>
</tr>
<tr>
<td>ARD 03</td>
<td>1984</td>
<td>21</td>
<td>24</td>
<td>27</td>
<td>30</td>
<td>33</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>1983</td>
<td>39</td>
<td>42</td>
<td>45</td>
<td>48</td>
<td>51</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>1982</td>
<td>57</td>
<td>60</td>
<td>63</td>
<td>66</td>
<td>69</td>
<td>72</td>
</tr>
<tr>
<td>ARD 04</td>
<td>1981</td>
<td>21</td>
<td>24</td>
<td>27</td>
<td>30</td>
<td>33</td>
<td>36</td>
</tr>
</tbody>
</table>

* M - Male
F - Female
E - Expected
7. Please indicate the number of people employed in plastics related activities in each category of occupation listed below, at 30 June 1981, 1984 and provide an estimate for 30 June 1987. If some of your employees undertake more than one occupation allocate them to their main occupation. If no-one is employed in an occupation please tick the box in the "not applicable" column.

<table>
<thead>
<tr>
<th>Occupation</th>
<th>June 30</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CARD 05</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Managers</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Specialist Managers</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
<td>37</td>
<td>38</td>
</tr>
<tr>
<td>Scientists (excludes Material Scientists)</td>
<td>45</td>
<td>46</td>
<td>47</td>
<td>48</td>
<td>49</td>
<td>50</td>
</tr>
<tr>
<td>Engineers (includes Material Scientists)</td>
<td>57</td>
<td>58</td>
<td>59</td>
<td>60</td>
<td>61</td>
<td>62</td>
</tr>
<tr>
<td>Business Professionals</td>
<td>69</td>
<td>70</td>
<td>71</td>
<td>72</td>
<td>73</td>
<td>74</td>
</tr>
<tr>
<td>Science Technical Officers/Technicians</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Tool Designers</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
<td>37</td>
<td>38</td>
</tr>
<tr>
<td>Engineering Technicians</td>
<td>45</td>
<td>46</td>
<td>47</td>
<td>48</td>
<td>49</td>
<td>50</td>
</tr>
<tr>
<td>Metal Tradespersons</td>
<td>57</td>
<td>58</td>
<td>59</td>
<td>60</td>
<td>61</td>
<td>62</td>
</tr>
<tr>
<td>Other Tradespersons</td>
<td>69</td>
<td>70</td>
<td>71</td>
<td>72</td>
<td>73</td>
<td>74</td>
</tr>
<tr>
<td><strong>CARD 06</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Processing and Business Machine Operators</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Other Clerks</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
<td>37</td>
<td>38</td>
</tr>
<tr>
<td>Salespersons and Personal Service Workers</td>
<td>45</td>
<td>46</td>
<td>47</td>
<td>48</td>
<td>49</td>
<td>50</td>
</tr>
<tr>
<td>Supervisor, Plastics Production Machine Operators</td>
<td>57</td>
<td>58</td>
<td>59</td>
<td>60</td>
<td>61</td>
<td>62</td>
</tr>
<tr>
<td>Plastics Die Setters</td>
<td>69</td>
<td>70</td>
<td>71</td>
<td>72</td>
<td>73</td>
<td>74</td>
</tr>
<tr>
<td><strong>CARD 07</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cellular Plastics Machine Setter</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Plastics Extruding Machine Setter</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
<td>37</td>
<td>38</td>
</tr>
<tr>
<td>Plastics Moulding Machine Setter</td>
<td>45</td>
<td>46</td>
<td>47</td>
<td>48</td>
<td>49</td>
<td>50</td>
</tr>
<tr>
<td>Thermoforming Machine Setter</td>
<td>57</td>
<td>58</td>
<td>59</td>
<td>60</td>
<td>61</td>
<td>62</td>
</tr>
<tr>
<td>Plastics Extruding Machine Operator</td>
<td>69</td>
<td>70</td>
<td>71</td>
<td>72</td>
<td>73</td>
<td>74</td>
</tr>
</tbody>
</table>

236
<table>
<thead>
<tr>
<th>Occupation</th>
<th>June 30</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1981</td>
<td>1984</td>
<td>1987 (E)</td>
<td>Not</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M*</td>
<td>F*</td>
<td>M</td>
<td>F</td>
<td>M</td>
<td>F</td>
</tr>
<tr>
<td>Blow Moulding Machine Operator</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>27</td>
<td>28</td>
<td>29</td>
<td>30</td>
<td>31</td>
<td>32</td>
</tr>
<tr>
<td>Compression Moulding Machine</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
<td>37</td>
<td>38</td>
</tr>
<tr>
<td>Operator</td>
<td>39</td>
<td>40</td>
<td>41</td>
<td>42</td>
<td>43</td>
<td>44</td>
</tr>
<tr>
<td>Injection Moulding Machine</td>
<td>45</td>
<td>46</td>
<td>47</td>
<td>48</td>
<td>49</td>
<td>50</td>
</tr>
<tr>
<td>Operator</td>
<td>51</td>
<td>52</td>
<td>53</td>
<td>54</td>
<td>55</td>
<td>56</td>
</tr>
<tr>
<td>Rotational Moulding Machine</td>
<td>57</td>
<td>58</td>
<td>59</td>
<td>60</td>
<td>61</td>
<td>62</td>
</tr>
<tr>
<td>Operator</td>
<td>63</td>
<td>64</td>
<td>65</td>
<td>66</td>
<td>67</td>
<td>68</td>
</tr>
<tr>
<td>Thermoforming Machine Operator</td>
<td>69</td>
<td>70</td>
<td>71</td>
<td>72</td>
<td>73</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>75</td>
<td>76</td>
<td>77</td>
<td>78</td>
<td>79</td>
<td>80</td>
</tr>
<tr>
<td>Plastics Foam Machine Operator</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>27</td>
<td>28</td>
<td>29</td>
<td>30</td>
<td>31</td>
<td>32</td>
</tr>
<tr>
<td>Plastics Sheet Press Operator</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
<td>37</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>39</td>
<td>40</td>
<td>41</td>
<td>42</td>
<td>43</td>
<td>44</td>
</tr>
<tr>
<td>Plastics Powder Hand</td>
<td>45</td>
<td>46</td>
<td>47</td>
<td>48</td>
<td>49</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>51</td>
<td>52</td>
<td>53</td>
<td>54</td>
<td>55</td>
<td>56</td>
</tr>
<tr>
<td>Plastics Gun Hand</td>
<td>57</td>
<td>58</td>
<td>59</td>
<td>60</td>
<td>61</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>63</td>
<td>64</td>
<td>65</td>
<td>66</td>
<td>67</td>
<td>68</td>
</tr>
<tr>
<td>Wire Sheather</td>
<td>69</td>
<td>70</td>
<td>71</td>
<td>72</td>
<td>73</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>75</td>
<td>76</td>
<td>77</td>
<td>78</td>
<td>79</td>
<td>80</td>
</tr>
<tr>
<td>Plastics Products Labourer</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>27</td>
<td>28</td>
<td>29</td>
<td>30</td>
<td>31</td>
<td>32</td>
</tr>
<tr>
<td>Cellular Plastics Cutter</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
<td>37</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>39</td>
<td>40</td>
<td>41</td>
<td>42</td>
<td>43</td>
<td>44</td>
</tr>
<tr>
<td>Hand Laminator</td>
<td>45</td>
<td>46</td>
<td>47</td>
<td>48</td>
<td>49</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>51</td>
<td>52</td>
<td>53</td>
<td>54</td>
<td>55</td>
<td>56</td>
</tr>
<tr>
<td>Lay-Up Hand</td>
<td>67</td>
<td>68</td>
<td>69</td>
<td>70</td>
<td>71</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td>73</td>
<td>74</td>
<td>75</td>
<td>76</td>
<td>77</td>
<td>78</td>
</tr>
<tr>
<td>Plastics Mould Hand</td>
<td>69</td>
<td>70</td>
<td>71</td>
<td>72</td>
<td>73</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>75</td>
<td>76</td>
<td>77</td>
<td>78</td>
<td>79</td>
<td>80</td>
</tr>
<tr>
<td>Plastics Sheet Fabricator</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>27</td>
<td>28</td>
<td>29</td>
<td>30</td>
<td>31</td>
<td>32</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
<td>37</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>39</td>
<td>40</td>
<td>41</td>
<td>42</td>
<td>43</td>
<td>44</td>
</tr>
</tbody>
</table>

*M - Male  F - Female  (E) - Expected
8. Have you had any difficulty in recruiting workers for plastics activities over the last 12 months?

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Recruitment Difficulty Experienced</th>
<th>Insufficient Numbers of Suitably Qualified Persons</th>
<th>No Relevant Training Course Available</th>
<th>General Difficulty in Obtaining Labour</th>
<th>Other (please specify)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Managers</td>
<td>22</td>
<td>24</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Specialist Managers</td>
<td></td>
<td>25</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Scientists (excludes Material Scientists)</td>
<td></td>
<td>26</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Engineers (includes Material Scientists)</td>
<td></td>
<td>27</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Business Professionals</td>
<td></td>
<td>28</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Science Technical Officers/Technicians</td>
<td></td>
<td>29</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Tool Designers</td>
<td></td>
<td>30</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Engineering Technicians</td>
<td></td>
<td>31</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Metal Tradespersons</td>
<td></td>
<td>32</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Other Tradespersons</td>
<td>23</td>
<td>33</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Data Processing and Business Machine Operators</td>
<td></td>
<td>34</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Other Clerks</td>
<td></td>
<td>35</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Salespersons and Personal Service Workers</td>
<td></td>
<td>36</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Supervisor, Plastics Production Machine Operators</td>
<td></td>
<td>37</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Plastics Die Setters</td>
<td></td>
<td>38</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Cellular Plastics Machine Setter</td>
<td></td>
<td>39</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Plastics Extruding Machine Setter</td>
<td></td>
<td>40</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Plastics Moulding Machine Setter</td>
<td></td>
<td>41</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

If YES, please identify the occupation(s) by ticking the appropriate box. Could you also indicate with a tick what you perceive to be the main reason for recruitment difficulties.
<table>
<thead>
<tr>
<th>Occupation</th>
<th>Recruitment Difficulty Experienced</th>
<th>Insufficient Numbers of Suitably Qualified Persons</th>
<th>No Relevant Training Course Available</th>
<th>General Difficulty in Obtaining Labour</th>
<th>Other (please specify)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermoforming Machine Setter</td>
<td>24</td>
<td>42</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Plastics Extruding Machine Operator</td>
<td>22</td>
<td>23</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Blow Moulding Machine Operator</td>
<td></td>
<td>2</td>
<td>24</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Compression Moulding Machine Operator</td>
<td>3</td>
<td>25</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Injection Moulding Machine Operator</td>
<td></td>
<td>4</td>
<td>26</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Rotational Moulding Machine Operator</td>
<td></td>
<td>5</td>
<td>27</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Thermoforming Machine Operator</td>
<td></td>
<td>6</td>
<td>28</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Plastics Foam Machine Operator</td>
<td></td>
<td>7</td>
<td>29</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Plastics Sheet Press Operator</td>
<td></td>
<td>8</td>
<td>30</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Plastics Powder Hand</td>
<td></td>
<td>9</td>
<td>31</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Plastics Gun Hand</td>
<td></td>
<td>23</td>
<td>32</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Wire Sheather</td>
<td></td>
<td>2</td>
<td>33</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Plastics Products Labourer</td>
<td></td>
<td>3</td>
<td>34</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Cellular Plastics Cutter</td>
<td></td>
<td>4</td>
<td>35</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Hand Laminator</td>
<td></td>
<td>5</td>
<td>36</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Lay-Up Hand</td>
<td></td>
<td>6</td>
<td>37</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Plastics Mould Hand</td>
<td></td>
<td>7</td>
<td>38</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Plastics Sheet Fabricator</td>
<td></td>
<td>8</td>
<td>39</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
<td>9</td>
<td>40</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
9. Have you found it necessary during the past 5 years to recruit workers from overseas to meet your plastics activity labour needs?

<table>
<thead>
<tr>
<th>YES</th>
<th>21- 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>2</td>
</tr>
</tbody>
</table>

If yes, please indicate for which occupations and the numbers involved. (For 1986-87 please indicate recruitment of overseas workers to date plus any expected recruitment of overseas workers over the remainder of the financial year).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>General Managers</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Specialist Managers</td>
<td>32</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
</tr>
<tr>
<td>Scientists (excludes Material Scientists)</td>
<td>42</td>
<td>43</td>
<td>44</td>
<td>45</td>
<td>46</td>
</tr>
<tr>
<td>Engineers (includes Material Scientists)</td>
<td>52</td>
<td>53</td>
<td>54</td>
<td>55</td>
<td>56</td>
</tr>
<tr>
<td>Business Professionals</td>
<td>62</td>
<td>63</td>
<td>64</td>
<td>65</td>
<td>66</td>
</tr>
<tr>
<td>Science Technical Officers/Technicians</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Tool Designers</td>
<td>32</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
</tr>
<tr>
<td>Engineering Technicians</td>
<td>42</td>
<td>43</td>
<td>44</td>
<td>45</td>
<td>46</td>
</tr>
<tr>
<td>Metal Tradespersons</td>
<td>52</td>
<td>53</td>
<td>54</td>
<td>55</td>
<td>56</td>
</tr>
<tr>
<td>Other Tradespersons</td>
<td>62</td>
<td>63</td>
<td>64</td>
<td>65</td>
<td>66</td>
</tr>
<tr>
<td>Data Processing and Business Machine Operators</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Other Clerks</td>
<td>32</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
</tr>
<tr>
<td>Salespersons and Personal Service Workers</td>
<td>42</td>
<td>43</td>
<td>44</td>
<td>45</td>
<td>46</td>
</tr>
<tr>
<td>Supervisor, Plastics Production Machine Operators</td>
<td>52</td>
<td>53</td>
<td>54</td>
<td>55</td>
<td>56</td>
</tr>
<tr>
<td>Plastics Die Setters</td>
<td>62</td>
<td>63</td>
<td>64</td>
<td>65</td>
<td>66</td>
</tr>
<tr>
<td>Cellular Plastics Machine Setter</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Plastics Extruding Machine Setter</td>
<td>32</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
</tr>
<tr>
<td>Plastics Moulding Machine Setter</td>
<td>42</td>
<td>43</td>
<td>44</td>
<td>45</td>
<td>46</td>
</tr>
<tr>
<td>Thermoforming Machine Setter</td>
<td>52</td>
<td>53</td>
<td>54</td>
<td>55</td>
<td>56</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------------</td>
</tr>
<tr>
<td>Plastics Extruding Machine Operator</td>
<td>62</td>
<td>63</td>
<td>64</td>
<td>65</td>
<td>66</td>
</tr>
<tr>
<td>Blow Moulding Machine Operator</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Compression Moulding Machine Operator</td>
<td>32</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
</tr>
<tr>
<td>Injection Moulding Machine Operator</td>
<td>42</td>
<td>43</td>
<td>44</td>
<td>45</td>
<td>46</td>
</tr>
<tr>
<td>Rotational Moulding Machine Operator</td>
<td>52</td>
<td>53</td>
<td>54</td>
<td>55</td>
<td>56</td>
</tr>
<tr>
<td>Thermofoming Machine Operator</td>
<td>62</td>
<td>63</td>
<td>64</td>
<td>65</td>
<td>66</td>
</tr>
<tr>
<td>Plastics Foam Machine Operator</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Plastics Sheet Press Operator</td>
<td>32</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
</tr>
<tr>
<td>Plastics Powder Hand</td>
<td>42</td>
<td>43</td>
<td>44</td>
<td>45</td>
<td>46</td>
</tr>
<tr>
<td>Plastics Gun Hand</td>
<td>52</td>
<td>53</td>
<td>54</td>
<td>55</td>
<td>56</td>
</tr>
<tr>
<td>Wire Sheather</td>
<td>62</td>
<td>63</td>
<td>64</td>
<td>65</td>
<td>66</td>
</tr>
<tr>
<td>Plastic Products Labourer</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Cellular Plastics Cutter</td>
<td>32</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
</tr>
<tr>
<td>Hand Laminator</td>
<td>42</td>
<td>43</td>
<td>44</td>
<td>45</td>
<td>46</td>
</tr>
<tr>
<td>Lay-UP Hand</td>
<td>52</td>
<td>53</td>
<td>54</td>
<td>55</td>
<td>56</td>
</tr>
<tr>
<td>Plastics Mould Hand</td>
<td>62</td>
<td>63</td>
<td>64</td>
<td>65</td>
<td>66</td>
</tr>
<tr>
<td>Plastics Sheet Fabricator</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>32</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
</tr>
</tbody>
</table>

E - Expected
10. Please record the number of plastics related employees who in calendar year 1986
* left employment in each of the occupations listed below
* were recruited in these occupations

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Number Who Left Employment</th>
<th>Number Recruited</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Managers</td>
<td>21</td>
<td>22 23</td>
</tr>
<tr>
<td>Specialist Managers</td>
<td>25</td>
<td>26 27</td>
</tr>
<tr>
<td>Scientists (excludes Material Scientists)</td>
<td>29</td>
<td>30 31</td>
</tr>
<tr>
<td>Engineers (includes Material Scientists)</td>
<td>33</td>
<td>34 35</td>
</tr>
<tr>
<td>Business Professionals</td>
<td>37</td>
<td>38 39</td>
</tr>
<tr>
<td>Science Technical Officers/Technicians</td>
<td>41</td>
<td>42 43</td>
</tr>
<tr>
<td>Tool Designers</td>
<td>45</td>
<td>46 47</td>
</tr>
<tr>
<td>Engineering Technicians</td>
<td>49</td>
<td>50 51</td>
</tr>
<tr>
<td>Metal Tradespersons</td>
<td>53</td>
<td>54 55</td>
</tr>
<tr>
<td>Other Tradespersons</td>
<td>57</td>
<td>58 59</td>
</tr>
<tr>
<td>Data Processing and Business Machine Operators</td>
<td>61</td>
<td>62 63</td>
</tr>
<tr>
<td>Other Clerks</td>
<td>65</td>
<td>66 67</td>
</tr>
<tr>
<td>Salespersons and Personal Service Workers</td>
<td>69</td>
<td>70 71</td>
</tr>
<tr>
<td>Supervisor, Plastics Production Machine Operators</td>
<td>73</td>
<td>74 75</td>
</tr>
<tr>
<td>Plastics Die Setters</td>
<td>77</td>
<td>78 79</td>
</tr>
<tr>
<td>Cellular Plastics Machine Setter</td>
<td>21</td>
<td>22 23</td>
</tr>
<tr>
<td>Plastics Extruding Machine Setter</td>
<td>25</td>
<td>26 27</td>
</tr>
<tr>
<td>Plastics Moulding Machine Setter</td>
<td>29</td>
<td>30 31</td>
</tr>
<tr>
<td>Thermoforming Machine Setter</td>
<td>33</td>
<td>34 35</td>
</tr>
<tr>
<td>Plastics Extruding Machine Operator</td>
<td>37</td>
<td>38 39</td>
</tr>
</tbody>
</table>

CARD 23

CARD 24
<table>
<thead>
<tr>
<th>Occupation</th>
<th>Number Who Left Employment</th>
<th>Number Recruited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blow Moulding Machine Operator</td>
<td>41</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>43</td>
</tr>
<tr>
<td></td>
<td></td>
<td>44</td>
</tr>
<tr>
<td>Compression Moulding Machine Operator</td>
<td>45</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td></td>
<td>47</td>
</tr>
<tr>
<td></td>
<td></td>
<td>48</td>
</tr>
<tr>
<td>Injection Moulding Machine Operator</td>
<td>49</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>51</td>
</tr>
<tr>
<td></td>
<td></td>
<td>52</td>
</tr>
<tr>
<td>Rotational Moulding Machine Operator</td>
<td>53</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td></td>
<td>55</td>
</tr>
<tr>
<td></td>
<td></td>
<td>56</td>
</tr>
<tr>
<td>Thermoforming Machine Operator</td>
<td>57</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td></td>
<td>59</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>Plastics Foam Machine Operator</td>
<td>61</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>63</td>
</tr>
<tr>
<td></td>
<td></td>
<td>64</td>
</tr>
<tr>
<td>Plastics Sheet Press Operator</td>
<td>65</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td></td>
<td>67</td>
</tr>
<tr>
<td></td>
<td></td>
<td>68</td>
</tr>
<tr>
<td>Plastics Powder Hand</td>
<td>69</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td></td>
<td>71</td>
</tr>
<tr>
<td></td>
<td></td>
<td>72</td>
</tr>
<tr>
<td>Plastics Gun Hand</td>
<td>73</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td></td>
<td>75</td>
</tr>
<tr>
<td></td>
<td></td>
<td>76</td>
</tr>
<tr>
<td>Wire Sheather</td>
<td>77</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td></td>
<td>79</td>
</tr>
<tr>
<td></td>
<td></td>
<td>80</td>
</tr>
<tr>
<td>Plastic Products Labourer</td>
<td>21</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24</td>
</tr>
<tr>
<td>Cellular Plastics Cutter</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td></td>
<td>27</td>
</tr>
<tr>
<td></td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>Hand Laminator</td>
<td>29</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32</td>
</tr>
<tr>
<td>Lay-Up Hand</td>
<td>33</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td></td>
<td>35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>Plastics Mould Hand</td>
<td>37</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>39</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>Plastic Sheet Fabrication</td>
<td>41</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>43</td>
</tr>
<tr>
<td></td>
<td></td>
<td>44</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>45</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td></td>
<td>47</td>
</tr>
<tr>
<td></td>
<td></td>
<td>48</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>........................</strong></td>
<td><strong>................</strong></td>
</tr>
</tbody>
</table>

243
EDUCATION AND TRAINING

11. Please record the number of plastics related employees in each occupational category as listed below who received during the calendar year 1986, on-the-job training and/or support from the establishment to attend an off-the-job education/training course. (Support includes time off work, payment of course fees or any other financial assistance).

On-the- Job training is both specific courses conducted at the plant and/or training provided in conjunction with normal plant operations e.g. learning by watching other people's work.

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Number Who Received On-the-Job Training or Support for Off-the-Job Education/Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Managers</td>
<td>21</td>
</tr>
<tr>
<td>Specialist Managers</td>
<td>23</td>
</tr>
<tr>
<td>Scientists (excludes Material Scientists)</td>
<td>25</td>
</tr>
<tr>
<td>Engineers (includes Material Scientists)</td>
<td>27</td>
</tr>
<tr>
<td>Business Professionals</td>
<td>29</td>
</tr>
<tr>
<td>Science Technical Officers/Technicians</td>
<td>31</td>
</tr>
<tr>
<td>Tool Designers</td>
<td>33</td>
</tr>
<tr>
<td>Engineering Technicians</td>
<td>35</td>
</tr>
<tr>
<td>Metal Tradespersons</td>
<td>37</td>
</tr>
<tr>
<td>Other Tradespersons</td>
<td>39</td>
</tr>
<tr>
<td>Data Processing and Business Machine Operators</td>
<td>41</td>
</tr>
<tr>
<td>Other Clerks</td>
<td>43</td>
</tr>
<tr>
<td>Salespersons and Personal Service Workers</td>
<td>45</td>
</tr>
<tr>
<td>Supervisor, Plastics Production Machine Operators</td>
<td>47</td>
</tr>
<tr>
<td>Plastics Die Setters</td>
<td>49</td>
</tr>
<tr>
<td>Cellular Plastics Machine Setter</td>
<td>51</td>
</tr>
<tr>
<td>Plastics Extruding Machine Setter</td>
<td>53</td>
</tr>
<tr>
<td>Plastics Moulding Machine Setter</td>
<td>55</td>
</tr>
<tr>
<td>Thermoforming Machine Setter</td>
<td>57</td>
</tr>
<tr>
<td>Plastics Extruding Machine Operator</td>
<td>59</td>
</tr>
<tr>
<td>Occupation</td>
<td>Number Who Received On-the-Job Training or Support for Off-the-Job Education/Training</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Blow Moulding Machine Operator</td>
<td>61 62</td>
</tr>
<tr>
<td>Compression Moulding Machine Operator</td>
<td>63 64</td>
</tr>
<tr>
<td>Injection Moulding Machine Operator</td>
<td>65 66</td>
</tr>
<tr>
<td>Rotational Moulding Machine Operator</td>
<td>67 68</td>
</tr>
<tr>
<td>Thermoforming Machine Operator</td>
<td>69 70</td>
</tr>
<tr>
<td>Plastics Foam Machine Operator</td>
<td>71 72</td>
</tr>
<tr>
<td>Plastics Sheet Press Operator</td>
<td>73 74</td>
</tr>
<tr>
<td>Plastics Powder Hand</td>
<td>75 76</td>
</tr>
<tr>
<td>Plastics Gun Hand</td>
<td>77 78</td>
</tr>
<tr>
<td>Wire Sheather</td>
<td>79 80</td>
</tr>
<tr>
<td>Plastic Products Labourer</td>
<td>21 22</td>
</tr>
<tr>
<td>Cellular Plastics Cutter</td>
<td>23 24</td>
</tr>
<tr>
<td>Hand Laminator</td>
<td>25 26</td>
</tr>
<tr>
<td>Lay-Up Hand</td>
<td>27 28</td>
</tr>
<tr>
<td>Plastics Mould Hand</td>
<td>29 30</td>
</tr>
<tr>
<td>Plastics Sheet Fabricator</td>
<td>31 32</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>33 34</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
</tr>
</tbody>
</table>
Please record the number of plastics related employees who were given formal and informal on-the-job training of the types listed below during the calendar year 1986.

Formal on-the-job training includes specific courses conducted at the plant. Informal on-the-job training includes training provided in conjunction with normal plant operations.

<table>
<thead>
<tr>
<th>Type of training</th>
<th>Number Trained During 1986</th>
<th>Number Provided With Formal On-the-job Training During 1986</th>
<th>Number Provided With Informal On-the-job Training During 1986</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apprentices</td>
<td>21</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>Company Trainees</td>
<td>25</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>Supervisory training</td>
<td>29</td>
<td>30</td>
<td>31</td>
</tr>
<tr>
<td>Management training</td>
<td>33</td>
<td>34</td>
<td>35</td>
</tr>
<tr>
<td>Sales Training</td>
<td>37</td>
<td>38</td>
<td>39</td>
</tr>
<tr>
<td>Professional/technician updating</td>
<td>41</td>
<td>42</td>
<td>43</td>
</tr>
<tr>
<td>Induction</td>
<td>45</td>
<td>46</td>
<td>47</td>
</tr>
<tr>
<td>Occupational health and safety</td>
<td>49</td>
<td>50</td>
<td>51</td>
</tr>
<tr>
<td>Production processes</td>
<td>53</td>
<td>54</td>
<td>55</td>
</tr>
<tr>
<td>Quality Control Training</td>
<td>57</td>
<td>58</td>
<td>59</td>
</tr>
<tr>
<td>Computer skills</td>
<td>61</td>
<td>62</td>
<td>63</td>
</tr>
<tr>
<td>Finance/Accounting</td>
<td>65</td>
<td>66</td>
<td>67</td>
</tr>
<tr>
<td>Clerical</td>
<td>69</td>
<td>70</td>
<td>71</td>
</tr>
<tr>
<td>Secretariat/Receptionist</td>
<td>73</td>
<td>74</td>
<td>75</td>
</tr>
<tr>
<td>English Language</td>
<td>77</td>
<td>78</td>
<td>79</td>
</tr>
<tr>
<td>Other</td>
<td>21</td>
<td>22</td>
<td>23</td>
</tr>
</tbody>
</table>
13. Please record the number of plastics related employees who were provided with assistance to undertake off-the-job education/training of the types listed below during calendar year 1986.

Assistance includes time off work, payment of course fees or any other forms of financial assistance.

<table>
<thead>
<tr>
<th>Type of training</th>
<th>Number Provided with Assistance to Undertake Off-the-Job Training in 1986</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apprentices</td>
<td>21</td>
</tr>
<tr>
<td>TAFE day release</td>
<td>23</td>
</tr>
<tr>
<td>TAFE block release</td>
<td>25</td>
</tr>
<tr>
<td>In-house training</td>
<td>27</td>
</tr>
<tr>
<td>Plastics Skill Centre Courses</td>
<td>29</td>
</tr>
<tr>
<td>Plastics Institute Seminars</td>
<td>31</td>
</tr>
<tr>
<td>University Courses</td>
<td>33</td>
</tr>
<tr>
<td>CAE Courses</td>
<td>35</td>
</tr>
<tr>
<td>Non - Apprenticeship TAFE Courses</td>
<td>37</td>
</tr>
<tr>
<td>Course run by Private Education/Training Providers</td>
<td>39</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>41</td>
</tr>
</tbody>
</table>

[43 (please specify)]
17. TRENDS IN PLASTICS ACTIVITY LEVELS

DIFERENT ESTABLISHMENTS MAY WORK ON DIFFERENT FINANCIAL YEARS.

PLEASE COMPLETE THIS SECTION WITH REFERENCE TO YOUR PARTICULAR FINANCIAL YEAR.

PLEASE STATE THE LAST FINANCIAL YEAR USED BY YOUR ESTABLISHMENT

<table>
<thead>
<tr>
<th>START OF LAST FINANCIAL YEAR</th>
<th>21</th>
<th>22</th>
<th>23</th>
<th>24</th>
<th>25</th>
<th>26</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MONTH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>YEAR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>END OF LAST FINANCIAL YEAR</th>
<th>27</th>
<th>28</th>
<th>29</th>
<th>30</th>
<th>31</th>
<th>32</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MONTH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>YEAR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14. Please indicate your experience in relation to plastics activities with respect to the performance indicators listed below for 1981-82 and 1984-85 and provide an estimate for 1986-87. Figures provided should show the percentage change in the performance indicator over the previous financial year e.g. if turnover was $10 million in 1980-81 and increased to $15 million in 1981-82 a 50 should be recorded in the 1981-82 % increase box corresponding to turnover.

The information sought in this question is required in order to allow conclusions to be drawn on the relationships between the performance indicators and employment, occupational structures and training.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% Increase</td>
<td>% Decrease</td>
<td>% Increase</td>
</tr>
<tr>
<td>Turnover</td>
<td>33</td>
<td>36</td>
<td>39</td>
</tr>
<tr>
<td>Domestic Sales</td>
<td>51</td>
<td>54</td>
<td>57</td>
</tr>
<tr>
<td>Export Sales</td>
<td>21</td>
<td>24</td>
<td>27</td>
</tr>
<tr>
<td>Average Costs</td>
<td>39</td>
<td>42</td>
<td>45</td>
</tr>
<tr>
<td>Investment in Buildings</td>
<td>57</td>
<td>60</td>
<td>63</td>
</tr>
<tr>
<td>Investment in Plant and Equipment</td>
<td>21</td>
<td>42</td>
<td>45</td>
</tr>
<tr>
<td>Research and Development Expenditure</td>
<td>39</td>
<td>42</td>
<td>45</td>
</tr>
<tr>
<td>Expenditure on Training</td>
<td>57</td>
<td>60</td>
<td>63</td>
</tr>
</tbody>
</table>

(E) Expected
15. Please indicate your operations expenditure on training of plastics related employees as a percentage of your plastics activity turnover for the financial years 1981-82 and 1984-85 and provide an estimate for 1986-87.

<table>
<thead>
<tr>
<th></th>
<th>1981-82</th>
<th>1984-85</th>
<th>1986-87 (E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenditure on Training/ Turnover</td>
<td>21</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
</tbody>
</table>

(E) Expected

Office Use

V = [ ]

Interviewer Use Only

Name of interviewer: ____________________________

I.D. Number: ____________________________

Date that the questionnaire was collected: ____________________________

............................................... ..............................
SURVEY OF THE PLASTICS INDUSTRY

PART 2: INTERVIEW BASED QUESTIONNAIRE

This survey of the plastics industry is being undertaken by McNair Anderson Associates on behalf of the Australian Council for Employment and Training and the National Plastics Industry Training Committee. The purpose of the survey is to provide information on current and prospective employment and training within the plastics industry, and the plastics industry requirements for training its personnel.

Individual company information collected in this survey will remain confidential to McNair Anderson. Only aggregate non company identifiable information will be released by McNair Anderson.

This questionnaire only relates to the operations or plant under the control of the respondent.

PLASTICS OPERATION INFORMATION

<table>
<thead>
<tr>
<th>COMPANY NAME</th>
<th>ADDRESS</th>
<th>PARENT COMPANY (if applicable)</th>
<th>CONTACTS NAME</th>
<th>POSITION IN COMPANY</th>
<th>TELEPHONE NUMBER</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>OFFICE USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ref No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post Code</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ASIC Classification</th>
</tr>
</thead>
</table>

McNAIR ANDERSON ASSOCIATES
FEBRUARY 1987
FUTURE TRENDS

1. Relative to current conditions what are your expectations of -

<table>
<thead>
<tr>
<th>Outlook</th>
<th>Next 12 months</th>
<th>Next 3 years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Improve</td>
<td>Same</td>
</tr>
<tr>
<td>The Plastics Industry Outlook</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your Plastics Activity Outlook</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The General Business Outlook</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Interviewer: Go through each determinant in turn and ask:- How you expect each of these factors to change over the next 12 months? How do you expect them to change over the next 3 years? How would you rate each of these factors now in priority order?

<table>
<thead>
<tr>
<th>Major Determinant of Plastics Activity Level</th>
<th>Outlook</th>
<th>Next 12 Months</th>
<th>Next 3 Years</th>
<th>Priority Order</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Improve</td>
<td>Same</td>
<td>Deteriorate</td>
</tr>
<tr>
<td>Level of Australian Market Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of Overseas Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price Competition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-price Competition e.g. product quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (please specify)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Interviewer: do not include government policies as they will be covered in Q4.
3. Relative to current conditions in your plastics activities over the next 12 months and 3 years, do you expect to have any change in your:-

<table>
<thead>
<tr>
<th>Period</th>
<th>Large Increase</th>
<th>Small Increase</th>
<th>Same</th>
<th>Small Decrease</th>
<th>Large Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10% or more</td>
<td>less than 10%</td>
<td></td>
<td>less than 10%</td>
<td>10% or more</td>
</tr>
<tr>
<td>Turnover</td>
<td>Next 12 Months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Next 3 Years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic Sales</td>
<td>Next 12 Months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Next 3 Years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Export Sales</td>
<td>Next 12 Months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Next 3 Years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Cost:</td>
<td>Next 12 Months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per Unit Output</td>
<td>Next 3 Years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Materials</td>
<td>Next 12 Months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Next 3 Years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Labour</td>
<td>Next 12 Months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Next 3 Years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Overheads</td>
<td>Next 12 Months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Next 3 Years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment in</td>
<td>Next 12 Months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buildings</td>
<td>Next 3 Years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment in</td>
<td>Next 12 Months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant and Equipment</td>
<td>Next 3 Years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research and</td>
<td>Next 12 Months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development Expenditure</td>
<td>Next 3 Years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not applicable</td>
<td>Next 12 Months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Next 3 Years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expenditure on Training</td>
<td>Next 12 Months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Next 3 Years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. (a) What impact do the following Government activities have on your plastics production/employment?

<table>
<thead>
<tr>
<th>Government Regulations/Activities</th>
<th>Impact on Plastics Production/Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research and Development Incentives</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>22</td>
</tr>
<tr>
<td>Tariff policy</td>
<td>23</td>
</tr>
<tr>
<td>Taxation policy</td>
<td>24</td>
</tr>
<tr>
<td>Training assistance *</td>
<td>25</td>
</tr>
<tr>
<td>Monetary policy</td>
<td>26</td>
</tr>
<tr>
<td>Public Works</td>
<td>27</td>
</tr>
<tr>
<td>Export assistance</td>
<td>28</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>36</td>
</tr>
</tbody>
</table>

(b) What action could the Government take to increase production/employment in the plastics industry? Interviewer: Circle appropriate numbers.

<table>
<thead>
<tr>
<th>Impact on Plastics Production/Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
</tr>
<tr>
<td>23</td>
</tr>
<tr>
<td>25</td>
</tr>
<tr>
<td>27</td>
</tr>
<tr>
<td>29</td>
</tr>
<tr>
<td>31</td>
</tr>
<tr>
<td>33</td>
</tr>
<tr>
<td>35</td>
</tr>
</tbody>
</table>

* Interviewer: Do not go into too much detail on training assistance as this will be covered in more detail in a later section.
CHANGES IN TECHNOLOGY

5. What has been the extent of your adoption of technology in plastics related activities, in the following areas, over the last 2 years?

Interviewer: Adoption of technology is defined to include changes in the way a function is performed and includes things such as new equipment, reorganisation of work methods and changes to products.

<table>
<thead>
<tr>
<th>Area of Plastics Activity</th>
<th>Extent of Adoption of Technology</th>
<th>Detail on Technology if &quot;Large&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large</td>
<td>Limited</td>
</tr>
<tr>
<td>Office Functions e.g. accounts, communications</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product Innovation</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Process</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Planning</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage, Packaging and Distribution</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology Integrated Across a Range of Activities</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Interviewer: Answers to question 5 and questions 6 and 7 on the next 2 pages are to be recorded together. For example if answer to likely extent of adoption of technology in an area of plastics activity listed in question 5 is "large", ask for the reasons for introduction of the technology (question 6) and the impact of the technology (question 7) prior to moving on to the next area of plastics activity in question 5.

If no "large" responses are indicated in question 5 proceed to question 8.
6. **Interviewer:** With respect to those areas of plastics activity which in Question 5 were identified as having experienced a large adoption of technology identify the reasons for introducing the technology. (provide as many reasons as are applicable).

<table>
<thead>
<tr>
<th>Area of Plastics Activity</th>
<th>Reasons for Introducing Technologies in these Areas</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reduce Labour Costs</td>
<td>Reduce Non-Labour Costs</td>
</tr>
<tr>
<td>Office Functions e.g. accounts communications</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Design</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Product Innovation</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Production Process</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Production Planning</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Storage, Packaging and Distribution</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Technology Intergrated Across a Range of Activities</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
Interviewer: With respect to those areas of plastics activity which in Question 5 were identified as being areas where the extent of adoption of technology was large, identify the effect of the technology in terms of the factors listed below.

<table>
<thead>
<tr>
<th>Area of Plastics Activity</th>
<th>Employment Levels</th>
<th>Skill Requirements</th>
<th>Training/Retraining Needs</th>
<th>Industrial Relations Climate</th>
<th>Competitiveness of Products/Services</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Increase</td>
<td>Same</td>
<td>Decrease</td>
<td>Increase</td>
<td>Same</td>
</tr>
<tr>
<td>Office functions e.g. accounts, communications</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
</tr>
</tbody>
</table>
8. What is the likely extent of your adoption of technology in plastics related activities, over the next 3 years? Where the extent of the adoption is seen as "large" please provide more detail on the technology. Additional space to answer this part of the question is provided at the bottom of the page.

<table>
<thead>
<tr>
<th>Area of Plastics Activity</th>
<th>Extent of Adoption of Technology</th>
<th>Detail on Technology if &quot;Large&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large</td>
<td>Limited</td>
</tr>
<tr>
<td>Office Functions e.g. accounts, communications</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product Innovation</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Process</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Planning</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage, Packaging and Distribution</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology Integrated Across a Range of Activities</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td></td>
<td>29</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>31</td>
<td></td>
</tr>
</tbody>
</table>

Interviewer: Answers to question 8 and questions 9 and 10 on the next two pages are to be recorded together. For example, if answer to likely extent of adoption technology in an area of plastics activity listed in question 8 is "large", ask for the reasons for introduction of the technology (question 9) and the impact of the technology (question 10) prior to moving on to the next area of plastics activity in question 8. If no "large" responses are indicated in question 8 proceed to question 11.
Interviewer: With respect to those areas of plastics activity which in Question 8 were identified as being areas where the extent of adoption of technology is likely to be large, identify the reasons for the anticipated introduction of the technology. (provide as many reasons as are applicable).

<table>
<thead>
<tr>
<th>Area of Plastics Activity</th>
<th>Reasons for Introducing Technologies in these Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reduce Labour Costs</td>
</tr>
<tr>
<td>Office Functions e.g. accounts communications</td>
<td>21</td>
</tr>
<tr>
<td>Design</td>
<td>22</td>
</tr>
<tr>
<td>Product Innovation</td>
<td>23</td>
</tr>
<tr>
<td>Production Process</td>
<td>24</td>
</tr>
<tr>
<td>Production Planning</td>
<td>25</td>
</tr>
<tr>
<td>Technology Integrated Across a Range of Activities</td>
<td>26</td>
</tr>
<tr>
<td>Storage, Packaging and Distribution</td>
<td>27</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>28</td>
</tr>
<tr>
<td>29</td>
<td>1</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>31</td>
<td>1</td>
</tr>
</tbody>
</table>

259
10. Interviewer: With respect to those areas of plastics activity which in Question 8 were identified as being areas where the extent of adoption of technology is likely to be large, identify the effect of the technology in terms of the factors listed below.

<table>
<thead>
<tr>
<th>Area of Plastics Activity</th>
<th>Employment Levels</th>
<th>Skill Requirements</th>
<th>Training/Retraining Needs</th>
<th>Industrial Relations Climate</th>
<th>Competitiveness of Products/Services</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Increase</td>
<td>Same</td>
<td>Decrease</td>
<td>Increase</td>
<td>Same</td>
</tr>
<tr>
<td>Office functions e.g. accounts, communications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product Innovation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Process</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Planning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage, Packaging and Distribution</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology Integrated Across a Range of Activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

260
11. Which of the following factors have prevented or slowed the introduction of technology into your plastics activities? What factors are likely to do so in the future?

<table>
<thead>
<tr>
<th>Factors Hindering the Introduction of Technology</th>
<th>In the Past</th>
<th>Likely to do so in the future</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of appropriate skills</td>
<td>21</td>
<td>□</td>
</tr>
<tr>
<td>Industrial relations problems (e.g. workforce resistance, demarcation disputes, inappropriate work practices)</td>
<td>22</td>
<td>□</td>
</tr>
<tr>
<td>Capital cost involved</td>
<td>23</td>
<td>□</td>
</tr>
<tr>
<td>Lack of information on available technologies and applicability to the establishment</td>
<td>24</td>
<td>□</td>
</tr>
<tr>
<td>Market share of operation does not justify the expenditure</td>
<td>25</td>
<td>□</td>
</tr>
<tr>
<td>Lack of confidence in the economy</td>
<td>26</td>
<td>□</td>
</tr>
<tr>
<td>Lack of suitable machines</td>
<td>27</td>
<td>□</td>
</tr>
<tr>
<td>Lack of suitable software programs</td>
<td>28</td>
<td>□</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>29</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>31</td>
<td>□</td>
</tr>
</tbody>
</table>
11. EMPLOYMENT OUTLOOK

12. What do you expect to happen to the size of your plastics workforce over the next 12 months relative to the current level? What do you expect over the next 3 years relative to current level?

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Total Plastics Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large increase (10% or more)</td>
</tr>
<tr>
<td>Next 12 months</td>
<td></td>
</tr>
<tr>
<td>Next 3 years</td>
<td></td>
</tr>
</tbody>
</table>

13. Interviewer: (Hand respondent occupation card) What do you expect to happen to the size of your plastics related occupations over the next 3 years, relative to current levels.

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Large increase (10% or more)</th>
<th>Small increase (less than 10%)</th>
<th>Remain about the Same</th>
<th>Small Decrease (less than 10%)</th>
<th>Large Decrease (10% or more)</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Managers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>34</td>
</tr>
<tr>
<td>Specialist Managers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>Scientists (excludes Material Scientists)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>Engineers (includes Material Scientists)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>37</td>
</tr>
<tr>
<td>Business Professionals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>38</td>
</tr>
<tr>
<td>Science Technical Officers/Technicians</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>39</td>
</tr>
<tr>
<td>Tool Designers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>Engineering Technicians</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>41</td>
</tr>
<tr>
<td>Metal Tradespersons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>42</td>
</tr>
<tr>
<td>Other Tradespersons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>43</td>
</tr>
<tr>
<td>Data Processing and Business Machine Operators</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>44</td>
</tr>
<tr>
<td>Other Clerks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>45</td>
</tr>
<tr>
<td>Salespersons and Personal Service Workers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>46</td>
</tr>
</tbody>
</table>

- continued over -
<table>
<thead>
<tr>
<th>Occupation</th>
<th>Large Increase (10% or more)</th>
<th>Small Increase (less than 10%)</th>
<th>Remain about the same</th>
<th>Small Decrease (less than 10%)</th>
<th>Large Decrease (10% or more)</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisor, Plastics Production Machine Operators</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>47</td>
</tr>
<tr>
<td>Plastics Die Setters</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>48</td>
</tr>
<tr>
<td>Cellular Plastics Machine Setter</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>49</td>
</tr>
<tr>
<td>Plastics Extruding Machine Setter</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>50</td>
</tr>
<tr>
<td>Plastics Moulding Machine Setter</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>51</td>
</tr>
<tr>
<td>Thermoforming Machine Setter</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>52</td>
</tr>
<tr>
<td>Plastics Extruding Machine Operator</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>53</td>
</tr>
<tr>
<td>Blow Moulding Machine Operator</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>54</td>
</tr>
<tr>
<td>Compression Moulding Machine Operator</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>55</td>
</tr>
<tr>
<td>Injection Moulding Machine Operator</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>56</td>
</tr>
<tr>
<td>Rotational Moulding Machine Operator</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>57</td>
</tr>
<tr>
<td>Thermofoming Machine Operator</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>58</td>
</tr>
<tr>
<td>Plastics Foam Machine Operator</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>59</td>
</tr>
<tr>
<td>Plastics Sheet Press Operator</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>60</td>
</tr>
<tr>
<td>Plastics Powder Hand</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>61</td>
</tr>
<tr>
<td>Plastics Gun Hand</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>62</td>
</tr>
<tr>
<td>Wire Sheather</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>63</td>
</tr>
<tr>
<td>Plastic Products Labourer</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>64</td>
</tr>
<tr>
<td>Cellular Plastics Cutter</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>65</td>
</tr>
<tr>
<td>Hand Laminator</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>66</td>
</tr>
<tr>
<td>Lay-Up Hand</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>67</td>
</tr>
<tr>
<td>Plastics Mould Hand</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>68</td>
</tr>
<tr>
<td>Plastic Sheet Fabricator</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>69</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>71</td>
</tr>
</tbody>
</table>
14. In which of your plastics related occupations are major changes in duties likely to occur over the next 3 years?

- what is the nature of the change in duties
- what is the main reason(s) underlying the change in duties

(prompts)
- "change in duties" responsibilities, skill level, functions
- "reasons for change" introduction of new equipment, work reorganisation, change in product mix

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Major changes in Duties Expected</th>
<th>Change in duties</th>
<th>Reasons for change</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Managers</td>
<td>21 Yes No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specialist Managers</td>
<td>26 Yes No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientists (excludes Material Scientists)</td>
<td>31 Yes No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineers (includes Material Scientists)</td>
<td>36 Yes No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Professionals</td>
<td>41 Yes No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science Technical Officers/Technicians</td>
<td>46 Yes No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool Designers</td>
<td>51 Yes No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Technicians</td>
<td>56 Yes No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metal Tradespersons</td>
<td>61 Yes No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Tradespersons</td>
<td>66 Yes No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Processing and Business Machine Operators</td>
<td>71 Yes No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Clerks</td>
<td>76 Yes No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salespersons and Personal Service Workers</td>
<td>21 Yes No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supervisor, Plastics Production Machine Operator</td>
<td>26 Yes No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Die Setters</td>
<td>31 Yes No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cellular Plastics Machine Setter</td>
<td>36 Yes No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Extruding Machine Setter</td>
<td>41 Yes No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Moulding Machine Setter</td>
<td>46 Yes No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermoforming Machine Setter</td>
<td>51 Yes No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Office Use Only

22 23 24 25

27 28 29 30

32 33 34 35

37 38 39 40

42 43 44 45

47 48 49 50

52 53 54 55

57 58 59 60

62 63 64 65

67 68 69 70

72 73 74 75

77 78 79 80

22 23 24 25

27 28 29 30

32 33 34 35

37 38 39 40

42 43 44 45

47 48 49 50

52 53 54 55

264
<table>
<thead>
<tr>
<th>Occupation</th>
<th>Major changes in duties expected</th>
<th>Change in duties</th>
<th>Reasons for change</th>
<th>Office Use Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastics Extruding Machine Operator</td>
<td>56 Yes</td>
<td></td>
<td></td>
<td>57 58 59 60</td>
</tr>
<tr>
<td>Blowing Moulding Machine Operator</td>
<td>61 Yes</td>
<td></td>
<td></td>
<td>62 63 64 65</td>
</tr>
<tr>
<td>Compression Moulding Machine Operator</td>
<td>66 Yes</td>
<td></td>
<td></td>
<td>67 68 69 70</td>
</tr>
<tr>
<td>Injection Moulding Machine Operator</td>
<td>71 Yes</td>
<td></td>
<td></td>
<td>72 73 74 75</td>
</tr>
<tr>
<td>Rotational Moulding Machine Operator</td>
<td>76 Yes</td>
<td></td>
<td></td>
<td>77 78 79 80</td>
</tr>
<tr>
<td>Thermoforming Machine Operator</td>
<td>21 Yes</td>
<td></td>
<td></td>
<td>22 23 24 25</td>
</tr>
<tr>
<td>Plastics Foam Machine Operator</td>
<td>26 Yes</td>
<td></td>
<td></td>
<td>27 28 29 30</td>
</tr>
<tr>
<td>Plastics Sheet Press Operator</td>
<td>31 Yes</td>
<td></td>
<td></td>
<td>32 33 34 35</td>
</tr>
<tr>
<td>Plastics Powder Hand</td>
<td>36 Yes</td>
<td></td>
<td></td>
<td>37 38 39 40</td>
</tr>
<tr>
<td>Plastics Gun Hand</td>
<td>41 Yes</td>
<td></td>
<td></td>
<td>42 43 44 45</td>
</tr>
<tr>
<td>Wire Sheather</td>
<td>46 Yes</td>
<td></td>
<td></td>
<td>47 48 49 50</td>
</tr>
<tr>
<td>Plastics Products Labourer</td>
<td>51 Yes</td>
<td></td>
<td></td>
<td>52 53 54 55</td>
</tr>
<tr>
<td>Cellular Plastics Cutter</td>
<td>56 Yes</td>
<td></td>
<td></td>
<td>57 58 59 60</td>
</tr>
<tr>
<td>Hand Lamainator</td>
<td>61 Yes</td>
<td></td>
<td></td>
<td>62 63 64 65</td>
</tr>
<tr>
<td>Lay-Up Hand</td>
<td>66 Yes</td>
<td></td>
<td></td>
<td>67 68 69 70</td>
</tr>
<tr>
<td>Plastics Mould Hand</td>
<td>71 Yes</td>
<td></td>
<td></td>
<td>72 73 74 75</td>
</tr>
<tr>
<td>Plastics Sheet Fabricator</td>
<td>76 Yes</td>
<td></td>
<td></td>
<td>77 78 79 80</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>21 Yes</td>
<td></td>
<td></td>
<td>22 23 24 25</td>
</tr>
</tbody>
</table>
15. What is your perception of the labour market situation for your plastics related occupations
   at the present moment?
   • in 12 months time?

Interviewer: Answers to question 15 and question 16 are to be recorded together. For example, if answer to current or potential outlook of any of the occupations listed in this question is "shortage", ask for the type of action to be undertaken to overcome this shortage, (question 16), prior to asking for next occupation's outlook.

If no "shortages" are indicated for any occupation proceed to question 17.

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Labour Market Situation</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current</td>
<td>12 months time</td>
</tr>
<tr>
<td></td>
<td>Shortage</td>
<td>Balance</td>
</tr>
<tr>
<td>General Managers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specialist Managers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientists (excludes Material Scientists)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineers (includes Material Scientists)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Professionals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science Technical Officers/ Technicians</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool Designers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Technicians</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metal Tradespersons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Tradespersons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Processing and Business Machine Operators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Clerks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salespersons and Personal Service Workers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supervisor, Plastics Production Machine Operator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Die Setters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cellular Plastics Machine Setter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Extruding Machine Setter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Moulding Machine Setter</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CARD 46
<table>
<thead>
<tr>
<th>Occupation</th>
<th>Labour Market Situation</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current</td>
<td>12 months time</td>
</tr>
<tr>
<td></td>
<td>Shortage</td>
<td>Balance</td>
</tr>
<tr>
<td>Thermoforming Machine Setter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Extruding Machine Operator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blow Moulding Machine Operator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compression Moulding Machine Operator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injection Moulding Machine Operator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotational Moulding Machine Operator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermoforming Machine Operator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Foam Machine Operator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Sheet Press Operator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Powder Hand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Gun Hand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wire Sheather</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Products Labourer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cellular Plastics Cutter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand Lamainator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lay-Up Hand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Mould Hand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Sheet Fabricator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
16. In what areas could action be undertaken to overcome the current or potential shortage you have indicated for this occupation?

<table>
<thead>
<tr>
<th>Occupation</th>
<th>In-house Training/Re-training Effort</th>
<th>Off-the-job training e.g. plastics skill centre</th>
<th>Conditions of employment</th>
<th>Recruitment activity</th>
<th>Immigration</th>
<th>Other (specify) at the bottom of table</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Managers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>39</td>
</tr>
<tr>
<td>Specialist Managers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>Scientists (excludes Material Scientists)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>41</td>
</tr>
<tr>
<td>Engineers (includes Material Scientists)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>42</td>
</tr>
<tr>
<td>Business Professionals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>43</td>
</tr>
<tr>
<td>Science Technical Officers/Technicians</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>44</td>
</tr>
<tr>
<td>Tool Designers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>45</td>
</tr>
<tr>
<td>Engineering Technicians</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>46</td>
</tr>
<tr>
<td>Metal Tradespersons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>47</td>
</tr>
<tr>
<td>Other Tradespersons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>48</td>
</tr>
<tr>
<td>Data Processing and Business Machine Operators</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>49</td>
</tr>
<tr>
<td>Other Clerks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>Salespersons and Personal Service Workers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>51</td>
</tr>
<tr>
<td>Supervisor, Plastics Production Machine Operator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>52</td>
</tr>
<tr>
<td>Plastics Die Setter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>53</td>
</tr>
<tr>
<td>Cellular Plastics Machine Setter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>54</td>
</tr>
<tr>
<td>Plastics Extruding Machine Setter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>55</td>
</tr>
<tr>
<td>Plastics Moulding Machine Setter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>56</td>
</tr>
<tr>
<td>Thermoforming Machine Setter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>57</td>
</tr>
<tr>
<td>Occupation</td>
<td>Possible Action</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------------</td>
<td>-----------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Extruding Machine Operator</td>
<td>58</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blow Moulding Machine Operator</td>
<td>59</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compression Moulding Machine Operator</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injection Moulding Machine Operator</td>
<td>61</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotational Moulding Machine Operator</td>
<td>62</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermoforming Machine Operator</td>
<td>63</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Foam Machine Operator</td>
<td>64</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Sheet Press Operator</td>
<td>65</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Powder Hand</td>
<td>66</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Gun Hand</td>
<td>67</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wire Sheather</td>
<td>68</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Products Labourer</td>
<td>69</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cellular Plastics Cutter</td>
<td>70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand Lamainator</td>
<td>71</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lay-Up Hand</td>
<td>72</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Mould Hand</td>
<td>73</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Sheet Fabricator</td>
<td>74</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The table continues with more occupations and possible actions, but the excerpt only shows the first few entries. The table is designed to capture data related to various positions within the plastic industry, detailing in-house and off-the-job training efforts, skill center conditions, employment recruitment activity, and immigration efforts. Other details can be specified at the bottom of the table.
**EDUCATION AND TRAINING**

17. (a) Does your establishment have a training budget?  
- Yes ☐  
- No ☐

(b) What factors affect the level of sources/funds allocated to training your plastics related employees?  
(prompts) Level of profits  
Rate of adoption of technology  
Business outlook  
Availability of in-house training facilities  
Appropriateness of external training courses

---

18. Could you indicate your training priorities over the next 12 months in relation to the occupations employed by your operation in plastics activities. For those occupations you have indicated a high priority could you provide a brief explanation of why this occupation is being given a high priority.  

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Training Priority</th>
<th>Reasons for High Training Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Managers</td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>Specialist Managers</td>
<td></td>
<td>41</td>
</tr>
<tr>
<td>Scientists (excludes Material Scientists)</td>
<td></td>
<td>42</td>
</tr>
<tr>
<td>Engineers (includes Material Scientists)</td>
<td></td>
<td>43</td>
</tr>
<tr>
<td>Business Professionals</td>
<td></td>
<td>44</td>
</tr>
<tr>
<td>Science Technical Officers/Technicians</td>
<td></td>
<td>45</td>
</tr>
<tr>
<td>Tool Designers</td>
<td></td>
<td>46</td>
</tr>
<tr>
<td>Engineering Technicians</td>
<td></td>
<td>47</td>
</tr>
<tr>
<td>Metal Tradespersons</td>
<td></td>
<td>48</td>
</tr>
<tr>
<td>Other Tradespersons</td>
<td></td>
<td>49</td>
</tr>
<tr>
<td>Data Processing and Business Machine Operators</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>Other Clerks</td>
<td></td>
<td>51</td>
</tr>
<tr>
<td>Salespersons and Personal Service Workers</td>
<td></td>
<td>52</td>
</tr>
<tr>
<td>Supervisor, Plastics Production Machine Operator</td>
<td></td>
<td>53</td>
</tr>
</tbody>
</table>

---

CARD 48
<table>
<thead>
<tr>
<th>Occupation</th>
<th>Training Priority</th>
<th>Reasons for High Training Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastics Die Setter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cellular Plastics Machine Setter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Extruding Machine Setter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Moulding Machine Setter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermoforming Machine Setter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Extruding Machine Operator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blow Moulding Machine Operator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compression Moulding Machine Operator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injection Moulding Machine Operator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotational Moulding Machine Operator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermoforming Machine Operator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Foam Machine Operator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Sheet Press Operator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Powder Hand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Gun Hand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wire Sheather</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Products Labourer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cellular Plastics Cutter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand Lamainator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lay-Up Hand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Mould Hand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics Sheet Fabricator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

271
19. (a) What is your evaluation of the quality of education and training, provided by external sources, as embodied in your plastics related employees

<table>
<thead>
<tr>
<th>Providers of Education and Training</th>
<th>Assessment of Education/Training</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very Good</td>
</tr>
<tr>
<td>Universities</td>
<td>21</td>
</tr>
<tr>
<td>CAE</td>
<td>22</td>
</tr>
<tr>
<td>TAFE</td>
<td>23</td>
</tr>
<tr>
<td>Plastics Skills Centres</td>
<td>24</td>
</tr>
<tr>
<td>Private Training Providers</td>
<td>25</td>
</tr>
<tr>
<td>Primary/Secondary School</td>
<td>26</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>29</td>
</tr>
</tbody>
</table>

(b) For those providers of education/training which you have assessed as “poor” or “very poor” could you indicate where you see the major problem(s)

(prompts) numeracy
literacy
communication skills
interpersonal skills
relevance of skills

30
31
32
33
34
35
36
37
38
20. (a) Do you believe that the current/prospective education and training efforts of (i) your establishment and (ii) the external education and training sector will be adequate to meet the skill requirements of your plastics operations over the next 3 years.

(I) Establishment

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(ii) External Education and Training Sector

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(b) If No to either (a) (i) or (a) (ii) where does the education and training effort need to be increased.

(I) Establishment

(ii) External Education and Training Sector

END OF PART 2 OF SURVEY
APPENDIX E: DESCRIPTION AND USAGE OF THE MAJOR OUTPUTS FROM THE PLASTICS INDUSTRY SURVEY

Introduction

As discussed, the Industry Studies Framework has been implemented and refined through a pilot study of the plastics industry. Full implementation of the methodology involves two main steps:

. a survey to collect the required statistics to enable an analysis of skill requirements according to the methodology; and

. the subsequent analysis of the data.

Outputs to facilitate the analysis of skill requirements include:

. a set of tables;

. a computer file of survey data.

The plastics industry survey project provided the following major outputs:

. tables;

. computer file of survey data;

. published brochure;

. software package;

. methodology and field reports;

. analysis of the structure, operations and training activities within the plastics industry.

Tables

A total of 91 tables of survey results have been produced from the survey. Further tables can be produced from the survey data files which have been provided. An appropriate software package such as PC SAS may be used to produce any further tables.
The tables are presented in the following manner:

- recent employment trends, including statistics on recruitment and labour turnover;
- education and training statistics for recent past, includes training expenditure and recent trends in performance indicators;
- expectations for future levels of activity in the industry;
- technological change within the industry;
- employment outlook;

**Computer file of survey data**

This file contains all coded survey data supplied by survey participants.

**Published brochure**

The brochure contains statistical tables and diagrams under a number of headings. These are:

- current size of the industry;
- expectations of the industry;
- occupational distribution of employment;
- labour market;
- technological change;
- education and training.

**Software package**

This product will function through a series of hierarchically structured panels which will be documented and, therefore, easy to use. It will present about 33 tables of survey results.

The package has been developed using DBase III Plus and will operate on any IBM compatible PC. It will be directed towards an executive and management audience through the Plastics ITC.
Methodology and field reports

Three copies of this major report were supplied and served as important inputs to this manual.

The report provides:

- an explanation of the project and details of the survey methodology employed;

- descriptions of the fieldwork associated with the project, including the testing program;

- reports of the pre-test and pilot test, copies of the survey questionnaires, and sets of operational instructions used in the conduct of the survey.
The following bibliography provides details of all references given in this manual.


292


