OCCUPATIONAL TRENDS IN NEW ZEALAND: 1991-2001[1]

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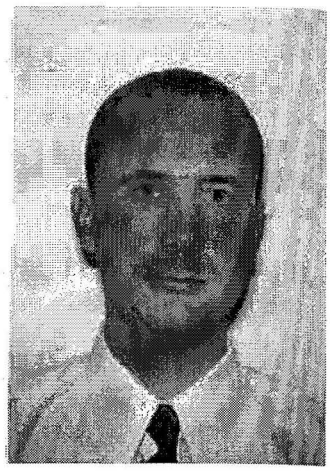


Abstract

This research provides a useful insight into the occupational evolution of the New Zealand labour market. Our presentation looks at three different areas and the research paper is divided accordingly. The paper begins with an analysis of the conceptual basis of occupational classifications used in New Zealand. This is done because the classification system forms the basis of the quality and amount of occupational employment information that can be used for historical trends. The NZSCO99 is a skills-based classification system therefore the paper examines the strengths and limitations of the way that the NZSCO99 uses skills information. The paper then follows with an explanation of how the research team constructed a time series of occupational employment using data from the 1991, 1996 and 2001 Census of Population and Dwellings. The paper concludes with some initial results from an analysis of trends in the occupational structure of the New Zealand labour market between 1991 and 2001 using this Census data. This section comprises key explanatory figures and charts of longitudinal trends.

The current provision and co-ordination of information on the demand for and availability of skills in New Zealand is very high level, patchy and poorly co-ordinated. To improve the future matching of people's skills to jobs will require better information on future job prospects. Analysis of historical trends can contribute to this. Such information could also aid students, prospective students, potential new and return migrants, employers and providers to make informed employment, training and migration decisions. These groups will need information on the potential returns to investment in particular skill acquisition, the potential for training and development, and the "security" of potential jobs. One way of providing this kind of information is to perform quantitative forecasts of occupational trends. There are a range of occupational forecasting methods that can be used, however many of these methods are resource intensive and some uncertainty exists about their usefulness and accuracy.

This research paper contains a historical analysis of occupational trends. The paper begins with an analysis of the conceptual basis of occupational classifications used in New Zealand. The New Zealand Standard Occupational Classification (NZSCO99) is a skills-based classification system therefore the paper examines the strengths and limitations of the way it uses skills information.

The paper also contains a descriptive analysis of historical occupational in New Zealand between 1991 and 2001 using Census data.

The Role of Occupational Classifications

Occupational classifications categorise the type of work that is performed in a job. They are used to collect, organise, analyse and disseminate empirical data on occupations from statistical surveys such as censuses and labour force surveys, and administrative sources. The nature of occupational information obtained for classification purposes is strongly influenced by the nature and social setting of the questions, enquires or data sources used to provide such information (Elias, 1997). The decisions underlying the collection of data on occupations also influence the nature of the occupational classification system itself.

One of the dilemmas of developing occupational classifications is the rapid nature of occupational change.

[1] The views represented in this paper are the author's own and should not be taken to represent the views of the Department of Labour.

To accurately reflect current labour market conditions, it is important that occupational classifications are kept up to date by national statistics departments and employment bureau. However, it is also important to build a sufficiently robust classification system that allows for long-term use and facilitates meaningful time series analysis of occupational data. Consequently, too much change between different versions of an occupational classification system is undesirable.

What is in the NZSCO99?

The following section describes the most recent version of the New Zealand Standard Classification of Occupations (NZSCO99). The aim is to analysis the conceptual basis of the NZSCO99. This is followed by a discussion of the components of the NZSCO99. Finally, it includes a discussion of the strengths and limitations of the way that the NZSCO99 uses skills as its conceptual basis.

Recent changes to the NZSCO

The NZSCO was established as the national framework for reporting on occupations in New Zealand in 1968. It was based on the International Standard Classification of Occupations (ISCO). The NZSCO is regularly reviewed to respond to changes in the labour market. There has been only one major review of the NZSCO recently in 1990. In this review, it was decided that NZSCO90 would adopt the ISCO-88 classifications to maintain time-series continuity and to improve its international comparability. Smaller, less substantial reviews of the NZSCO have been conducted in 1995 and 1999.

The conceptual basis of the NZSCO99

NZSCO99 is a skills based classification. The definitions of job, occupation and skills used in NZSCO99 are the same as those used in the ISCO-88. Occupations in the NZSCO99 are *described,* including *outlines of the tasks and duties* involved and provide details of the *training and experience required.* NZSCO99 uses the following two definitions for determining what is an occupation and what is a job:

An *occupation* is a set of jobs, which involve the performance of a common set of tasks. Whereas, a *job* is a set of tasks performed or designed to be performed by one individual. Jobs usually have a specific title and a person may require or have any of the following attributes to enable them to perform their job(s):

- Formal qualifications;
- Competencies;
- Experience;
- Subject matter knowledge;
- Ability to use specific tools and equipment; and/or
- Ability to produce specific good and/or services.

Skills in the NZSCO99 are defined according to 'skill level' and 'skill specialisation'. These two kinds of skills are used to classify occupations within the hierarchical NZSCO99 structure. Occupations are assigned in the NZSCO99 to the highest level, known as a major group, based on their required skill level, whereas they are assigned to lower levels known as sub-major and minor groups based on progressively finer interpretations of skill specialisation.

The *skill level* of an occupation is defined as a function of the complexity and range of tasks involved. This is used to determine which major group an occupation belongs to. Skill level is operationalised as the amount of education (or training) and work experience needed to perform the given tasks and duties competently. The NZSCO99 has four skill levels:

- University degree;
- New Zealand Certificate or other advanced vocational qualification;
- Experience – observation, practical acquaintance with facts or events;
- On-the-job training – learning of tasks and how to do a job.

Skill level is an attribute of *the occupation*, not necessarily of the individual who holds that occupation.

Skill specialisation is defined as a function of the field of knowledge required to perform the tasks, the tools and equipment used, the materials worked with and goods and services produced. Skill specialisation is used to differentiate between occupations that are grouped under the same skill level. It allows the major groups to be sub-divided into sub-major groups, minor groups and unit groups.

The hierarchical structure of NZSCO99

The NZSCO99 is a five-level hierarchically structured classification. At its highest level, the structure of NZSCO99 is designed around nine major groups. Each major group has its own characteristics that distinguish it from the other major groups (in terms of education qualifications, levels of responsibility, skill types, etc). Major Groups are loosely organised in the NZSCO99 from high skilled (Major Group 1) to less skilled occupations (Major Group 9). Each major group can be further subdivided into four other levels of sub-major group, minor group, unit group and occupations.

Measuring Changes in Skill Demand

In a dynamic economy, the demand for and supply of different skills undergoes constant change. Skills changes are likely to occur when the skill requirements of a specific task change or the required ability of workers to perform an occupation or task changes (Haskel & Holt, 1999). There are three conceptual characteristics of skill

change – skill-extensive, skill-intensive and skill-neutral. The question of interest is whether New Zealand has experienced changes in its skill demand and what type of changes those are.

Occupational classifications: a good measure of changes in skill demand?

The concept of skill is used widely in occupational classifications but tends not to be well defined or regulated in a consistent fashion (Elias, McKnight & Kinshott, 1999).

A number of occupational classifications define occupations in terms of their skill content. Occupational data may be used as to assess whether increases in employment in particular occupations are accompanied by changes in the demand for skills. However, five-early Census descriptions of occupational distributions may not accurately measure either supply or demand, as they are a snapshot at one particular point in time. In the constantly changing economy occupational data may contribute better to understanding past trends than predicting the need for kinds of skills. Researchers have also expressed general dissatisfaction in the manner in which occupational-based skill measures provide relatively crude and broad measures of skill (Green, Felstead & Gallie, 2000; WPEUS, 2002).

Analyses of occupations at higher levels of the occupational structure (e.g. major group level) may understate or overstate aggregate change in skill demand, as changes may be occurring *within* occupations. At an aggregate level, occupational data may give a false signal about the direction of skills change (Haskel & Holt, 1999). For example, the number of people in an occupation may have decreased, however the skill demand has increased. It may be incorrectly concluded that because the number of people employed in this occupation is declining that there is an associated shift in skill demand. If the supply of people with particular skills increases, it cannot be assumed that this is because of a change in the demand for those skills. It may be the case that the supply has simply changed. Consequently, caution must be exercised in attributing increases in employment in particular occupations as a measure of increases in skill demand in that occupation. One way that occupational classifications systems account for changes in skill demands is by shifting occupations into higher skilled major groups. These reviews, however, occur at a slower pace than actual changes in the labour market due other factors, such as resource cost and a desire to maintain time series information.

Qualifications are frequently used as a proxy for skills. They are used in two ways: either as a separate measure of *educational attainment* of the individual, or as *job requirements*, the entry level-qualification required for a particular occupation (WPEUS, 2002). Generally, measures of educational attainment represent a measure of the supply of skills, whereas measures of job requirements represent the demand for skills. Within occupational classifications, qualifications are used as a proxy for job requirements or the level of skill needed to perform an occupation.

There are a number of limitations in using qualifications as a proxy for skills in occupations. Qualifications are a measure of educational attainment not necessarily skills. It cannot be assumed that the skills which each qualification certifies remain unchanged as skills can depreciate over time (Green, Felstead & Gallie, 2000). In addition, a large proportion of learning does not lead to recognised qualifications, for example learning as part of on-the-job experience. Furthermore the trend to obtaining qualifications has increased over time. In particular, younger people are more likely to certify their skills then the older workers who they are replacing in the labour market. This does not necessarily imply that the match between qualifications and skills is better now than it was previously, merely it demonstrates that younger people are more likely to get formal qualifications. This cohort effect has been referred to as a "wave of qualifications inflation". It has made it is difficult to tease out whether there are actual changes in the skills required for occupations or whether there are simply more people with higher qualifications (e.g., Dore 1997; Elias & McKnight, 1999).

Another reason that qualifications are a limited proxy of skills is that occupations are increasingly requiring a range of generic skills. 'Generic skills' refer to a wide range of general skills that can be transferred between occupations. These skills may include learning-to-learn, problem solving, innovation, communication, numeracy, ability to use information technology, problem solving, team leadership, negotiation, facilitation and social skills (Stasz, McArthur, Lewis & Ramsey, 1990; Bikson and Law, 1995; Bikson, 1994; Institute for Employment Research, 2002). Although a person may learn some of these skills in obtaining their qualification, qualifications are not a direct measure of having such skills. Overall, research overseas suggests that the importance of generic skills is increasing relative to vocational skills in occupations (Elias & McKnight, 2001). However it is likely to be happening in very specific occupations resulting in two occupations melding into one (Haskel & Holt, 1999).

Occupational information is an imperfect measure of changes in skill demand, however its limitations are not profound. Any classification system would experience similar limitations because it represents a simplification of the labour market. Qualifications may constitute the best evidence of skills currently available. This is particularly the case in New Zealand, where qualifications are the only readily available measure of skills that is consistently updated. Consequently, it is a matter of feasibility that they are used a proxy for skills Qualifications are easy to measure and may be standardised, particularly if they are registered with a national qualifications authority (e.g. the New Zealand Qualifications Authority). There is also less of a

tendency for people to 'inflate' their qualifications as may occur when reporting on occupational titles or job duties (WPEUS, 2002).

Skills in the NZSCO99

The following section explores how skills are measured within the NZSCO99. Skill level in the NZSCO99 incorporates experience and on-the-job training in addition to qualifications as skill level criteria. NZSCO99 uses a more general operationalisation of skill level so that it remains flexible enough to respond to changes in the labour market or in the New Zealand qualifications system without having to review the classification. The NZSCO99 is based on the ISCO-88, however it applies skill level less strictly than its counterpart. The ISCO-88 makes reference to four skill levels linked to primary, secondary and tertiary education. An apparent limitation of ISCO-88 is that it implies that all occupations require some form of a qualification as a prerequisite. In the NZSCO99, specific qualifications or training are not set for any occupations or groupings as they act as a guide only. As the NZSCO99 is currently designed, people may enter at a lower level of the occupational classification system and move up to higher levels as they gain more skills or change their qualifications.

A potential problem with applying skill level in a more general way as it is done in the NZSCO99 is that major groups may not be able to be significantly differentiated from each other on the basis of skill level. In addition, there may also be more heterogeneity within a major group. A particularly problematic example of this is Major Group 6 (Agriculture and Fishery Workers), that includes all agriculture and fishery occupations. This was done because of the difficulty in distinguishing between the skills required to perform the tasks and duties of farmers and fishers and those who work for them. It was argued that within this major group, it is the nature of their skills that binds the occupations more closely together than the level of the skills required. However, New Zealand has a large number of people involved in these types of occupations. It may be difficult to identify occupational changes between or within major groups if there is heterogeneity within major groups.

One alternative is to apply skills in a more restricted manner as has been done in the Australian Standard Classification of Occupations Second Edition (ASCOSE). In ASCOSE, less explicit references are made to on-the-job training as part of skill level, and there has been an increased emphasis on the entry requirements. ASCOSE have applied the concept of skill more comprehensively than NZSCO99.

For example, ASCOSE and NZSCO99 place supervisors in different major groupings. NZSCO99 groups supervising roles with their associated professions on the basis that they are performing similar tasks. However, in ASCOSE supervisory occupations are classified at a higher skill level because a higher level of skill and training is required for entry into the given supervisory occupation. This means that supervisory occupations are in different major groups to their associated non-supervisory occupations. For example, Retail Supervisors and Checkout Supervisors are classified in ASCOSE at Skill Level 4 in Major Group 6 Intermediate Clerical, Sales and Service Workers, while the occupations which are generally supervised by persons in these categories are located at Skill Level 5 in Major Group 8 Elementary Clerical, Sales and Service Workers. However, it may be argued that this more restricted application of skill levels result in occupations being inappropriately classified within major groups.

In the lower levels of NZSCO99, skill specialisation is used to distinguish between groups[2]. Occupations that have similar tasks are able to be separated from each other based on the knowledge required, tools used and material produced. However, a clear hierarchy does not exist as to which sub-major or minor groups within a major group of NZSCO99 have higher skill levels than others. For example, Major Group 1 (Legislators, Administrators and Managers) has the highest skill level of the NZSCO99, however, it is unclear whether within Major Group 1, Legislators and Administrators have greater skills than Corporate Managers. This is a potential problem for those wanting more detailed information about changes in skill demands within occupational groupings. However, making a judgement about skill differences within major groups would introduce a certain amount of subjectivity (i.e. value judgements about the kinds of skills used in an occupation). It is questionable whether it is the purpose of the NZSCO99 to include such information.

Conclusion

The NZSCO99 provides some limited information on changes in skills. However, it needs to be used carefully in view of its limitations. It is possible that major groups in the NZSCO99 may not be able to be significantly differentiated from each other on the basis of skill level. In addition, there may be heterogeneity within NZSCO99 major groups. The NZSCO99 provides some broad skill information but may not be able to usefully distinguish between the types of skill changes needed to forecast future demands.

Constructing a time series of occupational employment

The following section explains how data from the 1991, 1996 and 2001 Census of Population and Dwellings in New Zealand was used to construct a time series of occupational employment.

[2] 'Skill level' is used in a limited and non-consistent way to distinguish between some lower levels of the NZSCO99.

The challenge

The objective of constructing the time series was to compare the employment counts for each occupational title in the 2001 census with employment counts for the same occupation in 1996 and 1991. The 2001 census results were coded to NZSCO99. More than 550 individual occupations were classified and about 75 per cent of these occupational titles were comparable with titles used in previous Censuses. As a result of revisions to the Standard Classification of Occupations, the rest were not. In the evolution from NZSCO90 to NZSCO95 to NZSCO99, occupational titles have been renamed, merged or split into two or more new occupational titles. We effectively had to reclassify NZSCO95 and NZSCO90 to NZSCO99.

The solution

Statistics New Zealand has published concordance tables showing how occupational titles changed in the revisions. Using these tables it was possible to identify occupations that underwent title changes and occupations that had been merged. To provide comparable data the latter were simply amalgamated. For example, the 1996 census (using NZSCO95) counted *Water and Soil Engineers* and *Other Civil Engineers*. In the NZSCO99 revision these two titles were merged and the 2001 Census counted Other Civil Engineers. Deriving this information from the concordance tables it was possible to total the employment counts for *Water and Soil Engineers* and *Other Civil Engineers* in 1996 effectively telling us how many *Other Civil Engineers* there were in this Census year and allowing us to compare with 2001.

It was possible to discern from concordance tables how occupational titles were split. For instance, the tables told us that *Administration and/or Accounting Managers* in NZSCO95 were split into *Transport Managers*, *Administration Managers* and *Finance Managers* when the occupation was revised for NZSCO99. *Transport Managers*, *Administration Managers* and *Finance Managers* were all counted in the 2001 census, but further information was needed to identify how many people were employed in these occupations in 1996. This information was available from 'level 6' data.

Level 6 is a coding index. Census respondents do not necessarily give answers about their occupation that fit directly into the Standard Classification. Level 6 provides a range of alternative titles that can be taken as meaning the same as the SCO title. For example, Accounting Manager, Admin Manager and Treasurer can all be classed as *Administration and/or Accounting Managers*. The employment count for each occupation title is derived by totalling the related level 6 counts.

Level 6 allowed us to trace back new occupational titles to previous census years. Progressing the example already used, it was possible to take the level 6 counts taken in the 1996 census, specify those that related to *Transport Managers*, *Administration Managers* and *Finance Managers,* and produce 1996 employment counts. So, the 19,115 *Administration and/or Accounting Managers* in the 1996 were split into 10,131 *Administration Managers*, 9040 *Finance Managers*, and 56 Transport Managers.

The 1991 census counts compiled under NZSCO90 were reclassified to NZSC99 using a similar combination of concordance tables and level 6 data. There is no direct concordance between NZSCO90 and NZSCO99 so the reclassification was carried in two stages, firstly NZSCO90 to NZSCO95 then NZSCO95 to NZSCO99. The second stage involved using the 1996 census level 6 data again, except this time the employment counts were applied as ratios. So for example, there were 18,813 *Administration and/or Accounting Managers* counted in 1991. This title needed no revision in NZSCO95 but for NZSCO99 the following ratios needed to be applied using the level 6 data shown in the preceding paragraph: *Administration Manager* 53%, *Finance Manager* 47%, *Transport Manager* 0.2%.

For example, of the 18813 *Administration and/or Accounting Managers*

Caveats to the methodology

The caveats centre on the use of level 6 data. Firstly, a degree of subjectivity was involved in applying the level 6 occupation names to titles that were developed in subsequent revisions. However the most serious caveat occurred in application of level 6 ratios from 1996 census data, to 1991 census data is explained in the preceding paragraph. Using the example, we are effectively assuming that the breakdown of *Administration and/or Accounting Managers* in to *Transport Managers*, *Administration Managers* and *Finance Managers* that existed in 1996 was equally applicable in 1991. There is no reason why this should be so.

Occupational trends

This section outlines some of the changes in occupational employment between 1991 and 2001. The results are mainly descriptive at this stage. They tell us what has been happening and therefore lay the foundation for future research that would provide a deeper understanding of why the changes have occurred.

Between 1991 and 2001, employment in New Zealand rose by approximately 327,000 people. The following table looks at how employment changed with the 9 Major occupational groups.

Major group	'91-'96	'96-01	'91-'01
1 Legislators/Admin/Managers	26,700	27,400	54,000
2 Professionals	24,900	43,000	68,000
3 Ass. Professionals/Technicians	25,700	18,100	43,800
4 Clerks	15,700	0	15,700
5 Service/Sales Workers	47,700	16,400	64,100
6 Agriculture/Fishery Workers	16,200	-16,000	100
7 Trades Workers	-400	-3,000	-3,500
8 Plant & Machine Operators/Assemblers	3,800	7,900	11,700
9 Elementary Workers	11,500	-10,600	900
Overall net employment growth*	230,300	96,525	326,800

*Including non-applicable

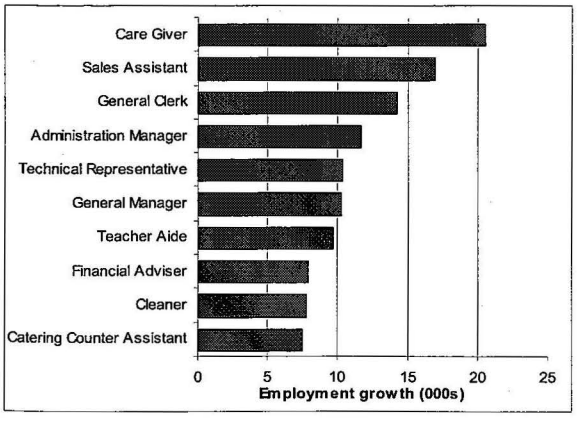
The table broadly reveals where occupational growth occurred:

- Between 1991 and 1996, Service and Sales workers were the main contributors to employment growth, rising by almost 48,000 – 20% of the total net employment increase.
- Between 1996 and 2001, Professionals were the main drivers of employment growth, rising by 43,000 – 44% of the total net employment increase.
- Overall net employment growth was much lower in the latter half of the 1990s with a number of occupational groups experiencing marked declines.

Growing occupations

The following chart shows the occupations that contributed most to employment growth between 1991 and 2001.

The top 10 contributors to employment growth 1991 to 2001



Of over 562 single occupational titles classified in our dataset, 365 of these grew in employment between 1991 and 2001. Totalling the employment growth in these occupations gives us the gross employment increase.

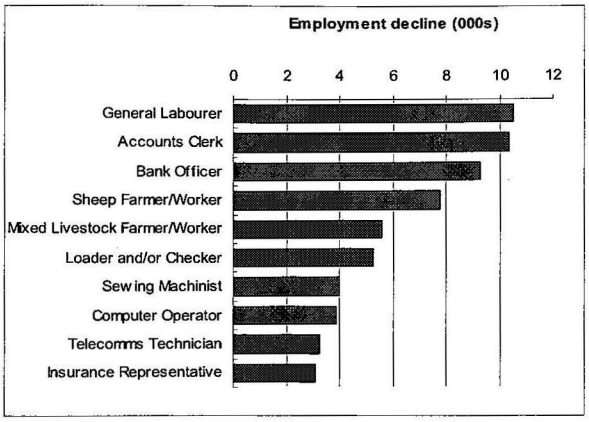
The gross increase in employment was concentrated in just a small number of occupations: the top 10 occupations that grew the most contributed 29 per cent to the total gross increase; less than 10 per cent of the 365 growing occupations contributed over half of the employment growth.

The drivers of occupational trends are likely to be complex but we might draw some tentative conclusions the occupations that have grown the most:

- Growth in the number of *Sales Assistants* and *Catering Counter Assistants* typifies the increasing importance of the service sector in the New Zealand economy. Between 1991 and 1996, Service and Sales workers were the main contributors to employment growth, rising by almost 48,000.
- *Technical Representatives* sell and advise customers on the application, installation and operation of specialised equipment. Many of them are involved in information technology and they are increasingly in demand as IT spreads across homes and businesses. The spread of information technology is also evinced in the rising employment of many other IT related occupations such *as Computer Applications Engineers* and *Systems Analysts*.
- The expansion in the number of *General Managers* demonstrates the continuing growth of professional occupations. Legislators, Administrators and Managers contributed significantly to employment growth during the whole of the 1990s, rising by 54,000 overall. In addition, between 1996 and 2001, Professionals were the greatest contributors to growth, rising by 43,000.
- *Care Givers* were the greatest single contributors to employment growth in the 1990s. They provide general household assistance, care and companionship for aged or disabled people in their homes. The expansion of this occupation may be associated to a greater emphasis on community based health care.
- The growth of *Financial Advisers* is related to the increase in the number and complexity of high street financial products that occurred after the deregulation of the financial sector.

Declining Occupations

Almost 200 occupations experienced a fall in employment between 1991 and 2001. The gross decline was highly concentrated in just a small number of these occupations. Roughly 10% of the 200 contributed almost two-thirds to the decline. The following chart shows the top 10 declining occupations between 1991 and 2001.



Some possible reasons may be put forward to explain why these occupations have declined in such high numbers.

- The decline of *General Labourers* may be indicative of upskilling in the New Zealand economy although amongst elementary occupations as a whole, employment has fluctuated but there is no evidence of a downward trend to suggest that occupations are becoming more highly skilled.

- Accounts systems are now run on sophisticated software packages rather than paper ledgers. The more basic accounting practices are therefore carried out much more quickly. This allows them to be subsumed into multi-skilled clerical roles, which may have contributed to a reduction in the demand for lower specialised accountancy occupations such as *Accounts Clerks*.

- The introduction of Automatic Teller Machines, Internet Banking and a more competitive (cost cutting) environment could all have contributed to a reduction in the demand for *Bank Officers*.

Of course, this is a very basic and tentative analysis. However it does give us a way forward. The concentrations of employment and employment growth allow us to combine the broad trends observed in the major groups with the detail afforded by examining movements in individual occupations. Our forthcoming work now will concentrate on better understanding the forces that are driving these trends.

Overall Conclusions

The aim of this research paper on occupational trends in New Zealand was to provide information that may improve the matching of people's skills to jobs. Information on historical occupational employment allows people to get an indication of future trends.

The paper began with an examination of conceptual basis of occupational classifications used in New Zealand. In terms of measuring skills, NZSCO99 provides some aggregate information on skills but may not be able to detect more subtle changes in the demand for skills needed to forecast future demands. This is because the more general application of skill level used in the NZSCO99 means that major groups in the NZSCO99 may not be able to be significantly differentiated from each other on the basis of skill level. In addition, there may be heterogeneity within NZSCO99 major groups. However, this is a necessary trade-off to prevent the classification system from becoming too prescriptive and placing artificial constraints about which group occupations belong to. More rigid occupational classifications systems run the risk of placing occupations together in groups that are no longer meaningful.

As an introduction to the empirical analysis a brief explanation was given about how we constructed the occupational dataset along with the unavoidable caveats in our methodology.

Our analysis of the empirical data showed that a large share of the change in occupational employment over the 1990s was dominated by a relatively small number of occupations. These principal contributors to employment change aligned with observations at a more aggregated level, provide us with the basis for understanding the drivers of occupational change.

Future Research

There are a number of areas for potential future research in occupational trends. Some other areas that may be explored include gender and ethnicity analyses of Census information from 1991, 1996 and 2001. Another useful area to explore is the relationship between occupational and industry changes over time. In addition, more detailed analyses for specific occupations are needed for example the growth of management and information technology occupations.

Notes

A more in-depth version of this paper is available on the Future of Work website (www.futureofwork.govt.nz).

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