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Occupational Classification
(ISCO-88): Concepts,
Methods, Reliability, Validity
and Cross-National
Comparability

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**OCCUPATIONAL CLASSIFICATION (ISCO-88):
CONCEPTS, METHODS, RELIABILITY, VALIDITY AND CROSS-NATIONAL COMPARABILITY**

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SUMMARY

This paper considers a range of topics concerned with the statistical application of an occupational classification, focusing in particular upon the use of the international standard, ISCO-88. Following a brief presentation of the conceptual basis of ISCO-88 and on methods of collecting and coding occupational information, evidence is presented on the reliability and validity of occupationally classified data. The paper reviews progress on the implementation of ISCO-88 on a global basis and presents an assessment of the likely comparability between countries of occupational data based upon ISCO-88.

From the evidence available it appears that ISCO-88 has successfully superseded ISCO-68 and, in many countries, has become the model for a new national classification even where a national classification of occupations previously existed.

However, occupational classification remains a difficult process, subject to a fairly low level of reliability. In addition to problems of reliability, the validity of cross-national comparison may also be affected by misinterpretation of the international standard within a national context. Most errors of misinterpretation stem from either a simple misunderstanding of the conceptual basis of ISCO-88 or from problems associated with the fact that national classifications may group occupations by criteria other than skill level and skill specialisation.

International comparability can be improved by aggregating national data which have been classified to ISCO-88 data. Coding/recoding studies indicate that the *sub-major group*¹ level of ISCO-88 represents a useful level at which to undertake comparative analyses of occupational data.

International comparability is improved via the active intervention of agencies which supply technical assistance and coordinate programmes of work which are specifically designed to promote understanding of the International Standard Classification of Occupations.

Given the improvements in comparability which have arisen from coodination, it seems reasonable to assume that in the absence of technical assistance, where countries have independently implemented ISCO-88 or mapped their existing classifications to the standard without reference to best practice elsewhere, comparability may suffer. In the resulting statistical data one cannot then distinguish between statistical differences which arise from differences in the interpretation of the classification and differences between countries in terms of their skill structure.

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OCCUPATIONAL CLASSIFICATION (ISCO-88): CONCEPTS, METHODS, RELIABILITY, VALIDITY AND CROSS-NATIONAL COMPARABILITY

After much pains with my enquiries into the purser's trade, and therein collected a little volume of observation, I profess myself at a perfect loss what to advise... I have no expectation that there will ever be found in so many persons as we shall need all the qualifications to make the project of cheques and stewards advisable.

[Samuel Pepys, diarist, in a letter to Sir William Coventry, 12 December 1665, responding to his request to define the tasks required of the ship's pursers he was attempting to recruit (Tanner, 1929, p. 88)].

Introduction

This paper examines a range of topics associated with the classification of occupational information. Issues addressed include the conceptual basis of such classifications, particularly the 1988 International Standard Classification of Occupations (ISCO-88), the nature of occupational information subject to classification, methods of classification, measurement problems associated with occupational classification, particularly the validity and reliability of data obtained via the classification process, and the international comparability of these data.

The meaning of occupation

In the English language there is an ambiguity in both the interpretation and usage of the word *occupation* which enriches the concept yet complicates the application of classification principles. From its Latin origin and on into Medieval French and Old English, the word was used to indicate the possession of space as in the phrase *an army of occupation*. Through Middle English, usage of the word broadened to encompass the possession of time, particularly to describe the way in which people devoted time to market and non-market activities. Interestingly, a usage now regarded as obsolete references *occupation* as the pursuit of mercantile employment, a trade or craft, with the word *profession* reserved for a higher status of employment, business or office². In modern English, these historical usages colour the interpretation that is placed upon the word. 'Occupation' nowadays implies a description of the general way in which we use time, rather than to reference what we may be doing at a specific moment. When asked what kind of work a person does, or what type of job he/she may have, the answer is likely to reflect their current status. Asked for their occupation however and the reply might reflect more upon a long term plan or indicate events on a broader timescale³. The question could also be interpreted as a request for information on the respondent's social status or rank, with the response being worded in a way which already reflects a form of classification and which recognises the existence of a social structure. Similarly, the word 'profession' in English now associates with the acquisition of a specialised body of knowledge and with the pursuit of employment in areas for which such knowledge is an essential prerequisite. In French the word 'profession' translates better as 'occupation' or 'career', yet still carries the general ambiguity derived from its Latin origins.

Two important points can be made from these etymological considerations. First, the nature of the occupational information obtained for classification purposes will be strongly influenced by the nature and social setting of the questions, enquiries or data sources used to provide such information⁴. Second,

the producers of occupationally-classified information need to be aware of the uses to which such information will be put and should reference its limitations to users. If the purpose is to compare, say, the skill structure of two economies it is obvious that the concept of skill as a basis for occupational classification should be operationalised in as identical a fashion as possible within the two occupational data sources. This may seem a trivial point, yet it is the fundamental problem with cross-national comparison of data. Users may see similar descriptions of occupational categories, for example ‘skilled’, ‘part-skilled’ or ‘semi-skilled’ and ‘unskilled’ and assume that these are comparable categories. But words like ‘skill’, ‘profession’ and ‘occupation’ do not translate easily, for reasons associated with cultural differences in the social construction and definition of these concepts⁵.

The conceptual basis of an occupational classification

Until the latter half of this century, the tendency for occupational classifications to reflect social strata seriously weakened the extent to which occupationally classified data could be utilised for detailed cross-national comparison⁶. Gradually, through a progressive clarification of concepts and via the promotion of the international standard, attempts have been made to set apart the process of occupational classification from the nature of social stratification in the country concerned. There is nowadays a general agreement that the object to be classified relates to the nature of the work performed by a worker rather than the characteristics of the worker. A worker may be under or overqualified for the work he/she is performing, or may be drawn from a social stratum which is unusual compared with the majority of holders of such posts. Such facts are deemed irrelevant as far as the *conceptual* basis of the classification is concerned, but may well remain influential in the process of classification.

ISCO-88 has been designed and constructed around two key concepts: the concept of the job and the skills required for competent performance of the job. A *job* is defined as the set of tasks or duties designed to be performed by one person. For the majority of jobholders the job is predefined before they are recruited into the post. Employers, professional bodies or institutions formulate jobs as bundles of tasks and duties allocated to employees who are recruited to these jobs. Associated with a job may be a job description, detailing the required tasks and duties and a job title, through which the postholder identifies with a particular job. In some cases, particularly for self-employed individuals, the job is designed and conducted by the postholder.

Skill is defined in ISCO-88 as ‘the ability to carry out the tasks and duties of a particular job’ (ILO, 1990; p.2). To develop a taxonomy around this concept of occupational competence, two different dimensions of skill are defined. The *level of skill* associated with competent performance of a job is intended to measure the complexity and range of the tasks and duties concerned. The *specialisation of skill* defines the field(s) of knowledge required, tools and machinery used, material worked on and kind of goods and services produced. Like its predecessor versions (ISCO-58 and ISCO-68), the areas of skill specialisation which are recognised in ISCO-88 create a taxonomy of types of work related to fields of knowledge, materials worked with etc. Apart from a sharpening and updating of the definition of such areas of knowledge, this concept presents no novelty. The major change brought about by ISCO-88 is the concept of a skill level. In ISCO-88 this is related to the amount of formal education and formal or informal training and work experience generally associated with competent task performance.

To provide an operational indication of the concept of skill levels, ISCO-88 references four broad levels which are equated with levels of formal education (see Table 1) via the International Standard Classification of Education (ISCED). As the ILO indicates:

The use of ISCED categories to define the four skill levels does not imply that the skills necessary to perform the tasks and duties of a given job can be acquired only through formal education. The skills may be, and often are, acquired through informal training and experience (ILO, 1990, p.2).

These four skill levels provide a quasi-hierarchical structure to the organisation of the classification. Although ISCO-88 avoids the terminology, ‘Elementary Occupations’ can be regarded as ‘Unskilled’, and ‘Manual’ or ‘Blue-collar’ occupations are concentrated within major groups 6 to 9.

Table 1. ISCO-88 skill levels and education/qualifications

Skill level	Corresponding education/qualifications
First skill level	Primary education (begun at ages 5-7 and lasting approximately 5 years)
Second skill level	Secondary education (begun at ages 11-12 and lasting 5-7 years)
Third skill level	Tertiary education (begun at ages 17-18 and lasting 3-4 years, but not giving equivalent of university degree)
Fourth skill level	Tertiary education (begun at ages 17-18 and lasting 3-6 years and leading to university degree or equivalent)

Source: ILO (1990)

Ten major groups constitute the broad structure of the classification at its most aggregate level. As can be seen from Table 2, eight of the ten major groups are related to the four ISCO skill levels. For the managerial major group (Major Group 1; Legislators, senior officials and managers) the range of tasks which can constitute a managerial occupation was deemed too large to link directly with a particular skill level. For the armed forces (Major Group 0), many countries had indicated that the information required to categorise occupations within their armed forces would not be available for statistical classification.

Table 2. ISCO-88 major groups and skill level

Major group	ISCO skill level
1. Legislators, senior officials and managers	-
2. Professionals	4th
3. Technicians and associate professionals	3rd
4. Clerks	2nd
5. Service workers and shop and market sales workers	2nd
6. Skill agricultural and fishery workers	2nd
7. Craft and related workers	2nd
8. Plant and machine operators and assemblers	2nd
9. Elementary occupations	1st
10. Armed forces	-

Source: ILO (1990)

Methods of collecting and classifying occupational information

Most of occupational data which is used for national statistical purposes is obtained from direct questions addressed to employers, employees or the self-employed. Such questions request information concerning the job title associated with a particular job, together with additional details about the main

tasks or duties associated with that job. The information may be collected from employers or their representatives in the case of enterprise-based enquiries, or from workers or household proxy respondents in the case of household-based enquiries. Data collection methods may take the form of postal enquiries, telephone interviews or direct face-to-face contact with respondents. Specific instructions usually accompany the questions concerning occupation in an attempt to ensure that responses are neither too vague nor overly detailed. These instructions may appear as guidance notes on a postal survey or census form, or may be issued as instructions to interviewers conducting household or enterprise-based enquiries.

The classification of occupational information is achieved through a coding process. Via manual methods, or by using computerised coding systems (eg van Bastelaer *et al.*, 1987; Elias *et al.*, 1992; Australian Bureau of Statistics, 1990), job title and task information is converted to a set of codes. These codes may be the classification categories themselves (eg. 4 digits representing the unit group structure of ISCO-88) or a set of intermediate codes which will later be converted to the appropriate classification categories.

The collection and coding of occupational information is a relatively expensive and tedious activity. For this reason, various techniques have been devised to reduce costs. 'Sample' coding is a procedure whereby not all of the original data is subject to occupational coding. For example, in the United Kingdom a 10 per cent sample of the Census of Population is selected for occupational coding. While this cuts coding costs significantly, it limits the extent to which the occupational content of such data can be studied for sub-groups of the population or for small geographic areas. Also, the fact that a large proportion of the data collected will never be used raises difficult questions about why such an amount of data should be collected in the first place. Self-classification, through which the respondent reports the category of the classification to which he/she belongs, is another method used to contain coding costs. The main difficulty with this approach lies in the fact that respondents may be deterred from selecting between more than, say, ten categories. For occupational classification, self-coding then implies that respondents can accurately classify their job to the major group structure of ISCO-88. This is generally regarded as poor statistical practice.

Computer-assisted and computer automated coding procedures provide the best way of containing coding costs. Various experiments have been conducted to determine the proportion of occupational descriptions which can be coded accurately using fully-automated computerised classification techniques⁷. Improvements in software, harnessed to the increase in data processing speeds achieved in recent years, are rapidly leading to a situation in which approximately two-thirds of the job title information provided by respondents may be classified in a valid and reliable fashion by fully automated coding methods. Additionally, the integration of occupational coding software with computer-assisted interviewing techniques will soon lead to a situation in which interviewers can enter and code data at the moment of data collection, facilitating further questioning of the respondent in the case of low quality information, or seeking further differentiation of the occupational information obtained in the face of ambiguous data.

The reliability and validity of occupationally classified data

The statistical concepts of reliability and validity are relevant to the assessment of the quality and accuracy of classified data. *Reliability* is a measure of the extent to which information obtained from the classification process via different data sources, or from similar data sources but generated at different points in time, produces consistent results. For example, if it is known with certainty that 0.1 per cent of the employed population in a country consists of, say, medical doctors and that this percentage was unchanging through time, different national surveys should reliably measure this percentage at 0.1 per

cent, within the tolerance of statistical variation associated with sample survey methods. *Validity* relates to whether or not the classification process measures this percentage without systematic bias. In the above example, if a figure of 0.2 per cent was obtained on a consistent basis, and if this percentage was significantly different from the true figure of 0.1 per cent, one would query the validity of the classification process with respect to this occupational category.

Some indication of the reliability and validity of occupational coding frames and processes can be obtained via coding/recoding methods. By coding the same body of occupational data more than once, sometimes varying the method of coding, insight can be gained into the validity and reliability of the occupational data so generated. Double coding, in which a team of coders simply codes data twice (without reference to the first set of codes), is often used to indicate the reliability of the classification process. Expert coding, in which a body of data is assigned a set of agreed codes by a group of classification experts, then coded via normal methods without reference to these 'expert' codes, is used to

Most national statistical institutes and other organisations which have responsibility for the coding of occupational data have undertaken coding/recoding studies at various times. These studies are generally performed to check on the performance of individual coders, to indicate how reliably the individual applies a set of coding rules to a body of occupational information in order to generate occupational data. Less frequently, possibly because of the higher costs involved, expert recoding of occupational information is performed to check on the validity of the process.

It should be recognised that the results obtained from these sorts of studies are indicative of problems stemming from a range of possible causes, all of which may interact. These include:

- the extent and quality of the occupational data to be coded. The data to be coded may be too brief for application of a relevant occupation code, uninformative or may be ambiguous in its interpretation;
- instructions for the application of coding rules may be poorly formulated, leading to differences in their interpretation by different coders;
- poor coder training procedures may lead to errors in the application of coding rules;
- human error, which may be a result of fatigue and boredom - coding occupational information is usually a difficult and unrewarding task;
- the classification itself may be poorly constructed, or may rely upon concepts which cannot be readily operationalised in a particular context.

Despite the wide range of problems which can arise in such studies and the extent to which they are confounded, the results are interesting and informative. Table 3 shows the coding/recoding agreement rates from a number of studies conducted, with one exception, using data from the United Kingdom over an eight year period. While nearly all these results pertain to a particular national classification, similar results are obtained from coding/recoding studies in other countries and using different national classifications⁸.

Table 3. Agreement rates from occupational recoding studies

Date	Source of information	Nature of coding/recoding	Agreement Rate ¹		(%)
			3-digit	2-digit	1-digit
1981	OPCS (1982)	600 occupational descriptions from General Household Survey. Coding and recoding by office coders.	78	84	87
1982	White (1983)	625 occupational descriptions from field-test of Labour Force Survey. Coding by interviewers, recoding by OPCS office coders	74	82	n.s.
1982	Elliot (1983)	2 772 occupational descriptions from control study for Ethnic Minorities Survey. Coding by market research agency, recoding by OPCS office coders.	n.a.	87	n.s.
1985	Dodd (1985)	900 occupational descriptions from 1985 continuous Labour Force Survey. Coding by interviewer, recoding by OPCS office coders.	70	84	87
1990	Elias (1990a)	1 682 occupational descriptions from work history survey data. Originally coded to 4-digit schema. Recoded using computer-assisted coding package.	74	78	85
1990	Elias (1990b)	167 job descriptions from pre-test of British Household Panel Study. Originally coded by Panel Study research staff. Recoded using computer-assisted untrained staff.	74	78	85
1996	Krizman et al (1996)	4 000 job titles from 1995 Labour Force Survey for Slovenia, recoded by office coders in the light of classification revisions	56	70	75

1. '3-digit' refers to a code frame with 350 categories
'2-digit' refers to 16 or 18 aggregate groups
'1-digit' refers to 5 or 6 major categories
'OPCS' refers to the UK Office of Population Censuses and Surveys (now within the Office for National Statistics)
n.a. not applicable
n.s. not stated

A number of generalisations can be made on the basis of these studies:

- Occupational coding is an inexact process. This reflects the complexity of the coding frames used and the coding rules, together with the variation in quality of the occupational information to be coded. Agreement rates in excess of 75 per cent at the '3-digit' level are hard to obtain;

- Agreement rates increase at higher levels of aggregation. This is a consequence of the fact that disagreement between coders, or variation in coding as performed by the same coder, often results in different codes which fall within the same aggregate category;
- There is a sharp improvement in agreement rates between coding frames which are compared at the ‘2-digit’ level as opposed to the ‘3-digit’ level. The further improvement at the ‘1-digit’ level is not so marked.

Other studies (Campanelli, 1996) have queried the use of expert coding as a method of measuring the validity of occupational coding processes. Her results show that there may be as much, or more, disagreement between a group of experts over the choice of codes to apply to a body of occupational data as there is from a group of trained coders.

In the context of ISCO-88, these generalisations suggest that comparisons between countries at a detailed level of classification (3-digit) will be fully exposed to the low level of reliability associated with occupational classification. Data comparisons made at the sub-major group level (essentially the ‘2-digit’ level as defined in Table 5) are likely to be reasonably reliable in terms of the application of the underlying classification process.

Progress in adopting ISCO-88

ISCO-88 was developed during the mid 1980s⁹ to facilitate international comparison of occupational statistics and to provide a conceptual framework for those national statistical offices in the process of developing or revising their national occupational classifications. Unlike its two predecessors (ISCO-58 and ISCO-68), the classification has been adopted, or is in the process of being adopted, by a large number of countries. In part this reflects both the more rigorous conceptual basis of ISCO-88 compared with its predecessors and the practical approach to its development which involved drawing upon the experience of a number of countries then in the process of reviewing and revising their national classifications. Particularly relevant in this respect was the major amount of development work which had taken place in Australia from 1981-86 to produce an occupational classification which gave priority to the need for labour market description and analysis. The resulting classification, widely accepted by Australian users, promoted the concepts of *skill levels* required to carry out the tasks and duties of jobs and *skill specialisations* for finer distinctions within skill levels. Concurrent with the development of ISCO-88, the United Kingdom rationalised its complex and poorly understood system of occupational classification¹⁰ aligning its new Standard Occupational Classification in part with the Australian system and ISCO-88. Subsequent revision to the Australian Standard Classification of Occupations has now brought the Australian Standard in line with ISCO-88 (Sarossy, 1996), a process which looks set to be repeated in the United Kingdom for its planned revision to the SOC in 2000.

The fact that two countries may have had some influence in the development of ISCO-88 or may have offered practical guidance does not fully explain the rapid rate of adoption of the new international standard and the extent of its influence. Two other events coincided which both gave impetus to the implementation of ISCO-88 and have helped promote understanding of the classification concepts. First, the European Union has long sought to measure and contrast labour market trends in the member countries according to some definition of skill, training or level of competence. Use of the 1968 International Standard did not assist with this goal. With its emphasis on skill levels however, ISCO-88 afforded just this possibility. Accordingly, Eurostat commenced plans in 1990 to ensure that member countries used ISCO-88 as the ‘European Union’ measure of occupational structure. For some countries (eg France) this appeared to pose seemingly insurmountable problems given that the French occupational classification

retains as its conceptual basis the principal of social similarity and perceptions of social standing. Some solution had to be found fairly rapidly, given that other European Union countries (eg Greece, Portugal) were planning revisions to their national classifications at this time and were keen to develop their new classifications in line with Eurostat recommendations. The solution to the problem faced by countries with existing classifications which bore little resemblance to ISCO-88 was to modify ISCO-88 in such a way that these countries could accept and understand the nomenclature and categories, without violating the conceptual principles upon which ISCO-88 was based. The resulting EU-version of ISCO-88, known as ISCO-88 (COM)¹¹, was then mapped onto the national classification at the most detailed level of the national classification, with this mapping providing a detailed *table des correspondences*¹². Certain new EU member countries (Sweden and Finland) have virtually adopted ISCO-88 (COM) in its entirety as their new national classification, while Austria is considering plans to revise its national occupational classification to align more closely with ISCO-88(COM) in the near future.

The second major event which has focused attention on ISCO-88 and has lent some urgency to its implementation is the collapse of the Communist system. For the countries of East and Central Europe, from Estonia to Albania, their release from requirements for occupational statistics to be based upon the 'All-Union Classifier', the detailed occupational numbering system which dictated Soviet labour force planning, left behind a statistical vacuum which had to be filled quickly and systematically. Most of these countries have received and still are receiving technical assistance for national statistics from Eurostat and were keen to align with European Union statistical practice. Like Sweden, Finland and Portugal, some have subsequently adopted ISCO-88 (COM) in its entirety (Romania, Slovenia, Estonia). Others have adapted ISCO-88 to their national circumstances (Poland, Bulgaria, Latvia, Lithuania, Czech Republic, Slovakia, Macedonia). Hungary took a more independent route, developing a classification which could only be aligned with ISCO-88 at the major group levels, a situation which is now under review.

Within the countries of the former Soviet Union the introduction of ISCO-88 has commenced, but progress with its implementation has been at a slower and, to some extent, more coordinated. Again, with technical assistance from the ILO, from Eurostat and with the support of other agencies such as the World Bank and the Asian Development Bank, all of the countries of the Former Soviet Union and Mongolia have agreed to implement ISCO-88 in place of the All-Union Classifier for the purpose of statistical reporting and monitoring of labour market trends¹³. A Russian translation of ISCO-88 has been prepared and distributed to their statistical offices. Additional technical assistance has helped Russia, the Ukraine, Moldova and Kazakstan to formulate plans for the implementation of the new classification into their statistical reporting systems.

Interestingly, China has now also commenced plans to introduce a version of ISCO-88 as its national classification. This process was started with a programme of training for key officials and statisticians associated with the production and use of occupational information, studying the conceptual basis of ISCO-88 and learning about the implementation of a new classification from the experiences of other countries, notably the United Kingdom.

The following box summarises the situation regarding the introduction of ISCO-88 by World Regions. This information gives only a broad overview. More detailed information is available from the author on request.

The significance of the developments across Europe and Central Asia should not be underestimated. It is relatively easy for almost any country to provide the ILO with data on occupational structure for its Yearbook or global database and for these data to be referenced according to say major or sub-major groups to ISCO-88. However, the relevant issue is not whether a country can produce

occupational data classified according to ISCO-88, but whether or not such data can be compared between countries in a reliable and valid manner. Experience with the implementation of ISCO-88 (COM) within the European Union and for the countries of East and Central Europe has shown that, left to their own interpretation, statisticians in different countries will disagree over the translation of key concepts, will misclassify some job titles and may misunderstand the conceptual basis of ISCO-88. But by bringing together those persons involved in the process of constructing new classifications, facilitating discussion over common problems of classification and identifying common linguistic solutions where appropriate, the process of implementing a new classification based upon ISCO-88 can then be achieved in a co-ordinated and comparable manner. Additionally, technical assistance to these countries has stressed the importance of the coding process itself as the means towards successful comparison of occupational data. To the extent that this causes countries to engage in coder training, careful construction of new coding indexes, clarification of the nature of the questions asked to generate occupational information and co-ordination regarding rules for the treatment of low quality responses, these activities will promote comparability of occupational data between countries.

The current situation

Information on the extent to which countries are using or plan to use ISCO-88 was collected in a more systematic fashion in 1994, to evaluate possibilities and problems linked to the introduction of the new classification into the *ILO Yearbook of Labour Statistics*. Table 4 shows the responses obtained:

Table 4: Summary of responses to ILO questionnaire concerning use of ISCO-88

Subject	No. Responses received	Number of countries stating:			
		ISCO-88 already in use	ISCO-88 to be used by 1996	ISCO-88 to be used after 1996	No plans to use ISCO-88
Part 1: Economically active population	82	17	18	4	16
Part 2: Employment	75	14	16	2	14
Part 3: Unemployment	72	15	17	1	15

Source: Taswell (1995)

Clearly a substantial number of countries are now applying ISCO-88 or intend to do so over the next year or two.

Current Status of Implementation of ISCO-88 by World Regions

European Union

Most countries of the European Union have now reached the point where their classification of national occupational statistics to a schema based upon ISCO-88 or ISCO-88 (COM) is considered to be useable for comparative analyses at the level of two digits (sub-major groups). Some problems remain to be resolved and plans are reasonably well advanced to undertake the necessary 'fine-tuning' between national occupational classifications and ISCO-88(COM). For Sweden and Finland, further investigatory work remains before occupational data for these countries can be regarded as comparable. On the basis of preliminary investigations, this is unlikely to prove problematic. For Austria, additional resources are required to facilitate a major revision to the country's outdated system of classification.

East and Central Europe

With the exception of Croatia, Bosnia and Serbia, these countries have participated in activities funded by their national statistical institutes and the European Union PHARE programme, to achieve comparability in their occupational statistics. These activities have resulted in three workshops, with a fourth planned to be held in 1997. It will probably be the case that reasonable comparability can be achieved at the three digit (minor group) level of ISCO-88 before this programme concludes.

Countries of the Former Soviet Union

The main effort to coordinate the introduction of new occupational classifications in these countries is being undertaken by Goskomstat CIS (formerly the Statistical Office for the Soviet Union) in Moscow. With technical assistance from the ILO, a translation of ISCO-88 has been prepared in Russian. Work has commenced on the process of mapping existing job titles and incorporating new job titles into ISCO-88. Simultaneously, various Republics are introducing new national occupational classifications, making use of materials provided by the ILO and Goskomstat (CIS). Some countries (Russia, Ukraine, Byelorussia) have made significant progress in this respect. Kazakhstan is receiving additional technical assistance from the Institute for Employment Research, financed via a World Bank loan facility.

China, Hong Kong, Macao

The colonies of Hong Kong and Macao have, for the past year or more, been developing their own versions of ISCO-88. The work programmes associated with these developments indicate that a substantial effort has already been expended to implement the new classification. No evidence is yet available to indicate the problems encountered and solutions adopted.

The People's Republic of China has commenced plans to introduce a variant of ISCO-88 as the national classification over the next few years. In preparation, key industrialists and statisticians have participated in training sessions organised by the ILO Turin Training Centre and the Institute for Employment Research.

Africa

South Africa has informed the ILO that ISCO-88 will be translated into all of their official languages (English, Afrikaans, Xhosa and Zulu). No further details of progress on this activity are available. With technical assistance from the ILO, Namibia has prepared and is now implementing an ISCO-88 based classification. Kenya is currently working to develop such a classification. Mauritius has an ongoing programme of job analysis, linking these analyses to ISCO-88.

Australia

Although the Australian Bureau of Statistics played an important role in the development of ISCO-88, their need to prepare a new classification in time for their 1986 Census of Population meant that the Australian Standard Classification of Occupations (ASCO) predated ISCO-88 and was not entirely consistent. This situation has now been modified via the introduction of a revised (1996) version of ASCO which aligns closely with ISCO-88.

New Zealand published their new classification of occupations in 1990, based upon ISCO-88.

North and Central America

The USA, Canada and Mexico have all undertaken development work over the past three years, with a view towards revising their national occupational classifications. The USA is close to production of the first draft of a revised Standard Occupational Classification (SOC). Statisticians from the Bureau of Labor Statistics have prepared 'cross-walks' mapping from the 1980 SOC to ISCO-88. Insufficient time has elapsed to facilitate detailed study of this mapping.

Plans have been aired for the coordination of efforts in Central America and the Caribbean to introduce new classifications based upon ISCO-88. Barbados was the first country in the world to publish its new occupational classification based upon ISCO-88.

South America

Argentina, Bolivia, Chile, Paraguay and Peru claim to have links between their national classifications and ISCO-88. Bolivia, Chile and Peru have detailed links, Argentina and Paraguay can link at the level of major groups. No evidence of coordination of these activities was available.

Indo China and the South Pacific

A number of countries in this region have requested or have received technical assistance from the ILO for the development and introduction of new occupational classifications based upon ISCO-88. Plans have been aired for the Indo-Chinese countries to engage in some form of collaboration for these activities.

More recently the ILO reviewed the status of economic characteristics in the 1990 round of Population Censuses. While most of the 145 countries and territories which reported details of occupational coding in their Population Censuses had conducted their census shortly after the publication of ISCO-88, many had made links to the new international standard. Tables 5 and 6 show that nearly half of all the countries with occupation coding has established links to ISCO-88 by the time of the ILO enquiry.

Table 5. Countries with occupation coding, by the version of ISCO to which they have established links from their national classification of occupations

ISCO version	Total	Non-OECD	OECD	Africa	America	Asia	Europe	Oceania
Total	145	124	21	32	34	32	33	14
ISCO-68	46	38	8	14	7	12	9	4
ISCO-88	57	49	8	15	19	8	10	5
Both	5	3	2	-	-	1	3	1
No links	35	32	3	3	8	10	11	3
Unknown	3	3	-	-	-	1	-	1

Source: Hoffmann and du Jeu (1995)

Table 6. Countries with links established to ISCO-88 by the level at which the links have been established

Level of links	Total	Non-OECD	OECD	Africa	America	Asia	Europe	Oceania
Total	57	49	8	15	19	8	10	5
Major group	19	18	1	6	7	3	1	2
Sub-major group	5	4	1	1	1	2	1	-
Minor group	13	12	1	4	4	1	4	-
Unit group	15	12	3	3	7	1	2	2
Unknown	5	3	2	1	-	1	2	1

Source: Hoffmann and du Jeu (1995)

The comparability of occupational data between countries

As was indicated in section 5, the complexities of occupational coding frames and their associated coding rules, combined with the often variable quality of occupational data, create problems for the reliability of occupational statistics. From a cross-national perspective, such problems may be minimised by a judicious choice of the levels at which data are compared. Aggregation tends to lessen the problem, but aggregation can be regarded as a process of data reduction - data may become less useful to users as a result.

Reliability, however, is not the fundamental problem associated with cross-national comparison. More important is the issue of whether or not there exists a common understanding and interpretation of the conceptual basis of the classification. A surprising finding which emerged from the work undertaken to harmonise classifications within the European Union was the extent to which countries varied in their interpretation of the relationship between ISCO-88 and their national classifications. In 1992 all countries of the EU were asked to map their occupational classifications from the most detailed level of their national classification to the minor group structure of ISCO-88 (the 3-digit level) and to apply these

mappings to data from their 1992 Labour Force Surveys. Comparison of the occupational distributions so obtained indicated that some major differences in the interpretation of ISCO-88(COM) had arisen (Birch and Elias, 1994). Following further discussions with the National Statistical Institutes involved, and modification of their mappings to ISCO, this exercise was repeated using Labour Force Survey data for 1993 and 1994. Significant improvements in comparability were noted as a result. However, scope for further improvement in these mapping almost certainly exists. Table 7 shows the relationship between the national classifications of the EU and ISCO-88 (COM) describing these mappings as either 'simple' (one-to-one) or 'complex' (involving methods to split nationally-defined unit groups to create ISCO-88 (COM) categories. The 'comparability rating' is a qualitative assessment of the extent to which cross-national comparability has been achieved at the level of sub-major groups of ISCO-88 (COM). For most countries this is now shown as 'good' or 'average'. Two countries (UK and Italy) still have a number of problems to resolve before useful comparisons can be made between occupational statistics for these countries and the rest of the EU. One further round of assessment, discussion and adjustment of the classification converters will take place in 1996/7, using 1995 and 1996 Labour Force Survey data.

Table 7. Classifications of Occupations in EU countries and relationship to ISCO-88 (COM)

Countries	Name of Classification	Mapping to ISCO-88 (COM)	Comparability rating
<i>"Pre 1995" countries</i>			
Belgium	INS-91	Simple	Average
Denmark	DISCO-91	Simple	Average
Germany	KldB-92 Rev	Complex (+ workplace size)	Good
Spain	CNO-94	Simple	Good
France	PCS-82	Complex (+ NACE, workplace size)	Average
Greece	STEP-92	Simple	Good
Ireland		Complex (+ NACE, workplace size)	Average
Italy	CP-91	Simple	Poor
Luxembourg	ISCO-88	Simple	Average
Netherlands	CBS 90/91	Direct	Average
Portugal	CNP-94	Simple	Good
United Kingdom	SOC-90	Complex (+ NACE, workplace size)	Poor
<i>"Post 1995" countries</i>			
Finland	TLN-95 (provisional)	Simple	Not known
Austria	ÖBS-72	Not available	Not applicable
Sweden	SSYK-95 (provisional)	Simple	Not known

Ten countries of East and Central Europe undertook a similar comparative analysis of occupational data from their Labour Force Surveys, via their participation in a PHARE-funded programme of technical assistance¹⁴. Despite a serious lack of resources, these countries were fortunate in that all were

in the process of developing new classifications and most had decided to base these classifications on ISCO-68 or ISCO-88 (COM). Commencing in 1993, these developments were coordinated and monitored. The most recent analysis, prepared for the 1996 technical workshop, (Elias and Birch, 1996) indicated a remarkable degree of similarity when comparing the distribution of occupational structure across these countries, controlling for differences in industry structure and by sex

Conclusions

A number of conclusions can be drawn from this review of progress in the implementation of ISCO-88 as a global standard for the exchange of occupational information.

First, from the evidence now available it appears that ISCO-88 has successfully superseded ISCO-68 and, in many countries, has become the model for a new national classification even where a national classification of occupations previously existed. The process of implementation still continues. For the countries of the former Soviet Union and China, it will be some years before these countries are in a position to supply occupational data coded to ISCO-88. However, nearly all have made some progress with implementation or have laid plans for this to take place, in most cases this will be in time for the 2000/2001 round of population censuses.

The second, somewhat obvious, conclusion to draw is that occupational classification remains a difficult process, subject to a fairly low level of reliability. In addition to problems of reliability, the validity of cross-national comparison may also be affected by misinterpretation of the international standard within a national context. Most errors of misinterpretation stem from either a simple misunderstanding of the conceptual basis of ISCO-88 or from problems associated with the fact that national classifications may group occupations by criteria other than skill level and skill specialisation.

Third, international comparability can be improved by aggregating national data which have been classified to ISCO-88 data. Coding/recoding studies indicate that the *sub-major group*¹⁵ level of ISCO-88 represents a useful level at which to undertake comparative analyses of occupational data.

Fourth, international comparability is improved via the active intervention of agencies which supply technical assistance and coordinate programmes of work which are specifically designed to promote understanding of the International Standard Classification of Occupations. For East and West European countries this process continues; the latest results indicate that most of the major problems of comparability have been resolved. Hopefully a similar situation will apply to countries of the former Soviet Union and for China.

Given the improvements in comparability which have arisen from co-ordination, it seems reasonable to assume that in the absence of technical assistance, where countries have independently implemented ISCO-88 or mapped their existing classifications to the standard without reference to best practice elsewhere, comparability may suffer. In the resulting statistical data one cannot then distinguish between statistical differences which arise from differences in the interpretation of the classification and differences between countries in terms of their skill structure. One possible solution to this problem would be to examine in some detail the nature of these mappings from national classifications to ISCO-88 and to engage in comparative analyses their occupational structure, controlling for gender and sectoral differences in employment structure.

NOTES

1. See Appendix 1 for a listing of the sub-major group structure of ISCO-88.
2. Oxford English Dictionary (1933). Volume VIII, pp 46-7.
3. For example, a claims assessment officer in an unemployment benefit office might well respond 'civil servant' when asked to state an occupation. Similarly, a university lecturer, professor or researcher might simply respond 'academic'.
4. An amusing and extreme example derives from the 1981 Census of Population carried out in the Channel Island of Jersey. One census question consisted simply of the word 'Occupation', with an empty box alongside for the written response. Many older residents wrote in '1939-1945'.
5. For a useful review of concepts and meanings underlying the term 'skill', see Spenner (1990).
6. For example, early British Censuses of Population used a classification of occupations which distinguished the following major classes in this order: Professional, Domestic, Commercial, Agricultural, Industrial and 'Indefinite', with the latter category including labourers.
7. See, for example, Andersson and Lyberg (1983); Campanelli and Moon (1994); Hale (1988).
8. The lower agreement rate shown for the Slovenian study reflects the fact that significant modifications were made to the classification between the dates of the original coding and the recoding.
9. Work on the new international classification commenced in 1984 and was virtually complete by 1987. The standard was adopted by Resolution III at the 14th International Conference of Labour Statisticians on 6 November 1987. Publication took place in 1990 (English) and 1991 (French and Spanish).
10. Developed in the 1950s and 60s and known as CODOT (Classification of Occupations and Directory of Occupational Titles), the classification spawned approximately five major sub-classifications, none of which could be readily interrelated (Thomas and Elias, 1989).
11. The main areas of difference relate to the removal of occupation unit groups which were considered inappropriate in the context of the European Union labour markets, the treatment of occupations in the public service, the definition of 'Corporate' as opposed to 'General' managers and the classification of agricultural occupations.
12. Various terms used: 'classification converter', 'look-up table' or 'cross-walk'.
13. In November 1995 statisticians from all countries of the Former Soviet Union (except Estonia, Latvia and Lithuania) and Mongolia met in Moscow to receive advice and guidance from the ILO and the IER on the subject of introducing new occupational classifications based on ISCO-88 and ISCO-88(COM).

14. This programme is known as TACO (Technical Assistance for Classification of Occupations), coordinated by the Institute for Employment Research and with additional assistance provided by the International Labour Office, Bureau of Statistics.
15. See Appendix 1 for a listing of the sub-major group structure of ISCO-88.

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APPENDIX 1. THE SUB-MAJOR GROUPS OF ISCO-88

11	Legislators and senior officials
12	Corporate managers
13	General managers
21	Physical, mathematical and engineering science professionals
22	Life science and health professionals
23	Teaching professionals
24	Other professionals
31	Physical and engineering science associate professionals
32	Life science and health associate professionals
33	Teaching associate professionals
34	Other associate professionals
41	Office clerks
42	Customer services clerks
51	Personal and protective services workers
52	Models, salespersons and demonstrators
61	Market-oriented skilled agricultural and fishery workers
62	Subsistence agricultural and fishery workers
71	Extraction and building trades workers
72	Metal, machinery and related trades workers
73	Precision, handicraft, printing and related trades workers
74	Other craft and related trades workers
81	Stationary-plant and related operators
82	Machine operators and assemblers
83	Drivers and mobile-plant operators
91	Sales and services elementary occupations
92	Agricultural, fishery and related labourers
93	Labourers in mining, construction, manufacturing and transport