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Standardisation and Harmonisation of Socio-Demographic Variables

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Abstract

Demographic and socio-economic variables are, as a rule, the independent variables in survey research. In order to be able to compare the attitudes and behaviours of respondents across different surveys, it is essential that these independent – demographic and socio-economic – variables be harmonised. A working group set up by the umbrella organisations of the survey-conducting groups in Germany (academic social researchers, commercial market and social researchers, and official statistical agencies) developed and formulated such an instrument for the Federal Republic of Germany entitled the *Demographische Standards*. The present contribution describes the individual variables in the latest edition of these standards, which was published in 2010.

When it comes to cross-cultural and cross-national comparative survey research, however, standardisation is not possible. The only solution here is to harmonise the individual variables across the cultures and countries participating in the survey. This contribution describes the various harmonisation techniques and the rules that must be observed when applying them.

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Introduction

In survey research, demographic and socio-economic variables are, as a rule, the independent variables in data analysis. They serve to classify respondents into groups. If attitudes, opinions, and/or behaviours of respondent groups are to be compared across different surveys and points in time, the objective variables that classify the respondents into groups – that is, the demographic and socio-economic variables – must be measured in a comparable way. However, comparability presupposes the standardisation of the survey instrument in terms of question wording, response categories, and the help provided to interviewers and respondents with answering the questions. Comparability can be achieved only if the survey instrument is standardised.

Why standardisation?

The standardisation of demographic and socio-economic variables means, on the one hand, that the question stimulus and the response categories are formulated in such a way that they correspond to those of the other surveys that are to be used for comparison purposes. On the other hand, one must be able to formulate the independent variable in one's own survey in such a way that it is in line with the question that the survey aims to answer. This dilemma can be resolved only if (a) the core demographic and socio-economic variables are measured in a standardised way across as many surveys as possible. However, it must be possible, (b), to refine, or coarsen, the categories of a standard instrument in line with one's own research question, as long as comparability with the categories of the standard instrument is maintained through recoding. Moreover, it must be possible, (c), where necessary, to expand the standard instrument by adding sub-questions or even variables in order to obtain more in-depth information, and it must be permissible to delete variables that are not required. In summary, this means that, when comparing surveys, the demographic and socio-economic variables must be measured with identical stimuli.

To enable variables to be measured in a comparable way, that is, to make standard instruments available, the leading umbrella organisations of the survey-conducting groups in Germany – the *Arbeitsgemeinschaft Sozialwissenschaftlicher Institute* (Association of Social Science Institutes – ASI) on behalf of academic social researchers, the *Arbeitskreis Deutscher Markt- und Sozialforschungsinstitute* (ADM) on behalf of commercial social and market researchers, and the *Statistisches Bundesamt* (Federal Statistical Office) on behalf of the official statistical agencies – set up a permanent working group in the mid-1980s, which developed the necessary demographic standards and has updated them at regular intervals ever since. The latest edition of the *Demographische Standards* was published in 2010 and is jointly endorsed by the ADM, the ASI, and the Federal Statistical Office (see Statistisches Bundesamt, 2010; www.destatis.de or www.gesis.org/unserangebot/studien-planen). The *Demographische Standards* are adapted to changing social and legal conditions at approximately five-year intervals. A revised edition is scheduled for publication in 2016. The *Demographische Standards* are available for use by all interested researchers, and because far-reaching comparability exists with the German Microcensus, annually updated enumerations from the Microcensus are made available to users of the *Demographische Standards* for the standard sampling plans used in social and market research.

The survey instrument *Demographische Standards*

This survey instrument comprises 13 variables operationalised by means of some 25 questions and sub-questions (see Statistisches Bundesamt, 2010: *Demographische Standards, Ausgabe 2010*):

- Sex – This variable is collected in two categories. Intersexuality and transsexuality are not covered.
- Age – Year of birth and month of birth are collected. In this way, any age-related cut-off dates for survey participation can be reacted to. For reasons of data protection, the day of birth may not be collected.
- Citizenship (in three categories) – In the first step, respondents are asked whether they are “German” or “non-German”. If the answer is “non-German,” they are asked whether they hold the citizenship of a member state of the European Union. Each of these three categories reflects a different legal status. If more in-depth information about the respondent’s migration background is required, it must be collected additionally. Hoffmeyer-Zlotnik and Warner (2010) proposed an instrument for the measurement of ethnicity, which they developed for use in cross-national comparative survey research.
- Marital status and registered partnership – This variable is measured in legal categories. Respondents who report that they are not living in the same household as their spouse or registered partner are asked whether they are sharing a household with a (non-marital/non-registered) partner.
- Education – This variable is measured with two questions about (a) the “highest general education school qualification” and (b) the “vocational education qualifications” achieved:
 - a) Highest general education school qualification (if the respondent is still at school: the highest general education school qualification aspired to): A distinction is made between general education school qualification and vocational education qualifications. The level of educational attainment is composed of both variables (school qualification and vocational qualifications). The response categories for the general education school qualification correspond to the major stages in the national school system. However, account is taken of the fact that, in national surveys, graduates of two different national school systems are surveyed – namely, graduates of the school system of the Federal Republic of Germany (pre-1990 and the present day) and graduates of the school system of the former GDR.
 - b) Vocational education qualifications: The second variable for the measurement of educational attainment distinguishes between (a) vocational education and training received within the so-called *duales System* (part-time vocational school and part-time in-company training), (b) full-time “school-based” vocational education and training, and (c) qualifications obtained at *Fachschulen*,¹ universities of applied sciences (*Fachhochschulen*), and universities (*Hochschulen*). University degrees are classified as vocational education qualifications. In the case of vocational education, too, the education system of the former GDR must be taken into account in a special category. Multiple responses are permitted.

¹ “Vocational schools offering continuing vocational education courses of between one and three years that build on initial vocational training and subsequent employment and lead to a further qualification in a profession” (KMK, 2010: http://www.kmk.org/fileadmin/Dateien/doc/Dokumentation/Glossary_dt_engl.pdf)

- Labour status – Employment as a sociological variable is collected in rough categories according to (1) intensity, for example: full-time, part-time, marginal, casual, etc., (2) different types of extended absences from work, for example partial retirement or maternity leave, and (3) segments of activities that are not classified as economic, for example community and volunteer services. In this variable, all non-employed persons are classified into a residual category.
- In official statistics, labour status is collected as an economic variable according to an International Labour Organization (ILO) concept with the aim of drawing inferences about gross national income (GNI; see ILO, 1982; Rengers, 2005; European Commission, Eurostat 2009). Although the wording of the proposed *Frage 8 Alternative* (Question 8 Alternative) in the *Demographische Standards* contains the core stimulus of the ILO concept, it neither does justice to that concept nor to the measurement of labour status in European official statistics. Hussmanns, Mehran, and Verma (1990: 258–262, 355ff.) demonstrated how the ILO concept could be measured with a battery of between 31 and 61 questions. As a way of combining both approaches, Hoffmeyer-Zlotnik and Warner (2011: 55–63) proposed a tested instrument for cross-national comparative survey research that takes both the social science and the economic approach into account.
- Filter – If respondent is employed: Description of the employment. This is collected with three questions:
 - a) Number of employment relationships in paid employment – The aim here is to capture the respondents' current situation in the labour market. A side-effect of this question is that the respondents' situation in the labour market is brought to mind, which prepares them for subsequent questions about their "main" activity.
 - b) Self-employed or liberal professional: Because hybrid forms are becoming more frequent, this question is also asked of those respondents who indicated in their response to the previous question that they were in paid employment.
 - c) Number of hours worked per week: Respondents are asked how many hours they "normally work per week" rather than how many hours they worked during the previous week.
- Filter – If the respondent is not employed full-time or part-time: the respondent's attachment to the labour force. The aim here is to capture the socially relevant group characteristic of all groups who are not in full-time or part-time employment or on an extended absence from work that is anchored in the labour market. These groups comprise school students, university students, pensioners, unemployed persons, persons who are permanently unable to work, and homemakers.
- Filter – Previous employment: This question is asked of those who are not, or who are no longer, employed at the time of the survey. The question serves as a filter for the questions about professional activity, which are meaningfully asked only of those respondents who are in full-time or part-time employment.
- Description of the professional activity – The respondent's professional activity is collected in several steps, so that it can be coded according to the International Standard Classification of Occupations (ISCO; ILO, 1990; 2007; 2014). Indices of relevance to the social sciences (see below) can be constructed using ISCO-coded data.
- Professional status – Professional status (also known as status in employment) is collected according to fields of activity. Self-employed persons are asked about the size of their enterprise, persons in paid employment are asked about the type of work that they do, and an

index of "job autonomy" is generated (see Hoffmeyer-Zlotnik, 2003; Hoffmeyer-Zlotnik & Warner, 2014: 132–137).

- Number of persons in the household – This is asked at three different levels of computation: (a) the total number of persons, (b) the number of persons who belong to the population of the survey, and (c) the number of persons who contribute to the household income.
 - a) Total number of persons in the household. Here, one must first define what is understood by the term *private household* (see Hoffmeyer-Zlotnik & Warner, 2008). In the *Demographische Standards* and the German Microcensus *private household* means all persons who "live together with common housekeeping". On the basis of this definition, which can be understood by both the interviewers and the respondents, and which is anchored in the national culture, the number of persons who belong to the thus defined group is recorded.
 - b) Number of persons in the household who belong to the population of the survey: Because all the persons who belong to the household do not necessarily belong to the specified population of the survey (e.g., exclusion due to minimum or maximum age limit), the household members who belong to the survey population must be determined in this step.
 - c) Number of persons in the household who contribute to the household income: The household income can be assessed better if it is known how many persons contribute to it.
- Income – The average net monthly income of (a) the household and (b) the respondent is collected:
 - a) The average net monthly income of the household: The question is preceded by an explanation of the purpose of the question and an assurance that the respondent's anonymity will be preserved. The types of income in question are then specified and the term *net* is defined. An interviewer instruction explains how the question should be put to self-employed persons, liberal professionals, and farmers. The response to the income question is not open-ended but rather in categories. The respondent is presented with a list of income categories in which each category is designated by a randomly generated letter of the alphabet. Respondents report only the letter that applies to their household. The intention here is to give them the feeling that the interviewer does not immediately recognise how high the reported income is.
 - b) The average net monthly income of the respondent: The procedure followed when asking this question is the same as in the case of the household income question.

There is also a battery of questions that relates to the equipment of the private household with technical communication media and to the household's communication media usage behaviour. These questions serve to determine the quality of samples in telephone and web surveys and are of less interest to the substantively interested social researcher.

The *Demographische Standards* provide information on the way in which the variables were operationalised, the underlying knowledge objective, and the things to which special attention should be paid when implementing them.

The three status variables: Education, occupation, and income

Instruments or recommendations developed by United Nations specialised agencies or working groups are available for the collection of the three status variables *education*, *occupation*, and *income*. In contrast to the ILO concept for the collection of *employment* according to economic criteria, the UN instruments for these three variables can also be meaningfully used by social scientists.

The education variable was operationalised in such a way that the information collected via the two questions about the “highest general education school qualification” and the “vocational education qualifications” can be used to construct an index according to the categories of the International Standard Classification of Education (ISCED). ISCED is an instrument for the classification of educational qualifications that was developed by UNESCO, the UN specialised agency responsible for education. It can be employed worldwide. The 1997 version (UNESCO, 1997; 2003) is still in use. It comprises seven categories at the upper level, ten sub-categories at the second level, and numerous possibilities for more detailed classification at the third level. The revised – 2011 – version (UNESCO-UIS, 2012) offers greater differentiation, with nine categories and a residual category at the first level and 19 categories at the second level. Although developed for official statistics purposes, ISCED is increasingly used by social researchers because it is a suitable instrument for comparing different national educational qualifications and it allows for comparability with official statistics.

The problems when collecting the education variable in Germany are as follows:

- a) Categories from two different education systems must be considered and incorporated into the two questions – about the “highest general education school qualification” and “vocational education qualifications”. Thus, what we are actually dealing with here is cross-national comparison, as the FRG and the GDR had different school systems and not all qualifications or school types are comparable. In the case of general education school qualifications, this is true of the certificate obtained on successful completion of grade 8 or 9 at a *Polytechnische Oberschule*; in the case of vocational education qualifications, it applies, in particular, to the GDR *Fachschulen*, which are not comparable to those of the FRG.
- b) Because the 16 *Laender* enjoy educational autonomy, the Federal Republic of Germany has 16 very different education systems, with very confusing terminology. For example, there are over a dozen terms to denote the merger of *Hauptschule* and *Realschule*. However, the questions are asked in superordinate categories that the researchers assume will be generally understood. For the interviewers, at least, it would be helpful to have a list of the current designations and descriptions of the different school types in the 16 *Laender*.
- c) In the case of two school qualifications (e.g., the general higher education entrance qualification, *Abitur*, achieved via a second chance programme) those variants that are necessary for ISCED coding are also taken into account.
- d) In the case of “vocational education qualifications,” all educational qualifications are collected – that is, multiple responses are possible and desirable – to enable possible educational equivalences to be identified (e.g. a master craftsman qualification as the equivalent of a higher education entrance qualification).

The second variable that should be collected in such a way that the data can be recorded according to an internationally applicable and comparable system of categories is *occupation*. The system of categories that can be used here for comparison purposes and for social scientific analysis is the International Standard Classification of Occupations (ISCO). It was first developed in the 1950s by the International Labour Organization (ILO) – the UN specialised agency responsible for collecting labour

market data. At present, the instrument is revised at 20-year intervals. While the 1988 version (ILO, 1990) is still frequently used, a revised – 2008 – version (ILO, 2007; 2014) is available. Although the logic of the revised version is the same as that of its predecessor, ISCO-08 takes account of the restructuring of the labour markets due to current developments in the areas of technology and education. To ensure that ISCO coding can be carried out, occupation should be collected in three steps. The following Indices of relevance to the social sciences can be constructed using ISCO-coded data:

- a) Occupational prestige (Standard International Occupational Prestige Scale, SIOPS, see Treiman, 1977; Ganzeboom & Treiman, 2003)
- b) Social status (International Socio-Economic Index of Occupational Status, ISEI, see Ganzeboom et. al., 1992; Ganzeboom and Treiman, 2003), and
- c) Class affiliation (see Erikson, Goldthorpe, & Portocarero [EGP], 1979; Goldthorpe, 1980; Erikson & Goldthorpe, 1992)

However, ISCO coding is a time-intensive, and therefore expensive, operation, and very few institutes have a command of the 500-page coding scheme. The collection of *professional status* (also known as *status in employment*) can be regarded as a rough alternative. The categories (farmers, self-employed persons, and liberal professionals are classified according to enterprise size; employees are classified according to the kind of work they do) are transformed into an index of “job autonomy,” on the basis of which the Standard International Occupational Prestige Scale (SIOPS; see Hoffmeyer-Zlotnik & Warner, 2014: 132–137) and the International Socio-Economic Index of Occupational Status (ISEI) can be roughly represented in around five categories.

The third status variable, after *education* and *occupation*, is *income*. Here, no standard instrument is available but rather a set of recommendations issued by a UN working group, the Canberra Group (2011). These recommendations, which also include an analysis of the possible national income categories, show how multifaceted even the income of a private individual can be. For the income of private households, this means not only that the income of private individuals from – in Germany, on average, six – different sources must be added up, but also, above and beyond this, household-related income types that accrue irrespective of the persons involved (e.g., child benefit). For this reason, it is important to include in the question wording the most important of the 38 income groups listed by the Canberra Group (2011) for the Federal Republic of Germany.

Harmonisation of demographic and socio-economic variables

As Przeworski and Teune (1970: 96–97) noted, “[d]irect measurement is based on definitions by fiat. ... Direct measurement requires that the language of measurement be common to all observations, reflect relationships among the phenomena observed, and be consistently applied.” However, comparisons of individual demographic and socio-economic variables across national systems have revealed that they are “dependent upon the units and the scale of measurement within each social system” (Przeworski & Teune, 1970: 42). National social systems have developed out of the respective national cultures and are subject to national legislation. Hence, cultural or national concepts underlie each individual variable, and via national organisations, institutions, and legislation, these concepts influence the definition and the values of that variable. For this reason, demographic and socio-economic variables cannot simply be translated for the purpose of cross-cultural and/or cross-national comparison. Rather, they must be harmonised – that is, they must be collected in a functionally equivalent way in different cultural or social systems using one and the same definition for each variable.

There are different techniques for harmonising variables. One approach entails measuring the variable with a country-specific instrument and endeavouring after data collection to identify the common attributes of the variable in the participating cultures or countries in order to harmonise the nationally collected data across those cultures/countries (output harmonisation). Another approach involves developing an instrument before data collection that takes the particularities of the different cultures/countries into account yet still enables a measurement that is harmonised across cultures/countries (input harmonisation; see Ehling, Rendtel et al., 2004: 8f.; Hoffmeyer-Zlotnik, 2008: 7ff.).

For output harmonisation, which takes place *ex post*, one needs, first, a common definition of what is to be measured. Second, the team of researchers must have sound knowledge of the variable to be harmonised and the underlying national concepts and structures, so that the information that is collected in national categories can be coded in a functionally equivalent way into the categories of the harmonised instrument that has been developed for comparison purposes. To this end, equivalent phenomena should be classified into the same category (Hoffmeyer-Zlotnik, 2008: 7). However, this is not always possible, for example in the case of nationally different definitions of private household or income categories that are governed by national tax law.

For input harmonisation, which is always carried out *ex ante*, a system of categories that is applicable in all the cultures or countries participating in the survey must be developed prior to data collection. The categories must capture the same thing across all participating cultures or countries with an identical instrument. That means that they must be understood by all respondents in the same way across all cultures and systems. "All survey countries use precisely the same survey procedures in an ideal case. Country-specific particularities are only permissible where they are indispensable" (Information Society Technologies & CHINTEX, 1999: 1). However, if too many particularities are indispensable, input harmonisation is no longer given.

In addition to input and output harmonisation, there is a special case, namely *ex-ante* output harmonisation. This third type of harmonisation is oriented towards an international standard, for example the International Standard Classification of Occupations (ISCO) or the International Standard Classification of Education (ISCED). The aim is to try to collect the data with a national instrument during the survey in such a way that they can be mapped into the categories of the international classification system. In the case of ISCO, this is done in Germany by using the three open-ended questions about occupation in the *Demographische Standards*. In the case of ISCED, it is possible to assign qualifications collected in national categories to a cross-national comparative matrix (see Hoffmeyer-Zlotnik & Warner, 2007: 138ff.; 2014: 99ff.).

There are five steps on the path from a national concept to a cross-nationally comparable data set (see Hoffmeyer-Zlotnik & Warner, 2014: 10–14):

In the first step, the national research groups participating in the project must agree on what the individual variables are supposed to measure.

The second step entails clarifying the cultural or national concepts underlying each variable in each culture and country participating in the survey and the structures by means of which these concepts are represented. That means, for example: What dimensions are used to define *private household*? Or: How is the education system, the labour market, the tax system, the welfare system, etc., organised?

In the third step, a measurement instrument must be selected on the basis of the following aspects: What did the research conducted in Step 2 reveal? Is a suitable measurement instrument available – for example, the International Standard Classification of Occupations or the International Standard Classification of Education – and does it measure what it is supposed to measure? If no suitable measurement instrument is available, the search must continue or a suitable instrument must be developed.

In the fourth step, it is decided whether output harmonisation or input harmonisation can be applied. If the researchers decide in favour of output harmonisation, suitable national survey instruments are used. If they opt for input harmonisation, a measurement instrument must be developed on the basis of the research question that measures the variable in a comparable way within the participating cultures/countries.

If output harmonisation is chosen, the fifth step entails developing a system of categories into which the different, nationally collected data can be coded after data collection. Here, too, the outcome must be a system of common categories.

Rules of harmonisation

Generally speaking, the following eight rules should be observed when harmonising socio-demographic variables in cross-national comparative surveys (see Hoffmeyer-Zlotnik & Warner, 2014: 13f.; Hoffmeyer-Zlotnik, 2008: 11f.; Hoffmeyer-Zlotnik & Wolf, 2003b: 404f.):

1. *For each variable, the researchers participating in the cross-national comparative project must agree on a common definition of what they want to measure.*
2. *The participating researchers must ensure that this common definition designates comparable things in each participating country.*
3. *The participating researchers must analyse for each country the national concepts and structures underlying the variables to be measured.*
4. *For each variable, the participating researchers must identify the commonalities between the underlying national concepts and structures.*
5. *The participating researchers must find a valid indicator (or a set of valid indicators) that represents both the variable of interest and the national particularities thereof.*
6. *The participating researchers must now decide whether the variable of interest should be transferred into a system of categories ex ante, thus rendering input harmonisation possible, or whether it should be measured with the usual country-specific national instruments and then adapted after data collection to a jointly usable instrument/system of categories (output harmonisation).*
7. *The participating researchers must test whether the measurement instrument or system of categories that has been developed realistically reflects the empirical structures in the individual participating countries and whether it captures the logic of the common definition of the variable to be measured.*
8. *The participating researchers must make sure that the measurement instrument that has been developed is understood in the intended way and can be answered by the average respondent in each national and cultural context,*

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