MOBILITY OF HUMAN RESOURCES IN HUNGARY: AN ANALYSIS AND A PROPOSAL FOR REGULAR COLLECTION OF STATISTICS*

ERZSÉBET VISZT1 – ZSUZSA PLANK2 – BALÁZS BORSI3

This article is one of the first results of the work undertaken in the OECD working group. It targets to explore the measurement possibilities of labour force mobility and to lay the foundations for future cross-country comparisons. Highly qualified labour force, which has substantial impact on a country’s innovative performance is focused in the OECD work. The authors’ aim was twofold: to study the available Hungarian Labour Force Survey database (1993–1999) to reveal the possibilities of these statistics used for analysing the mobility processes of the transition economy and to show development alternatives of the Labour Force Surveys. This way the mobility of the Hungarian highly qualified labour force is becoming reliably measurable and internationally comparable.

KEYWORDS: Human resources; Innovation; Skilled labour mobility.

Although the human resource factor is often referred to in studies on innovation, due to the lack of availability of data the discussion usually goes little beyond general statements about its importance. The paper presents initial results based on the Hungarian Labour Force Survey (LFS), as an introduction to a discussion of possible ways of collecting statistical data on the mobility of the human resources devoted to science and technology (HRST) in Hungary. First, we review the conceptual background and present the key results of our 1998 pilot study, before going on to propose possible methods for measuring HRST. Finally, in the tables of the Appendix, we summarise the advantages and disadvantages of the methods proposed.

1. CONCEPTS AND CURRENT STATE OF RESEARCHES

Studying human mobility from basic statistics is never an easy task. In Hungary, human resource statistics of science and technology development are far from complete; unlike the Nordic countries, Hungary does not collect register data. The Hungarian Central Statistical

* The original version of this article was published in OECD (2001): Innovative people, Paris.
1 Research manager of the GKI Co.
2 Senior adviser of the HCSO.
3 PhD student of the Budapest University of Technology and Economics.
Office (HCSO) collects statistical data on the number of employees with high qualifications, as well as on their sectoral, professional and other structural characteristics, but contains only limited information on changes of workplace and migration. However, mobility of highly qualified workers – not only among but also within companies and institutions (including changes in positions and individual career paths) – is an important catalyst for research and technical development; it is thus reasonable to aim its measurability by statistical methods. The NIS (National Innovation System) Focus Group on Human Mobility was initiated by the OECD with two aims: to map how the various OECD countries measure knowledge and the flows of knowledge which are important for innovation; and to obtain statistical measurements which would be comparable across countries.

The internationally recommended measurement methods – including the definition of mobility of human resources – are provided in the so-called ‘Canberra Manual’, compiled by the OECD (1995). According to the Manual, both those people with higher education whose qualifications are considered to be important from the aspect of technical development and those who work in this field despite having a different educational background, should be considered as the target group for research on the human resource aspects of science and technology development. Statistical analysis of workers with high qualifications is a relatively new topic, not only in Hungary but also in many other countries, and the research projects launched so far have only been able to examine some parts of the field.

2. USING THE LFS DATABASE TO MEASURE LABOUR MOBILITY IN HUNGARY

When the EU-harmonised quarterly surveys of the labour force were first launched in Hungary, the main objective was to study the economic activity of households. Thus, mobility was not, and is still not, the focus of these surveys. In 1992, however, a number of amendments were made in the survey structure in line with international recommendations. Accordingly, we can now analyse to what extent the LFS databases are suitable for studying mobility in Hungary. For this study, we have followed the methodological recommendations of the OECD, paying special attention to the study by Mikael Åkerblom on mobility of the highly qualified labour force (Åkerblom; 1999). The findings are presented in the following.

In 1993–1999, employment in Hungary shifted in favour of the young, with an increase in the share of 20-29 year olds entering the labour market. On the supply side, this rise in the most qualified and flexible manpower is a good sign. Nonetheless, the fall in the number of employees in the youngest age bracket indicates that the younger generation increasingly prefers to remain in training and further education. At the same time, expectations for older employees have deteriorated significantly.

In terms of labour force inflow by qualification, most of those entering the labour market had completed industrial and trade school and, by 1999, the second largest group comprised those with a specialised secondary qualification (‘other secondary school’ see in Figure 1). Thus, a substantial change in employment patterns is currently taking place: the low skilled – regardless of whether or not they have completed primary or secondary education (final examination at a high school) – are increasingly unable to find jobs. In
1993–1999, the share of highly qualified employees remained stable among those entering the labour market; this trend contrasts with that experienced in developed economies in the same period.

In 1993–1999, important sectoral changes took place, the results of which can be seen in the labour force outflow figures. The share of employees leaving the labour market decreased in manufacturing and agriculture, but it rose sharply in the sectors financed mostly by the state (education, healthcare, some cultural activities, etc.). There were two main reasons for this: public administration employees were laid off in an effort to achieve cost-savings; and wages in the public sector lag far behind those in the private (business) sector.

The share of those changing their place of work was high in industries where employment was on the rise. One possible reason for this is that the most mobile labour force – the young and skilled – is seeking jobs in the developing industries; these industries also offer greater opportunities for trying out several workplaces. In industries where employment has fallen (education, transport, agriculture, public administration), mobility tends to be fairly low. Low mobility is obviously a drawback with respect to innovative capacities – knowledge flows – since it signals that shrinking sectors also lag behind in terms of human resources, leading to further disadvantages.

The 1998 database was used to examine the suitability of the LFS for constructing internationally comparable mobility rates. It was concluded that both the ‘broad’ and ‘narrow’ – or ‘gross’ and ‘net’ as termed in the literature – interpretations of the mobility rate
could be computed. Broad mobility rates are expressed as the total inflows and outflows for the total number of employees, while narrow rates show the ratio of ‘job-changers’ only (as a percentage of total employees; net mobility rate concerns job changing among employees).

In 1998, 10 percent of employees changed their place of work; this share is approximately in line with the narrow rates of the EU-countries. The share for highly qualified workers, at 6.1 percent, is also similar to that in the developed countries.
The breakdown by gender – a basic distinction in international practice – is also available. The figures show that men are more mobile than women, both in the sample and among employees with higher education degrees. The Hungarian figures correspond to known international patterns in other respects as well: the younger generation is more mobile, with no significant variations between genders, while among the older generation, men are more mobile than women. In both age brackets, the highly qualified are less mobile than the unskilled.

In the ICT (Information and Communication Technology) industry (mostly high-technology sectors belong here, see the Appendix), mobility of the older (more experienced) generation is higher than in other industries, which may mean that the outflow of ‘knowledge’ via mobility is more intensive in this sector. Differences in the inflows and outflows of highly qualified workers reflect the attractiveness and perspectives of a given industry.

* For an explanation of ‘highly qualified’ and the ICT sectors, see the Glossary.
The higher the rate of outflow, the lower the attractiveness of an industry; higher inflows reflect greater opportunities for the highly qualified. In 1998, education and agriculture had the lowest rates of inflow, while manufacturing and some service sectors (business services – real estate and financial services) had the highest inflow. Agriculture was not attractive to job-starters and experienced a substantial outflow. A similar situation prevails in education, while high rates of both inflow and outflow in services highlight the dynamic changes taking place in this very fast-growing sector.

The share of highly qualified workers reflects knowledge intensity and its growing economic importance; the LFS therefore enables us to track the weight and dynamics of employment among this segment of the labour force.

**Figure 6. Share of employees with higher education degrees, by branch**
(Percentages)

**Figure 7. Share of employees with higher education degrees in manufacturing**
(Percentages)
In the production sectors and some services (trade, catering and accommodation, transport), the share of employees with higher education degrees is low (10 percent and less). The public administration and healthcare sectors are more knowledge-intensive, with a share of between 20 percent and 30 percent; the business service sector boasts between 30 percent and 40 percent. The qualifications of employees in education are outstanding: more than half of those employed in this sector have a higher education degree.

Among the manufacturing industries, the chemical industry leads in terms of the share of employees with higher education degrees, although the food industry has caught up in recent years. However, in engineering – the sector with the highest performance in terms of output, productivity and exports – the share of highly qualified workers remains low at under 10 percent. These figures also refer to the R&D activity of the respective sectors.

The figures shown were constructed from the Labour Force Surveys of the Central Statistical Office of Hungary. Our experimental analysis enabled us to show sectoral differences between the broad and narrow (gross and net) mobility rates of employees. Due to the shortcomings of representativity, however, more detailed analysis using the current methodology of the HCSO was not possible. Misleading results would be obtained if, for example, the engineering industry was broken down into its sub-branches and employment categories, although this is clearly a very exciting field for future analysis.

*Figure 8. Number of employees and job-changers*
The overall net mobility rate in the 1990s was not high in Hungary, with substantial differences across sectors. The major structural changes which took place in the Hungarian economy explain some of these differences: manufacturing – especially engineering – gained momentum as a result of foreign direct investment and the activities of multinational firms. The most substantial depression took place in agriculture, which has a low mobility rate (4–5%). Structural changes are still underway in the engineering industry: the broad (or gross) rate of inflows and outflows stabilised at a high of 15 percent and 10 percent respectively; more young employees are being attracted to this sector today than was the case in the past.

Interesting changes are also taking place in some service sectors. In catering and accommodation, the number of employees remained stable. However, as the number of market actors – i.e. firms – is rising, mobility has picked up since 1996. In the state-owned, or government-dominated service sectors – public administration, education, healthcare – outflow is higher than inflow. Nonetheless, the narrow (or net) mobility rate is low due to the fact that these branches comprise many large organisations (especially in healthcare), and intersectoral mobility of teachers and medical professionals is poor. This is the case even though wages in these sectors remain below those in the competitive sphere.

In summary, in order to study human mobility – which is an important factor in explaining the restructuring and innovation processes – there is a need for more detailed statistics. If two- or three-digit sectoral data were available (General Industrial Classifica-
tion of Economic Activities within the European Communities – NACE or Standard International Trade Classification – SITC) by profession (International Standard Classification of Occupations – ISCO) and education and skills (International Standard Classification of Education – ISCED), very interesting research projects could be undertaken despite the relatively short time series available. To achieve this, the current practice and methodology of Labour Force Surveys need to be revised and developed.

3. HOW TO GENERATE THE HRST DATABASE IN HUNGARY?

In principle, the human resources devoted to science and technology (HRST) database should include the highly qualified. Sources of relevant information available in Hungary are the HCSO censuses and micro-censuses which contain comprehensive data regarding education, orientation of graduate study and occupation. Censuses are held every ten years. In contrast with some European countries, the other possible registers (social insurance register, tax register, population register) do not contain complex information relevant to this subject of research and thus cannot be considered as a possible frame for sampling (in any event, current Hungarian regulations would not allow their utilisation). Only the census can provide the basis for the continuous sampling of individuals and households.

In the light of the previous, we investigated three different implementation methods for developing the Hungarian HRST database:

Method 1. Organising a panel from a representative sample of highly educated workers based on census data on the population with appropriate qualifications or occupation.


Method 3. Supplementary data collection of persons with higher education degrees in conjunction with the Labour Force Survey.

Data collection from a panel of people with higher education degrees

The census enables the compilation of a comprehensive database from which an appropriate sample may be selected and basic information gathered. However, time series could only be generated in one of the following two cases. An extended questionnaire containing questions on the various stages of the individual's career could be added to the census questionnaire. Accordingly, data could be analysed through a couple of years after the first questionnaire which would have to be filled in annually by the same sample of population. (This would, of course, imply legal and technical considerations, e.g. according to the current legal regulation, personal data must not be identifiable after the survey etc.)

Experts say that the questionnaire respondents would not have difficulties relating their position and workplace changes over the previous ten years of their careers, since in international comparison Hungarians do not change their workplace or position very frequently. The survey should involve at least 10 000 people, representing 1.7 percent of the
total population with higher education degrees. A final decision on the size of the sample, however, would only be possible after testing.

A major drawback to this solution is its high cost: data collection from panels tends to be very expensive. The sample has to be relatively large since a certain number of people are expected to drop out from one year to another. Complicated, time-consuming questionnaires require trained interviewers, which increases the wages to be paid to the interviewers. More importantly, the selection and maintenance of the sample, and the constant development of methods for reconstructing the sample according to the original population properties, increase costs considerably. Furthermore, processing by individual programmes or organisational procedures is more costly than in the case of a simple survey or continuous population survey.

On the other hand, large amounts of data could be collected during the census, and this is one of the great advantages of this method. A relatively short supplementary questionnaire would therefore be sufficient, and is more likely to be filled in by the people interviewed. Another advantage is that it is possible to include in the sample those people who were most co-operative during the census, especially during the first interviews.

**Supplementing the questionnaire of the Labour Force Circulation surveys**

Until 1993, the Hungarian Central Statistical Office collected data on Labour Force Circulation (LFC) from the institutional labour statistics. Since the late 1980s, however, organisational changes – liquidations, start-ups – have become so frequent that this method can no longer be applied. The reason for the introduction of a supplementary survey on Labour Force Circulation in the first quarters since 1994 – in conjunction with the Labour Force Survey (LFS) data collection introduced in 1992 – was to make up for this deficiency (since then, data collection refers to individuals; the Appendix refers to this kind of data collection). Through interviews, the Hungarian Central Statistical Office collects data on those who quitted their employment, liquidated their private enterprise, entered new employment or started a private enterprise during the previous year.

From the basic sample of the LFS, those who have changed employment constitute the sample for the Labour Force Circulation survey; sample sizes of the Labour Force Circulation supplementary surveys ranged from 4 200 to 7 200 between 1994–2000. The sample covered 327 people with higher education degrees. This sample is too small to enable the collection of reliable information on the mobility of people with higher education, only a new survey can provide sufficient data to allow the more subtle characteristics of the mobility of the highly educated to be analysed.

**Supplementary questions in the Labour Force Survey**

The Labour Force Survey is the largest continuous statistical survey of households in Hungary. The core questionnaire does not include questions on mobility. The related supplementary survey would gather information on the career paths of the highly qualified workers included in the sample and on the motives underlying any change in employment.
The supplementary questionnaires could be distributed together with the core questionnaires, this is the main advantage of this method. As a consequence, collecting basic information on the selected people or households and on the general characteristics of the labour market would not burden the supplementary survey. Furthermore, the sample of highly educated people belonging to HRST could provide retrospective information on changes in employment and other parameters (sector, position etc.).

The address register of the Labour Force Survey consists of 12,775 districts of the census performed in 1990, including 751 settlements and 626,000 addresses. Due to its size (approximately 10 percent of the registered addresses), the sample is representative at regional level NUTS2 as well.

The current sample of the LFS would enable some 6,000 people with higher education degrees to be interviewed. The LFS contains sufficient data on education to allow groupings according to both the Hungarian classification and the ISCED '97 (International Standard Classification of Education – ISCED) international classification. The occupations of people aged 15-74 are coded on the basis of a detailed description. A three-digit classification of occupation, corresponding to the ISCO '88 (International Standard Classification of Occupations – ISCO) international classification system, was introduced in 2000. In 2001, the Hungarian system will be enlarged to four digits to bring it in line with EU regulations.

Any drawbacks caused by the rotational character of the survey could be eliminated by the introduction of characteristics: 1/6 of the 6,000 people – i.e. 1,000 people – would remain in the sample for one and a half years due to the rotating method mentioned.

In the panel survey, interviewees would answer questions relating to

- Qualifications and skills.
- Changes in employment.
- Reasons for changing employment: motives of choosing the new employment; changes in the activities performed at work.

The panel survey would enable researchers to obtain information relating not only to the year in question but also to the professional careers of the respondents, thus facilitating analysis of the direction of knowledge flows over a longer period of time.

This method is more cost-efficient than those described former, since only the fees for interviewers and handling of the database are calling for additional expense.

ADVANTAGES AND DISADVANTAGES OF THE PROPOSED SURVEY METHODS

Although the use of a separate panel (Method 1) of people with higher education degrees would enable in-depth analysis of mobility of the workforce linked with innovation, the discontinuity of regular time series and the cost of the surveys make this method less feasible.

Due to the small sample size, the Labour Force Circulation survey (Method 2) of those with higher education degrees would yield only superficial information and would
neglect the smallest organisations, the segment of the economy in which employment changes are most frequent. Admittedly, this is also a problem in the ongoing data collection on Labour Force Circulation, since many employees of small firms work in the underground economy and are thus unlikely to provide information on their movements. Moreover, at the present time, numbers of employees and trends in employment cannot be estimated from the Labour Force Circulation surveys.

In considering the implementation of the supplement to the Labour Force Survey (Method 3), which would appear to be the most reasonable statistical method of the three, it should be borne in mind that supplementary surveys can be extended by ad hoc surveys like the Labour Force Circulation survey. Another advantage of this method is that there would be no need to collect basic information, data gathering and processing costs would be considerably lower than those for Method 1 and the survey questions would only need to be devised once since they would be repeated in succeeding surveys.

APPENDIX

1. Data collection from a separate panel of people with higher education degree

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<th>Advantages</th>
<th>Disadvantages</th>
<th>Expenditures per survey</th>
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<tbody>
<tr>
<td>– The new sample would allow an analysis matching most of the necessary needs.</td>
<td>– The basic information needs to be gathered, which could be avoided if the survey supplemented an already existing one.</td>
<td>– Sampling.</td>
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<tr>
<td>– The sampled people would probably not be identical to those having already participated in other surveys, therefore would be more willing to answer.</td>
<td>– It could not be carried out before the second half of 2002.</td>
<td>– Developing statistical methods.</td>
</tr>
<tr>
<td>– The new sample could be selected on the basis of the census held in 2001.</td>
<td>– Given that the survey is launched with an entirely new sample that cannot be combined with already existing surveys, initial costs would be considerably high especially on the first occasion.</td>
<td>– Methodological assistance.</td>
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<tr>
<td>– Sample size (highly educated, according to age groups): 15–20 thousand people.</td>
<td>– Drop-outs are difficult to predict for the first 5-10 years, the sample may prove to be insufficient.</td>
<td>– Preparation of interviewers.</td>
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<td>– Fee of interviewers.</td>
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<td>– Statistical control of the responses.</td>
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<td>– Material costs.</td>
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<td>– Software development.</td>
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<td>– Data processing.</td>
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<td>– Writing up the survey.</td>
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<td><strong>Total expected costs in the first year: euro 170 000 in the following years: euro 34 000.</strong></td>
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2. Supplementing the questionnaire of the Labour Force Circulation surveys

<table>
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<th>Advantages</th>
<th>Disadvantages</th>
<th>Expenditures per survey</th>
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<tbody>
<tr>
<td>– Adding new questions to the supplementary Labour Force Circulation survey would make the development of a new survey unnecessary.</td>
<td>– The survey would only yield data in the case of people, who change jobs in the given year, therefore insufficiency of sample size would not allow a more detailed analysis.</td>
<td>– Preparation of interviewers.</td>
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<td></td>
<td>– Sample size (participants of the supplementary Labour Force Circulation survey in the first quarter of 2000): 327 people.</td>
<td>– Supplementary fee to interviewers.</td>
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<td>– Modification of software.</td>
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<td>– Writing up the survey.</td>
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<td><strong>Total expected costs: euro 14 000.</strong></td>
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3. Supplementary questions in the Labour Force Survey

<table>
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<tr>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Expenditures per survey</th>
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<tbody>
<tr>
<td>– The supplementary survey would not need to collect basic information.</td>
<td>– The number of people, who refuse answering, is expected to increase with the introduction of a further questionnaire.</td>
<td>– Questionnaire.</td>
</tr>
<tr>
<td>– Data gained from the Labour Force Circulation survey could also be used.</td>
<td>– Costly sample size (people with higher education degree in the core sample): 6 000 people.</td>
<td>– Methodological assistance.</td>
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<tr>
<td>– Data gathering and processing costs would be considerably lower than those of Appendix.</td>
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<td>– Preparation of interviewers.</td>
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<tr>
<td>– Questions in the surveys could be repeated in other surveys following the first occasion.</td>
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<td>– Fee of interviewers.</td>
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Total expected costs: euro 24 000.

Glossary of terms

Gross (or wide) mobility rate: a percentage rate of all employees, it concerns every movement in the employment status, i.e. – beside job-changers – beginners and those, who die, etc. are also included in the gross rate of mobility. To put it simply, everybody, who enter or leave the labour market and change employment, is included.

Highly qualified labour force: ‘highly qualified’ has two interpretations: one of them is associated with the abilities and experience of the employee, the other is associated with education. In this article and in most statistics ‘highly qualified labour force’ means employees with a college degree or higher.

ICT (Information and Communication Technology) sectors: high technology sectors. By the OECD definition, they include manufacture of pharmaceuticals, manufacture of office machinery and computers, manufacture of radio, television and telecommunication equipment, telecommunication.

Net (or narrow) mobility rate: a percentage rate of all employees, it concerns only the actual job-changers, i.e. only those employees, who change employment.

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