

PART 7. STRIKING A NEW PATH FOR MEASUREMENT OF RECENT FLOWS

A pilot survey: Foreign Direct Investment and Migration of Foreign-citizen Scientists and Engineers in Hungary



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1. Introduction¹

The internationalisation of economic development has accelerated the spatial movement of people. Highly-skilled workers (HSWs) are key in micro- and macro-economic competitiveness for the decades now facing us, whilst in the most recent decades a world-wide scarcity of both jobs and of well-educated people has been clearly visible in several specialised fields. The globally-expanding learning economies have turned advanced countries into hunters for skilled workers. The international competition for HSWs, as for highly-skilled jobs, is now playing a crucial role in developing and reshaping the migration pattern of more highly educated people.

At the same time the numbers of highly-skilled "globetrotters" have been increasing rapidly, although this class of migrant still represents only a small fraction of all migrants of the whole human resources of science and technology (HRST) population. However, it is no accident that both sending and receiving countries pay careful attention to this very small group of migrants. Highly-skilled human resources must be taken into account by policy-makers, since it is such skilled people who are essential for the production, diffusion and dissemination of knowledge. They are one of the most important factors linking technological progress, economic growth, competitiveness, social and environmental well-being.

Global competition for HSWs has placed the international mobility of more highly educated personnel at the very centre of policy concerns. Countries which are heavily affected by the migration of HSWs, together with international organisations, have initiated a systematic monitoring of both the stock and of the flow of scientific, technical and engineering personnel.

Changes in the political environment (for example, the free movement of people among EU member states and the liberalisation and democratisation of the post-socialist countries) have swept away many of the factors which hampered the outflow and inflow of skilled workers in the past.

Immigration into central and east European countries (CEECs) is a relatively new (mass) phenomenon as democratisation and economic transformation have now placed CEECs firmly on the map of host countries for both transit and final destination migrants and these countries are heavily committed to spatial mobility. The stock of HRST is increased by the inflow of foreign and of returning migrants and the transition period has opened the doors of CEECs to immigrants. Liberalisation and the relative economic advantages of the ex-socialist countries in relation to the developing economies have made CEECs an attractive target for such immigrants. These economies have also created a demand for highly skilled specialists. The post-socialist countries were able to fill knowledge gaps quite easily by means of migrants - and so become "open territory" for foreigners from the advanced market economies. Knowledge-brokers, advisors and managers have all accompanied foreign aid, and foreign investors and individuals are also now attempting to make their fortune there. Scientific research into the topic is, however, lagging behind, partly, at least, since adequate data are hard to come by.

This study seeks to improve the measurement and interpretation of highly skilled internationally mobile scientists and engineers by means of studying persons who enter a country of the

¹ This report was prepared by IKU for the project *The Brain Drain — Emigration Flows for Qualified Scientists*. The principal author was Dr. Annamaria Inzelt; a complete list of contributors appears in the technical notes in the annex.

CEECs as business-driven immigrants. The conundrum of the socialist economies lay between, on the one hand, a well-developed scientific foundation and, on the other hand, their inefficient ad-hoc business enterprises is well known in the literature. When located within a socialist system, this type of industry arriving late on the scene, was effectively cut off from the major international sources of technology. The supplementary knowledge on which our study focuses can help to shed light on reasons behind relatively low innovative performance of these countries by examining the entry of foreign-citizen qualified persons.

The migration of HSWs varies according to profession, and the motivational background to outflow and inflow vary as well. One of the most important initiators of migration is business. Business-driven migration has two aspects: (1) in the home country it is business which initiates HSWs inflow as the means of overcoming a lack of specific knowledge or expertise within the country, a shortage of skilled workers in a particular field, or the acquisition of highly specialised skills; and, (2) business, as an investor or trader in a foreign country posts employees there for varying time periods.

The opening-up of the transition economies offers a new solution for introducing new skills, for replacing missing knowledge and for upgrading capabilities through mobility. Different forms of inward and outward migration such as short-term visits (by advisors, lecturers, trainees or experts), long-term employment and joint research can help in the process of upgrading knowledge. During the transition period, foreign investors could perform both types of business-driven migration (initiating and posting) in their role as initiators. This transition-related specificity of the CEECs shows many similarities which we can observe in the less-developed economies and the key players in such employment-based immigration are usually foreign investors.² Under these circumstances foreign affiliates seem a good example for the study of business-driven migration and for examining HRST gains.

The population targeted in this study is highly skilled immigrants working for foreign-owned companies, either posted or employed by them. Our analysis considers the results of this pilot survey to investigate the relationship between business migration into CEECs and the accompanying mobility of HS personnel.

The survey collected data to explore the relationship between foreign direct investment (FDI) and knowledge-flow through migration. We assume that the migration of highly educated people means a flow of knowledge from one country to another. The question, therefore, was whether the penetration of foreign direct investment (FDI) into the CEECs has been accompanied by emerging international mobility, that is to say, how foreign investors are involving the CEECs in brain circulation. The survey looks at the role of foreign investors. Entities range from small (that is, owned by one or by a small number of foreign nationals) to giant multinational companies (MNCs).

This study investigates the migration of HSWs from the perspective of employers in the receiving countries. Against this background the continuing internationalisation of larger companies appears to be a strong trend whilst a relatively new phenomenon is the transnationalisation of smaller companies. The internationalisation of economies is clearly changing the size; direction and character of employment-based migration.

² Large companies facing shortages in their highly skilled workforce are also important players but their role is much more limited in the less advanced countries.

2. Conceptual Framework

There exists no generally accepted definition of *highly-qualified migration*. The two main elements for definition - "highly-skilled" and "migrant" - are not, in themselves, simple terms. The problem of measurement becomes much more complicated if we wish to encapsulate the concept of brain circulation, that is to say, the flow of knowledge through migration of the highly skilled. The migrant HRST are what we might call the "population" of this investigation.

Many different terms are used in the literature to measure and discuss the international mobility of human resources in science and technology. *HRST definition* has two criteria: those of education and occupation. Brain gain/circulation may be measured on the basis of the occupation of immigrants, and a definition of occupation may be attempted through their employment. Employers are research and development (R&D) institutes, universities, business organisations and international agencies. R&D surveys collect data on immigrants. Data are usually available in transition economies on the outflow and inflow of R&D personnel to and from R&D organisations, but data concerning business-related highly-skilled migration are more limited.

2.1. Highly-skilled Workers

The notion of HSWs is much broader than that of scientists defined according to the "HRST core" population in the Canberra Manual (1995). The total HRST population includes not only those working in research and development laboratories but also personnel such as shop-floor engineers, medical salesman and financial managers. In this way the HRST population is broader than a simple group of scientists who are usually gifted, talented individuals.

The term "skill" includes the qualification needed to perform certain tasks in the economy. Most jobs require a multiplicity of skills ranging from physical abilities to cognitive skills. (Wolff 1996) "Like other human pursuits science and technology draws crucially upon sets of human skills and techniques – the ingredients of “scientific expertise” or “engineering expertise” – that are acquired experientially, and transferred by demonstration, by personal instruction and the provision of expert services (advice, consultations, and so forth) rather than being reduced to conscious and codified methods and procedures.” (David and Foray, OECD, STI 1995 p. 27)

The term "highly-skilled" tends to be associated with qualifications. The most significant proportion of "highly-skilled" workers is "highly qualified" (more highly educated). "Highly qualified" refers to a level of achievement in education or to a formal qualification and usually includes university- and polytechnic-degree holders. Educational establishments are important. Indeed, simply to distinguish among different countries' education curricula is in itself a major aspect of research (see, for example, Cheese 1991, UOE 2001).

Distinctions among skills acquired through experience and qualifications are also important since in accumulated skills, capabilities, and in knowledge itself, the uses of knowledge are influenced by many factors other than the education actually completed and the jobs worked in. The specificity of mankind is his capability to combine accumulated knowledge with the influence of a new environment, which together can produce new, or significantly modified, knowledge.

Having a degree is not in itself sufficient to warrant the use of the term highly-qualified since, even in their own countries, many graduates end up in jobs which do not require a high-level qualification. Conversely, many people who are not graduates hold jobs which undoubtedly demand superior skills.

To employ Canberra Manual-type working definitions in this instance: those people belong to the HRST category who (a) successfully completed education at tertiary level in a science and technology (S&T) field of study [more highly educated people]. (b) Not formally qualified as in (a), but who are employed in an S&T occupation where such qualifications are normally required [skill level]. The Canberra manual definition requires us to measure knowledge embodied in HRST as "certificate" knowledge (diplomas, scientific degrees) and as "accepted" knowledge (occupation, salary). This consideration relates to the statistical feasibility of measuring HRST. Education statistics have solved the problem of the basic measurement of certificate knowledge. However, the Canberra Manual includes in the total HRST population not only those working in R&D laboratories but also shop-floor engineers, medical salesman and financial managers.

In combining the educational/occupational classifications we are speaking about "highly-skilled workers". If we are to look at both the supply side of HRST in terms of qualification and the demand side in terms of occupation, then, at least at first glance, this twin definition is both realistic and close to real life. In the mid-20th century researchers and, in several fields, engineers without a degree in higher education were not so rare. However, in the age of the learning economy the certification of qualifications has grown enormously in importance, and the fast-growing enrolment rate in higher education has also reduced the acceptance of non-qualified talent. Our changing world is pressing us to modify this definition, although there is value in retaining its "occupation" dimension. The statistical stock of HRST and the actual usage of the individual as HRST are never the same. By way of example, the contrastive pairing of employment/unemployment is not sufficient to characterise the employed HRST. More highly educated people may well be employed in jobs which require no more than secondary school education.

2.2. Migration

Migration itself is also a complicated term. It covers many different types and forms of cross-border movement. One distinctive part of the total migrant population is the "highly-skilled migrant".

We can give two historical examples of migration:

The German Alexander von Humboldt embarked on June 5th, 1799, to Spain's South American colonial empire to study plants and fossils and to make astronomical observations during a five-year research expedition. His voyages of exploration, educational journeys, were part of his "job" and he regularly returned to Berlin. He spent this period as a research explorer at his own expense, with no political support.

Hungarian-born (1902) American (naturalised 1937) Nobel Prize winner (1963), Eugene Paul Wigner, (d. 1995) graduated at the Budapest (József Nádor) Technical University and then moved to Berlin as a postgraduate where he was lecturer (1928-33). He was invited to Princeton, USA, in 1930 but retained his lectureship in Berlin. Due to political changes he did not return to Berlin for almost three decades. He retained his professorship in mathematics at Princeton until 1971.

If we were to employ retrospectively the current UN definition, we would have to take into account many different factors when calculating length of stay. This means that simple migration statistics cannot assist too much in classifying HS migrants as emigrant/immigrant or mobile. Definitions employed in scientific literature and definitions in official documents are not the same. The length (of time) dimension is important in these notions but it does not enjoy overall priority among all other factors. As Avveduto (2001) summarised the matter, literature sometimes uses the term “skilled international migration”, “skilled international labour circulation”, “professional transients“, “migration of expertise“ and “quality migration”.³

Several notions are important here: mobility, emigration, immigration and returning migration. At this point we return to the dictionary definition(s). (Longman 1982):

Migration: movement of many people in a body from one part of the world to another. Wars always cause great migrations of people who have been taken prisoner or taken away to work.

Emigrate: to leave one’s country in order to go and live in another (to go and become a citizen of another).

Immigrate: to come into a country from abroad to make his home there.

Émigré: a person who leaves his own country, usually for political reason. (escape from dictatorship, political, racial discrimination).

Immigrant: a person who coming into a country from abroad to make his home there.

Migrant: the emigrant from the point of view of the country he enters; the same person is an immigrant and the practice is called immigration.

Returning migrant: a person who goes back his own country from where he emigrated previously. (Non-dictionary definition).

All of these notions implicitly assume an emigrant/immigrant: the process is close ended and goes in one or two directions. The emigrant/immigrant normally changes his country/home once, although the process may happen again in the opposite direction when an immigrant returns to the country from which he earlier emigrated as a so-called returning migrant. He moves along a single path in one or both directions. Another term also used in HS migration studies – “mobility” - seems a better notion for the systematic investigation of HS movement.

Mobility: the state or quality of being mobile.

Mobile: able to move, or to be moved, quickly and easily, not fixed in one position. He/she is

³ The original sources in order of notions: Findlay 1991, Cormode, 1994, Appleyard, 1991, Salt and Singleton, 1995, and Todisco, 2000.

able to move from place to place, from employment to employment in different directions.

If we wish to study the changes in HRST thanks to flow of HSWs among countries it would be better to use the word "mobility" since this contains no prejudice against brain flow. Its broader coverage includes emigrants/immigrants as a basic concept, but together with bi-directional migrants, globetrotters and posted "migrants".

We have many unsolved problems to face in the measurement of migration of HSWs. The sheer number of difficulties apart, it is much easier to measure migration than mobility, the first being more static. Our analyses will employ the original term of this research "migrant" as it was so used during the investigation.

2.3. Knowledge Flow

Knowledge may circulate across borders in many forms. Mobility is one of the instruments for the transfer of scientific, engineering, and business knowledge. A mobile human means a conveyor of knowledge. There are several ways for knowledge embodied in S&T Personnel to move across borders, and the basic mobility of HSWs is only one of these. The globalising, learning economy needs more mobile human resources. Globalisation has strengthened existing forms of brain circulation through mobility, has broadened the old avenues and created new ones for such circulation. This brain circulation process has different impacts on national economies, on innovativeness, competitiveness and on reinvestment into knowledge.

This phase of research may assume that the *mobility of a highly-skilled person means spatial outflow and inflow of knowledge*. The assumption is that the mobile person transfers knowledge embodied in him from a country or a region and/or on a job-to-job, employer-to-employer and sector-to-sector basis, across borders. The embodied knowledge is always has "certificate" as well as tacit content and is, on the one hand, not fully transferable; on the other hand, the new environment may support the new combination of embodied knowledge which can lead to positive externalities for both the organisation and the individual.

Foreign knowledge and the inflow of HRST are important sources of new technology, increasing productivity for any national economy.

The "knowledge" embodied in humankind changes continuously (further education and training, experience, unpractised, forgotten or devalued knowledge). The acceptance of an immigrant's knowledge also changes in the receiving country according to such factors as the economic situation, the organisation of the recipients and by the degree of assimilation of the immigrant himself (language skills, accreditation of degrees, networking).

2.4. Development of Measurement

The shortcomings of measurement in general originate from both migration and S&T statistics and from their weak linkages. Mobility statistics as a measure of S&T personnel international mobility are rare and migration statistics are used to fill the gap.

The common domain of HRST and migrant populations raises further difficulties for statistical measurement and analysis. Until now all statistics relating to the migration process are imperfect in that they cannot cover the total of the migrating population and they cannot follow the changes in the status of emigrants/immigrants, and the employment of

accumulated knowledge and skills. (Cervantes and Guellec 2002) Many new forms of mobility are irrelevant to migration statistics.

Many different social science studies shed light on the drastically changing character of migration in the late 20th century. The old emigration/immigration pattern still exists and its scale has significantly increased, but a new wave and style of migration is emerging from the mobility of the scientific and business community.

The knowledge-based economies favour innovative networks and the development of a dynamic of the creation and circulation of knowledge, and networking is more and more common among different institutions both at the domestic and international level. The geography of the production of knowledge is on the way to being drastically modified. "Multinationals are establishing and expanding R&D abroad, benefiting from the possibilities offered by ICT to internationalise the learning process along the whole of the value chain." (Cohendet and Joly 2001 p. 80.) Multinationals are going to some leading-edge locations where the key competencies for excellent research are available and combine internationally the capabilities where absorptive capabilities have been existing.⁴ Such reshaping strategy has increased in-house" mobility and has changed the typical length of foreign postings; the professional pattern of posted personnel also differs from earlier periods. All in all, multinationals and other foreign investors are becoming important players in the field of HS mobility. The forms of mobility accompany the foreign investment differ widely: we note both bilateral and multilateral posting of HS personnel, the training of people in countries different from their normal workplace and long-term collaborative work involving short-term physical coexistence.

Foreign investors are becoming increasingly involved in and responsible for the migration of qualified personnel. Many academics have recognised (for example Findlay *et al.*, 1994; Salt, 1997) that there is a positive correlation between the inflow of skilled labour and investment spending, as foreseen by a model of expertise migration following the economic theory of globalisation, but this is certainly not always the case. Intra-firm migration is a known phenomenon although very little empirical evidence is available. Studying this topic is not easy since business organisations are usually reluctant to afford insight into this process. (Winkelmann 2002)

Central and Eastern European countries, however, are appropriate "laboratories" in which to investigate this movement of foreign investors from the point of view of mobility. FDI started its penetration into these countries in the 1990s at the same period when the advanced market economies could observe a positive correlation between the inflow of HS workers and the inflow of FDI.

Migration relating to foreign investment is only one part of the whole mobility picture, although it is crucial to study the mobility process from the perspective of the foreign investor/employer. If this relatively new development could be accommodated within an old statistical frame, we would not need to develop new measurements, and in this case we would "merely" need to include HSWs mobility in our existing data collection, data gathering, questionnaires and classifications. Even established statistics would need revision as they may be useful in measuring this domain. However, if the revision were not satisfactory to meet these new needs then we would have to indulge in "blue sky" exercises. This present

⁴ Another important lesson from many countries' experience is that FDI relates to pools of talent on a de facto, existing basis; foreign investors are not prepared to invest in education or in improving education. (Pavitt, 1997).

research has followed both paths, and this first part describes our attempt to develop new frames.

The first step in this research was to develop a feasibility survey which allows us to investigate how useful are our existing classifications. For the purpose of this statistical feasibility survey and its analysis we need to accept some definitions even if we agree to discuss further the terms relating to brain circulation. When presenting and analysing data this study refers to existing international standard classifications, even if they are under revision and as yet incomplete to support the analyses.

In relating to migration statistics highly skilled considers several key definitions — (1) education, (2) occupation, (3) migration, (4) R&D personnel, (5) foreign personnel — are extremely important in identifying the statistical population, and the application of relevant international classifications produces a statistically measurable definition on migrant / mobile highly skilled humans.

Out of five topics, four already have internationally accepted classifications:

- (1) Education is defined by UNESCO as ‘organised and sustained communication designed to bring about learning’. ISCED (International Standard Classification on Education) relates to education. The educational qualification is covered by ISCED-97, in which tertiary or third-level education includes 5a, 5b and 6 ISCED categories. The definition includes all persons who completed their education at tertiary level in any field of science including social sciences and the humanities.
- (2) Occupation is defined in terms of jobs or posts. ISCO (International Standard Classification of Occupations) relates to occupation. S&T occupations by skill level and skill specialisation are defined in the following ISCO-88 categories: 122, 123, 131, 21, 22, 23, 24, 31, 32, 33, and 34. Existing internationally (semi-) accepted classifications were the starting point for assembling data and indicators. However the countries investigated (the CEECs) are in what we might term their infant phase in employing these classifications.
- (3) UN definition relates to migration. The United Nations has formulated concepts and definitions to establish standardised data-collection procedures. The criterion of “duration of stay” in the country of immigration or emigration, in association with the concept of residence, is used as a basic means of distinguishing between “migrants” and “non-migrants”. Short-term business travellers and frontier workers are included into the group of non-migrants. Two basic categories of migrant are distinguished: long-term (at least one-year) and short-term (at least three-months but less than a year). (UN 1998)
- (4) Frascati Manual on R&D Personnel. All persons employed directly on R&D should be counted, as well as those providing direct services such as R&D managers, administrators, and clerical staff. From the point of view of mobility the head-count measurement is relevant. (Frascati Manual 1993, Chapter 5.

The education/occupation-related definition raises a further problem for measurement if we investigate cross-border mobility. HRST-related manuals and classifications simply touch upon migration-related definitions of this particular population sector. The measurement of brain circulation belongs to different (as yet not harmonised) statistical domains. The effective realisation of "brain-gain" naturally takes different periods of time for different groups of

immigrants, and if we are to focus on HSWs immigrants amongst the newcomers to a country, we need to divide them into two distinct groups. The greater part is established highly skilled personnel on arrival, although another part will belong to the receiving country's HRST following a period of accreditation of their highly education degree under the rules and regulations of the receiving country. Personnel posted to a country by foreign-owned companies belong to the first group, although it should be remembered that foreign-owned companies, as normal recruiters in the local labour market, may employ other new arrivals.

This study focuses on a part of the inflow of HSWs, namely on immigrants employed in S&T jobs by foreign (affiliated) companies. The IKU pilot survey collects the basic facts concerning the inflow of foreign highly-skilled employees. Further research may go deeper and deal with the value of knowledge, the valorisation of transferred knowledge as embodied in the migrant, both the cost of such transfer and the concomitant losses – as well as many other related problems.

3. Penetration of FDI in CEECs

Foreign investors vary from the small foreign company, located in one or two countries, to the giant multinational⁵, and distinguished players in the process of the internationalisation of labour markets are the trans-nationals. According to the recent UNCTAD 2000 report, roughly 40,000 multinational companies run 300,000 firms in 130 countries of the world, although MNCs actually originate in very few countries. (Of the 100 top MNCs 88 originated from "the Triad".)

These companies produce one-third of the world's gross product, and one-third of world trade is the internal business of MNCs. These companies are great investors world-wide the main technology traders and the most important employers. Their investment has an important influence on national labour markets and on the cross-national mobility of their employees and on migration itself.

The regional structure of investment flow has changed much during the last three decades. Until the beginning of the 1990s the majority of investment flow took place among the most advanced countries, inside "the Triad".

FDI is a relatively new phenomenon in CEECs. As is well known from the literature, the CEECs were out of the main flow of internationalisation for roughly four decades. In the bipolar world system the planned economies decided to set up joint enterprises inside the framework of the CMEA and few transnational socialist enterprises were created. However, it was the system itself, which was the blocking factor to internationalisation at the micro-level, even within the CMEA framework. There was much political impedimenta in the way of setting up joint ventures with entities from the market economies. The first laws on foreign direct investment were enacted in this region since late 1960s, but with many constraints. The first country to enact a law on FDI was Yugoslavia in 1965, although the country was not a member of the CMEA. The first CMEA country was Romania in 1970, followed by Hungary

⁵ Foreign investment is classified as a direct investment if the foreign investor holds at least 10% of the ordinary shares or voting rights in an enterprise and exerts some management influence. The term foreign affiliate is restricted to foreign affiliates, which are majority-owned.

in 1972, and then by Bulgaria in 1980, Czechoslovakia in 1985 and Poland in 1986. (WIIW Forschungsberichte No. 215, and Transition Report 1994) One hundred percent foreign ownership was first allowed only in 1988 (Hungary and Poland). Between 1972 and 1988 only 6 joint ventures were set up in Hungary – by way of illustration of the constraints of the law and of the whole system in the field of globalisation.

CEECs have accumulated considerable experiences of the influence of non-investment by foreigners in respect of knowledge flow. The less developed regions, which are avoided by investors, are usually great sources of migrant labour, including skilled migrants for the longer-term, and only political constraints prevented these countries from being large-scale suppliers of highly-skilled workers. The opening of borders acted as a release-valve for what we might term pent-up migration.

The collapse of communist regimes and the transition of CEECs towards market economies have changed the situation completely. CEECs have become important targeted countries for foreign investors. (Resmini 2000).

FDI has played a fundamental role in the transformation of the Hungarian economy. One of the most common forms of FDI, that is to say acquisition, was an important part of privatisation. Inward FDI flows (as a share of GDP and averaged over the period 1990-98) put Hungary at the top of the list among OECD countries. At the same time outflow was very limited and very much at the lower end of the ranking table. (OECD 2001, p. 99).

There are many factors (and actors also) involved in establishing the ways in which people and jobs are brought together across borders. If foreign investment is accompanied by employment-based HS migration, then the consequent inflow and outflow will result in effective brain circulation.

3.1. FDI and Mobility

The penetration of foreign direct investment in the transition economies offers a good possibility to study how foreign investors lock their local CEEC firms into intra-company mobility.

Any type of foreign investor has a part to play in international migration, although the MNCs, as the important players in the world economy, are the rule-makers in the field of intra-firm international mobility. In the 20th century these companies accelerated the internationalisation of trade and capital markets and played an important role in national labour markets. During the last two or three decades of the century they were economic initiators of the free movement of people and started to internationalise business research and development activities.

Multinational companies are important players in terms of brain circulation. They both export and import knowledge through internal mobility on an international scale. MNCs offer international career possibilities to their own employees. Transnational companies always were involved in organising labour market across national boundaries, largely by encouraging people to change their location to where they could be most useful to the company. They brought managers into affiliates and created international career possibilities for people either from headquarters or from these affiliates. The differences may be observed by occupation and by the status of affiliates within the group, this status relating to the position of individual countries in terms of world competition.

Types of such internal migration include short-term migration (for example, in training seminars, on-the-job training and study tours within the "empire") and long-term migration from one country to another. Both have important roles to play in knowledge dissemination, diffusion, accumulation and exchange. The tacit and codified knowledge of the organisations may be shared. Inside the group ideas may be exchanged, people may participate in training courses, in study tours in different countries, and may work for shorter or longer periods in different countries, although such possibilities are not open to all employees.

Foreign investors are important players on the Hungarian labour market. (Inzelt 1994 and 2000) As an OECD study (OECD 2001, p. 102) highlighted, the ratio of foreign affiliates in Hungarian manufacturing employment is around 50% - as high as in Ireland and Luxembourg. The ratio of foreign affiliates in industrial R&D is also high in Hungary at 70%. This high figure reflects the foreign affiliates' economic activity, since they carry out relatively more R&D than national firms. It is, therefore, worth studying how the posting of people from parent companies and mobile people from other regions relates to this level of activity.

It was assumed that the internationalisation of employment in CEECs would occur first at those companies, which were capitalised by foreigners. The foreigners would upgrade the knowledge of companies by transferring their knowledge. Other scenarios were not excluded. Foreign investors might preserve firms' capabilities at the same level or even downgrade them. These scenarios, however, do not belong to our study.⁶ According to their area of employment, they may be multinational (subsidiary) managers, professionals, consultants, specialist workers, international experts. The foreign, highly-skilled workers may be transferred within foreign-owned companies, recruited abroad by the company or simply employed locally.

We would like to know whether the penetration of foreign direct investment in Central and Eastern European Countries is accompanied by emerging international mobility. Do foreign investors bring in highly-skilled people in CEECs to upgrade the knowledge in several fields? Are our economies involved in brain circulation? From the point of the whole migration process this is a very narrow topic but it is very important.

We attempt to measure the employment-based HS workers inflow into the region. One important part of business-led HSWs mobility is the long-term business posted emigration from affiliates and partner organisations. Until now CEECs have not featured on any map of such a type of mobility even if scattered emigration may be observed towards investor countries and to other locations of the multinationals. This survey does not deal with this (almost negligible) outflow of HRST.⁷

⁶ Concentrating on brain circulation, we are less interested in the general influence of MNCs on the labour market. We are interested in cross-national HS mobility accompanying foreign direct investment.

⁷ Generally speaking the HS emigration from CEECs is not negligible. Here I would emphasize that an outflow through foreign investment channels has as yet hardly occurred.

4. Designing the Survey

The thorough investigation of data sources (see country folders on CEECs) illustrate well that we cannot compile a reliable data set to analyse many important policy questions which are emerging with the internationalisation of economies. Very limited data are available on R&D migrants and that on non-researcher, highly qualified employees is minuscule.

An assessment of available sources leads us to conclude that a new survey is needed to fill the gap of missing data and indicators. A new survey on business-led HSWs inflow must to provide data to analyse the brain gain of the business sector in receiving countries.

IKU designed a survey to study the inflow of FDI business-led, highly-skilled workers.⁸ The aim was to attempt to measure this process and collect adequate data for further investigation. The survey focuses on the role of foreign investors in HS inflow where the investors are either small foreign firms or giant MNCs.⁹

The working definition of highly skilled worker included in the population all foreign highly skilled workers employed in an occupation where first degree qualifications are normally required and who have worked at the investigated firm more than 1 year. Those who met these criteria were included into the sample whether or not the Hungarian firm was their employer. (The employer might be another firm in the same group abroad or another company which borrows them) – hence the definition based on the Canberra Manual and UN Migration.

Two categories of HS migrants are employed: (1) business-led and (2) job-seekers. A further distinctive group of migrants is that of returnees. They may belong to both groups.

4.1. The Questionnaire

The questionnaire was designed in two stages. In the first a very short questionnaire was developed to screen and test the population (i.e. the firms). The aim of the first draft (option 1) was to test the willingness of the target group to respond.

This half-page questionnaire contained few questions and asked about foreigners as a group of employees. ("Option 1") (See the comparison of items included in Option 1 and Option 2 in Table 1.)

"Option 1" was tested by means of interviews by phone and fax. The phone interviews concluded that, if a company is employing HS immigrants and is ready to give information on them, they usually provide detailed data also. A short questionnaire (option 1) does not help to improve a willingness to respond. If a company regards any employment-related data as secret, then they will refuse to give even the number of HE immigrants. (Option 1 asked regarding "profession" – something which proved to be very unclear for respondents.)

The next step was to test and run "Option 2" which asked personal data of each individual. The survey method was of a 'phone interview together with a fax-sheet. The testing process reinforced the experiences of the first round of 'phone interviews using "Option 1". The

⁸ The IZA International Employer Survey 2000 is a "relative" to this survey, but during the development stage it was unknown.

⁹ In the survey process Katalin Miskolczi (register preparation and testing survey), Nóra Csunderlik (testing and running survey) and Mandy Fertetics (data processing and tabulating) participated. Their valuable work was extremely important for the successful performance of the pilot survey.

different lengths of questionnaire and the simplicity/complication of questions had hardly any influence on the willingness of respondents. "Option 2" was more meaningful to human resource (HR) managers and they were ready to spend more time on their reply. Combined survey methods (phone interview and fax-sheet) increased the reliability of responses. ("Option 2" was more reliable than "Option 1"). The reason is very simple: The phone interview allowed respondents to rely on their own memories, whilst fax sheets encouraged them to use company files.

Table 1. A Comparison of *Option 1* and *Option 2* Questionnaires

Questions	Option 1	Option 2
General Data		
Name of the employing organisation:	In Hungarian	In English
Address:	WebPage:	
Name of the contact person:	Title the contact person:	
Telephone number:	Fax number:	E-mail address:
In what language can he/she give information:		
Foreign HE employees	Foreigners as a group	Each foreigner
Gender	✓	✓
Age	✓	✓
Nationality(ies)	✓	✓
Country (ies) of birthplace:	✓	-
University		
degree (1 st , 2 nd 3 rd)	✓	✓
Dept/Faculty	-	✓
Field (s) of science:	✓	✓
Profession (s):	✓	-
Occupation (s)	-	✓
Since when employed by		
- This firm	-	✓
-Mother/Affiliate	-	✓
Permit type	✓	✓

This type of questionnaire allows the collection of data on foreign HE employed by a company on the actual day [month] of investigation. This information is extremely helpful in learning the features of highly skilled migrants, although many characteristics of mobility remaining unclear. Two directions for further research can bring crucial, additional information to the study of mobility patterns of HSW and of changing business behaviour in employing highly skilled migrants. One is the retrospective survey using company archives. The other is the direct surveying of individuals — this is the approach of our pilot survey.

4.2. Preparation of the Register

The first step was to find a register or a databank to help to identify potential employers of highly skilled immigrants. The target group of this survey is foreign-owned firms (partial or total foreign-ownership) employing highly skilled immigrants.

In 1998, the total number of foreign-owned companies in Hungary was 26,272, one third of all companies (Statistical Yearbook 2000, p. 275-279). Such a large group was unmanageable for our feasibility study and we had to narrow the circle. It may be assumed, however, that (1) if a firm's ownership is at least 51% foreign, the foreign affiliate is more likely to employ immigrants than others, and (2) if a foreign-owned firm is innovative, it will employ highly-skilled workers more frequently than non-R&D oriented, non-innovative firms.

One databank seemed relevant to our sample selection. The databank of the Ministry of Economic Affairs contained information on R&D, innovation, and technology transfer activities in the broad sense.¹⁰ It also contained the results of the Ministry's own, one-off survey. The reference period was 1998. Information was also available on foreign investments. These sources met our double-filtering criteria of a minimum of 50 % foreign ownership and involvement in innovation. The result was a new net total of 172 companies.

A thorough investigation of this carefully selected sample highlighted several important players in the Hungarian economy such as MNCs meeting both filtering criteria are missing from the list. Because of the distinctive role of multinational/transnational companies in internationalisation it is crucial that they be included in the register. To complete our sample including well-known multinationally owned firms we employed another source: the Hungarian Top 200 compiled by "Figyelő".¹¹ It was a time-consuming process in that we had to compare manually the original sample (172) and the first quarter of the list of Top 200 Hungarian firms. Following this investigation 36 firms were added to the sample.

The next task was to find companies employing highly-skilled (more highly educated) immigrants in this sample. We combined two different tasks: to find employers of HS workers and to find the targeted population through phone calls and to test the questionnaire (Option 1).

The unforeseen result of this selection and testing period was that our list is inadequate for the survey. Too many companies that used to meet the criteria in 1998 are no longer doing so because of basic changes in ownership and involvement in R&D. The size of the randomly selected sample collapsed dramatically. Taking previous experience into account, a low response rate (maximum 20%) was to be expected and it seemed too risky to run a feasibility survey with less than 200 companies. We needed to employ another list meeting only one of the criteria – that of foreign ownership - to find a satisfactory number of companies with HS immigrants.

At the beginning of 2001 a further databank of the Ministry of Economic Affairs became available containing information on companies with a proportion of foreign ownership by relevant sectors and based on 1999 data.¹² Three size-categories (100%, 75.1-99.9% and 50.1-75%) of foreign-owned companies were selected from this data compilation to increase the number of firms surveyed. (Insurance companies, hotels and trading companies were excluded from investigation). Table 2 presents the results from this stage of research.

¹⁰ The additional advantage of this list to others would be that micro-economic data on companies are available for research purposes, which allow the combination of information from different sources, increasing analytical possibilities without asking too much from companies.

¹¹ The reasons why MNCs were missing from the databank go beyond this investigation.

¹² The disadvantage of this source is that no other company-related data are available for research purposes. The problem of availability or non-availability does not originate from the different sources. In the first case IKU was involved in different phases of survey on a "voluntary" basis and as a free-of-charge collaborator could have access to micro-data.

Table 2. Sources of sample register and steps in selection.

Steps in sampling	Number of firms by sources		
	Ministry of Economic Affairs, R&D ¹	'Figyelő' TOP 200 ²	Ministry of Economic Affairs, FDI ³
Total	725	200	
Performing double filtering criteria*	172	36	1095
Not employing HSW immigrants**	79	16	638
Refused, disappeared, etc.	53	12	438
Respondents	40	8	19
Employing HSW immigrants for more than 1 year	16	6	17
Note(s):*Filtering criteria by sources ¹ 51% foreign ownership and innovation ² At least 51 % foreign ownership among the first 50 in the rank of Top Hungarian list compiled by 'Figyelő'. ³ 51% foreign ownership and large net sales (about HUF 300 Million) ** Including short-term immigrants.			

Only a minority of companies employ immigrants in the longer-term. Among the companies listed many have not employed foreigners for a long time, although there are many short-term migrant activities in this group. In the group not employing immigrants 5% mentioned that highly-skilled foreigners were regularly working at the firm but always stayed in Hungary for short periods only.

4.3. Identifying Respondents

One of the most critical tasks of any survey is to identify the relevant person and her/his availability at a company. The best potential partners were *human resource managers*. In a few, smaller firms the managing director or chief accountant was the partner.

Among non-respondents it worth mentioning a group of Hungarian medium- and large-size firms owned by large foreign, national or multinational companies who did not respond. 7 reported that records were at corporate headquarters (HQ), whilst others could not respond without permission from HQ.

Different respondents interpreted confidentiality variously. Several human resource managers provided no details of immigrants if the number in the company was less than 3. Their argument was that everyone would be able to identify the person from the data. In those cases they gave nothing more than the number of their highly-skilled immigrants. These companies, therefore, are not included in our sample. The majority of companies refused to respond to questions relating to its employment composition based on levels of *education, occupation and nationality*, mentioning "competitive secrecy" as their reason. This behaviour does not relate to the person, occupation or nationality of the respondent but to the general corporate culture, the culture of the affiliate and the affiliate's treatment by the group.

5. Key Findings

The *foreign owned companies as employers of immigrants* may be classified in three different groups:

1. Long-term immigrants from investor-related countries (either from less- or from more-developed regions).
2. Long-term immigrants from non-investor-related countries (either from less- or more-developed regions).
3. Short-term immigrants from investor-related organisation.

The latter group is of little interest for immigration statistics but is important in respect of mobility and brain circulation. We no longer deal with this 3rd group.

Immigrants belonging to the first and second groups may be business-led employees or job-seekers. Business-led, highly-skilled workers are naturally employed as highly-skilled workers. Job-seeking, highly-skilled personnel may or may not obtain HS positions. Those who could not are usually missing from an employer's archives. There is no-one in our sample with a higher education who does not perform an HS job. They were not excluded from the investigation per se, but hardly any information is available on them through their employer.¹³

The characteristics of the survey are described in the Annex 8.3 - Technical Notes.

5.1. Immigrants in Foreign-owned Companies

Systematic responses came from 43 companies, 39 of whom employed long-term highly-skilled immigrants in 2000. The remaining four used to employ long-term HS immigrants in the 1990s. The latter group is interesting but immigrants who used to be in Hungary were not included in our survey and so any information on them is not included in the sample. The sample includes only those firms who were employers of long-term HS immigrants in 2000.¹⁴

The respondent 39 companies employing highly-skilled immigrants provided detailed information on a total of 182 long-term employed, foreign citizens. The first section presents a few characteristics of the companies, the second offers some details on highly-skilled, foreign employees and the third investigates the relationship between the firms' characteristics and their foreign HS employees.

¹³ There are many reasons why more highly educated migrants cannot work in HS jobs. (E.g. the labour market situation, the receiving country devalues the degree acquired by the immigrant, limited knowledge of receiving country's language). Some are "under process" for HS in receiving countries; others not. The survey could not identify immigrants belonging to these "no longer" and "under process" groups of HRST. According to our scattered information, these people do not report themselves as more highly educated if their chances of an HS job are very limited. They like to avoid their degree become a burdening factor of their employment.

¹⁴ The "used to employ" group illustrates the presence of two phases of FDI-related HS immigration even if we do not have retrospective statistical evidence on HS inflow and outflow of companies. People interviewed mentioned that the company used to have long-term immigrants for a couple of years in many cases. They arrived in the first, initial stage when the company was set up or acquired by its first foreign owner. The owners arrived or posted a few HS employees to Hungary to inculcate the new corporate culture, to bring in missing capabilities and to learn the newly set-up/acquired firm's local culture and capabilities. After a few years co-working these positions were delegated to locals (either trained abroad by the company or not). Similar tendencies may be observed in other post-socialist countries also.

5.2. Characteristics of Employers

Generally speaking, the term "foreign affiliate" is restricted to foreign affiliates which are majority-owned. Accordingly, the geographical origin of a foreign affiliate is defined as the country of the parent company if it holds, directly or indirectly, more than 50% of the affiliate's voting shares. However the majority-holding criterion is not used for Hungary (and the US), since minority foreign-owned firms are also included in the statistics.¹⁵ (OECD 2001, p. 102) Table 3 shows the number of respondents by country of foreign investment and by size group of foreign HSWs at companies.

From the 39-strong sample 21 investors originated from major, 10 from medium, and 4 from small economies. (The remaining 4 were unknown). The most common foreign owners are Germans (13 of the 39) followed by Austrian (6), and French (4).

Out of 39 respondent companies 3 employ more than 10 highly educated (more highly educated) foreigners.

Foreign investment has practically penetrated all sectors of the Hungarian economy. Of four-digit level economic sectors, 30 are present in our sample as employer of highly-skilled foreigners for more than 1 year in 2000. We classified the respondents by 10 two-digit sectors with at least 3 responding firms for further investigation. Table 3 presents the firms by investors' countries and number of HS employees.¹⁶ (See also Annex Table 1).

¹⁵ The deviation of Hungarian definition is deeply set in the transitional character of the economy. Foreigners who started to buy into a company usually acquired more than 50% within two years. They have played an important role in the restructuring of enterprises/companies.

¹⁶ Here and in several other tables we classified countries as investors or as the sending country by the OECD classification of major, medium and small economies.

Table 3. Number of companies by origin of foreign investment and foreign HS employees.

Country origin of investment		Number of companies					
		Total	by number of foreign HS employees				
			1	2	3-5	6-10	11
Major economies	United States	2	1	1			
	Germany	13	7	2		4	
	France	4	3		1		
	Italy	1	1				
	Russia	1		1			
	Total	21	12	4	1	4	
	Medium economies	Netherlands	2		2		
Switzerland		1					1
Austria		6	3		1	1	1
Sweden		1					1
Total		10	3	2	1	1	3
Small economies	Denmark	1	1				
	Finland	1				1	
	Cyprus	1	1				
	Luxembourg	1			1		1
	Total	4	2		1	1	
Unknown		4	2		1	1	
Total		39	19	6	4	7	3

By economic activity, 7 firms were active in the manufacture of chemicals, in chemical products and in the rubber & plastics sector. The second largest number, 5, had invested in the manufacture of metal fabrications, 4 are engaged in the manufacture of electrical and non-electrical machinery, construction and high-tech services (software, engineering advisors, engineering firms, natural science and engineering R&D activities) (Table 4).

Table 4. Number of companies by sector and group of investor countries.

Sector	Investors' country				Total
	Major economies	Medium economies	Small economies	Unknown	
Miscellaneous (1596, 1600, 2121)		3			3
Manufacture of wearing apparel, leather luggage, handbags, and footwear (1821, 1822, 1910)	2		1		3
Manufacture of chemicals, rubber and plastic products (2410, 2441, 2442, 2470, 2513)	5		1	1	7
Manufacture of fabricated metal products (2810, 2830, 2852, 2863)	4	1			5
Manufacture of machinery and equipment; of electrical machinery and apparatus (2923, 3161, 3162)	2	2			4
Manufacture of radio & television equipment (3220, 3230)		3			3
Manufacture of medical, precision and optical instruments, clocks; motor vehicles (3340, 3430)	3				3
Construction (4510, 4521)	2	1		1	4
Service 1. (5112, 5510, 6420)	2		1		3
Service 2. (7220, 7310, 7420)	1		1	2	4
Total	21	10	4	4	39

At the end of year 2000 the number of companies which were 100% foreign-owned was 21, foreign capital was involved from 90.1% to 99.9% in 8, from 50.1% to 90.0 % in 5 companies and in 3 it was below 50%. As mentioned earlier, the selection criterion was at least 50% foreign ownership. Redeployment caused many changes in ownership between selection and the investigation period. The percentage of foreign ownership was not known at 2 firms in 2000.

Regarding the size of companies, the sample is very colourful: the smallest has 2 employees and the largest 8,427. Tables 5 and 6 summarise the main economic characteristics of responding firms.

Table 5. Responding companies by share of foreign ownership and number of foreign HE employees.

Ratio of foreign ownership	Number of companies						Total number of foreign HE employees
	Total	by number of foreign HE employees					
		1	2	3-5	6-10	11-	
100%	21	9	3	1	5	3	136
91.0 – 99.9%	8	5	1	2			15
75.1 – 90.0%	1				1		10
50.1 – 75.0%	4	3			1		12
below 50%	3	1	2				5
unknown	2	1		1			4
Total	39	19	6	4	7	3	182

More than half of the respondents were 100% foreign owned (21 of the 39 surveyed). They employed 75% of the more highly educated (HE) foreigners.

By size group, medium and large companies employed 78% of foreign HE personnel and one quarter employed at least 6. (One of these was among the small companies.) As Table 6 shows, half of the firms investigated employ only 1 highly-skilled foreigner.

Table 6. Responding companies by total number of employees and by number of foreign HE employees.

Size group of employees	Number of companies						Total number of foreign HS employees
	Total	by number of foreign HS employees					
		1	2	3-5	6-10	11-	
1-49	6	3	1	1		1	30
50-249	8	7	1				9
250-499	6	2	1	1	2		27
500-999	9	4	1	1	1	2	76
above 1000	10	3	2	1	4		40
Total	39	19	6	4	7	3	182

Fewer than 10 % of the companies employ more than 10 HE personnel.. The largest number of foreign highly-skilled workers is 39, employed by a multinational company. The next in ranking is also a multinational corporation (MNC) and employs 22. As we know from other sources, these MNCs have involved their Hungarian affiliates in R&D activity. Joint and shared R&D activities are characteristic of them.

The total number of employees in the sample is 34,965. Data is not available as to how many highly-skilled people are employed by these companies. The total number of foreign employees and the number of foreign HE personnel are also unknown. The total number of foreigners employed in highly skilled jobs is 182 in the sample. The ratio of foreign HE employees

to total employees is around 0.5% in the sample. If we assume that the total number of highly skilled workers is not more than 10% of all employees (3,497), then the foreign highly skilled workers represent 5% of all highly skilled ones.

5.3 Highly-skilled Foreign Employees

There is no Hungarian predecessor of this employer-based HE immigrant sample in Hungary, and so it is worth investigating the 182-strong sample in details.

Using Hungarian migration statistics, 4,384 higher educated immigrants were identified in 1999 (24.1% of total immigrants), The National Employment Office registered 3,771 in the same year (613 arrivals are missing). Hungarian R&D statistics registered 42 R&D Personnel at the R&D Units of firms and for profit institutes. This is the statistical environment of our sample. The sample covers 5% of HS immigrants registered by the National Employment Office.

5.3.1. Citizenship/nationality

The foreign-citizen HE persons can be divided into two groups:

- Immigrants from countries more developed than the host country
- Immigrants from countries less developed than the host country

Each group of HS immigrants has both common and different roles in the S&T system and economy of the host country. As Table 7 illustrates, HS immigrants arrived from 25 different countries. Thirteen (13) of the sending countries are advanced economies, 8 are CEE post-socialist countries and 4 belong to the developing world. Two Romanian citizens were identified as ethnic Hungarians, of whom one has been naturalised in Hungary.

One quarter of foreign, highly-skilled employees are Romanian citizens (48). These are usually economic and ethnic migrants settling in Hungary or moving from East to West.¹⁷ The second largest group of highly-skilled workers is German (31); this is due to foreign acquisitions and investment. In this category many nationalities precede the Austrians. A special group of migrants, the returnees, may arrive from both groups of countries.

¹⁷ The liberalisation of CEE countries plays an important role in ethnic-based economic migration such as Hungarian minorities moving to Hungary. Other motivating factors were: important: economic differences and labour market possibilities in neighbouring countries are important factors of short-term and long-term migration.

Table 7. Foreign HS employees by citizenship

Country of citizenship		Total
	Austria**	7
	Belgium	3
	Denmark	1
	Finland	11
	France	15
	Netherlands	3
	UK	11
	Germany**	31
	Portugal	1
	Sweden	9
EU countries		92
	Norway	2
	Switzerland	6
EFTA		8
	Poland	3
	Romania*	48
	Slovakia	2
	Czech Republic	1
Candidates		54
	Ukraine	2
	Russia	2
	Croatia	3
	Yugoslavia	4
Other European countries		11
	USA**	11
America		
	Iraq	2
	Iran	1
Middle East		3
	India	2
Asia		2
	Egypt	1
Africa		1
Total all countries		182

Note(s):

*2 of them are Romanian citizens, ethnic Hungarian, of whom 1 has been naturalized in Hungary.

**1-1 of them is Hungarian by origin.

Official statistical agencies struggle to data on genuine, returning (highly skilled) migrants; for us it also proved a challenge. Human resource managers reported as returnees those holding dual nationality and foreign citizens with Hungarian family origins (either born in Hungary or born abroad but speaking Hungarian). If a Hungarian citizen had worked abroad for 5-10 years without changing citizenship he/she was not included in the immigrant category nor identified as a returnee (one from Germany and the other from the USA). Among the immigrants two were identified as returnees posted by foreign owners. However, we know of several other returnees educated in Hungary, holding foreign citizenship and who were posted here. These people usually have an important role as knowledge conveyors. They are participating in brain circulation.

5.3.2. Language

If the countries are of the same language or language family, communication is much easier. Highly-skilled workers may have more chances of employment in their education/occupation category if they can speak either the local language or the best-known foreign language in the region.¹⁸ It is well known that Hungarian belongs to a very small language family and is not easy for foreigners to learn.

One of the lessons of our attempt to distribute the ‘accompanying questionnaire’ was that immigrants may split into two groups by language requirement — the requirement of posted immigrants to be fluent in the best-known foreign languages. In the initial period of foreign investment, Hungarian language skill was supposed to be crucial. One of the functions of returnees was to help in communication with their language skills. Over a period of a couple of months, this function was not so important. Posted immigrants lacking the language skills were soon replaced either by locals or by other foreigners who have language skills in one of the most used foreign languages (e.g. English, German).

None of the neighbouring countries to Hungary belong to the same language family (Finno-Ugrian) but many ethnic Hungarians live in neighbouring countries and their neighbours are at least familiar with the language. Job-seeking immigrants from post-socialist countries and the developing world usually have to learn Hungarian as an everyday and as a professional language. The few exceptions are several jobs where communications are less important and the shortage of specialists is high.

5.3.3. Gender

Almost nine in ten of the highly skilled immigrants (88%) are men, from 25 different countries. Women (12%) arrived from 11 different countries only. (Table 8)

The number of females is too small in our sample but it worth noting that only 36% of females arrived from advanced countries while for men the share was 57%.

The sample is too small for evaluating gender distribution among long term immigrants but it can be observed that the proportion of females is higher among those whose aim is permanent immigration. Professional women seem less involved in intra-firm mobility than man. They might be more reluctant because of family reasons or they might have fewer opportunities to be delegated by their employers.

¹⁸ A well-educated Afghan dentist cannot work in his field in Hungary since he cannot adequately communicate with clients even if he is fluent in English and Russian, but Afghan computer scientists can be employed as computer scientists in Hungary even with no Hungarian.

Table 8. Foreign HS employees by citizenship and gender.

Country of citizenship		Gender		Total	% of female to total HS immigrants by country
		Female	Male		
	Austria	1	6	7	14
	Belgium		3	3	
	Denmark	2	1	1	
	Finland		9	11	18
	France		15	15	
	Netherlands		3	3	
	UK		11	11	
	Germany	3	28	31	10
	Portugal		1	1	
	Sweden		9	9	
Total EU		6	86	92	7
	Norway		2	2	
	Switzerland	1	5	6	
Total EFTA		1	7	8	17
	Poland	1	2	3	33
	Romania	9	39	48	19
	Slovakia	1	1	2	50
	Czech Republic		1	1	
Total Candidates		11	43	54	20
	Ukraine		2	2	
	Russia		2	2	
	Croatia	1	2	3	33
	Yugoslavia	1	3	4	25
Total Other European countries		2	9	11	18
America	USA	1	10	11	9
	Iraq		2	2	
	Iran		1	1	
Total Middle East			3	3	
Asia	India	1	1	2	50
Africa	Egypt		1	1	
Total		22	160	182	12

5.3.4. Age

Two-thirds of immigrants are below 40 years of age, belonging to the generally more mobile population sector (Table 9).

Table 9. Foreign HS employees by citizenship and age-group.

Country of citizenship		Age-group				
		20-29	30-39	40-49	50<	Total
	Austria		1		2	7
	Belgium		1	1	1	3
	Denmark					1
	Finland	1	5	1	4	11
	France	5	4	3	3	15
	Netherlands	1	1	1		3
	UK	2	4		3	11
	Germany	6	14	2	7	31
	Portugal		1			1
	Sweden		5	3	1	9
Total EU		15	36	11	21	92
	Norway		2			2
	Switzerland	1	3	1	1	6
Total EFTA		1	5	1	1	8
	Poland	2		1		3
	Romania	18	19			48
	Slovakia	1	1			2
	Czech Republic	1				1
Total Candidates		22	20	1		54
	Ukraine	2				2
	Russia				1	2
	Croatia					3
	Yugoslavia		1	2	1	4
Total Other European countries		2	1	2	2	11
America	USA		8	3		11
	Iraq		1		1	2
	Iran		1			1
Total Middle East			2		1	3
Asia	India	2				2
Africa	Egypt		1			1
Total		42	73	18	25	182

Fourteen percent (25 employees) are above 50 but only 4 of these arrived from post-socialist or developing countries (refugee supplier countries). Different proportions in age groups by country of origin highlight the fact that immigrants from different environments are arriving with different aims, expectations and opportunities. Immigrants from advanced economies have strong mobility characteristics. Young West Europeans and Americans look for jobs in Hungary as a stepping stone for a future career. More mature Westerners are given the opportunity by their employer as a pre-retirement or "winding-down" position.

People from candidate and developing countries are typical immigrants. For them Hungary might be a final destination (Hungarian national minorities from the neighbouring countries

and for those who were educated in the country and speak the language) or just a transit stop on the way from their home country towards the more advanced countries.¹⁹

The picture of age-group by gender is very typical. On average the female HS immigrants are younger than their male counterparts. Among the women, 73% were under the age of 40 but among the men only 66% were. The proportion of females to the total population below 40 is 14% while above 40 it is 7%.

5.3.5. University degree and field of science

University degree information is based on the foreign worker's educational qualifications as accepted in the country of origin. The information on *field of science* was not included in the companies' record, and the meaning of the question was unclear to many respondents. Several human resource managers consulted with the migrants on this point, but in other cases they simply guessed or did not respond. *University Department* was usually recorded. This information helped to revise data on the field of science.

The response rate to this item is lower than to others. We have information on education for 60% of employees. (In the case of females the rate of response is higher at 80%.) The majority of people are not involved in scientific jobs. "Scientific field" means in this context their educational background, i.e. field of education.

The largest group of immigrants has a university degree in engineering, employing the ISCED classification. Two thirds of the people have degrees in engineering and half of these belong to ICT-related fields: electrical engineering and informatics (32% of item respondents). The engineering field was significant among arrivals both from the advanced countries and from the former socialist countries. Even the total number of arrivals shows almost the same proportion of ICT-related engineers as higher among immigrants from candidate countries. (Table 10) Few immigrants have architecture, town or development planning and natural science degrees whereas one had graduated as science teacher, a lawyer or a medical doctor.

Ten percent of respondents have natural or social science (business, marketing, commerce) education. The majority of business degree holders arrived from EU countries and 35% of them are above 50 years of age. If we look at their occupations that is self-explanatory. People with a degree in the natural sciences arrived from the former socialist countries and from the developing countries and 53 % of these are below 40 years of age (Table 10).

¹⁹ In addition to the turbulent migration within the region, Hungary and other CEECs, are becoming target - or at least temporarily - destination countries for many Asians. In accordance with general migration tendencies people are arriving from the former socialist countries or satellites of the communist world. (e.g. Mongolia, Vietnam, Afghanistan, Georgia, Uzbekistan) People from the large Asian developing countries are also among the immigrants, although we could not find many of these in the companies surveyed in highly skilled jobs.

Table 10. Number and proportion of foreign HE employees by field of science and gender.

Field of science	Female	Male	Total	% fields by total
Natural science	6	11	17	9.3
Engineering	7	65	72	39.6
electrical engineering	3	20	23	12.6
informatics	3	19	22	12.1
Social science	4	13	17	9.3
economics	3	7	10	5.5
Medical science		1	1	0.5
Unknown	5	70	75	41.2
Total:	22	160	182	100.0

The majority (119 immigrants) had a second degree, whilst two persons have a third degree and 21 persons have only a first degree. In the class of ‘unknown’ there are several non-degree holders. (Table 11).

Table 11. Number of foreign HS employee by class of degree.

Degree	Number	%
1st	21	11.5
2nd	119	65.4
3rd	2	1.1
Unknown	40	22.0
Total	182	100.0

Differences in educational systems among the countries of origin of the degree make it unreasonable to attempt any detailed comparison between education and occupation by developed and developing countries.

5.3.6. Occupation

We used data provided by human resource (HR) managers for occupation reporting. These occupations were then classified by IKU into ISCO categories, although on several occasions we did feel it necessary to consult with the respective HR managers in order to obtain a clearer understanding of the actual occupation quoted.

Highly skilled immigrants, as reported by companies, are employed in those types of job which require a university or college degree.²⁰ According to their occupation they were employed in highly skilled jobs. (Table 12).

Table 12. Number of foreign HS employees by occupation (ISCO88) and citizenship.

²⁰ According to the experience of many other studies and to our face-to-face interviews with immigrants, several graduates are employed in non-highly skilled jobs for a variety of reasons (language, the non-recognition of their degree, the situation of the labour market) - for example, a Mongolian military engineer working as a maintenance mechanic is not included in the HS population. Without going into detail, we would like to emphasize that companies reported people as highly skilled (HS) immigrants if they were employed in jobs requiring a degree.

Occupation		Citizenship of foreign HS employees							Total	Total in %	
		EU	FFTA	Candidates	Other European countries	America	Middle East	India			Egypt
1	Legislators, Senior Officials and Managers	58	6	7	2	3	1		1	78	42.9
12	Corporate managers	52	6	6	2	3	1		1	71	35.7
	121 Directors and chief executives	16	2		1	1				20	10.4
	122 Production and functions department managers	24		6		2	1		1	34	23.1
	123 Other departmental managers	4								4	2.2
13	General managers	12		1						13	7.1
2	Professionals	33	2	47	9	8	1	1		101	55.5
21	Physical, mathematical and engineering science professionals	19	2	40	5	8	1	1		76	41.8
	211 Physicists, chemists and related professionals (R&D personnel)			1						1	0.6
	213 Computing professionals	6	2	19	1			1		29	16.5
	214 Architects, engineers and related professionals	11		20	4	8	1			44	24.7
22	Life science and health professionals (biologist-scientist, chemist, medical salesman)			1	3					4	2.2
24	Other professionals (241 Business professionals)	14		6	1					21	11.5
3	Technicians and Associate Professionals						1	1		2	1.1
	32 Life science and health associate professionals (medical trainees)						1			1	0.6
	34 Other associate professionals (administrative staff)							1		1	0.6
Unknown		1								1	0.6
Total		92	8	54	11	11	3	2	1	182	100.0

The pattern of occupation by ISCO category is quite interesting. Forty three percent of immigrants hold “leader” positions, although most of those involved in production and functional managerial positions arrived in the country without management experience. The other 57% are professionals and associates. Out of a total of 101 professionals, it is the engineers and architects who form the largest group (45) and second are computer specialists. Whilst managerial positions are held by foreigners emanating from developed countries (mainly owners or owners’ representatives) there is no significant pattern of professional jobs arising from developed, post-socialist or developing countries.

If we examine the occupation of immigrants by age group, we can find only senior officials and managers above 60. In the 50-59 age-bracket this proportion is 21%, whilst only 6% of professionals belong to this particular age-group. Table 13 highlights the relationship between occupation and age-group in selected occupations (featuring at least 10 employees).

Table 13. Number of foreign HS employees by occupation (ISCO88) and age-group.

Occupation		Age-group						Total
		20-29	30-39	40-49	50-59	60-69	Unknown	
1	Legislators, Senior Officials, Managers	7	33	12	16	3	7	78
12	<i>Corporate managers</i>	7	27	9	13	3	6	65
	121 Directors and chief executives	1	5	1	8	2	2	19
	122 Production and functions department managers	6	21	7	4		4	42
	123 Other departmental managers		1	1	1	1		4
13	<i>General managers</i>		6	3	3		1	13
2	Professionals	33	39	6	6		17	101
21	<i>Physical, mathematical and engineering science professionals</i>	21	32	3	3		17	76
	211 Physicists, chemists and related professionals (R&D personnel)		1					1
	213 Computing professionals	16	14					30
	214 Architects, engineers and related professionals	5	17	3	3		17	45
22	<i>Life science and health professionals (biologist-scientist, chemist, medical salesman)</i>	1		2	1			4
24	<i>Other professionals (241 Business professionals)</i>	11	7	1	2			21
3	Technicians and Associate Professionals	1	1					2
	32 Life science and health associate professionals (medical trainees)		1					1
	34 Other associate professionals (administrative staff)	1						1
Unknown		1						1
Total number		42	73	18	22	3	24	182
<i>Total in %</i>		<i>23</i>	<i>40</i>	<i>10</i>	<i>12</i>	<i>2</i>	<i>13</i>	<i>100.00</i>

The relationship between occupation and field of education is also interesting. Both variables being known for 80% of the sample. One third of senior officials and administrators are graduates in the fields of social and behavioural sciences and of law. Only one of this group was reported as holding a business degree. A majority of the others in managerial positions have various engineering degrees, and of a total of 40 engineering graduate managers we find 20 with have a distinct specialisation. (Table 14).

Occupation		Field of education							Total known	Total
		Law	Social and behavioural s.	Natural	Mathematics and computer	Medical doctor	Engineering	Unknown		
1	Legislators, Senior Officials and Managers	1	25		1		40	9	69	78
12	<i>Corporate managers</i>	1	23		1		34	6	59	65
	121 Directors and chief executives	1	7				11		19	19
	122 Production and functions department managers		16		1		20	5	37	42
	123 Other departmental managers						3	1	3	4
13	<i>General managers</i>		2				8	3	10	13
2	Professionals		8	1	10		59	23	78	101
21	<i>Physical, mathematical and engineering science professionals</i>				10		48	18	58	76
	211 Physicists, chemists and related professionals (R&D personnel)							1		1
	213 Computing professionals				3		13	14	16	30
	214 Architects, engineers and related professionals				7		35	3	42	45
22	<i>Life science and health professionals (biologist-scientist, chemist, medical salesman)</i>			1				3	1	4
24	<i>Other professionals (241 Business professionals)</i>		8				11	2	19	21
3	Technicians and Associate Professionals					1		1	1	2
	32 Life science and health associate professionals (medical trainees)					1			1	1
	34 Other associate professionals (administrative staff)							1		1
	Unknown						1		1	1
	Total	1	33	1	11	1	100	35	147	182

Among professionals only the “other professionals” occupation have degrees in social sciences.

One biologist and one medical doctor are employed in life science and health related occupations. It may not be an accident that the education field, which is recorded as “unknown”, is

highest among computer experts and software developers. These fields are still not completely independent at many universities, and people can obtain other types of degree at the same institution. It is also well known from the literature that many talented individuals in this field “drop out” of university before graduation.

The strong correspondence between occupation and field of education illustrates very well that those professionals who were posted here because of their profession and that job-seeking immigrants could obtain HE jobs if their degree or knowledge was considered relevant by the employers.

5.3.7. Employment sector

The *economic sector* as a variable was not among the data collected, and the name and address of organisations helped us in the identification of the sector classification of companies from directories or registers. Our next survey may avoid this laborious, follow-up work, since the identification number of companies is now available to researchers.

Most immigrants (one third) were employed in sectors related to information and communications technology, and it clearly shows that Hungary, a newcomer to the field of employers of immigrant labour, matched well with the contemporary “HE immigrant” job pattern.

This sector is the top employer for both groups – that of the developed countries and of the post-socialist and developing countries. However, the proportion of HE immigrants from post-socialist and developing countries is higher (58%) than of those from the developed world. (Table 15) The second largest employer group for immigrants and vast majority of HS immigrants arrived from the developed countries is “miscellaneous” and the third employer sector is “manufacture of chemicals, rubber and plastic products”, where the number of immigrants from the post-socialist and developing countries is higher (Table 15).

Table 15. Number of foreign HS employees by sector and developed/developing countries.

Economic sector	Citizenship		Total	% by sector
	EU countries, EFTA, USA	Candidates, Other European countries, Middle East, Africa, Asia		
Miscellaneous (1596, 1600, 2121)	20	2	22	12
Manufacture of wearing apparel, dressing and dyeing of fur; tanning and dressing of leather, manufacture of luggage, handbags, saddlery, harness and footwear (1821, 1822, 1910)	1	2	3	2
Manufacture of chemicals and chemical products; of rubber and plastic products (2410, 2441, 2442, 2470, 2513)	7	10	17	9
Manufacture of fabricated metal products, except machinery and equipment (2810, 2830, 2852, 2863)	12	6	18	10
Manufacture of machinery and equipment; of electrical machinery and apparatus (2923, 3161, 3162)	11		11	6
Manufacture of radio, television and communication equipment and apparatus (3220, 3230)	26	36	62	34
Manufacture of medical precision and optical instruments, watches and clocks; motor vehicles, trailers and semi-trailers (3340, 3430)	12	3	15	8
Construction (4510, 4521)	5	5	10	6
Service 1. (5112, 5510, 6420)	7	2	9	5
Service 2. (7220, 7310, 7420)	10	5	15	8
Total	111	71	182	100

Immigrants with an educational background in the natural sciences are employed only in three sectors, in chemicals, in radio, television and communications equipment - and in “services 2” (i.e. high tech services). A background in engineering and the social sciences appears in almost all sectors.

It is quite interesting that among business-led HS immigrants (with the same citizenship as the investor) there is no-one with a natural science degree. (Table 16).

Table 16. Number of business-led foreign HS employees by economic sector and field of education

Sector of employment	Field of education				Total known	Total
	Law	Social and behavioural sc.	Engineering	Unknown		
Miscellaneous (1596, 1600, 2121)	1	3	3		7	7
Manufacture of wearing apparel, dressing and dyeing of fur; tanning and dressing of leather, manufacture of luggage, handbags, saddlery, harness and footwear (1821, 1822, 1910)				1	0	1
Manufacture of chemicals and chemical products; of rubber and plastic products (2410, 2441, 2442, 2470, 2513)		1	3		4	4
Manufacture of fabricated metal products, except machinery and equipment (2810, 2830, 2852, 2863)		4	4		8	8
Manufacture of machinery and equipment; of electrical machinery and apparatus (2923, 3161, 3162)		2	1		3	3
Manufacture of radio, television and communication equipment and apparatus (3220, 3230)		2	4	4	6	10
Manufacture of medical precision and optical instruments, watches and clocks; motor vehicles, trailers and semi-trailers (3340, 3430)		2	8		10	10
Construction (4510, 4521)			4		4	4
Service 1. (5112, 5510, 6420)			3		3	3
Service 2. (7220, 7310, 7420)			10		10	10
Total	1	14	40	5	55	60

5.3.8. Length of employment

The questions relating to *Time Frame* and *Work Permits* were treated differently by companies.²¹ Data regarding the years of employment at a firm is known in relation to 60% of immigrants. The number of replies to “years of employment at this firm” was 110.

Most human resources managers know how long a foreign HE employee has been employed at the Hungarian firm (affiliate), but few recorded such historical data as “years of employment within the group”. It may be assumed that these responses show such gaps when posted immigrants first of all joined another member of the group (either the mother-company or a sister-company). This data was, in fact, available in only 13 cases.

The length of their long-term stay in Hungary differs according to the class of immigrant. A large group of “non-FDI related immigrants” wish to settle in Hungary and are applying for naturalisation, whilst others would like to go further westward and Hungary is merely a stopover in their career-building process, as with other classes of immigrants.

²¹Only a limited number of HS personnel needed work permits in the period under investigation, according to Hungarian regulations. If a permit was needed, the HR managers knew when the permit was granted to the person joining the firm, whether the permit was new or renewed. They knew nothing of any permit issued before the commencement of their own employment relationship.

5.4. The Relationship Between Ownership and Immigration

It is immediately obvious that of the number of countries of origin of foreign investors (13), the country of origin is unknown at 4 companies and the number of countries sending immigrants (25) differs. The rankings of the countries of origin of investors and the number of foreign HE employees also differ.

HE immigrants employed by foreign-owned companies may be divided into two large groups: (1) the business-driven flow and (2) job-seekers.

The “business-driven flow” comprises both employment-driven and employment-initiated flows. In the first case, immigrants accompanying FDI are employees of the investor companies who simply post them from one location to another. The “employment initiator” may head hunt specialists or recruit new employees through different channels in different foreign countries – but still in order to post them to the investment recipient country.

We do not have exact data on business-driven and job-seeking immigrants. However we can use rough measures to classify respondents into these two groups. It may be assumed that the “business-driven flow” is roughly the same as that of immigrants from investor countries and that the “job seekers” are those who arrived from non-investor countries - including both the advanced market economies and the post-socialist and developing countries.²² At this stage of transition this rough classification is relevant, although there are exceptions to be found in both groups.

We term the first group “business-driven” immigrants and the second “non-FDI-related” immigrants’ even though the latter group was also influenced by FDI. Foreign investors have an important influence on labour market conditions. In the first period of transition the companies privatised by foreigners or who invested in foreigners could sometimes offer jobs with better salaries than the others. In several sectors they were job-keepers/creators in the transition period.²³ Our sample covers only those groups of companies which maintained or created jobs. A large group of foreign investors employs no foreigners whatsoever — neither posted nor job-seeking. (See Table 2).

As was mentioned earlier, the total number of investor countries is 13, whilst the number of countries sending immigrants is 25. Common to both groups are 9 countries that are both investors and senders of immigrants - from 13 different countries. A dozen countries where foreign ownership originates are the advanced European market economies excluding the USA; another is the post-socialist giant, Russia.

Fifty five percent of immigrants arrived from medium-sized (investor) economies, 29% from major and the rest from small economies. Of a total of 182 highly educated foreign employees, 96 arrived from the home countries of the investors. The vast majority of these (60) came from the same countries or had the same citizenship as the investors. The number of business-led immigrants is somewhere between 60 and 96. 86 HS immigrants originated from non-investor countries, 18 of these from developed economies (UK, Belgium, Norway, Portugal) (Table 17).

²² The investor countries in our sample are the developed (advanced) countries - with one exception: Russia. This Russian-owned company employs 1 Russian, which supports our rough measure.

²³ Acquisition by foreigners has very different impacts on the job-market. In many cases they closed down departments and/or factories, but if they recruited, or were ready to employ HE job-seekers, they usually offered better prospects than other companies.

An interesting feature of the highly-skilled immigrants accompanying foreign investment is that an origin in the home country does not mean intra-firm mobility in all cases. Several highly-skilled workers were recruited in the home country (or in neighbouring or in same language-family countries) specifically to work in the host country. We can assume that this type of recruitment policy which focuses on countries similar to the home-country is a transitory phenomenon. The reason for recruiting from countries similar to the home country (i.e. among the market economies) is perfectly rational: that is, to cover any missing capabilities in the host country and to upgrade knowledge in such areas as financial management, development management and specialised engineering skills. Naturally, such recruitment policy also reflects the fact that we, as other transition economies, were a great puzzle to many foreign investors and that, in consequence, they preferred to employ leading professionals from their own, better-known environment.

The number of arrivals from investor and non-investor countries shows that the recruited and posted managers (people with a background in the Social Sciences) are almost the same. (This business-related inward migration is directed towards certain crucial jobs which did not exist before the transition.). Amongst engineers from the developed countries those who were posted represent two-thirds of the total of engineers from the developed countries. This relatively large proportion illustrates the perceived importance of upgrading engineering knowledge in several fields and of co-operating in R&D activities in other fields. (Table 18) This table is more illustrative of the possible direction of analyses than as a tool of analysis.

Table 17. Number of foreign HS employees by country of investor and citizenship.

Country of investor	Citizenship of foreign HS employee																								Total				
	Immigrants from country of investor											Immigrants from country of non-investor												All					
	Germany	Austria	France	United States	Netherlands	Finland	Sweden	Switzerland	Russia	Denmark	All	Romania	UK	Yugoslavia	Croatia	Poland	Belgium	Ukraine	Norway	Slovakia	Iraq	India	Portugal			Czech Republic	Iran	Egypt	
Germany	25	1			1		2				29	9															10	38	
Austria	2	5		7				1			15	15	3		3						1						22	37	
France			6								6																	6	
United States	1										1								1	1						2	3		
Netherlands	1	1		1	1						4																	4	
Finland						10					10																	10	
Sweden	1		1		1	1	6			1	11	17	4	1		1	1		2			2					28	39	
Switzerland			3	2			1	6			12		3			2				1			1	1			8	20	
Russia									1		1							1									1	2	
Denmark				1							1																	1	
Italy															1												1	1	
Luxembourg	1		4								5																	5	
Cyprus												1															1	1	
Unknown			1								1	6	1	3				1							1	1	13	14	
Total	31	7	15	11	3	11	9	6	2	1	96	48	11	4	3	3	3	2	2	2	2	2	2	1	1	1	1	86	182

Note: Ranking of investing country by number of firms.

■ HS immigrant has citizenship of investing country.

Table 18. Relationship between field of education and different groups of HS immigrants.

Field of education		Foreign HS employee from					
		Developed country			Developing country		
		business posted	business initiated and job seekers	total	business posted	job-seekers	total
Law		1		1			
Social and behavioural sc.	economics	12	15	27		3	3
	business	2	1	3			
	<i>total</i>	14	16	30		3	3
Natural science	biologist					1	1
Mathematics and computer sc.			2	2		9	9
Medical doctor	general doctor					1	1
Engineering	without specialisation	25	6	31	1	13	14
	economic engineer	4	5	9			
	mechanical engineer	4	6	10		7	7
	production engineer					1	1
	electrical engineer	4	3	7		10	13
	chemical engineer	1	1	2			
	construction engineer	1		2		4	4
	<i>total</i>	39	21	61	1	35	39
Total known		54	39	94	1	49	53
Unknown		5	11	17		10	18
Total		59	50	111	1	59	71

6. Conclusions

The research focused on the investigation of the inflow (immigration) of HSWs into Hungary from the perspective of the receiving countries' employers. The internationalisation of economies is changing the size, direction and character of (employment-based) migration.

The premise of this study was that the migration of highly educated people means a flow of knowledge from one country to another. This approach takes into account the migrants as knowledge conveyors from one country and/or sector to another. The question, therefore, was whether the penetration of foreign direct investment (FDI) into the CEECs has been accompanied by emerging international mobility, that is to say, how foreign investors are involving Hungary (and, in the broader sense, the CEECs) in brain circulation. Hungary, together with the other CEECs, is a good laboratory for such studies, since the penetration of FDI coincided with the process of globalising knowledge economies.

CEECs have accumulated considerable experience of the influence of non-investment by foreigners in respect of knowledge-flow. Similar to other less-developed regions, which are avoided by investors, the opening up of these economies made them a great source of migrant labour, including skilled migrants for the longer-term. The period of the command economy system had constrained these economies from being involved in migration in any direction. The political burden prevented these countries from being large-scale suppliers of highly-skilled workers. The opening of borders acted as a release-valve for what we might term pent-up migration. The inflow of HSWs is still narrower than the outflow but its presence is a good sign that a country is participating in the circulation of knowledge, since technology upgrading and innovation are both supported by the inflow of HSWs.

Observation of the changes in the pattern of highly skilled migrations over a period of time is crucial to learning the pattern of brain circulation and knowledge-sharing and also to obtaining a closer picture of the relationship between systems of innovation and migration / mobility. Relevant data and indicators concerning the size, character and tendencies of highly skilled migration are important to policy-makers, the business community and to society in general. The aim of this survey was to explore the relationship between foreign direct investment (FDI) and knowledge-flow through migration, and so we attempted to measure the employment-based inflow of HS workers into the region.

This newly-designed survey has attempted to fill the information gap. The survey, therefore, focuses on the role of foreign investors: entities are either small (that is, owned by one or by a small number of foreign nationals) or they are giant multinational companies (MNCs). This survey investigated HS immigrants who are employed by foreign-owned companies and who arrived either with or without investment.

This survey brought to light much empirical evidence which give us food for thought in revising our present methods of measurement and in identifying key questions for any surveys which collect data on highly skilled immigrants and/or mobile workers.

6.1 Definition and Collection of Data

The main elements of the key definition of HSW migration are: (1) migration (2) highly skilled and (3) worker.

The working definition of this study included into the population all foreign, highly- skilled workers who are employed in an occupation where first degree qualifications are normally

required and who work at the investigated firm for more than 1 year.

(1) Migration — Many different social science studies have shed light on the drastically changing character of migration in the late 20th century. The old emigration/immigration pattern still exists and its scale has significantly increased. However, a new wave and style of migration is emerging from the mobility of the scientific and business community.

One of the important elements of the present UN definition is *length of stay in the host country*. It defines the borderline between visitors and migrants as 1 year + 1 day. Whoever stays less than this is a visitor and who stays longer is an immigrant. This definition has many advantages for international comparison, but the changing world calls for a revision of this definition. The pure migration statistics based on this definition cannot give too much help in investigating such typical knowledge conveyors as globetrotters, posted migrants and returnees. It does not help in making distinctions between groups of emigrant/immigrant and mobile HS workers according to the original meaning of these words. The length dimension is an important element in these notions, but it does not have an overall priority over the others.

The notions of “emigrant” and “immigrant” assume implicitly that the process is a closed ended one and that it goes in a one- or two-way direction. The émigré or immigrant changes his own country or home once. The process may happen again in the opposite direction when the immigrant returns to the country from where he once emigrated and he is then termed a returning migrant. He moves in a one- or two-way direction. Another term which is also used in migration studies on HSWs is “mobility”.

If we wish to study the changes in HRST thanks to the flow of HSWs among countries, it would be better to use the word ‘mobility’ since this word has a broader coverage. It includes emigrants/immigrants as a basic concept but together with bi-directional migrants, globetrotters, round-migrants, and “posted migrants”. The word ‘mobility’ is neutral; it contains no prejudice against brain-flow. It has a multidimensional character, which incorporates “brain waste” (whether “drained” or otherwise), “brain gain” and “brain losses” in the transfer process. The notion of “mobility” seems a much superior notion in investigating systematically the flow of HS workers among countries.

We would recommend the study of HS workers’ cross-border mobility rather than migration, even if it is more difficult to operationalise this definition into a workable statistical definition. The changing pattern of migration has widened the focus of investigation, and today a study of cross-border HS workers must include migrants, mobile (commuting HS workers) distance workers and frequent travellers as partners in collaborative research since all are clearly knowledge conveyors.

(2) Highly-skilled (worker) — Another key element of the definition is that of “highly-skilled worker”. To employ Canberra Manual-type working definitions in this instance, those people belong to the HRST category who (a) successfully completed their education at tertiary level in a science and technology (S&T) field of study [more highly-educated people]. (b) are not formally qualified as in (a), but who have an appropriate skill level and who worked at the investigated firm in an occupation usually performed by higher-educated personnel.

In combining the educational/occupational classifications we are speaking about “highly-skilled workers”. If we are to look at both the supply side of HRST in terms of qualification and the demand side in terms of occupation, then, at least at first glance, this twin definition is both realistic and close to real life. In the mid 20th century researchers and, in several

fields, engineers without a degree in higher education were not so rare. However, in the age of the learning economy the certification of qualifications has grown enormously in importance, and the fast-growing enrolment rate in higher education has also reduced the acceptance of non-qualified talent. Our changing world is pressing us to modify this definition, although there is value in retaining its "occupation" dimension. The statistical stock of HRST and the actual usage of the individual as HRST are never the same. By way of example, the contrastive pairing of employment/unemployment is not sufficient to characterise the employed HRST. More highly educated people may well be employed in jobs which require no more than secondary school education.

These double criteria become still more complicated if a highly qualified person qualified in another country and cannot meet the above occupational criteria in the receiving country. Therefore, the third element of the definition, "worker" is crucial to measure the real inflow of knowledge, the real gain in HRST.

(3) (*Highly-skilled*) worker — The "worker" means a person who actually works in a highly-skilled job. Unlike native citizens, the unemployed immigrants, employed immigrants who are performing non-HS jobs or who may withdraw at least temporarily from HRST - or who may never belong to HRST in receiving country - do not meet this criterion.

If the HE immigrant cannot belong to the category of HS workers in the receiving country for any reason (labour market situation, non-recognition of the acquired degree, limited knowledge of the receiving country's language) there is no gain in HRST. These immigrants may be just "in the pipeline" of HRST or "no longer HRST".

As touched upon above, in the case of immigrants the term "worker" is added to the Canberra criteria which exclude from the targeted population the group of unemployed, more highly-educated immigrants and higher educated migrants employed in low skilled jobs.

It cannot be argued against that the "occupation" element of the definition is crucial, and we suggest the employment of the following definitions in respect of HS migrants/mobiles:

- (1) HE (More Highly Educated) migrants in an occupation usually performed by HE personnel
- (2) Not formally qualified migrants performing highly skilled jobs

These two groups definitely belong to the Human Resources area of S&T in the receiving country and may be approached through employers' organisations.

Several *other terms* have to be clearly defined if we wish to measure migrants /mobiles by means of their employment.

Cross-border employment — A foreign person who has worked in a country for years might be on the (foreign) payroll of another firm - either in the same group or in another company which has "borrowed" him. If we consider only the payroll of the legal employer we may overlook a large number of migrants who might have a significant influence on upgrading knowledge and the internationalisation of R&D activities where they are physically present.

We suggest taking into account the migrant / mobile HSWs at his/her actual workplace. If they spend the majority of their annual working time in a specific country, this should be accounted for there. (In our survey we included the immigrant in our sample, whether or not the Hungarian firm was their legal employer.) The definition on the outsourcing / borrowing

of highly skilled migrants / mobiles is further elaborated in the Frascati Manual.

Migrant mobile by initiators — Two main classes of employed HS migrants / mobiles may be established by initiators: (1) Business-led and (2) Job-seekers.

Business-led migrants are those who were posted or recruited by business. The job-seekers are those immigrants who came into the country seeking highly skilled jobs for any reason and whose search was successful.

Returnees — Returnees constitute a distinctive group of migrants, and it can be assumed that the returnees could have many positive effects on the country. At the time of their return they can restore the benefits of their knowledge lost at the time of their emigration.

At first glance, to consider those who left the country once and return at some later point seems appropriate, but it is not easy to satisfy the requirements of these simple terms.

The term “country” is not always easy to define in time. Here I offer some examples for further consideration.

The citizenship and/or country of birth can only partly help to solve this problem. The legal system in some countries allows dual citizenship, whilst other countries do not accept it. (European citizenship may simplify this question.).

The turbulent history of CEECs in the 20th century overcomplicated the issue of national origin. For example (1) Ethnic Hungarians born in Romania, Ukraine and Israel might identify themselves as returnees in Hungary although they have never lived within the present borders. (2) The (enforced) emigrant German minorities from Hungary to Germany - and their descendants who never lived in Hungary - may also identify themselves as returnees.

For several practical reasons it is not very important to draw distinctions between returning migrant and returning mobile workers. People may leave the country as mobile and become migrant for a variety of reasons. The problem for measurement originates from the fact that the mobile worker may be missing from employer derived “highly-skilled migrant” statistics. Mobiles usually have not changed their citizenship and, in common parlance, they are not highly-skilled immigrants. However they might be posted back as professionals.

As regards the different groups of highly skilled returnees, further investigation is needed. The suggestion of revising currently employed terminology is one of the outcomes of this research and would be worthwhile in refocusing or redefining the core concept of highly-skilled migration studies.

If we wish to avoid any such solution as simply cutting the Gordian knot, we have to find suitable classifications, which take into account the experiences of countries involved with immigrants. The global mobility of highly skilled workers is a new challenge for measurement in the 21st century.

6.2. Indicator Development

Neither administrative data sources nor existing surveys can provide such indicators as we were looking for. Our pilot survey is based on an academic-type survey, and the findings of these surveys are a good starting point for moving further ahead in indicator development and for thinking about different ways in which to fill the information gap.

This explicit requirement does not mean that only a new survey can produce relevant information regarding this population. A new survey is simply one alternative. Another would be the revision of existing surveys to produce new information relatively economically.

We think that what we might term complementary solutions could be best in obtaining relevant information without overburdening potential respondents, and we suggest, therefore:

1. Including a filtering question *into existing surveys* on the employment of foreign HS workers. The potential candidates are existing business R&D surveys and structural business surveys. A slight revision of any of these could support the making of an effective new survey every second or third year.
2. Developing a new survey on business-led HSWs inflow, which provide detailed data for analysing the brain gain of the business sector in receiving countries. This survey makes it possible to collect detailed data on foreign highly educated persons employed in highly skilled jobs by a company on the actual day [month] of investigation. This information is extremely helpful in learning the features of HS migrants.

6.3 Lessons of an Academic Survey for a Statistical Survey

The identification of suitable respondents, the meaningfulness of the questions, and definitions, which are clearly understandable are crucial in survey development phase.

Managing directors were first to be approached at the companies. They decided either to permit the questionnaire to be completed or not. However the decision regarding the provision of such data does not always belong to the Hungarian affiliate and the MD has to ask permission from Group Headquarters to devote time to filling in the questionnaire and to ensure that the data is treated as confidential.

There were two typical cases when General Managers were the best respondents: (1) the GM was the single foreign HSW at the firm and practically reported on himself (2) The firm was small and the GM knew all his HS foreign employees and their personnel record. In all other cases *Human Resource Managers* were best in providing the relevant information.

It worth mentioning here two elements of our fieldwork experience: the country of citizenship/nationality is much easier to identify if the respondent is the HR manager than the individual. Ethnic Hungarians, people who are waiting for naturalisation, prefer to regard themselves as Hungarian.

From the alternative questionnaires "Option 2" was more meaningful to HR managers and they were ready to spend more time on their reply. Combined survey methods (telephone interview and fax-sheet) increased the reliability of the responses, "Option 2" being more reliable than "Option 1". The reason for this is very simple: The telephone interview allowed respondents to rely on their own memories, whilst fax sheets encouraged them to use company files.

The criteria for defining 'highly-skilled' are easier to employ in the study of research jobs but not for other groups of highly skilled personnel. The definition of "highly skilled" is unknown, even among HR managers. According to their interpretation, highly skilled is equal to more highly educated. (e. g. if the General Manager was not "highly educated", the HR manager would report all relevant data as confidential, simply to avoid debate.) However

the growing importance of mass education and degrees is reducing the space for non-degree holding talent and it is worth providing HR managers with detailed descriptions of highly skilled jobs to overcome this constraint.

6.3.1 Highlights of empirical findings

Most immigrants (one third) were employed in sectors related to information and communications technology, and it clearly shows that Hungary, as a newcomer to the field of employers of immigrant labour, matched well with the contemporary “HE immigrant” job pattern. This sector is the top employer for both groups – that of the developed countries and of the post-socialist and developing countries.

Among the different type of business-led immigrants, managers arrived first in Hungary in the initial phase of transition. Foreign owners came here or delegated employees for the initial years of FDI to establish a smooth collaboration or simply to train locals for the tasks and exercise strict control. The importance of the CEO is not negligible in the process of knowledge-flow, of the transfer of technology and in changing the rules and behavioural routines. They are creating an environment for others to employ - or not to employ - their accumulated knowledge and skills and to support ups killing and mutual learning. In the later stages of development, in the late 1990’s other professionals were also led here by business, such as development engineers and designers. Different types of knowledge assets are flowing into the country through these occupations.

Germination of the seed sown by posted R&D activities has occurred in Hungary. Involvement in research by MNC affiliates and extramural R&D activities are relatively new phenomena of globalisation, and the participation of Hungarian affiliates matches the new world experience. A few multinationals have posted professionals to manage research laboratories here in order to participate in research tasks allocated to Hungary; these are crucial representatives of brain circulation.

Foreign owners prefer to recruit returnees and they can offer suitable jobs, providing salary and benefits packages fully comparable to those in the West. (This group of people may be identified only by means of oral interviews.)

If we consider the European Research Area it is not sufficient to measure the process and its impact from the perspectives of the sending and receiving countries of Europe; the cost of transfer among them is also crucial. The globalising learning economies make it important to focus on the costs of transfer also. We have to elaborate further the concept of “brain drain”, “brain gain”, “brain waste” and “brain circulation”, but the findings are encouraging for the launching of studies into measuring the content of knowledge-flow through brain circulation.

The interdisciplinary character of the topic makes it difficult to develop appropriate measurements. The mobility of highly-skilled migrants belongs to the common domain of demographic, labour and S&T statistics. *We are now halfway towards describing the pattern of brain circulation relating to FDI and to developing good methods for monitoring the changing patterns.*

6.3.2 Testing of the survey method in several newly associated countries

The feasibility of conducting this type of survey in other CEECs was also tested as part of our pilot work. This type of survey can be important in a country if foreign investors are there and they are involved in activities that need highly skilled workers. The investigated

countries of post-socialist economies are characterised by the penetration, size, sectors and activities of FDI. The differences in presence of FDI by countries can explain some differences in HS migration patterns and, in the presence of business-led migrants. The resources of this project did not allow a complete and thorough testing of the survey method as a whole. We did, however, test the understanding of the questions in other post-socialist countries.

Following the positive Hungarian testing results with Questionnaire ‘Option 1’ we distributed both versions of the IKU questionnaire ‘Option 1’ and ‘Option 2’ among CEECs. It was a task for local researcher to choose between ‘option 1’ and ‘option 2’ for testing. The meaning of questions, methods and first experiences were discussed step by step through e-mail exchanges. The lack of personnel communication (e.g. face to face) did make it quite difficult to clarify everything. We would recommend face-to-face discussions to advance the survey development.

Our partners followed different methods to investigate the feasibility of conducting this type of survey in their own country. The questionnaire was tested in Bulgaria, Estonia, Latvia, Lithuania and Romania. Some of the researchers translated the questionnaire into the national language. It is not easy to find relevant organisations for this survey and so the questionnaire was typically tested at foreign-owned companies. In Bulgaria, the test was conducted among NGOs and companies; in Estonia it was tested at a university; in Lithuania the questionnaire was tested at a research institute and a company with FDI.

At this stage of research, the personal relationship with companies has important influence on sample selection. The identification of a target population(s) was difficult in many countries even if a register on companies with FDI was available. (Lack of foreign investors with HSWs; reluctance of companies to respond.) The radically number of respondents relates to different penetration of FDI in the countries and different activity of foreign-owned businesses to post or initiate foreign highly skilled workers into the countries.

Table 19 summarises the number of completed questionnaires by country, organisations and HSWs. Five countries were involved in this process and three others (Poland, Russia and Ukraine) gave some explanations on the situation.

Table 19. Feedback on items/questions.								
	Number of organisations				Number of foreign highly skilled workers			
Countries	Total Firms with FDI HE, R&D institutes, NGOs				Total at firms with FDI at higher education, R&D institutes, NGOs			
Bulgaria	9	7		2	9	7		2
Estonia	2	1	1		8	1	7	
Latvia	1	1			1	1		
Lithuania	32	29	2	1	128	66	51	11
Romania	8	8			14	14		
Total	52	46	3	3	160	89	58	13

The questionnaire proved to be workable. The *missing items* are very similar to Hungarian experiences. Some lessons are worth mentioning here as starting points for further investigations (Table 20).

Table 20. Number of organisations approached and number of foreign highly skilled workers by countries

Problematic items	Reasons	Revision
<p><i>Missing response:</i></p> <ul style="list-style-type: none"> country of birth however that information was important if birthplace is different from sending country, since when employed by mother affiliate 	<ul style="list-style-type: none"> archive information, time consuming for HR managers 	<ul style="list-style-type: none"> include yes/no questions clarifying the changes payroll the HSW will find
<p><i>Unclear response:</i></p> <ul style="list-style-type: none"> field of science field of education 	<ul style="list-style-type: none"> they have never been employed by mother company if they responded on the question 'since when employed at this firm' and it was same as employed by mother affiliate they left the square empty unknown terminology explanation need. It is premature to suppose knowledge on ISCED and field of science 	

When we identified this information systematically missing, we tried to learn the reasons from human managers.

Another problem is related to international comparability of responses. It was recommended to surveyors to use internationally harmonised classifications if it was possible. The CEE countries are in different stages of revision of their statistical classification. Harmonisation process with international standards (ISCED, ISCO, and ISICRev3) is on the way, as it was described in methodological chapter.

During the testing period we did not employ detailed explanations, definitions to questions. This mode of testing brought into the light to which items need explanation and to which do not need.

If it is reasonable to run this survey in a country it has to *broaden the questions* on general data. The following firm-related variables are important for analyses:

- country of origin of FDI
- proportion of foreign ownership
- total number of employees and total number of HS employees
- sector of firm.

It depends on country-specific regulation if these variables have to be collected or we just have to ask the identification number of firms to get them from databank.

Another important issue is to identify the population and select sample. But this topic was not included into testing phase.

6.3.3 Some experiences — by country

Bulgaria

Feasibility of the questionnaire was tested in Bulgaria. The questionnaire was translated in Bulgarian and was tested with face-to-face interviews.

Sample selection criteria followed IKU's recommendation: firms created by foreigners and employing foreign HE person. 65 firms were approached and 14% of them responded. The location of these units was mainly in Sofia. These 9 were firms were private (7) and NGOs (2). Number of HS immigrants was 9, so each of these units employed 1-1 foreign higher educated person, 6 immigrants belong to middle age group (41-50) (Table 21).

Table 21. Summary of Bulgarian results (Option 2).

Nationalities	Person	Age co-hort	Gender	Education		Field of Science	Occupation	Since when employed by this firm
				Degree	Department			
Germany	1	51-60	M	Ph.D	...	Transport engineering	Expert	2000
Italy	1	41-50	M	M.A.	...	Computer engineer	Co-owner	1992
Russia	1	41-50	F	Ph.D	Moscow University/ BAS	Economics	Senior research fellow	1987
	1	21-30	F	M.A.	Moscow institute	Pedagogue	Hairdresser	1998
USA	1	31-40	F	M.A.	USA - ...	Urban planning	Expert	1996
Iraq	4	41-50	M	Ph.D 3	BAS Plovdiv Medical Inst.	Mathematics 3	Manager 2 Entrepreneur 1	1992,1998
				MA 1		Medicine 1	Doctor 1	1987 1996

From 9 HSWs 3 were business-led from *Germany*, *Italy* and *US* and 6 job-seekers from *Russia* (2 married to Bulgarians) and *Iraq* (got the university degree in Bulgaria and did not go back to their country of origin). Except one of the HE immigrants, (hairdresser), all are performing highly skilled jobs. Although nothing can be concluded basis of 9 cases, it does draw our attention to the value of investigating the dual pattern of HS immigration in Bulgaria.

Estonia

As the Estonian expert stated skilled foreign personnel is represented in Estonia mainly on the bilateral exchange basis. Foreign capital based firms hire the local high skilled manpower rather than bring their personnel.

The university archive allowed filling the questionnaire. A foreign investor firm in the field of insurance was also selected. This firm has 5 HE employees and only one of them is a posted foreigner, who is engaged in international operation department and comes with the same citizenship as investor company. This person is between 30-40 years old, and stays at the Estonian affiliate for 2 years (Table 22).

Table 22. Summary-table of the Estonian results (Option 2).

Citizenship	Person	Date of birth	Gender	Education		Field of Science	Occupation	Since when employed by this firm
				Degree	Department			
German	1	1961	M	3 rd	Philosophy	German philology	Professor	1997
French	2	1977	F	3 rd	Arts	French philology	Teacher	2000
		1969	M	2 nd		History		
Finnish	2	1965	F	3 rd	Arts	Finnish language	Lecturer	1999
		1969	M			Swedish language		
Swedish	1	1969	M	2 nd	Politics	Social policy	Professor	1994

Lithuania

The largest sample is from Lithuania.. The mini-survey was tested in Lithuania by phone and e-mail: 165 companies were approached; 2 of them have no foreign HSWs; 131 refused to respond. Data was collected from 32 companies that are employing 128 highly-skilled foreign workers. Half of the companies employed only 1 HS foreigner; 4 companies had more than 10 and one of them 48 HE immigrants. Eighty percent of the HS immigrants were male and 20% female. On in ten were below 30 years of age and almost one in five were aged 60 and older. Slightly less than one third of the HS immigrants were between 31-40 years of age (Table 23).

Table 23. Lithuanian foreign HSWs by age-group and gender.

Age-group	Male	Female	Total	%
below 30	10	3	13	10.2
31-40	31	6	37	28.9
41-50	30	2	32	25.0
51-60	14	9	23	18.0
above 61	17	6	23	18.0
Total	102	26	128	100.0
%	79.7	20.3	100.0	

When the nationality is examined, we see that more than one quarter (26%) of HS immigrants arrived from Nordic countries, countries that are important investors in the region. HSWs that are belonging to different nationalities of former Soviet Union represented 4% of HS immigrants and 2.5% arrived from other post-socialist countries. The largest inflow came from North America with 27% coming from the US and another 16% from Canada (Table 24).

Table 24. Lithuanian foreign HSWs by nationality and gender

Country of origin (nationality)	Male	Female	Total	%	
EU countries	Belgium	2		2	1.6
	Denmark	7		7	5.5
	Finland	11	1	12	9.4
	France	1	1	2	1.6
	Germany	4	2	6	4.7
	Great Britain	4	2	6	4.7
	Ireland	2		2	1.6
	Italy	1		1	0.8
	Sweden	10	2	12	9.4
EFTA	Norway	2		2	1.6
	Switzerland	4		4	3.1
Candidate	Bulgaria	1		1	0.8
	Estonia	3		3	2.3
	Hungary	1		1	0.8
	Poland	1		1	0.8
Other European	Russia	2	1	3	2.3
	Ukraine	1		1	0.8
America	Canada	14	7	21	16.4
	Columbia	1		1	0.8
	USA	25	10	35	27.3
Middle East	Syria	1		1	0.8
Asia	India	2		2	1.6
	Kazakhstan	1		1	0.8
Total	102	26	128	100.0	

One fifth of HS immigrants have 3rd university degree and two-two fifth are 1st or 2nd degree holders (Table 25).

Table 25. Lithuanian foreign HSWs by university degree.

Degree	Number of HE employee	%
1 st	54	42.2
2 nd	48	37.5
3 rd	26	20.3
Total	128	100.0

One third of foreign HSWs have studied Humanities and more than one third social sciences. About 9 % of them have degree in Engineering and only about 5 % received it in Natural sciences (Table 26).

Table 26. Lithuanian foreign HSWs by field of science.

Field of science	Number	Percent
Natural sciences	6	4.8
Applied science	2	1.6
Chemistry	1	0.8
Geography	1	0.8
Hydro botany	1	0.8
Mathematics	1	0.8
Engineering	11	8.6
Engineering	7	5.5
IT	4	3.1
Social sciences	48	37.4
Management	15	12.0
Economics	20	16.0
of which finance	13	10.2
Commerce	1	0.8
HR administrator	1	0.8
Internal accounting	1	0.8
Psychology	7	5.5
Sociology	3	2.3
Education	6	4.7
Humanities	30	23.4
English	13	10.2
History	5	3.9
Literature	1	0.8
Philosophy	1	0.8
Theology	10	7.8
Medical science	2	1.6
Unknown	25	19.5
Total	128	100.0

If look at the occupation of the HSWs, we can see that almost half of the immigrants (42.2%) are working as director or deputy director. One fourth of them are working as professor or teacher, and about 21.9% as instructor. Another 5% is working as leaders as well, as head of department (Table 27).

Table 27. Lithuanian foreign HSWs by occupation.

Occupation	Number	Percent
Analyst	1	0.8
Assistant	1	0.8
Director/Deputy Director	54	42.2
Department head	6	4.8
Engineer/Chief technologist	3	2.4
Instructor	28	21.9
Press	1	0.8
Professor/teacher	33	25.8
Total	128	100.0

Note: By the Lithuanian classification on occupation "Chief technologist is the person responsible for strict following technological process in a factory making some goods As "Instructors" foreigners were employed at higher education school (non-university HE). As far as we understood, it is a person involved in the development of practical skills of students.

Romania

Romanian sample selection have based on IKU's recommendation. First step was to select the candidate sectors for investigation. The largest receptor of FDI is the sector of commerce, 60% of FDI went to this sector in Romania. However these firms in commerce are usually not employers of highly skilled workers. So the potential target group was selected from industry and technology oriented service sectors (Table 28).

Table 28. Firms with foreign capital in Romania.

	Commerce (no highly educated workers)	Industry	Technology oriented service sectors (IT, communication)	Others	Total
Number of firms with foreign capital	47,890	14,519	6,790	11,643	80,842
Percentage of firms	59.3	18.9	8.4	13.5	100.0
Percentage of subscribed foreign capital	18.0	65.0		17.0	100.0

Table 29 shows the age-tree is typical. The largest number of immigrants belongs in the middle age group, those aged 41-50 years (Table 29).

Table 29. Romanian foreign HSWs by age group.

Age-group	Persons
under 30	1
31-40	4
41-50	6
51-60	3
above 60	0
Total	14

Most of the foreign HSWs are French immigrants and five of the six reported work in a French invested company (Table 30).

Table 30. Romanian foreign HSWs by nationality.

Nationality	Number
British*	2
American	2
French	6
Italian	2
Swiss	2
Total	14

Latvia

Latvia filled out one questionnaire. The person is a returning posted migrant. The responses can provide information.

Comments from other countries

Earlier, we mentioned that several countries could not participate in the testing process. The reasons were explained as:

From Poland

The questionnaire was tested at 2 companies with face-to-face interviews. This exercise certified the questions are relevant and may respond them. These interviews paid our attention interesting factors of HS immigrant patterns. Several companies with FDI from advanced market economies are recruiting foreign HSWs from neighbouring Eastern countries into Poland. However new European Visa regime is becoming a burdening factor to such patterns. The surveyor evaluated the exercise as time- and cost-consuming process.

From Russia

The expert's opinion was that it is not possible to conduct a survey of firms employing foreign citizens with higher education degrees because:

- 1) First, the available data base is compiled in such a way that it does not permit to identify organisations employing foreign citizens.
- 2) The background information contains no data on the educational attainment level of foreign labour force, which in turn does not enable to disclose the object of study.
- 3) The existing statistical information demonstrates that the share of researchers and university graduates within foreign labour force employed in the Russian Federation is too small to be studied by a random sample.

In the R&D sector there were just 185 foreign employees registered in 2001, of which 120 came from Ukraine. Therefore identification of the object and a subsequent detailed survey will require substantial funds and efforts without any really promising results.

From Ukraine

Ukraine has few companies with foreign employment and it is difficult to identify them. The Ukrainian team has carried out a survey on innovations in different sectors (INTAS-project) recently. This sample contained foreign-owned companies and a filtering question on foreign HSWs was included into the interview questionnaire. The result of the screening period was: none of the roughly 250 companies employed foreign HS workers.

Foreign-owned companies have very few non-Ukrainians in their offices. Foreigners are not even among the top managers at Ukrainian branches of large foreign companies. These companies have not posted foreign specialists in Ukraine.

To some extent, it could be explained by the limited operations of these companies in the country. Almost all of them rely to primarily on local specialists.

The other kind of highly skilled immigrants, job-seekers are hardly present in Ukraine. This period of transition does not make Ukraine an attractive country for economic, political refugees. (Most of the Asian immigrants are Afghans and Indians; very few of them have higher education degree.) Unemployment rate among the HE people is higher in Ukraine than

in neighbouring countries. Salaries of HE people are lower in Ukraine than in neighbouring countries.

From Slovakia

According to the expert's evaluation, there are no possibilities to obtain (more exactly to publish) necessary information on the current state of higher educated personnel from the firm level. Reasons are always the same: lack of willingness to co-operate and confidentiality. Generally speaking, in foreign firms the smaller part of managers has only came from mother company. But all further information is unavailable.

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8. Annex — Technical Notes

1. A Note on the Authors and Contributors

This report was prepared by Annamária Inzelt with contributions from Hungary: Katalin Miskolczi (preparation of register and testing of the questionnaire), Nóra Csunderlik (testing and running of the survey), Mandy Fertetics (data processing and tabulating) and for testing in the CEE countries: Bulgaria: Rossitsa Chobanova; Estonia: Luule Sakkeus; Latvia: Leonid Ribickis; Lithuania: Vincas Buda, Vida Janusoniene; Poland: Jan Kozlowski; Romania: Steliana Sandu, Gheorghe Zaman; Russia: Leonid Gokhberg; Ukraine: Igor Yegorov.

2. Mini survey of firms' HE foreign labour force

Option 1	
Name of the employing organisation: In Hungarian In English	
Address:	WebPage:
Name of the contact person:	Title the contact person:
Telephone number:	Fax number:
E-mail address:	
In what language can he/she give information:	
Foreign HE employees	
Gender	
Male: _____	Female: _____
Age: below 30 _____ 31-40 _____ 41-50 _____ 50-60 _____ 60-70 _____ above 70	
Nationality (ies):	Country (ies) of birthplace:
Education	
University	1 st degree
	2 nd degree
	3 rd degree
Field (s) of science:	Profession(s):
Permission issued:	

Option 2										
General Data										
Name of the employing organisation: In Hungarian In English										
Address:					WebPage:					
Name of the contact person:					Title the contact person:					
Telephone number:					Fax number:					
E-mail address:										
In what language can he/she give information:										
Nationalities	Person	Age group	Gender F/M	Education		Field of sc	Occupation	Since when employed by		Perm. issued
				Degree	Depart			This firm	Mother/Aff	
...country	1									
	2									
...country	1									
	2									
...country	1									
	2									
Note: the question on country of birth was optional (only to mention, if it differs from nationality or citizenship).										

3. The Lifelines of the Hungarian Academy Survey on Inflow of Highly Skilled Workers

(Business Sector)

Methodology	Characters
Kind of survey	Academic survey
Survey unit	Firms with foreign ownership and employing highly skilled immigrants.
Classification	ISIC Rev. 3 (two digit level) ISCO ISCED
Definition	Canberra on HRST UN on migrants
Obligatory/voluntary survey	Voluntary
Size of survey Number of responding firms employing HE immigrants <ul style="list-style-type: none"> · Brutto 43 · Net 39 Number of Highly Skilled Foreign Workers Employed by Responding firms <ul style="list-style-type: none"> · Brutto 207 · Net 182 	
Cut-off-point	Foreign ownership at least 50% Employing at least 1 HE immigrant
Questionnaire	Self-development
Combination with other survey	Not yet
Reference period	2001
Survey method & implementation	Phone interviews, face-to face interviews and fax survey

Note: Data collected and analysed by IKU, contracted with MERIT for the European Commission.

9. Detailed Statistical Tables

Table A-1. Number and ratio of companies by sector and investor country

Table A-2. Number of foreign HS employees by level of education degree and citizenship.

Table A-3. Number of foreign HS employees by occupation (ISCO88) and citizenship.

Table A-4. Number of foreign HS employees by occupation (ISCO88) and age-group.

Table A-5. Number of foreign HS employees by occupation (ISCO88) and field of education.

Table A-6. Number of foreign HS employees by sector and developed/developing countries.

Table A-7. Number of foreign HS employees (with same citizenship as country of investor) by sector and field of education.

Table A-1. Number and proportion of companies by sector and country of investors¹.

Economic sector	Number of companies																						
	Major economies						Medium economies					Small economies					Unknown	in %	Total	As a %			
	United States	Germany	France	Italy	Russia	Total	As a %	Netherlands	Switzerland	Austria	Sweden	Total	As a %	Denmark	Finnland	Cyprus					Luxemburg	Total	As a %
Miscellaneous (1596, 1600, 2121)								1	2			3	7.7									3	7.7
Manufacture of wearing apparel, dressing and dyeing of fur; tanning and dressing of leather, manufacture of luggage, handbags, saddlery, harness and footwear (1821, 1822, 1910)		1		1		2	5.1								1			1	2.6			3	7.7
Manufacture of chemicals and chemical products; of rubber and plastic products (2410, 2441, 2442, 2470, 2513)	1	3	1			5	12.8							1				1	2.56	1	2.6	7	17.9
Manufacture of fabricated metal products, except machinery and equipment (2810, 2830, 2852, 2863)		4				4	10.3	1				1	2.6									5	12.8
Manufacture of machinery and equipment; of electrical machinery and apparatus (2923, 3161, 3162)		1	1			2	5.1	1		1		2	5.1									4	10.3
Manufacture of radio, television and communication equipment and apparatus (3220, 3230)									2	1		3	7.7									3	7.7
Manufacture of medical precision and optical instruments, watches and clocks; motor vehicles, trailers and semi-trailers (3340, 3430)		3				3	7.7															3	7.7
Construction (4510, 4521)			2			2	5.1			1		1	2.6							1	5.1	4	10.3
Service 1. (5112, 5510, 6420)		1			1	2	2.6									1		1	2.6			3	7.7
Service 2. (7220, 7310, 7420)	1					1									1			1	2.6	2	7.7	4	10.3
Total	2	13	4	1	1	21	53.8	2	1	6	1	10	25.6	1	1	1	1	4	10.3	4	10.3	39	100.0

Table A-2. Number of foreign HS employees by citizenship and level of education degree.

Citizenship		Level of degree				Total
		1 st	2 nd	3 rd	Un-known	
EU countries	Austria	1	6			7
	Belgium		2		1	3
	Denmark				1	1
	Finland	7	3		1	11
	France	3	10		2	15
	The Netherlands		2		1	3
	UK		7		4	11
	Germany	7	22	1	1	31
	Portugal		1			1
	Sweden		3		6	9
	<i>total</i>	18	56	1	17	92
EFTA	Norway				2	2
	Switzerland		6			6
	<i>total</i>		6		2	8
Candidates	Poland	1	1		1	3
	Rumania	1	30		17	48
	Slovakia		2			2
	Czech Republic		1			1
	<i>total</i>	2	34		18	54
Other European countries	Ukraine	1	1			2
	Russia		2			2
	Croatia		3			3
	Yugoslavia		3		1	4
	<i>total</i>	1	9		1	11
America	USA		10	1		11
Middle East	Iraq		2			2
	Iran		1			1
	<i>total</i>		3			3
Asia	India				2	2
Africa	Egypt		1			1
Total		21	119	2	40	182

Part 7. Striking a New Path — FDI and Migration of Foreign-citizen Scientists and Engineers in Hungary

Occupation		Citizenship of foreign HS employees																				Total								
		EU countries										EFTA		Candidates			Other European countries				America		Middle East		Asia	Africa				
		Austria	Belgium	Denmark	Finland	France	The Netherlands	UK	Germany	Portugal	Sweden	Total	Norway	Switzerland	Total	Poland	Rumania	Slovakia	Czech Republic	Total	Ukraine		Russia	Croatia	Yugoslavia	Total	USA	Iraq	Iran	Total
1	Legislators, Senior Officials and Managers	6	1	1	5	10	2	6	20	1	6	58	6	6	6	6	1	7	1	1				2	3	1	1	1	1	78
12	<i>Corporate managers</i>	6	1	1	4	9	2	6	18	1	4	52	6	6	5	1	6	1	1	1	1			2	3	1	1	1	1	71
121	Directors and chief executives	1	1	1	1		1	3	7	1	16	2	2							1				1	1					20
122	Production and functions department managers	5	1		6	1	2	5	1	3	24				5	1	6								2	1		1	1	34
	- finance	2			3					1	6	1	1																	7
	- production	1				1		3			5			1		1													1	7
	- construction, architecture				1						1			4		4										1	1			6
	- sales and marketing				1		1	1	1		4	1	1							1				1						6
	- project manager				2	1					3																			3
	- branchmanager									2	2																			2
	- controlling				1						1																			1
	- factory director											2	2																	2
	- quality management director							1			1													1						2
	- human resources manager		1								1					1	1													2
	- engineering manager	1									1																			1
	- economic manager	1									1																			1
	- operational manager							1			1																			1

Table A-3. Number of foreign HS employees by occupation (ISCO88) and citizenship (continued).

Occupation		Citizenship of foreign HS employees																	Total														
		EU countries										EFTA			Candidates					Other European countries				America	Middle East		Asia	Africa					
		Austria	Belgium	Denmark	Finland	France	The Netherlands	UK	Germany	Portugal	Sweden	Total	Norway	Switzerland	Total	Poland	Rumania	Slovakia		Czech Republic	Total	Ukraine	Russia	Croatia	Yugoslavia	Total	USA	Iraq	Iran	Total	India	Egypt	
123	- customer service director																									1							1
	Other departmental managers				3		1																										4
	- apparatus director				2																												2
	- development director				1																												1
	- informatics director						1																										1
13	<i>General managers</i>				1	1		8		2						1																	13
2	Professionals	1	2		6	4	1	5	11	3	33	2	2	3	42	2					1	1	3	4	9	8	1		1	1			101
21	<i>Physical, mathematical and engineering science professionals</i>	1	2		6	3	1	4	2		19	2	2	1	39							1	3	1	5	8	1		1	1			76
211	Physicists, chemists and related professionals (R&D personnel)														1																		1
213	Computing professionals				1	1	4				6	2	2	1	18								1		1					1			29
	- software developer					1	4	1			6	2	2	1	11								1		1					1			22
	- informatiker														5																		5
	- software designer														1																		1
	- software tester														1																		1
	- informatics engineer				1						1																						1
214	Architects, engineers and related professionals	1	2		6	2					11				20									4	8	1		1					44

Table A-3. Number of foreign HS employees by occupation (ISCO88) and citizenship (concluded).

Occupation		Citizenship of foreign HS employees																						Total								
		EU countries										EFTA		Candidates			Other European countries				America	Middle East			Asia	Africa						
		Austria	Belgium	Denmark	Finland	France	The Netherlands	UK	Germany	Portugal	Sweden	Total	Norway	Switzerland	Total	Poland	Rumania	Slovakia	Czech Republic	Total	Ukraine	Russia	Croatia		Yugoslavia	Total	USA	Iraq	Iran	Total	India	Egypt
	- engineer	1		2	1			1			5				12				12		1	3		4	3							24
	- system engineer		1								1				7				7													8
	- electrical engineer			2							2														3							5
	- economic engineer		1		1						2														1							3
	- development engineer																								1	1		1				2
	- project engineer				2						2																					2
	- developer														1				1													1
22	Life science and health professionals (biologist-scientist, chemist, medical salesman)															1			1				3	3								4
24	Other professionals (241 Business professionals)				1		1	9		3	14				2	3	1		6		1				1							21
3	Technicians and Associate Professionals																										1	1	1			2
32	Life science and health associate professionals (medical trainee)																										1	1				1
34	Other associate professionals (administrative staff)																												1			1
	Unknown				1						1																					1
	Total	7	3	1	11	15	3	11	31	1	9	2	6	8	3	48	2	1	54	2	2	3	4	11	11	2	1	3	2	1	182	

Table A-4. Number of foreign HS employees by occupation (ISCO88) and age-group.

Occupation		Age-group					Un-known	Total
		20-29	30-39	40-49	50-59	60-69		
1	Legislators, Senior Officials and Managers	7	33	12	16	3	7	78
12	<i>Corporate managers</i>	7	27	9	13	3	6	65
121	Directors and chief executives	1	5	1	8	2	2	19
122	Production and functions department managers	6	21	7	4		4	42
	- finance	2	1	2	1		1	7
	- production	1	6					7
	- construction, architecture		4		2			6
	- sales and marketing	1	4	1				6
	- project manager	1		1	1			3
	- branchmanager		1	1				2
	- controlling		1					1
	- factory director		2					2
	- quality management director		1				1	2
	- human resources manager	1		1				2
	- engineering manager						1	1
	- economic manager						1	1
	- operational manager			1				1
	- customer service director		1					1
123	Other departmental managers		1	1	1	1		4
	- apparatus director			1		1		2
	- development director				1			1
	- informatics director		1					1
13	<i>General managers</i>		6	3	3		1	13
2	Professionals	33	39	6	6		17	101
21	<i>Physical, mathematical and engineering science professionals</i>	21	32	3	3		17	76
211	Physicists, chemists and related professionals (R&D personnel)		1					1
213	Computing professionals	16	14					30
	- software developer	11	11					22
	- informatiker	2	3					5
	- software designer	1						1
	- software tester	1						1
	- informatics engineer	1						1
214	Architects, engineers and related professionals	5	17	3	3		17	45
	- engineer	1	2	2	2		17	24
	- system engineer	3	5					8
	- electrical engineer		5					5
	- economic engineer		2		1			3
	- development engineer		1	1				2
	- project engineer		2					2
	- developer	1						1

Table A-4. Number of foreign HS employees by occupation (ISCO88) and age-group (concluded).

Occupation		Age-group					Un-known	Total
		20-29	30-39	40-49	50-59	60-69		
22	<i>Life science and health professionals (biologist-scientist, chemist, medical trainee)</i>	1		2	1			4
24	<i>Other professionals (241 Business professionals)</i>	11	7	1	2			21
3	Technicians and Associate Professionals	1	1					2
32	<i>Life science and health associate professionals (medical trainee)</i>		1					1
34	<i>Other associate professionals (administrative staff)</i>	1						1
Unknown		1						1
Total		42	73	18	22	3	24	182
<i>Total in %</i>		<i>23.1</i>	<i>40.1</i>	<i>9.9</i>	<i>12.1</i>	<i>1.7</i>	<i>13.2</i>	<i>100.0</i>

Table A-5. Number of foreign HS employees by occupation and field of education.

Occupation		Field of education														Known total	Total	
		Law	Social and behavioural sc.			Service trades	Natural science	Mathematics and computer sc.	Medical doctor without specialization	Engineering								Unknown
			economics	business	total					biologist	Medical doctor	economic eng.	mechanical eng.	production eng.	electrical eng.			
1	Legislators, Senior Officials and Managers	1	23	1	24	1		1	20	4	6		4	2	6	40	9	78
12	<i>Corporate managers</i>	1	22	1	23			1	16	3	5		3	1	6	34	6	65
121	Directors and chief executives	1	6	1	7				5	3	1		1	1		11	19	19
122	Production and functions department managers		16		16			1	9		4		2		5	20	42	37
	- finance		7														7	7
	- production								2		3					5	7	5
	- construction, architecture								1		1				4	6	6	6
	- sales and marketing		4						2							2	6	6
	- project manager								2						1	3	3	3
	- branchmanager																2	
	- controlling		1														1	1
	- factory director								2							2	2	2
	- quality management director							1					1			1	2	2
	- human resources manager		1														2	1

Table A-5. Number of foreign HS employees by occupation and field of education (continued).

Occupation		Field of education														Known total	Total		
		Law	Social and behavioural c.			Service trades	Natural science biologist	Mathematics and computer sc.	Medical doctor without specialization	Engineering								Unknown	
			economics	business	total					economic eng.	mechanical eng.	production eng.	electrical eng.	chemical eng.	construction eng.				total
	- engineering manager													1		1	1	1	
	- economic manager		1														1	1	
	- operational manager		1														1	1	
	- customer service director		1														1	1	
123	Other departmental managers							2							1	3	4	3	
	- apparatus director							2								2	2	2	
	- development director													1	1	1	1	1	
	- informatics director															1	1	1	
13	<i>General managers</i>		1		1	1			4	1	1		1	1		8	3	13	
2	Professionals		7	1	8		1	10	24	8	8	1	17	1	59	23	101		
21	<i>Physical, mathematical and engineering science professionals</i>							10	22	3	7		15	1	48	18	76		
211	Physicists, chemists and related professionals (R&D personnel)															1			
213	Computing professionals							3	9				4		13	30	16		
	- software developer								8						8	22	8		

Table A-5. Number of foreign HS employees by occupation and field of education (continued).

Occupation		Field of education														Known total	Total		
		Law	Social and behavioural sc.			Service trades	Natural science	Mathematics and computer sc.	Medical doctor without specialization	Engineering								Unknown	
			economics	business	total					biologist	Medical doctor	economic eng.	mechanical eng.	production eng.	electrical eng.				chemical eng.
	- informatiker						3							2			2	5	5
	- software designer													1			1	1	1
	- software tester													1			1	1	1
	- informatics engineer								1								1	1	1
214	Architects, engineers and related professionals						7	13	7	11	1			35			45	42	
	- engineer						5	3	5	9	1			18			24	23	
	- system engineer						2	5						5			8	7	
	- electrical engineer							2	1	2				5			5	5	
	- economic engineer								3					3			3	3	
	- development engineer								1	1				2			2	2	
	- project engineer								2					2			2	2	
	- developer																1		
22	Life science and health professionals (biologist-scientist, chemist ,medical salesman)						1										3	4	
24	Other professionals (241 Business professionals)		7	1	8				2	5	1	1	2				11	2	21

Table A-5. Number of foreign HS employees by occupation and field of education (concluded).

Occupation		Field of education															Known total	Total		
		Law	Social and behavioural sc.			Service trades	Natural science	Mathematics and computer sc.	Medical doctor without specialization	Engineering									Unknown	
			economics	business	total					biologist	economic eng.	mechanical eng.	production eng.	electrical eng.	chemical eng.	construction eng.				total
3	Technicians and Associate Professionals							1										1	2	
32	Life science and health associate professionals (medical trainee)							1										1	1	
34	Other associate professionals (administrative staff)																	1		
Unknown									1									1	1	
Total		1	30	2	32	1	1	11	1	45	9	17	1	20	2	6	10	35	147	182

Table A-6. Number of foreign HS employees by citizenship and sector (concluded).

Economic sector	Citizenship of foreign HS employees																				Total											
	EU countries										EFTA			Candidates				Other European countries				Middle East										
	Austria	Belgium	Denmark	Finland	France	Netherlands	UK	Germany	Portugal	Sweden	Total	Norway	Switzerland	Total	Poland	Rumania	Slovakia	Czech Republic	Total	Ukraine		Russia	Croatia	Yugoslavia	Total	USA	Iraq	Iran	Total	India	Egypt	
Manufacture of medical precision and optical instruments, watches and clocks; motor vehicles, trailers and semi-trailers (3340, 3430)						1		10		1	12				1	2			3													15
Construction					5						5				4				4							1		1			10	
Service 1.					4			3			7									1	1			2							9	
Service 2.				10							10				3	1			4								1		1		15	
Total	7	3	1	11	15	3	11	31	1	9	92	2	6	8	3	48	2	1	54	2	2	3	4	11	11	2	1	3	2	1	182	

Table A-7. Number of foreign business-led HS employees by field of education and sector.

Sector of employment	Field of education															Total		
	Law	Social and behavioural sc.			Service trades	Natural science	Mathematics and computer sc.	Medical doctor	Engineering								Unknown	
		economics	business	total					without specialization	Economic eng.	mechanical eng.	production eng.	electrical eng.	chemical eng.	construction eng.			total
Miscellaneous (1596, 1600, 2121)	1	2	1	3					3							3		7
Manufacture of wearing apparel, dressing and dyeing offur; tanning and dressing of leather, manufacture of luggage, handbags, saddlery, harness and footwear (1821, 1822, 1910)																	1	1
Manufacture of chemicals and chemical products; of rubber and plastic products (2410, 2441, 2442, 2470, 2513)		1		1							2			1		3		4
Manufacture of fabricated metal products, except machinery and equipment (2810, 2830, 2852, 2863)		4		4							2		2			4		8
Manufacture of machinery and equipment; of electrical machinery and apparatus (2923, 3161, 3162)		2		2					1							1		3
Manufacture of radio, television and communication equipment and apparatus (3220, 3230)		2		2					2				2			4	4	10

Table A-7. Number of foreign business-led HS employees by field of education and sector (concluded).

Sector of employment	Field of education															Total		
	Law	Social and behavioural sc.			Service trades	Natural science	Mathematics and computer sc.	Medical doctor	Engineering								Unknown	
		economics	business	total					without specialization	Economic eng.	mechanical eng.	production eng.	electrical eng.	chemical eng.	construction eng.			total
Manufacture of medical precision and optical instruments, watches and clocks; motor vehicles, trailers and semi-trailers (3340, 3430)		1	1	2					4	4						8		10
Construction (4510, 4521)									3						1	4		4
Service 1. (5112, 5510, 6420)									3							3		3
Service 2. (7220, 7310, 7420)									10							10		10
Total	1	12	2	14					26	4	4		4	1	1	40	5	60