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## Session 3 : New Challenges for the Formation and Accumulation of Human Capital

*Chairperson: Prof. Dominique Foray*

**Prof. Dominique Foray** First, we need to agree on a definition of the knowledge-based economy. I prefer a minimalist definition. That is the sector of production and services based on knowledge intensive activities and oriented towards innovation. Human capital policy must feed this sector with a supply of human capital and this will affect labor diversity and relative availability.

There are six issues which I have identified that we need to address. The first is the growing demand for highly qualified human resources. The second concerns the need for new skills and competencies. The third relates to new human resource management practices. The fourth issue is the flexibility of labor markets. The fifth concerns the demand for heterogeneity. The sixth issue is widespread concern about the low employability of some people and the poor performance of some education systems.

The most important issue in a knowledge-based economy is securing a supply of human capital. Policy must cope with this situation. There is a complementarity between R&D policy and human capital policy. R&D depends on the supply of human capital. To secure high qualified people we need to develop our education system to capture international resources in a changing global market, and to involve university people in R&D in companies. The role of immigration is important for some countries. There are two problems associated with securing a supply of human capital. First is tertiary education. In many countries, the percentage of tertiary education among students is not very high. Second is that many science graduates in Europe go to work in the public sector.

Issues to be taken into consideration are the need for new skills for the knowledge-based economy and human resources management (HRM) practices to raise workers' performance levels. Another important issue is the need for a more flexible economy because of the rapid rate of change. This is a process of creative destruction. We must equip people to transfer their skills from one learning setting to another. Lifelong learning is also important in providing more flexibility to survive.

It is important to recognize demand-side heterogeneity. Both small and big firms are important in this process. Small firms tend to be good at developing breakthrough technology. Large firms tend to be good at product improvement. Both types of companies need different kinds of labor. If we look at the data we see that the most important employer for our students now is small companies. The challenge is how to train students to work for small rather than large companies. Finally, we are very concerned with the low employability for some young people who lack computer, numeracy, and other necessary skills. We need to transform this sector of the labor market.

**Prof. Nina Dey Gupta:** In India, we have well known ambassadors and diplomats but we are best known for our great knowledge workers. Despite the incompetence of the government, Indians are taking advantage of all initiatives. You can see this through the micro-loan system that enables women and young people to advance. The pace is fast. Nowadays there is talk of an indigenous approach to looking at science and technology development. This is important.

There are reforms underway to make telecommunications more accessible and to stimulate technology research and create links between universities and companies. We need to stimulate greater entrepreneurship to attract venture capital. Our first prime minister said scientists should work

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on their own. Our current prime minister says scientists now should work on behalf of agriculture because we have so many farmers committing suicide due to the effects of globalization.

There are 200 million illiterates in India of whom 70% are women. Let me now introduce the video showing how to give illiterate women an opportunity for empowering themselves. It is titled '*Success Story of Women Barefoot Solar Engineers*'. This video has demonstrated how management of the sophisticated technology.

Management of the sophisticated technology was placed in the hands of very poor people. The four women selected for the program went to the Barefoot College in Rajasthan. Since they spoke different languages they used sign language to communicate and learned how to install and fix solar lights and solar panels. They set up a five-kilowatt solar power plant in a technology park and then proceeded to set up an association. They are now selling solar lamps. The Barefoot approach prepares communities first and then brings technology to poor, remote villages.

**Prof. Yuko Harayama:** Investing in human capital is not really a new issue. Economic performance depends on the equality of human resources. But the connection between investment in human capital and the outcomes is not clear. Human capital is not a simple factor. It is very heterogeneous. A complex relationship exists between human capital and economic value. Nowadays, we rely so much on new human capital, the importance of which is evidenced by today's session. What we need is an innovation friendly environment.

We need to start from the regional level and move to the national and international levels. Human resources transfer knowledge and human capital is essential for interaction. We as consumers benefit from innovation. And this is linked to the quality of life.

We have several restraints which Prof. Foray has mentioned. The first is scarcity. World demographic changes are increasing the world's population and yet there is a scarcity of highly trained human resources in some segments. The second restraint is the quality of human resources. Core competencies do not change so much over time but we also need new specialized skills. The third relates to the allocation of results of research for applications to create a better life. Here the need is for an entrepreneurial mindset.

In the policy area, Japan has a five-year plan for science and technology that places a strong emphasis on human resources. There are six policy goals all supported by human resources. The government is trying to implement reforms to systems to encourage women. It is also trying to attract foreign resources to create more diversity in Japan among researchers. We want to make the system less prejudicial against mobility. We are also aiming for better education for our younger children to encourage curiosity in science.

In May 2006, we established a strategy for boosting innovation. It promotes the creation of knowledge to make universities more attractive. One focus is on incubation of knowledge and fostering industry-university partnerships.

We need to ask whether we are taking full advantage of human resources. Human resources is a key component of the innovation ecosystem. We need to change the social structure to improve mobility of not just scientists but all people. The catalyst for interaction is very important in Japan. Another major point for Japan is who the beneficiaries of innovation are. Japanese customers are keen on new technology. We can exploit this to improve technology exchange.

**Prof. Maria J. Rodrigues:** Europe has a general goal to speed up the move to the knowledge economy. The Lisbon Strategy in 2000 set several goals. After some achievements and problems we

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conducted a midterm review in 2005, with the two key words being innovation and human resources.

The Lisbon Strategy is the first attempt in Europe to adopt common goals and this is the first year. The connection between innovation and human resources is central to all 25 EU members. What kind of objectives should we pursue? First, we need to target our education and training levels. If we want to retain education levels and spread competencies, we need a new structure for lifelong learning and to understand the main components of learning demand. In order to supply new learning opportunities, the challenge is to turn schools and training centers into open centers.

As a catalyst for interaction for learning, supply and demand some issues need to be solved, such as vocational guidance and investing in skills that are properly compensated by employment opportunities and wages. All European countries now have strategies for lifelong learning. The key point is to define goals and then develop new infrastructure for lifelong learning. The big question is how do we share the responsibilities for achieving lifelong learning and who sets the rules.

A final question concerns innovation and lifelong learning for what? We need to address new social needs and to provide new jobs. We need to move from a passive to a proactive approach. A major effort for us is to support regions to make this change.

Research bodies can work together. In the EU, we are trying to identify what is the path for more added value to sell more products. In Europe, we invite each cluster to organize this joint work to create permanent interaction between universities and companies. We are attempting to find our own path to respond to the needs of the knowledge-intensive economy.

**Prof. Poh Kam Wong:** Singapore's biggest challenge is to change the mindset of students by introducing a more entrepreneurial approach. We have invested in innovation but are lacking entrepreneurship among youth.

Some studies in the past show that economic growth depends not so much on innovation but on entrepreneurship. We have depended heavily on multinational corporations to drive growth in the region and this has led to rapid growth. We have also achieved increased citations and encouraged rapid patent growth in patent applications. While we have been successful in raising the level of science and technology output, this achievement is still dependent on the MNEs.

Our universities have followed the British model of public universities but are now trying to develop new approaches. Our politicians understand this need. The deputy prime minister has said that part of the role of the university is to foster entrepreneurship and industry involvement.

Our key task is to show how to do this. We have created NUS (National University of Singapore) Enterprise as a new division within the university. The key initiatives focus not just on imparting skills but on changing mindsets. We have provided opportunities for more experiential programs. We need to bring the excitement of companies to the classroom and this needs to start with undergraduates. We also have an incubator program where some students get to work in startup companies.

We face many challenges. Among them is leadership from the top down. We need new organizations. In our case, we deliberately did not place our entrepreneurship program in the university's business school. It has proven to be a popular course and now the business school wants to include our course in its curriculum.

**Floor:** I know policy is important, but putting it into practice is even more important. The problem in Japan is that policy does not manage to get researchers to join companies rather than work at

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universities, and universities do not know how to encourage researchers to join companies. Could you make a comment about how to secure this kind of human capital?

**Prof. Poh Kam Wong:** SMEs in Singapore cannot attract scientists. Scientists worry that a small company will fail and so they head for the public sector. The government in Singapore will pay two-thirds of the salary of a scientist working in an SME for a period of two years. In this way, the companies get to learn about scientists and scientists get to know companies. After two years, the scientist can choose to go back to university or the public sector or he/she can arrange to stay at the company. This is one mechanism we are following. Another is to change the mindset of students when they are still learning. SMEs are having trouble finding good scientists and we are trying to change the supply side.

**Floor:** I am interested in the scheme whereby Singapore sends 250 students around the world. What kind of SMEs do your students join and what kind of jobs do they do?

**Prof. Poh Kam Wong:** The program is still in the early stages. Some students are heading to SMEs. Some have even started up companies and I have invested in them. Some have gone to McKinsey and other consultancies and some to investment banks as associates.

**Prof. Dominique Foray:** I think we should contrast the EU, India and Singapore in regard to how advanced the knowledge economy is. Lifelong learning is an important challenge for rich countries while in poorer countries just learning is important. The issues are different.

**Prof. Yuko Harayama:** Social entrepreneurship is very important. We need to change the mindset of business but the final objective is to contribute to society. First benefit yourself. This is a common point between the EU, India and Singapore in terms of social impact.

**Floor (Embassy of South Africa):** South Africa has two economies. The second economy has unemployable people because they have no skills while the first economy has scientists but too few of them. One argument is that we cannot define a first and a second economy because every country has skilled and unskilled workers. In South Africa, however, we are facing 90% of the population without skills. How can we address poverty alleviation and integration into the first economy?

**Prof. Maria J. Rodrigues:** I would like to talk about bridging the gap. It is a general problem. My policy conclusion is that we must have different strategies for different generations. It takes time. Most successful cases show that we need a two-pronged strategy, one for the young generation, where it is easier to bridge the gap, and another for the adult population. The Indian example shows innovation is not for just high tech companies but for all people. The challenge is to find a tailor made approach to add value.

**Prof. Dominique Foray:** What about the Lisbon agenda? How has enlargement of the EU with many new countries changed the agenda?

**Prof. Maria J. Rodrigues:** We need to fine tune the original targets but generally the average situation is quite good in the new member states. Another problem not just relating to Europe is how can we talk about internationalization of education opportunities. We are talking about national situations while Singapore is showing a more open approach for learning opportunities. This brings us to the brain drain. How can we replace it?

**Prof. Dominique Foray:** Japan is not an open country for immigration. Of course, the language is a problem. But how can Japan attract highly skilled people from overseas?

**Prof. Yuko Harayama:** Mobility is a big problem. Language is also important. Nevertheless, universities are culturally very closed. Physical infrastructure is also relevant. We need to talk about

brain circulation and not just brain drain. We also need not just to attract students but also to facilitate exchanges in the other direction. The average Japanese student is not so enthusiastic about studying overseas.

**Prof. Dominique Foray:** In new skills for the knowledge economy, we need mobility.

**Floor:** One problem with Japan is that when students get a PhD overseas, Japanese universities are not willing to accept them back.

**Prof. Dominique Foray:** This is not unique to Japan. The same applies in many other countries.

**Floor (Embassy of South Africa):** When Japan was not so rich it still made an effort to develop human resources. How can we advance thinking in Africa for human resources development to be our own responsibility? ODA is okay but Africa must create budgets for human resources development.

**Prof. Nina Dey Gupta:**

In India we had the 'White Revolution' nearly 45 years ago- through the AMUL Milk Co-operatives. It started in Gujerat. Today it is internationally renowned and acknowledged as one of the greatest success story in co-operative experiment producing not only milk but ice-cream, cheese and chocolates. Majority of the villagers have profited by this experiment.