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## **Social Policy and Productive Transformation: Linking Education with Industrial Policy**

***Irmgard Nübler***

*Coordinator, Industrial Policies and Structural Transformation Program  
at International Labour Organisation.*

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UNRISD, Palais des Nations  
1211 Geneva 10, Switzerland

Tel: +41 (0)22 9173020  
Fax: +41 (0)22 9170650  
[info@unrisd.org](mailto:info@unrisd.org)  
[www.unrisd.org](http://www.unrisd.org)

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## ***Social policy and productive transformation: linking education with industrial policy***

Irmgard Nübler  
Research Department  
International Labour Organisation  
Geneva

### *Abstract*

*This paper argues that the dynamics of catching up in developing countries is driven by a circular and cumulative process of social and productive transformation. The paper introduces a concept of capabilities which establishes the link between social and productive transformation, and argues that education plays a central role in shaping social capabilities for productive transformation. The analysis shows that the educational attainment structure rather than educational levels are the most significant determinants of the pattern of industrial development and growth. Education policies therefore are not only challenged with achieving basic education goals but also to develop education attainment structures that open up wide opportunities for diversification, technological upgrading and productive transformation. Education therefore needs to be integrated into a long-term strategy of productive and social transformation that closely coordinates education and industrial policies and provides institutions that coordinate these policies effectively. Finally, the analysis identifies research issues in the area of education policies for generating high performing, job-intensive catching up patterns and processes.*

## ***I. Introduction:***

### ***The new debate in development economics: productive transformation for growth, jobs and development***

The new debate in development economics recognizes productive transformation as the central driver of economic development and growth. The challenge of developing countries aiming at catching up and driving economic development is to promote a high dynamics of productive transformation which is reflected in patterns of diversification and structural change that contribute to achieving fundamental development objectives, in particular productivity and jobs growth, and in a high speed and sustainable processes of structural and technological change.

A central question in this debate is: what are the actors and forces driving the dynamics of productive transformation? Mainstream economics continues to focus on accumulation of productive capacities and the structure of production factors, in particular physical capital, human capital and infrastructure. Catching up is measured in terms of productivity growth. In contrast, economic traditions such as evolutionary, structural and institutional economics as well as the catching up literature highlight productive or dynamic capabilities as another key driver of structural transformation. However, this literature failed to develop a concept of capabilities to explain how capabilities shape productive transformation and where capabilities reside. Dosi, Winter and Nelson (2000, p. 1) note that, “[t]he term ‘capabilities’ floats like an iceberg in a foggy Arctic sea, one iceberg among many, not easily recognized as different from several icebergs nearby”.

It was Abramovitz (1986), an economic historian, who in a seminal paper introduced *social* capabilities in explaining the different catching up performance of today's developed countries. Based on the historical analysis he concludes “...that a country's potential for rapid growth is strong ... when it is technologically backward but socially advanced.” Social capabilities allow countries to rapidly imitate technologies already existing in more advanced countries. Although Abramovitz did not elaborate a concept of capability, the important contribution of this catching up concept is the idea that there are two processes driving the dynamics of catching up - the development of social capabilities and technological development - and that the level of social capabilities determines the pace by which technological development can potentially be achieved. This model also implies that countries without relevant social capabilities will not be able to develop a sustained process of catch up growth.

Against this background, the ILO developed a concept of capabilities for productive transformation. This concept of capabilities establishes an explicit link between social and productive transformation. Hence, capabilities may be labeled “social” in the sense that the capabilities reside in social groups and societies, but they can also be labeled “productive” as capabilities enable firms and countries to manage, direct and accelerate economic change and productive transformation.

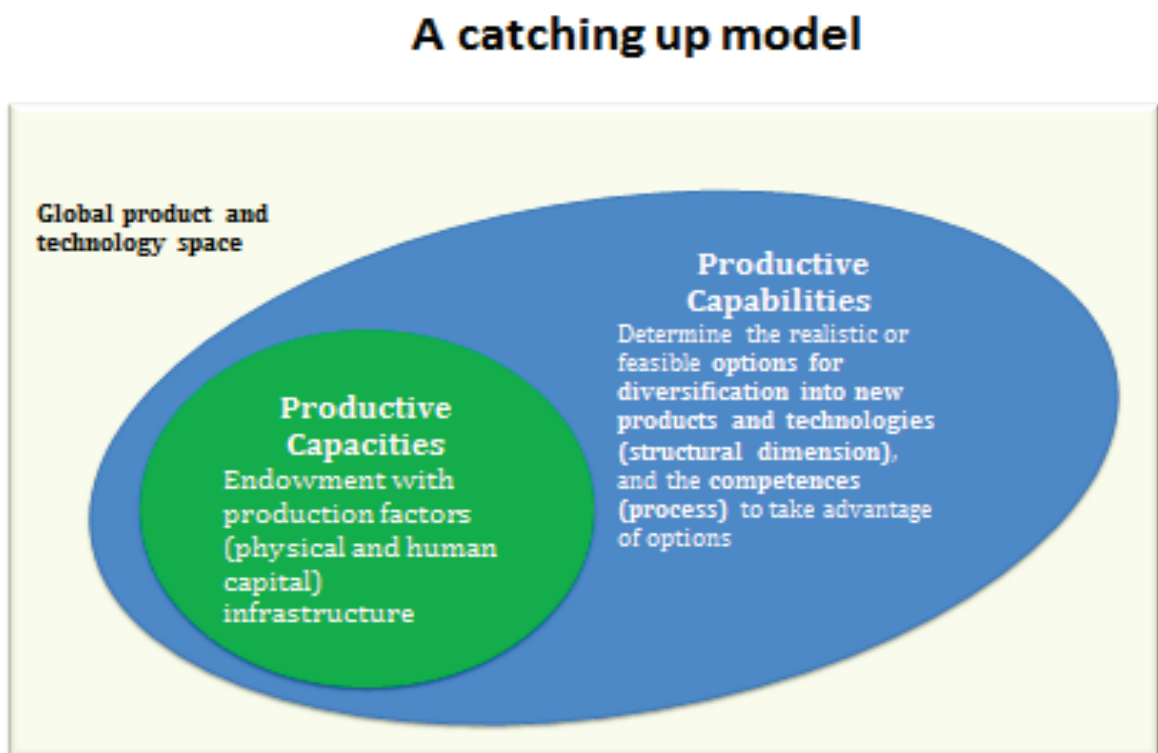
## ***II. A theory of capabilities for productive transformation – linking social and economic development***

The theory of capabilities for productive transformation developed by the ILO consists of two main components. First, a concept of catching-up is elaborated which defines catching up as a dynamic and sustained process of productive transformation. The dynamics of productive transformation is reflected in two dimensions: One the one hand, it is reflected in the patterns of diversification “... not all goods are alike in terms of their consequences for economic performance” (Hausmann et al., 2007, p. 1), and in the patterns of technological change. Some patterns of structural and technological

change and specialization in certain goods contribute more than others to improvements in productivity, income and wages, the generation of more productive and higher quality jobs, and opportunities for learning in the production process.” High performing patterns result in higher productivity, the creation of more productive and better jobs and employment patterns that result in rising wages and poverty reduction. On the other hand, the dynamics of productive transformation is reflected in the process dimension. High performing processes demonstrate rapid imitation of new products and fast adoption of advanced technologies, and are sustained for a long period thereby allowing countries to move from low to middle and advanced income levels. In short, high performing catching up is expressed in patterns of structural and technological change that help countries to achieve fundamental development goals in a rapid and sustained process.

The dynamics of productive transformation is driven by both, the accumulation of productive capacities and development of capabilities. These are two fundamentally different but interrelated concepts. Productive capacities are expressed in the products and technologies a country already masters and they are created through investment in physical and human capital and infrastructure. In contrast, capabilities determine those products and technologies that a country may be able to imitate and adopt, but are not yet part of its production portfolio. Capabilities shape the dynamics of the productive transformation process by determining the feasible patterns or the options for structural change and diversification (what products, what technologies), and by determining the competences of firms and the economy to take advantage of these options in a rapid and sustained process. Capabilities shape both dimensions of catching up – the structural change and the process dimension.

**Figure 1: A catching up model**



**Second, a knowledge-based concept of social capabilities** is developed. **Capabilities to drive and govern productive change are embedded in various collective, shared or aggregate forms of knowledge at the levels of enterprises, the labour force, economies and societies.** Hence, while productive capacities reside in the “material” sphere of the economy (in tangible production factors and infrastructure), productive capabilities exist in the “non-material” or in the intangible sphere of knowledge.<sup>1</sup>

**The options or the range of feasible patterns of structural and technological change are determined by the knowledge structure** of the labour force or society. Options are embedded in the particular nature, mix, diversity, variety and complexity of general, technical, occupational, business and cultural knowledge elements. Each social group such as the team of an enterprise or society as a whole develops a particular knowledge mix, and this mix determines the mix of products and technologies a country may realistically produce. Shared and socially provided knowledge systems are critical in determining knowledge structures at collective levels. Such shared knowledge systems relate in particular to the national curriculum taught in the formal education and training system and the quality of teaching, the type and level of technologies applied in the production system, as well as cultural knowledge and other belief systems (e.g. ideologies, philosophies, religions) provided through social networks, such as families and communities. These formal and informal knowledge systems are major determinants of the nature, diversity and complexity of knowledge structures embedded in social groups.

High options for productive transformation, however, are not enough. Countries also require the competences to translate options into productive capacities and to exploit the options. Evolutionary economics shows that **competences are embodied in routines at the level of enterprises, and in institutions at the level of the society and economy.** Routines and institutions determine the abilities of firms and economies to exploit options by being able to perform such tasks as searching for new investment opportunities, coordinating different tasks, transferring and adopting technological and organisational routines to new economic contexts, managing finance and investment, innovating, identifying and solving problems, and learning.

Again, the knowledge-based catching up concept suggests different forms of collective knowledge to determine the competences embodied in routines and institutions. Firstly, firms and societies need to adopt (codifiable) rules or principles, and secondly, they need to develop collective (tacit) procedural knowledge of how to use and apply these rules in a competent and “smart” way. Routines and institutions evolve as social groups and societies learn in a process of experience and practice both the “knowing that” (the rules and principles) and the “knowing how to do” (the tacit procedural knowledge).

In short, **capabilities represent the link between social transformation and economic transformation.** Successful catching up requires both, options and competences for productive transformation. Societies need to transform their knowledge structure – e.g. through education, training, learning in industries and social networks – and they need to develop routines and institutions that support the translation of options into investment and productive transformation. For example, cooperatives are suggested to have played a central role in sustained agricultural and rural development in countries such as Germany, Switzerland, Finland etc., (e.g. because the value added produced in agriculture and in rural enterprises remained to a large extent in the rural areas. Also social security institutions are considered as capabilities for productive transformation as they guide behaviour of economic actors, e.g. enhancing risk taking and investment in new products, or in human capital, in particular in education and training or in

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<sup>1</sup> This distinction between the material and the knowledge sphere in explaining economic development goes back to List (1909 [1841]), and was highlighted more recently by the “new” economic historians such as McCloskey, Goldstone and Mokyr (see Nübler, forthcoming).

mobility in labour markets. Schumpeter (1911) argues that a society's "entrepreneurial spirit" and "pioneer" entrepreneurship form a central driver of the process of "creative destruction and productive transformation, and that those societies achieved high levels of entrepreneurial spirits that have developed social institutions that reward entrepreneurial activities.

### ***III. The various roles of education in productive transformation – transforming knowledge structures and shaping human capital***

Education policies play a critical role in enhancing social capabilities for productive transformation as it is a powerful instrument to transform the knowledge structure of the labour force and enhance the mix and diversity of the knowledge base. The high value of education for economic development lies in its ability to teach the labour force advanced technological concepts and skills even when the economy is still at a low level of technological development and learning in industries and in the production sphere is limited. Education allows countries that still specialize in low-technology products to enrich the knowledge base of the labour force, to transform the knowledge structure and to develop the options to enter more sophisticated products and technologies or even leapfrog into advanced technological knowledge communities. In traditional societies without formal education systems and science, technological knowledge is largely shaped by learning in social networks and learning by doing at the work place, both change the labour force's knowledge systems only gradually and in a path-dependent process. In contrast, education allows to infuse fundamentally new knowledge elements into society and therefore, to adopt and imitate advanced products and technologies.

Another high value of formal education in traditional societies is that it can be a powerful instrument to change belief and cultural knowledge systems. Belief systems are socially constructed, and provide commonly shared attitudes, values, preferences and work ethics. They influence preferences, choices and behaviour of individuals and therefore, belief systems play an important role in technological and economic development. For example, evidence shows that educational, training and occupational choices of individuals are not only determined by wages and working conditions, but they are strongly guided by the value and the prestige which societies ascribe to different types of education, fields of study, occupations (Denzau and North (1994; Brock and Durlauf (2001). Productive transformation into new technologies and industries can only be accelerated and sustained if social and cultural belief systems support educational, training and occupational choices that are in high and rising demand in the economy.

Thirdly, education and training produce the human capital required for efficient use of technologies. Human capital is defined as investment in those skills and knowledge that are needed in enterprises and the labour market and therefore raise productivity. Human capital is productive capacity. The concept of human capital assumes technologies as given, and takes a labour market perspective. Given the demand for specific skills of individuals at a particular point in time, (or the anticipated demand of planned technological change), the function of the education and training system is to produce the right set of skills to match demand and supply.

To conclude, education is instrumental in enhancing both social capabilities for productive transformation (transforming collective knowledge structures) and human capital for high productivity (matching skills supply with skills demand).

### ***IV. Educational attainment structures determine feasible options for productive transformation: a typology and empirical evidence***

How does education shape productive transformation? Recent research has shown that the aggregate level of education – the indicator normally used by growth economists to

measure human capital - can only to a limited extent explain economic growth (Nübler 2013). The ILO therefore has developed a different approach and methodology to assess the impact of education on economic development. It argues that educational attainment structures determine the pattern and speed of productive transformation and thereby growth.

The educational attainment structure (EAS) developed in a particular country indicates the nature and complexity of formal knowledge accumulated in the labour force. EAS are defined by the share of the different educational categories (no school attendance, primary, lower secondary, upper secondary, tertiary) in the labour force. Since individuals build up conceptual and procedural knowledge in a cumulative process, each educational category reflects particular sets of knowledge elements, with higher education levels reflecting higher levels of complexity and specialization. Hence, the shares of the different educational categories indicate the nature and diversity of formal knowledge in the labour force.

The research has developed a **typology of educational attainment structures** (Nübler, 2013). Comparative analysis across countries as well as case studies of high-growth countries demonstrate that the educational attainment structure shapes the feasible patterns of technological and structural transformation. It is through this link that education determines industrial development and productive transformation, which in turn has an important influence on the country's growth performance.

These findings have important implications for education policies and underline the need to see productive transformation, education and industrial policies as closely related.

Based on the Barro-Lee dataset which provides information on the share of the labour force (older than 15 years) with no schooling, incomplete primary, complete primary, lower secondary, upper secondary and post-secondary as highest educational attainment, Nübler (2013) developed a typology of educational attainment structures which allows to analyse a country's options space. By sorting these six educational categories in increasing order, the different lengths of the six bars suggest five different educational structures (see box 1 and figure 1).

#### **Box 1: Typology of educational attainment structures**

- 1) **L-shape** educational structures with the median category being non-schoolers or (complete and incomplete) primary education show extremely low shares of upper and post-secondary education. **L+** structures have the shape of an L-curve but with higher shares of upper and post-secondary education.
- 2) **Dual** structures may be described as the composition of two distinct education structures of two groups (such as rural and urban). It shows high levels of non-schoolers and

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