

# Chapter 14.

## Innovative performance in a learning economy

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### 14.1. Introduction

The paper presents assessment of innovative performance using a theoretical and methodological concept of learning economy applied to the example of EU countries, with a special regard to the group of Visegrad countries (EU-4). Implications of this assessment for quality-based competitiveness (i.e. a competitive advantage based on quality intensive inputs and outputs) are also discussed, and the positions of EU countries are compared in terms of different sources of competitiveness (cost versus knowledge-based advantage) and technology knowledge (internal innovative capacity versus technology transfer). The theoretical and methodological concept of learning economy has so far not been applied to new EU members. The paper starts with the introductory description of the key theoretical and methodological concepts and clarification of the applied terms and methods. The exploited data set is described and major results of the analysis of organisational models presented. The structural aspect includes classification according to industries, occupations, and countries. The impact of national differences on organisational models is also discussed. The typology of organisational models is subsequently compared against the typology of innovative activities and sources of competitiveness. The applied methodology is mainly based on the work of Lundvall *et al.* (2006).

### 14.2. Theoretical and methodological starting points

Distinguishing between price/cost-based and quality-based sources of competitive advantage to some extent reflects both the achieved economic level of a

country and conditions for its further improvement.<sup>1</sup> Competitiveness of more advanced countries tends to be based more on quality uniqueness reflecting their more developed domestic knowledge base and hence allowing for higher incomes for production inputs.<sup>2</sup> On the other hand, cost-based competitiveness prevails in less advanced countries, as it is supported by low wages and undervalued currencies. A transition to a quality-based competitive advantage in the less developed countries (which have exhausted their cost-based competitiveness) is a condition for long-term sustainable growth performance. Improving economic levels and increasing price levels associated with currency appreciation inevitably lead to the loss of the cost-based competitiveness, which must be replaced with competitive advantage requiring improvement in technology knowledge and internal innovation capacity.

Quality-based competitiveness has played a key role in long-term economic development and explained much of its cross-country differences and their changes in time. The importance of innovativeness for sustainable long-term growth performance and competitiveness has been studied widely and explored in terms of alternative analytical methods and (ever expanding) data sources.<sup>5</sup> The subject has also attracted attention of the practical economic policy, in particular when striving for an effective support to the transition to a knowledge economy or improving growth performance and competitiveness (see for example recommendations of the Lisbon Strategy with multitude of related documents and proclamations).

In the discussion on the adequacy of data sources for a qualified analysis of innovative performance, potentially leading to valuable policy implications, a shift of emphasis can be observed from measurement of traditional innovative input (research and development activities) to identification of innovative output and its impact on competitiveness, covering the widest possible range of innovative activities (including non-technical innovation and innovation in services). At the same time, the stress is being put on a wider context of conditions for and

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<sup>1</sup> For a more detailed overview of the key theoretical approaches and concepts related to the sources of quality-based competitiveness and long-term performance see for example Kaderabkova (2003), Kaderabkova, Müller (2005), Müller, Srholec (2006). Specifically for the role of innovation based competitiveness see e.g. Fagerberg *et al.* (2005).

<sup>2</sup> Quality is an additional (tangible or intangible) feature of a product that increases consumer, investor and producer willingness to pay for it. Higher quality allows achieving higher market value without reducing or losing the existing market share. Products competing with their quality (as opposed to price-based competition) are characterised by lower price sensitivity and higher income sensitivity (elasticity), vertical differentiation, higher profit margins and a limited number of competitors. Maintaining competitiveness in these market structures is conditional on continuous quality improvement through process and product innovation (Aiginger, 2005).

<sup>3</sup> See especially Community Innovation Survey, patent statistics of EPO and USPTO, internationally comparable data of OECD/EUROSTAT on inputs and outputs of research and development activities.

results of innovative activities in the comprehensive concept of quality-based competitiveness (institutional characteristics of the environment, linkages and networking, quality of human resources and the educational system specifically in supporting lifelong learning, globalisation of economic activities and positions of countries in the multinational value chain of FDI activities). This knowledge progress requires new theoretical, methodological and analytical concepts and methods, including new data sources capable of providing information about what we need to know (rather than what we are able to measure) to make the related policy support effective.

#### 14.2.1. Models of work organisation and organisation of innovative activities

In the assessment of innovative performance of EU members the paper identifies alternative learning styles/organisational models presented in particular by Lundvall (discretionary learning, lean production learning, taylorism, traditional organisation). These are combined with different types of innovative activities as identified in Arundel's background papers for European Innovation Scoreboard (they differentiate between strategic innovators, intermittent innovators, modifiers, adopters reflecting especially the role of internal R&D).

Innovative activities are influenced by a wide range of factors. Qualification and skills acquired in the workplace, i.e. as a part of lifelong learning, play an important role besides the traditional inputs of research and development activities and tertiary educational attainment of workforce. Moreover, a higher quality of work organisation and working environment has a positive impact on innovation, as they promote learning and efficient exploitation of skills. With innovations ever more interpreted as an interactive process including a wide range of agents, their openness and the intensity of their linkages and interactions play an important role, as well. Therefore, the indicators used to evaluate innovativeness must also analyze the combination of traditional inputs, and the capacity of the environment to support development of knowledge and skills of workers.

Lundvall *et al.* (2006) presented the application of this approach to the EU-15 countries exploiting 2000 data; the current paper uses the same methodology with the 2005 data for EU-15 compared to EU-4 country groups. The relationship between innovation and work organisation is evaluated in terms with micro-data from two surveys – the European Study on Working Conditions (ESWC) undertaken by the European Foundation for the Improvement of Living and Working Conditions (in 2000 and 2005) and the Community Innovation Survey (CIS). The data on working conditions are used to define types of organisational practices and policies, while the data on innovation are used to identify the typology of innovators. The relationship between the two data sets shows correlation rather than causality when aggregated at the national level. Nevertheless, it

confirms the importance of work organisation in supporting learning and problem solving for the type of innovative activities (and therefore innovative performance) carried out by enterprises.

### 14.3. Measuring forms of work organisation

Lundvall *et al.* (2006) base the selection of variables for the analysis on two groups of sources focused on the relationship between forms of work organisation and the ways of learning and innovating in companies. The approach of high performance work system focuses on the diffusion of Japanese organisational techniques, based on increased involvement of workers in problem solving and operational decision-making, in the USA and Europe (Ramsay *et al.*, 2000; Truss, 2001). They specifically point to the model of the so-called lean (flexible) production, which originated from transforming companies with strong hierarchical structures based on Taylorist task specialisation and clear division of conception and executive work.

The approach of organisational design strives towards the development of more comprehensive taxonomies. Mintzberg (1983) distinguishes between bureaucratic and organic organisations. Bureaucratic organisations are typical for their limited capacity for adjustment and innovation. Jobs and tasks in machine bureaucracies are standardised in terms of formal work descriptions and rules established by the management. The organisation is therefore highly centralised and provides a limited space for discretion in decision making regarding methods or pace of work. On the other hand, the level of centralisation in professional bureaucracy is low and behaviour is regulated and modified through the acquired standardised qualifications, skills, and internalisation of professional norms and standards of conduct. Although the autonomy of workers is high, operating procedures are very stable and routine. An organic organisation is typical for its high ability to adjust. A traditional form is based on direct supervision by an individual (typically the entrepreneur). Adhocracies are based on mutual adjustment where workers coordinate their work through informal communication. The autonomy of work is low in the former and high in the latter case.

Two ideal forms of organisation that support various learning and innovative styles – operating adhocracy and J-form are presented in the synthesis and extension of both approaches (Lam, 2005). Adhocracy relies on the individual expertise and uses a project structure to its dissemination to creative project teams that implement innovation projects (usually on behalf of their clients). Adhocracy allows a high level of autonomy in work and thus discovering new knowledge, which in turn supports the capacity for radical innovation. The J-form is a rather bureaucratic, although pro-innovation form of organisation. Knowledge

penetrates the collective organisation through formal team structures and job rotation. Stable professional careers within the internal labour market provide incentives for involvement in the continuous product and process improvement, i.e. for incremental innovations.

Selected EWCS questions are used to construct 15 binary variables (see table 14.1) based on the anticipated relationship between work organisation and the innovative type and capacity of companies. The variables (1-4) involve the use of work practices identified in the literature on high performance. The variables (5-6) reflect the involvement of workers in learning and problem solving, which is a typical characteristic of adhocracy and the J-form. The variable (7) identifies the complexity of tasks and relates to operating adhocracy. The variables (8-9) include discretion in determining work methods or work pace typical for adhocracy. The variables (10-13) identify various forms of constraints to workers: hierarchical constraints (direct management and control carried out by immediate superiors) and automatic constraints (determining the pace of a production line or the pace of equipment operation) represent Taylorist work organisation, while norm-based constraints (quantitative production standards) are intrinsic to Taylorism, as well as the Japanese form of organisation.

**Table 14.1. Clusters of organization modes in EU-4 and EU-15 (in % of labour force)**

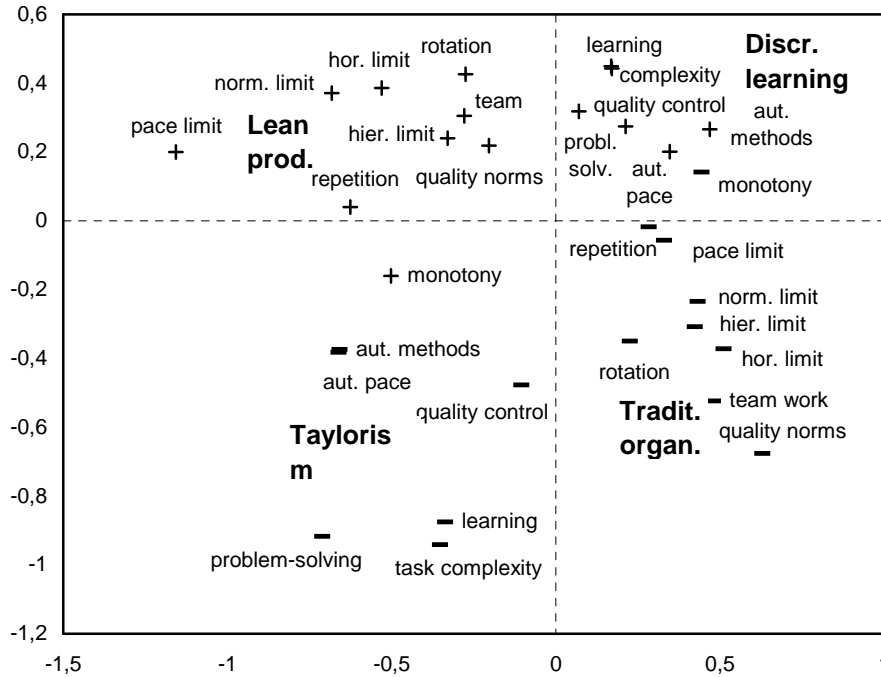
		Discr. learn.		Lean prod.		Taylorism		Tradit. org.	
		EU15	EU4	EU15	EU4	EU15	EU4	EU15	EU4
1	Team work	61.4	51.5	89.2	87.2	61.1	66.9	34.5	34.6
2	Job rotation	43.8	34.9	78.6	73.0	42.4	38.9	28.0	26.0
3	Quality norms	69.7	71.4	90.0	91.2	88.9	94.0	16.0	18.2
4	Quality control	83.7	72.7	87.7	72.2	63.0	50.5	19.0	19.4
5	Problem solving	94.8	94.1	93.1	89.7	61.3	49.5	49.0	54.0
6	Learning new things	93.5	86.2	93.7	91.1	41.4	32.4	35.9	25.7
7	Complexity of tasks	77.4	87.9	85.4	87.0	23.1	32.8	16.6	34.3
8	Auton. in work. methods	87.1	79.7	74.3	60.4	18.8	15.6	45.6	48.7
9	Auton. in pace of work	84.2	85.5	73.0	70.9	27.4	32.2	55.8	55.8
10	Horizontal limit of pace	27.6	26.3	82.1	85.5	54.0	60.0	24.6	19.7
11	Hierarchical limit of pace	13.6	37.2	53.2	77.2	55.2	66.9	25.2	35.8
12	Norm limit of pace	30.7	20.0	73.3	67.4	53.7	52.3	15.4	7.5
13	Automotive limit of pace	3.7	4.5	30.1	35.7	36.9	40.8	6.7	6.3
14	Monotonous tasks	19.8	24.5	52.5	55.3	70.3	72.1	32.5	42.7
15	Repetitive tasks	22.2	12.4	58.8	45.5	57.0	46.2	23.6	15.2
	Total	41.3	35.2	31.0	25.6	17.5	24.1	10.1	15.0

Source: Own calculations based on ESWC data (2005).

Horizontal constraints show whether work is carried out collectively rather than individually. The last two variables (14-15) are typical for taylorist work organisation.

Workers are divided into individual clusters based on a factor analysis (the multiple correspondence analysis – MCA), which identifies relationships between the 15 variables listed above (for the EU-4 group see the graphic presentation of the results of the analysis shown in figure 14.1).<sup>4</sup>

**Figure 14.1. Clusters of organization modes in terms of factor analysis (EU-4)**



Note: +/- = Presence/absence of the characteristic.  
 Source: Own calculations based on ESWC database.

Table 14.1 presents distribution of workers in the EU-4 and EU-15 country groups according to the forms of organisation and the variables used. The first

<sup>4</sup> The use of the MCA method is especially suitable as category variables are being analysed. The method measures the overall variation of the data matrix using the chi-squared statistics and interprets (analyses) the variation according to factors (elements). The chi-squared statistics are commonly used to determine the row-column independence. The significance of factors is described by their benefit for clarifying the overall inertia. Inertia is defined as a ratio of the chi-squared statistics of the data matrix and the number of observations.

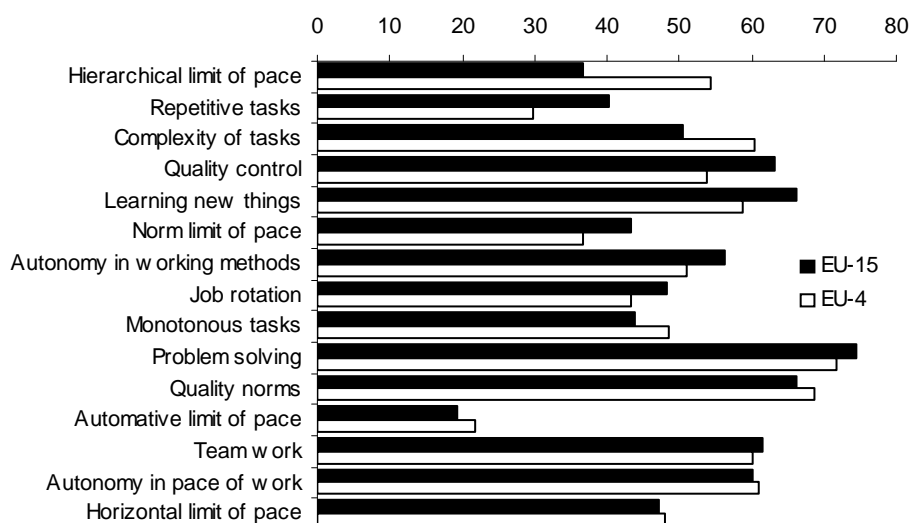
organisation cluster with **discretionary decision making** includes 41% of workers in the EU-15, but mere 35% in the EU-4 (however, the share increased rather significantly in Visegrad countries as compared with 26% in 2000; in EU-15 the increase reached only 2 p.p.). Besides a significant autonomy, this cluster is characterised by a high level of learning and problem solving. Comparison of the structure of cluster characteristics between the groups of the EU-15 and the EU-4 members reveals particularly lower importance of teamwork and job rotation and learning in the EU-4; the role of problem solving is similar in both country groups. On the other hand, the importance of task monotony is stronger.

The second, **lean production** cluster includes 31% of workers in the EU-15 and 26% in the EU-4 (the share slightly increased in the first group and decreased in the other). It is characterised by frequent job rotation, high importance of team or collective work and increased significance of quality norms. Compared to the EU-15, quality control and problem solving play a less important role in the EU-4, as well as autonomy in working methods. On the other hand, hierarchical limits are stronger.

The third, **taylorist production** cluster includes 14% of workers in the EU-15 and 24% in the EU-4 (with a slight increase in both country groups). The characteristics of this cluster are in many aspects opposite to those of the organisation with discretionary decision making, i.e. the importance of learning, problem solving and task complexity is lower, while various constraints and working standards play a more important role and tasks are monotonous and repetitive. Taylorism in EU-4 features more limits, norms, and controls than in EU-15. At the same time, problem solving and learning new things are given less space.

The share of workers in the **traditional organisation** cluster is for one third higher in EU-4 (15% as compared to 10% in EU-15). This organisational form is mainly characterised by informal and non-codified constraints with a low level of learning (in the EU-4 less so than in the EU-15). The complexity of tasks and problem solving are more important in the EU-4, on the other hand, learning new things is more limited and tasks are more monotonous (yet less repetitive) than in EU-15.

The largest differences in individual variables between the EU-15 and the EU-4 (see figure 14.2) in favour of the former can be observed in responsibility for quality control, problem solving and learning new things (but also repetitiveness of tasks). On the other hand, relatively more employees in the EU-4 report hierarchical constraints, complexity of tasks and setting quality norms. The highest, on average, is the share of workers reporting problem solving in both country groups, followed by setting quality norms. More diverse are the shares of workers learning new things in EU-15 and EU-4.

**Figure 14.2. Indicators of organization modes in EU-4 and EU-15 (averages, in % of labour force)**

Source: Own calculations based on ESWC data (2005).

#### 14.4. Structural aspects of work organisation

Structural aspects of alternative forms of work organisation are described according to industries (table 14.2) and occupations (table 14.3) for the EU-15 and the EU-4, and at the level of individual EU countries (table 14.4).

**Table 14.2. Organization modes in industries in EU-4 and EU-15 (in % of industry labour)**

	Discr. learn.		Lean prod.		Taylorism		Tradit. org.	
	EU15	EU4	EU15	EU4	EU15	EU4	EU15	EU4
Agriculture, fishing	25.3	27.1	34.1	25.0	26.4	29.2	14.3	18.8
Mining, manufacturing	31.2	22.5	33.9	28.3	27.4	39.3	7.5	9.9
Network industries	46.7	25.5	38.7	38.2	11.7	16.4	2.9	20.0
Construction	27.4	26.2	39.8	41.7	22.7	27.4	10.1	4.8
Trade and repairs	35.3	36.7	24.6	28.5	22.9	13.5	17.1	21.3
Hotels and restaurants	17.9	26.1	34.0	30.4	31.7	30.4	16.4	13.0
Transport, communications	30.6	29.5	31.6	20.1	23.7	24.8	14.1	25.5
Financial intermediaries	47.1	54.2	34.5	11.9	11.3	10.2	7.2	23.7
Real estate	47.9	38.0	30.6	19.0	12.0	17.7	9.6	25.3
Public services	47.0	43.3	30.3	22.8	12.7	18.7	9.9	15.2

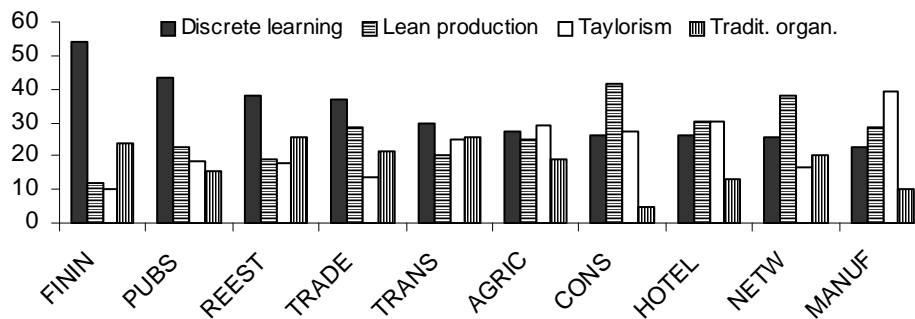
Source: Own calculations based on ESWC data (2005).



The **industry classification** in the EU-15 group shows the highest share of organisation with discretionary decision making in network industries and financial, business and public services. The share of employees in this form of organisation is the highest in financial intermediaries in the EU-4 group (even higher than in EU-15). Manufacturing reports a significantly lower share of discretionary decision making (the lowest of all industries), a slightly lower share of lean production and higher importance of taylorist organisation (which is significantly higher even in the construction and in some of knowledge-intensive services) in EU-4 as compared to the EU-15.

When compared with the starting period of 2000, in the EU-4, the most significant is the increase of discrete learning organization form in financial intermediaries (at the expense of lean production form), followed by construction and manufacturing (however their qualitative structure remaining much lower in comparison with the EU-15). The structure of other industries remains rather stable.

**Figure 14.3. Organization modes in industries in EU-4 (in % of industry labour)**



Source: Own calculations from ESWC (2000).

In the case of **occupation groups** (classified according to occupational categories – ISCO-88) the EU-4 countries approach the EU-15 group in the share of discretion in decision making in professions with the highest qualitative intensity (i.e. managers, engineers and professionals, and technicians), similarly as in the case of the lean production organisational form. Only exceptionally more significant structural differences are visible between both country groups (as in the occupation category of skilled agricultural workers).

The category of engineers and professionals reports the highest share of discretionary decision making in both groups of countries and is followed by managers and technicians (this group overall represents the so-called high-skill white-collar workers). The least skilled occupations (unskilled blue-collar work-

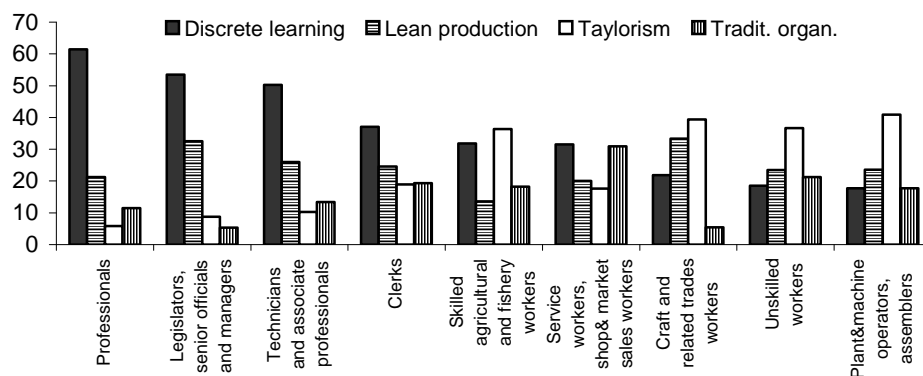
ers) in the EU-4 report a lower share of lean production and a higher portion of the traditional organisation compared to the EU-15, which may weaken the adjustment capacity.

**Table 14.3. Organization modes in professions in EU-4 and EU-15 (in % of labour)**

	Discr. learn.		Lean prod.		Taylorism		Tradit. org.	
	EU15	EU4	EU15	EU4	EU15	EU4	EU15	EU4
Legislators, senior officials and managers	53.9	53.5	37.1	32.5	4.9	8.8	4.1	5.3
Professionals	58.6	61.4	29.6	21.3	5.8	5.8	6.0	11.5
Technicians and associate professionals	51.6	50.3	32.1	26.0	9.7	10.3	6.6	13.4
Clerks	42.7	37.1	28.8	24.6	14.8	18.9	13.7	19.3
Service workers, shop & market sales workers	37.4	31.5	28.4	20.0	18.9	17.6	15.2	30.9
Skilled agricultural and fishery workers	22.9	31.8	45.7	13.6	17.1	36.4	14.3	18.2
Craft and related trades workers	26.8	21.9	38.9	33.3	28.2	39.4	6.1	5.4
Plant & machine operators, assemblers	15.8	17.7	29.9	23.6	41.1	40.9	13.2	17.7
Unskilled workers	21.4	18.5	23.9	23.5	35.5	36.7	19.2	21.3

Source: Own calculations based on ESWC data (2005).

**Figure 14.4. Organization modes in occupations in EU-4 (in % of labour)**



Source: Own calculations based on ESWC data (2005).

Skilled labour (high-skill blue-collar workers) in the EU-15 has a higher share of discretionary decision making and a lower share of taylorism compared to the EU-4 group. A higher share of discretionary decision-making was reported in clerks and service shop and market sales persons (unskilled white-collar workers) in the EU-15 compared to the EU-4.

Development in time shows up rather favourable trends in EU-4, particularly in the group of high-skilled occupations. The share of employment in lean production significantly decreased in favour of discrete learning organisation mode. On the contrary, the structure of the remaining two modes has been changed much less.

#### 14.4.1. Work organisation forms in countries

The structural characteristics listed above reflect differences in individual forms of work organisation. The cluster with discretion in decision making/learning includes jobs with significant responsibility and capacity for solving (new and complex) problems. Problems solved in the lean production cluster are defined within a narrower range with a limited spectrum of possible solutions. Work in this cluster is often repetitive and monotonous.

Extensive use of managing techniques such as job rotation and teamwork can be seen as an effort to overcome the constraints of the taylorist type of production and to support active participation of workers. A low lever of learning and absence of problem solving are typical for taylorism. Work is highly monotonous and limited by numerous constrictions, and tasks are repetitive and narrowly defined. Qualification intensity is low and workers are easily replaceable by another person or a machine (these jobs can be easily transferred to countries with low wages or filled with immigrants from less developed countries). The traditional organisation involves less complex problems, is less individualistic than other organisational forms and less monotonous than lean or taylorist production, and often involves direct and indirect interaction with local customers and suppliers.

The structure of workers in individual EU-27 countries according to forms of organisation is presented in table 14.4. A more detailed view of EU-4 countries as compared to EU-15 is presented in figure 14.5.

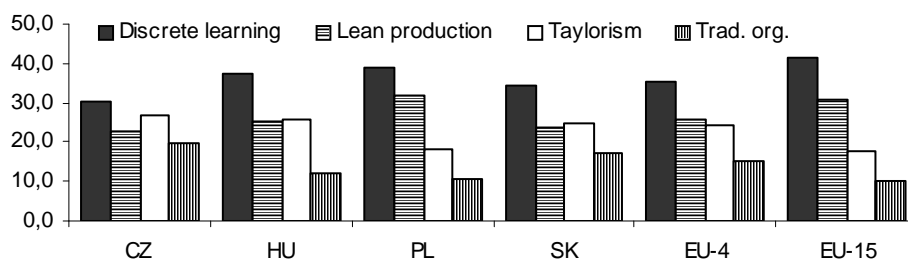
The comparison shows significant differences between individual EU members. In the EU-15, forms with discretionary decision making have the strongest presence in the Netherlands and Nordic countries, Belgium and Ireland. On the other hand, southern countries report the lowest share of these forms of organisation. The lean production form is dominant in Finland, United Kingdom, and Greece.

Table 14.4. Organization modes in countries in EU-27 (in % of labour force)

	Discrete learning		Lean production		Taylorism		Trad. organizat.	
	2000	2005	2000	2005	2000	2005	2000	2005
SE	52.6	62.1	18.5	22.3	7.1	9.1	21.7	6.5
DK	60.0	54.2	21.9	34.0	6.8	8.5	11.3	3.3
NL	64.0	49.5	17.2	32.7	5.3	11.7	13.5	6.2
AT	47.5	45.9	21.5	28.9	13.1	16.1	18.0	9.1
BE	38.9	43.9	25.1	30.7	13.9	14.6	22.1	10.8
FI	47.8	43.6	27.6	40.2	12.5	10.8	12.1	5.3
LU	42.8	42.5	25.4	34.5	11.9	14.5	20.0	8.5
IE	24.0	41.4	37.8	28.8	20.7	14.9	17.6	14.9
MT	20.3	39.9	57.1	34.1	11.0	13.2	11.5	12.9
SI	27.3	39.1	40.7	34.1	17.1	15.7	14.9	11.0
<b>PL</b>	<b>31.5</b>	<b>39.1</b>	<b>24.7</b>	<b>31.9</b>	<b>18.4</b>	<b>18.3</b>	<b>25.4</b>	<b>10.7</b>
FR	38.0	37.9	33.3	29.4	11.1	23.9	17.7	8.7
<b>HU</b>	<b>34.5</b>	<b>37.4</b>	<b>26.9</b>	<b>25.0</b>	<b>21.2</b>	<b>25.6</b>	<b>17.4</b>	<b>12.0</b>
IT	30.0	37.4	23.6	23.2	20.9	26.2	25.4	13.2
DE	44.3	35.5	19.6	25.0	14.3	21.2	21.9	18.3
<b>SK</b>	<b>24.7</b>	<b>34.3</b>	<b>30.5</b>	<b>23.9</b>	<b>28.4</b>	<b>24.8</b>	<b>16.4</b>	<b>17.0</b>
EE	35.4	34.3	40.4	35.3	13.5	15.7	10.7	14.7
LV	26.7	32.6	31.7	34.2	15.5	19.0	26.1	14.2
<b>CZ</b>	<b>32.5</b>	<b>30.4</b>	<b>31.7</b>	<b>22.7</b>	<b>19.7</b>	<b>27.0</b>	<b>16.1</b>	<b>19.9</b>
PT	26.1	27.6	28.1	32.7	23.0	30.4	22.8	9.3
UK	34.8	27.5	40.6	38.8	10.9	22.3	13.7	11.4
RO	16.2	25.3	28.0	40.0	40.2	24.0	15.5	10.6
ES	20.1	25.1	38.8	27.7	18.5	29.8	22.5	17.5
LT	28.4	25.0	17.4	26.0	19.9	23.2	34.3	25.8
CY	28.1	23.9	32.3	34.2	22.9	25.0	16.7	16.9
GR	18.7	23.3	25.6	34.5	28.0	24.6	27.7	17.6
BG	13.4	22.2	35.0	33.3	24.9	25.4	26.7	19.1

Source: Own calculations based on ESWC data (2005).

Figure 14.5. Organization modes in EU-15 and EU-4 (in % of labour force)



Source: Own calculations based on ESWC data (2005).

The occurrence of the taylorist form is almost precisely the opposite of the organisation with discretionary decision-making and is prevalent in southern countries. The traditional form of organisation is typical for Greece and Italy.

In the EU-12 (new members), the organisations with discretionary decision making appear most frequently in Malta, Slovenia, and Poland. On the other hand, Lithuania, Cyprus, and Bulgaria show the lowest share of this organisational form. The share of workers in lean production is by far the highest in Romania, Estonia, and Latvia. The taylorist organisation is reported the most frequently in the Czech Republic, Hungary, and Bulgaria. The traditional organisation appears the most frequently in Lithuania, the Czech Republic, and Bulgaria.

As to the development in time, the qualitative structure of labour in EU-27 showed up rather diverse trends. When only the share of discrete learning mode is considered, an improvement has been more remarkable in a number of the less developed member countries with the exception of Sweden and particularly Ireland, followed by Greece and Italy. Although the differences within the EU-27 (as expressed e.g. by standard deviations) have been decreasing in time, they still remain rather large as to the shares of the individual organization modes.

Within the EU-4, the highest increase of the discrete learning cluster took place in Slovakia and Poland. The most stable appeared the organization structure in Hungary. In the Czech Republic, the most important was the increase of taylorist organization at the expense of the qualitatively more intensive clusters of discrete learning and lean production. Following these changes, at the end of period, the most favourably can be assessed the resulted structure in Poland, followed by Hungary and Slovakia.

Similarities and differences between individual EU-27 countries and the average values for the shares of workers in individual organisational clusters are shown in table 14.5. The results show that occupational categories in a particular country strongly influence the likelihood of working in a certain type of organisation. On the whole, it is possible to conclude that the frequency of a certain organisational form in EU-27 countries is influenced by other, national factors that have not been explained in this study, such as the rate at which companies adopt new organisational forms, heritage from the historical development, attitude to organisational innovations etc.

As to the individual EU-4 countries, the Czech Republic, Hungary and Slovakia show significantly above average shares of taylorist organization (similar to France, Portugal, United Kingdom and Bulgaria). In Poland, there is significantly lower share of employment in traditional organization. Slovakia features significantly above average share of workers in discrete learning organization mode (similar to Austria), however in combination with high share of taylorist organisation.

**Table 14.5. Logit estimates of national characteristics influencing organization modes, EU-27**

	<b>Discrete learning</b>	<b>Lean production</b>	<b>Taylorism</b>	<b>Traditional organization</b>
Austria	0.25**	0.14	-0.28	-0.70*
Belgium	0.49*	0.48*	-0.10	-0.26
Bulgaria	-0.30**	0.45*	0.35*	0.21
Cyprus	-1.00*	-0.29**	-0.43*	-0.68*
<b>Czech Republic</b>	<b>-0.08</b>	<b>-0.02</b>	<b>0.32**</b>	<b>0.15</b>
Denmark	0.71*	0.6*	-0.63*	-1.42*
Estonia	-0.30*	0.08	-0.56*	-0.49*
Finland	0.49*	0.76*	-0.39*	-0.96*
France	0.23**	0.33*	0.29**	-0.58*
Greece	-0.67*	0.07	-0.10	-0.29
<b>Hungary</b>	<b>0.19</b>	<b>0.14</b>	<b>0.32*</b>	<b>-0.29</b>
Ireland	0.28*	0.27**	-0.22	-0.08
Italy	-0.09	-0.22	0.07	-0.47*
Latvia	0.03	0.43*	0.01	-0.14
Lithuania	-0.22**	0.17	0.22	0.47*
Luxembourg	-0.13	0.02	-0.68*	-1.08*
Malta	-0.35*	-0.16	-0.94*	-0.82*
Netherlands	0.59*	0.53*	-0.34*	-0.82*
<b>Poland</b>	<b>0.08</b>	<b>0.22</b>	<b>-0.17</b>	<b>-0.56*</b>
Portugal	-0.30**	0.22	0.31**	-0.73*
Romania	-0.45*	0.36*	0.01	-0.66*
<b>Slovakia</b>	<b>0.22**</b>	<b>0.21</b>	<b>0.41*</b>	<b>0.18</b>
Slovenia	-0.17	0.05	-0.56*	-0.77*
Spain	-0.61*	-0.16	0.08	-0.31
Sweden	0.99*	0.32*	-0.41*	-0.60*
United Kingdom	0.05	0.74*	0.36*	-0.17

Note: \* significant at 1% level, \*\* at 5%. Reference value is always the EU-27 average in the given cluster.

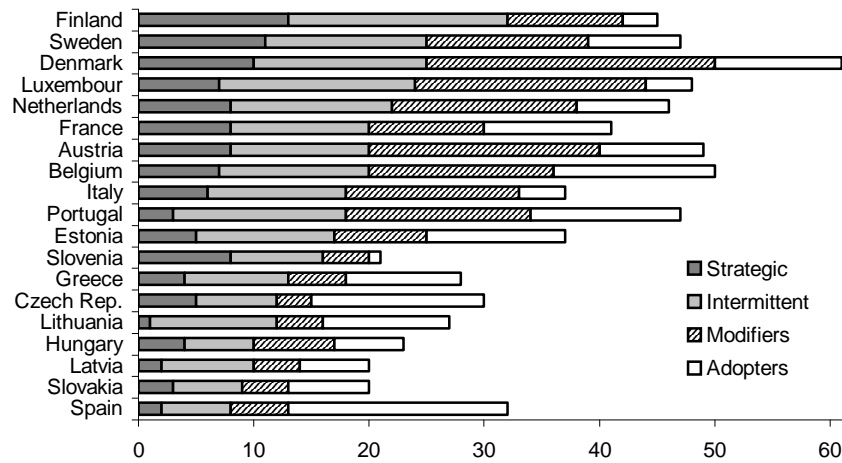
Source: Own calculations from ESWC (2005).

#### **14.5. Relationship between types of innovators and organisations**

The structure of innovators is defined mainly according to the importance of research and development activities for company innovative performance (Arundel, Hollanders, 2005) in terms of the results of Community Innovation Survey. Research and development (carried out with varying intensity) is the main source of innovation in strategically and intermittently innovating companies. Other sources of innovation prevail in the remaining types of innovators. Technology developed by other companies is modified through process innovations

or passively adopted. The share of innovators in most countries (except for Germany) does not exceed 50% (see figure 14.6). Companies with internal research and development as the source of innovation are typically in minority.

**Figure 14.6. Typology of innovators (% of companies)**



Source: EIS Database (2005).

Significant differences between individual countries can be observed in the occurrence, as well as the structure of innovators. The Czech Republic shows up a low overall share of innovators and most of them merely adopt technology (developed by others). Moreover, the share of adopters in the Czech Republic is the second highest in all included countries, which may suggest that a critical level has been reached. Hungary and Slovakia show on average lower share of innovating companies than the Czech Republic, with the role of strategic innovators remaining quite negligible.

Relationships between forms of **work organisation and types of innovators** are shown in table 14.6.<sup>5</sup> Companies with prevailing lean production tend to be non-innovators. The intermittent and the modifying types occur rarely, similarly to strategic innovators (although with a less certainty). The adopting innovation type does not depend on this organisational form. Non-innovators are typical for the Taylorist form of organisation. On the other hand, no other innovation types tend to occur in this form of work organisation. No relationship with any of innovation type can be seen in the traditional work organisation, except for strategic innovation, which tends to be totally absent in this organisational form.

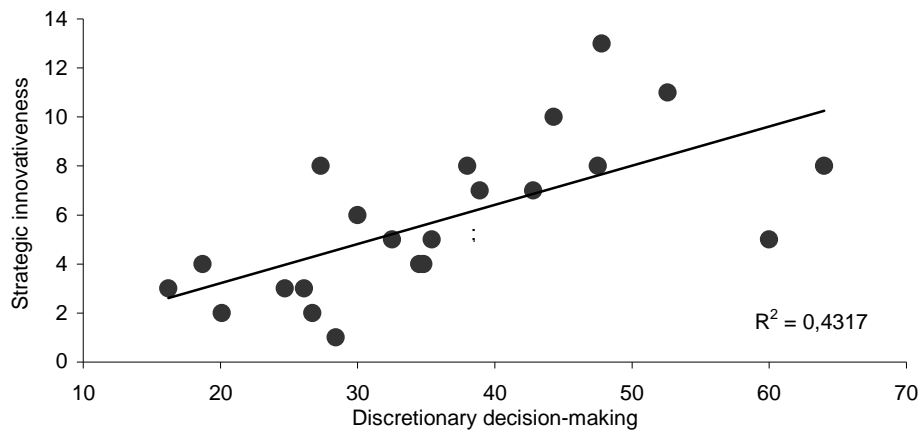
<sup>5</sup> For the quantification of the relation between the organisation modes and innovation types have been used the previous ESWC survey round, i.e. taking place in 2000, so that a certain time delay is allowed.

**Table 14.6. Relation between innovation and organization modes**

Typology	Discrete learning	Lean production	Taylorism	Traditional organization
Strategic	0,66*	-0,26	-0,54*	-0,36
Intermittent	0,64*	-0,50*	-0,5*	-0,07
Modifiers	0,59*	-0,56*	-0,44*	0,02
Adopters	0,03	0,16	-0,25	0,07
Non-innovators	-0,69*	0,46*	0,62*	0,06

Note: \* 5% significance.

Source: EIS Database (2005), own calculations from ESWC (2000).

**Figure 14.7. Relation between strategic innovativeness and discrete learning**

Source: EIS Database (2005), ESWC (2000), own calculations.

The strongest relationship can be observed between work organisation with discretionary decision-making and strategic innovation (see figure 14.7), which is followed closely by the intermittent and the modifying type. Non-innovators are virtually non-existent among companies with this form of work organisation.

#### **14.6. Relationship between sources of competitive advantage and work organisation**

Evaluation of the positions of EU-27 members is based on an indicator distinguishing between two opposite **sources of competitiveness**:



1. low costs or local natural resources on one hand (sensitive to price-based competitiveness or price changes) and
2. unique products and processes that are difficult to imitate on the other.

Movement between the two extremes can be referred to as transition from a cost / price-based competitiveness to a quality-based one.<sup>8</sup>

A closely related aspect of sources of competitiveness (cost vs. quality intensive) includes the **sources of technology knowledge** or the level of (internal) innovative capacity. Once again, we distinguish between two opposites, i.e.

1. acquiring knowledge mainly through licences and imitation of foreign technology, and
2. carrying out internal research activities leading to the creation and introduction of new products and processes.

Naturally, there are numerous intermediate steps between the two extremes and these reflect the level of development of the local knowledge base. Individual stages in principle advance from passive adoption of external knowledge through the ability to modify external knowledge for local needs to a dominating role of internal innovative activities.

Positions of individual EU-27 countries according to the nature of their competitive advantage are shown in figure 14.8, including comparison between 2001 and 2006. Differences between the old and new EU members persist in time. While the averages for the EU-15 show slight decline or stagnation (from 5.4 to 5.3 in sources of advantage and 5.0 in sources of knowledge), the position of the EU-12 group has improved: from 3.0 to 3.5 in sources of advantage and from 3.4 to 3.5 in sources of knowledge.

As to the EU-4 countries, the improvement in the position of the Czech Republic is among the strongest in the EU, in particular in terms of sources of technology knowledge. However, despite this achievement, it is necessary to point out that the position the Czech Republic reached only in 2006 equals that of Slovenia in 2001. Poland and Hungary closely follow the Czech Republic in terms of sources of innovation and competitive advantage evaluations, while Slovakia lags behind the three countries more markedly (particularly strongly perceived is still the cost-based nature of Slovakian competitiveness).

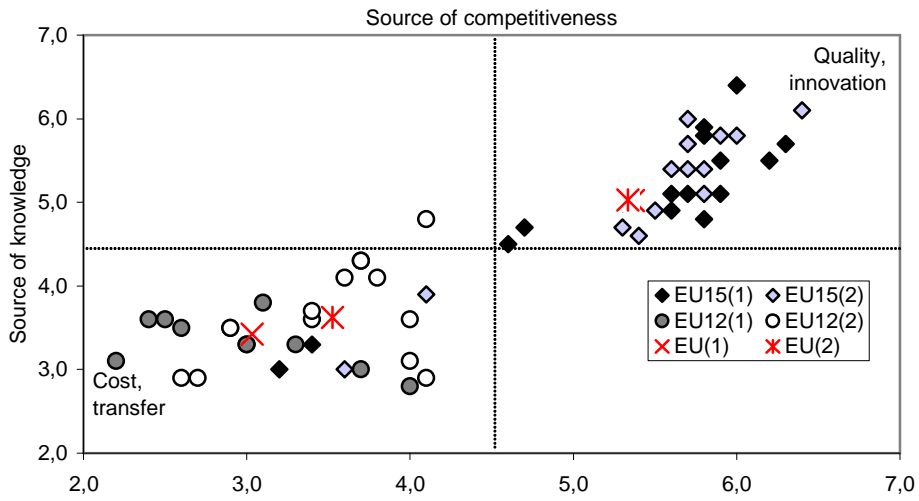
A positive correlation with the form of work organisation based on discretionary decision-making can also be observed in the achieved competitiveness position (see figure 14.9). Therefore, it may be concluded that a qualitatively

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<sup>6</sup> For explanation of the methodology for assessing sources of a competitive advantage in terms with the data of the Global Competitiveness Report by the World Economic Forum (WEF, 2005, 2006) see Kaderabkova (2006).

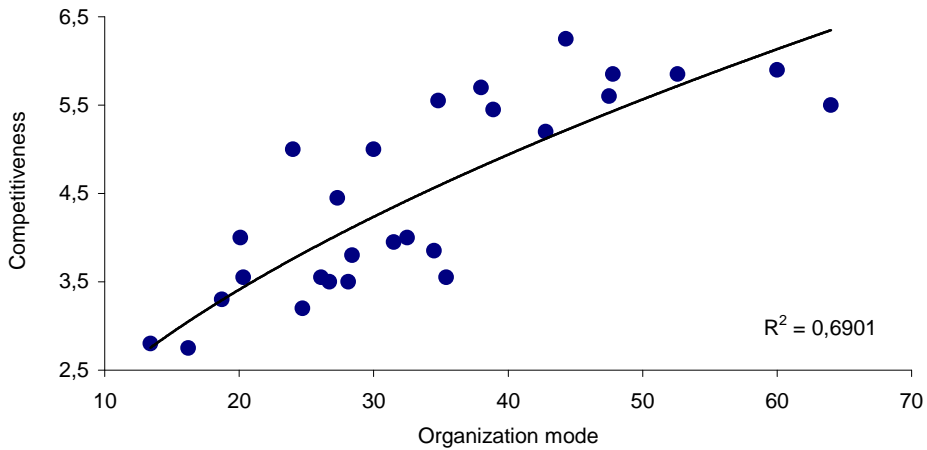
more advanced form of learning influences positively the resulting position of a (quality-based) competitive advantage.

**Figure 14.8. Nature of competitiveness in EU-27 countries, 2001, 2006**



Note: Higher value = better result. (1) year 2001, (2) year 2006.  
Source: WEF (2001, 2006).

**Figure 14.9. Relation between discretionary decision making and competitiveness**



Source: WEF (2006), ESWC (2000), own calculations.

## 14.7. Conclusions

The starting comparison of the distribution of workers among alternative **clusters of work organisation and learning** shows significant differences between the old and the new EU members, as represented by the country groups EU-15 and EU-4. A lower share of workers in the organisational form with the highest qualitative intensity, i.e. in the cluster of discretionary decision-making, and, on the contrary, a higher share in lean production and taylorist organisation are evident in the new members. With regard to individual characteristics of work organisation, new members are characterised especially by lower importance of teamwork, job rotation, task complexity and problem solving, and higher significance of task monotony and various forms of constraints on the working process.

The assessment of **structural characteristics** of workers according to forms of organisation in the new members shows the most frequent occurrence of discretionary decision making in financial and other business related services. Manufacturing reports a significantly lower share of discretionary decision making, a lower share of lean production and higher significance of taylorism compared to the old members. In terms of groups of occupations, the new members lag behind due to the slightly lower importance of the organisational form with discretionary decision making in occupations with the highest skill intensity, and this is mainly in favour of lean production. Occupations with the lowest skill intensity in the new members are characterised by a higher share of the taylorist organisational form.

At the **national level**, significant differences between individual members or their groups appear in the structure of workers according to forms of organisation and learning. The Nordic countries are typical especially for their higher share of organisations with discretionary decision making, while southern European countries hold almost exactly the opposite position. Although the importance of national characteristics for the quality of structure of work organisation and learning is significant, a large portion of the observed differences can be attributed to other factors not included in the presented variable set.

The analysis shows a strong relationship between forms of work organisation and learning and **types of innovative activities**. A larger share of workers involved in discretionary decision making positively influences the intensity of innovative activities (development of internal innovative ability). Any support of innovative performance should therefore also take into account the development of a pro-innovative working environment (rather than merely increasing research and development expenditure itself, which is strongly influenced by the structure of industries). Unexplained national factors (such as institutional characteristics) are also very significant. Moreover, a very strong relationship exists between the

initial importance of organisation with discretionary decision-making and the resulting level of quality-based competitiveness.

More specifically, the position of **Visegrad countries** can be assessed as rather positive, particularly when the development in time has been considered. Although the data comparability between the two survey rounds may be rather limited, on average the share of discrete learning organisation form in the EU-4 is increasing (especially in knowledge intensive services and in high-skill occupations). Nevertheless, the qualitative position of manufacturing (dominated by companies under foreign control and playing a key role in export performance) remains inferior, i.e. with relatively low share of discrete learning work organisation. The unfavourable structure of manufacturing may bring a demanding challenge in the inevitable process of structural adjustment, related to the weakening cost-based competitiveness.

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