The spread of ISO 9001 and ISO 14001 management system standards

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Abstract: - ISO 9001 and ISO 14001 can be considered as the fundamental management system standards in many aspects. The systematic set of the requirements may establish a common language between corporations as well as it may support the development of organizational performance with regard to quality, environmental and social issues. Since certification of the management systems is usually required by business partners, the number and distribution of certificated systems is an important international indicator of the state and development of the economies. The recent revisions of the standards offer wider possibilities than before by strategic orientation, stakeholder orientation, and risk-based thinking. The trend of applications shows a recessive period; hence the new approach may be the key to revival. The paper gives an international overview and explores the differences between the headway of some western and eastern countries in Europe. Comparing the national trends between competing economies can contribute to the designation of strategic responses both on the corporate and national level.

Key-Words: - ISO 9001, quality management, ISO 14001, environmental management, integrated management system, certification

1 Introduction

Integrating the concept of quality and quality management into the management approach and toolbar allows a comprehensive development and utilization of the management systems. The quality approach can be interpreted as proactive management of activities related to internal and external customers. Quality approach – through professionally selected tools – can support CSR efforts, project management, development of working processes and working environment (Berényi, 2017) as well as strategic problem-solving. Nevertheless, a systematic approach is essential for coordinating the efforts. Although, large corporations may have enough resources and knowledge for establishing a self-developed management system and culture, an internationally accepted framework may give support for the wide range of organizations, exceeding the limitations of the strategic shortcomings of SMEs (Holátová et al., 2015). Moreover, Borial (2011) points out that ISO 9001 and ISO 14001 are the passports to international trade.

The attention to quality management has been decreasing in the recent years. Notwithstanding, a remarkable expansion of other management system standards in not to experienced that may fill the gap. I found the main reasons as follows:

- The appreciation of sustainable development and corporate social responsibility (CSR) has brought a new focus point, so corporations require more comprehensive solutions than before, considering also strategic issues (Deutsch et al., 2013).
- Besides environmental and social issues, there is an increasing interest in occupational safety, information security, food safety etc.
- Integrated management systems are attractive but providing the corporate commitment, knowledge, and resources may be difficult.
- Management researchers use new keywords in searching the success, e.g. competencies, coaching, strategic capabilities, lean management.
- Establishing a certified management system is usually required by business partners. Trough the related expenditures may make products and services more expensive what goes beyond the possibilities of many corporations.

The recent revision of ISO 9001 and 14001 standards offer a solution for the challenges above

but success is a great question of the future. The paper investigates the evolution of these management standards and the diffusion of the certifications. Of course, individual characteristics influence the decision on the implementation of the management system (Ozusaglam et al., 2017), the overall picture gives a good report of the economy.

2 Development of quality concept

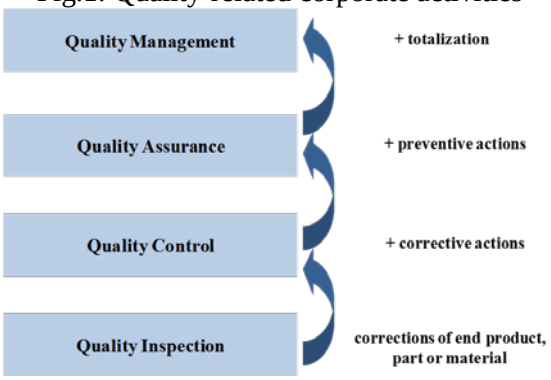
At the beginning of the 20th century the quality control, especially the statistical process control (Shewhart, 1931) could contribute to improving corporate performance and competitiveness. From the 1960s this was not enough, the bottleneck has moved from corporate effectiveness to market possibilities. Strategic planning and management became more and more important. However, methods and tools for controlling the operative processes still used nowadays (see Evans 1991; Kear, 1998) and even those are essential. Development has been boosted many times:

- The teachings of Deming (2000) shook up the management thinking in Japan and later worldwide. Extension of statistical tools and controlling approach to business processes opened up new opportunities, the concept has contributed to the spectacular development of the Japan industrial production (Tenner & DeToro, 1995).
- There was a development of data processing by industrial application of computers in production control and measurement technology: time need of analysis, depth, and possibilities of analysis or punctuality has radically developed.
- Improving the availability of IT solutions fosters remote data access, faster decision-making and establishing new organizational solutions, too (Tóth, 1999).

Sustaining corporate success requires a renewal in corporate management approach. Garvin (1988) deals with the development of quality as a strategic factor. Quality assurance and later quality management supplemented quality inspection and control (Figure 1). The development progress moved the focus from the follow-up of products and production to the conditions of production as well as the enhancing of competitiveness.

Of course, the quality-related activities above cannot replace each other: recognizing the customer needs does not guarantee the ability to make the proper product; or precise manufacturing does not necessarily lead to customer satisfaction. This complexity is easy to observe in case of services. Production and consumption of services are linked, so bringing back the nonconformities in achieving customer satisfaction to interventions needs a complex approach (see Heidrich et. al. (2006), Szolnoki (2015).

Fig.1: Quality-related corporate activities



Source: Berényi (2013:24)

The 1980s brought a new economic situation for U.S. corporations. Leading industries (automotive industry, electronic industry) disadvantaged in comparison with Japanese and German industries (Peters & Waterman, 1984), (Tenner & DeToro, 1995). Deming's principles appreciated again (Deming, 2000) and searching national excellence has been launched. The Baldridge-model (Hakes, 2007) in the USA and the EFQM-model in Europe boosted the management system development by multi-criteria evaluation frameworks.

Awakening attention to environmental issues and global problems can be dated to 1962 (Carson, 1962). Research activity and international attention were very intensive in the 1970s. A broadly accepted sustainable development definition can be traced back to the Report of the Brundtland Commission. The report defined sustainable development as a development which meets the needs of current generations without considering the ability of future generations to meet their own needs (WCED, 1987). The concept integrates environmental, social and economic aspects. From the viewpoint of corporate management, CSR (Kotler & Lee, 2004) and the standardization should be highlighted. There are environmental management systems and methods (see Callan & Thomas, 2013) for supporting the implementation of the above aspects of business strategies and corporate operations. These issues are considered even in the early excellence models, the increasing dominance of social aspects is to observe. The requirements of the ISO 14001 standard can be considered the core corporate guides in this field.

3 Development of ISO 9001 and ISO 14001 standards

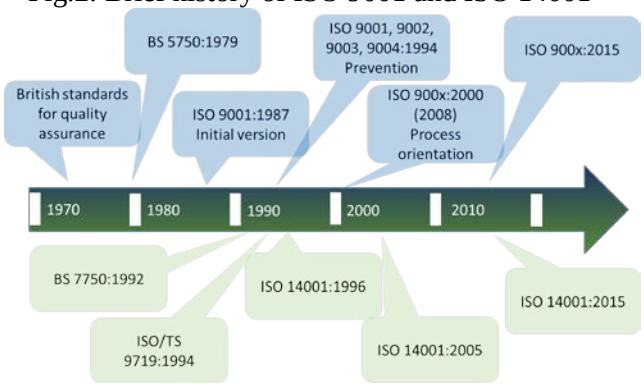
3.1 Milestones of development

The United Kingdom had an important role in developing management system standards. The 'internalization' of BS 5750 and BS 7750 standards to ISO 9001 and ISO 14001 lead to a common concept and definitions worldwide (Rothery, 1995). The management approach of the ISO 9001 standard gave the basis both of standardizing of new scopes (occupational safety, information security, food safety etc.) and industry-specific quality management systems (e.g. ISO/TS16949, TL 9000). Due to the diversified development of the latter group, Koczor (2001) calls them "X9000". Globalization is a key factor in this diffusion: the globalization supported the diffusion of the standards (and nationalization procedure promoted the better acceptance on the local level), and the increasing number of certified management systems supported the globalization by unifying the supply chains.

ISO management system standards give more benefits than using for certification or other contractual purposes:

a) "the ability to consistently provide products and services that meet customer and applicable statutory and regulatory requirements,
b) facilitating opportunities to enhance customer satisfaction,
c) addressing risks and opportunities associated with its context and objectives,
d) the ability to demonstrate conformity to specified quality management system requirements" (ISO 9001:2015).

Fig.2: Brief history of ISO 9001 and ISO 14001



Source: own compilation

The focus points of the evolution of ISO 9001 (Table 1) and ISO 14001 (Table 2) can be summarized as Figure 2 shows.

Table 1: Focus points of developing ISO 9001

Year	Novelty
1987	The first international system of requirements in the field focuses on quality inspection and control.
1994	The comprehensive quality assurance standard for producers. Requirements for service-oriented organizations in a separated standard. Introduction of the requirements related to preventive actions.
2000	The standard for quality management. A new approach based on system- and process orientation. Unified requirements independently of size and activity.
2008	Refinement of the terminology related to managing organizations in a supply chain and other practical expectations. Focus on harmonization with other management system standards.
2015	Establishing risk-based thinking instead of preventive actions. The focus of the management system spreads from customer to the needs and expectations of interested parties.

Source: own compilation

Table 2: Focus points of developing ISO 14001

Year	Novelty
1996	Requirements for an environmental management system. Developing a policy and objectives taking into account legislative requirements and information about significant environmental impacts.
2004 (2009)	Greater focus on leadership. More focus on documentation and communication. Improved environmental performance added and preventive actions. Enhanced compatibility with ISO 9001:2000. Corrected in 2009.
2015	A stronger focus on strategic objectives and risk-based thinking. Common structure with ISO 9001, great possibilities for implementing an integrated management system.

Source: own compilation

3.2 Results of the recent revision

Croft (2012) stated that the 2015 editions of the ISO 9001 and ISO 14001 standards prepare the future of

various management standards for the next 25 years. This requires a comprehensive structure, considering the pursuit of becoming more sustainable. The long-run thinking foreshadows both the renewal of management toolset rather than patching the existing solutions and the benefits of implementing an integrated management system especially when other standards will follow the new concept. Others call into question the novelty of the standards. Hunt (2014) highlights that an existing management system mostly fulfills the new requirements. She does not believe the new approach, only a terminology refinement.

The main changes of the concept and the standards are the followings:

- It is clearly declared that the scope of management system shall be derived from understood external and internal context, with regard to the needs and expectations of interested parties, strategic direction and the products and services of the organization. There is a higher attention on external issues as the sources of the management system requirements.
- The new standards give a special attention to external issues beyond the requirements of understanding the organizational context. Based on practical expectations about the development of supply chain-oriented thinking and the supporting organizational structures the standards manage also outsourced processes and their performance.
- The risk-based approach allows a universal management thinking that fits all organizations. It replaces the former requirements of preventive actions, moreover, the consideration of risks and opportunities may cover the whole business process (see e.g. Gołaś, 2014).
- Instead of mandating a management representative, top management shall ensure that the responsibilities and authorities for relevant roles are assigned, communicated and understood.
- Requirements for resource management is more detailed than before and it includes a great emphasis on knowledge management.
- Documentation systems are revised and simplified in terminology. The expression ‘documented information’ covers all data, procedure, records etc.
- Performance evaluation session organizes the assessment, evaluation, audit and review procedures on product/service, process, and organizational level.

The structural changes are more spectacular in case of the ISO 14001 standard. Having regard to the goal of establishing a clear and conform structure and more harmonized chapters related to general management issues. The former planning concept with objectives, targets, and programs is absent because risk management is intended to fulfill the challenges. In my opinion, this change allows a soft approach for organizations with a less developed management toolset, so the responsibility of system development consultants is increased in finding the suitable solutions.

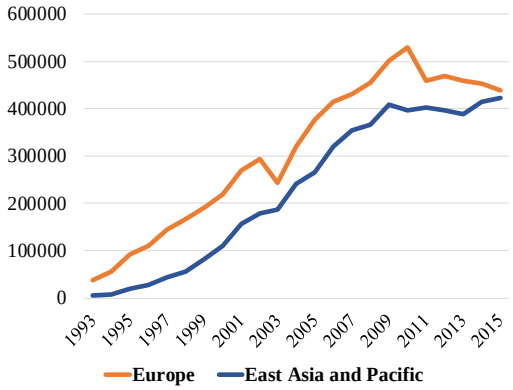
4 Changes in the spread of certified management systems based on ISO 9001 and 14001

4.1 Global overview

The paper analysis the diffusion of the ISO 9001 and ISO 14001 standards based on the number of living certifications per year. It should be noted that the impact of the management system standards is much wider but an objective and overall assessment is difficult to implement. The source of the analysis is the annual ISO Survey database, available at https://www.iso.org/the-iso-survey.html. The 2015 data set includes the distribution by industries where it could be stated, so conclusions based on it are limited.

ISO 9001 is the most popular management system standard in the world. There were 1,034,180 ISO 9001 certifications in 2015 worldwide. In that year there were 319,496 ISO 14001 certifications. The global distribution shows a mixed picture. Europe, East Asia and Pacific area leaders with 83.4% of ISO 9001 and 89.3% of ISO 14001 certifications.

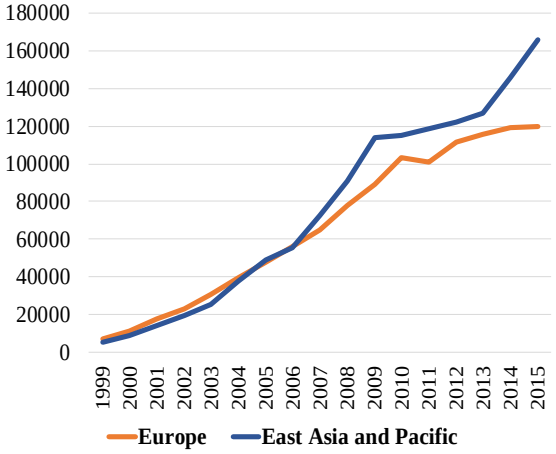
Fig.3: ISO 9001 certifications in Europe and in East Asia and Pacific



Source: based on ISO Survey data

Figures 3 and 4 present the dynamic expansion of the certifications in these two regions. Notwithstanding the world economic weight of North America, the number of certifications is quite low in case of both standards (ISO 9001: 46,938; ISO 14001: 8,712 in 2015). However, the development of the quality concept in the USA differs from the European way, the reason for the remarkable tendencies of Europe and East Asia and Pacific may be found in their positions in the global supply chains.

Fig.4: ISO 14001 certifications in Europe and in East Asia and Pacific



Source: based on ISO Survey data

The rate of growth is gradually decreasing. The number of ISO 9001 applications carries a special impact. Switching to ISO 9001:2000 standard was a serious challenge for European organizations (because of the 3-year certification period the impact is to see delayed). Such deceleration is not to observe in East Asia and Pacific. Probably, the economic crisis in 2008 had an impact is visible in case of both standards, although the strength of this impact is different. European ISO 9001 certifications apparently decrease, East Asia and Pacific are on a new development path. The decline is less spectacular in case of ISO 14001. Checking the ratio of ISO 14001 and ISO 9001 certifications show that ISO 14001 is more and more popular. In the year 2005, there were 7.9 times more ISO 9001 certification in Europe and 5.5 times more in East Asia and Pacific; these figures were 3.7 and 2.5 in 2015.

Based on the industrial distribution of the certified management systems (39 defined industries included), 70.2% of ISO 9001 and 72.4% of ISO 14001 certifications are concentrated in the top 10 industries. The list related to ISO 9001 includes basic metal & fabricated metal products (13.2%), electrical and optical equipment (9.5%), construction (8.5%), wholesale & retail trade; repairs of motor vehicles, motorcycles & personal & household goods (8.4%), machinery and equipment (7.1%), other services (6.4%), rubber and plastic products (5.1%), engineering services (4.6%), chemicals, chemical products & fibres (3.7%) and information technology (3.7%).

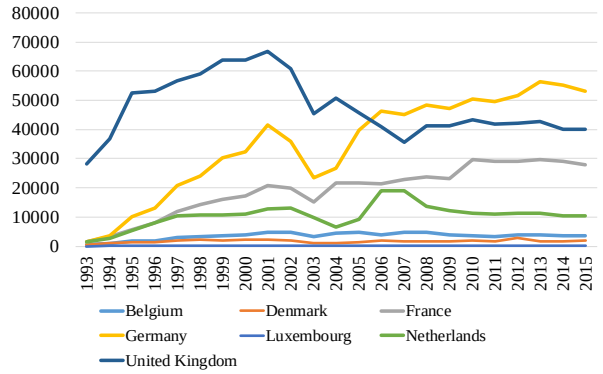
The list related to ISO 14001 largely overlaps with the previous result but the order is different. It includes construction (17.5%), basic metal & fabricated metal products (9.9%), electrical and optical equipment (9.6%), wholesale & retail trade; repairs of motor vehicles, motorcycles & personal & household goods (7.2%), machinery and equipment (5.7%), engineering services (5.4%), rubber and plastic products (5.2%), chemicals, chemical products & fibres (4.5%), other services (4.2%), transport, storage and communication (3.2%).

4.2 European overview

Similarly to the global picture, the European diffusion is diverse if we compare the state of the western and the eastern countries. Group formation of the countries is difficult because of the territorial, cultural and national diversity on the relatively small continent. The post-war influence after 1945 and the enlargement of the European Union also determines European economic and social development paths. An overview of the grouping possibilities is given by Probáld and Szabó (2005). Lipták (2012) gives a practical demarcation of Central and Eastern Europe (CEE), including countries that joined the European Union in 2004 (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia). I also added Romania because of its growing role in European industrial supply chain (Stehrer et al., 2016). Germany, France, Benelux states, Denmark and the United Kingdom is highlighted as Western European (WE) countries for the comparison.

The number of ISO 9001 certifications in the selected countries is summarized in Figures 5 and 6. Of course, a direct comparison of the data lines is misleading because the size of the countries, especially the number of corporations and other organizations are different, but the total numbers make the tendencies visible.

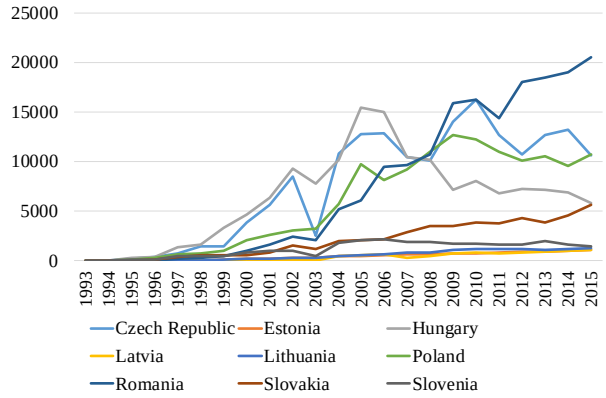
Fig.5: ISO 9001 certifications in WE countries



Source: based on ISO Survey data

The data of WE countries present an intensive growth in the 1990s and keeping the level ever since. A remarkable fall back is to find in case of Germany and the United Kingdom from 2000. Based on Simon (2006), I see the main reason for economic fall in the spillover of latent structural problems in case of Germany. Checking the daily press about the economy of the United Kingdom I found that the strong consumer demand was absorbed by rising imports, but slowing economic growth made exports and expansion more difficult.

Fig.6: ISO 9001 certifications in CEE countries

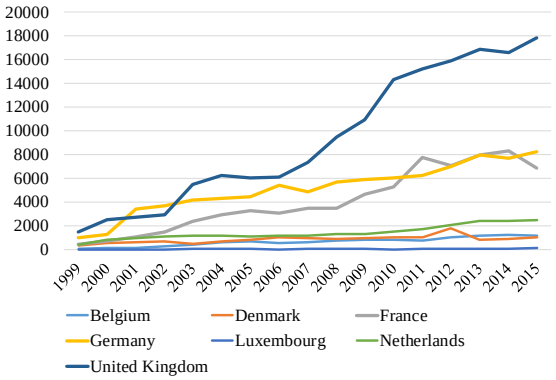


Source: based on ISO Survey data

The patterns of CEE countries show different paths of development. There is a dynamic expansion in case of Slovakia and Romania. The Polish progression has been broken after 2008. Hungarian expansion was the greatest until 2005, followed by but an extreme fall back. Also, the figure of the Czech Republic broke in 2005, and after a rebound in 2009 again.

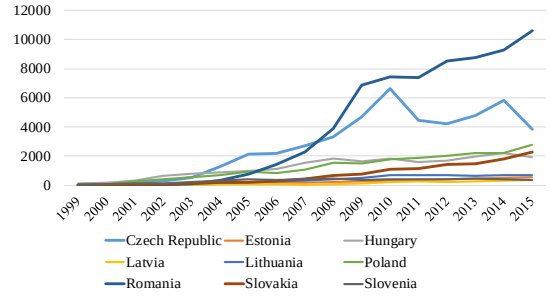
The number of ISO 14001 certification in WE and CEE countries confirms the worldwide trend that interest in environmental management systems is increasing. Figures 7 and 8 summarize the results.

Fig.7: ISO 14001 certifications in WE countries



Source: based on ISO Survey data

Fig.8: ISO 14001 certifications in CEE countries



Source: based on ISO Survey data

Both application and expansion are continuous in the United Kingdom. Germany shows a slow but stable growth from 2001. A break of the French data line is to see after 2010. CEE countries woke up later, expansion started after 2003. The pattern is very similar in case of ISO 9001 and ISO 14001: there is a remarkable expansion in Romania, a hectic run in case of the Czech Republic. Hungarian expansion is different: the increase of the certifications has stopped but did not fall back as in case of ISO 9001. Table 3. compares the ratio of certifications in 2015 and 2005 that highlight the trends above.

Table 3: Ratio of certifications between 2005 and 2015 (in 2015/2005 format)

Country	ISO 9001	ISO 14001
Czech Republic	0.8	1.8
Estonia	2.3	3.8
Hungary	0.4	2.0
Latvia	2.0	4.3
Lithuania	2.1	3.5
Poland	1.1	3.0
Romania	3.4	14.1
Slovakia	2.8	10.3
Slovenia	0.7	0.9

Source: based on ISO Survey data

The industrial breakdown of the survey data for the top five industries is summarized in Tables 4 and 5. While construction industry (12.6%) is the leader in case of ISO 9001 certifications in CEE countries, other services (15.2%) are at the top of the list of WE countries, the construction industry is the 6th (7.1%). Based on the data related to ISO 14001, the leading industry is construction but the proportion is different between CEE countries (28.7%) and WE countries (12.2%).

Table 4: ISO 9001 certifications in selected European countries, distribution of top 5 industries (%)

CEE countries		WE countries	
Construction	12.6	Other Services	15.2
Wholesale & retail trade …	10.1	Basic metal & fabricated metal products	11.5
Basic metal & fabricated metal products	8.1	Health and social work	9.2
Other Services	6.0	Wholesale & retail trade…	7.6
Rubber and plastic products	5.5	Electrical and optical equipment	7.4

Source: based on ISO Survey data

Table 5 ISO 14001 certifications in selected European countries, distribution of top 5 industries (%)

CEE countries		WE countries	
Construction	28.7	Construction	12.2
Wholesale & retail trade…	9.9	Basic metal & fabricated metal products	11.0
Basic metal & fabricated metal products	7.7	Other Services	9.3
Engineering services	7.5	Electrical and optical equipment	7.4
Other Services	5.9	Wholesale & retail trade…	6.6

Source: based on ISO Survey data

5 Conclusions

ISO management standards, especially ISO 9001 and ISO 14001 offer comprehensive management approach and framework from the 1980s. The recent review process aimed an easier way of establishing integrated management systems. Risk-based thinking, strategic orientation or higher attention on external issues and interested parties follow the professional concept of management. The comprehensive set of requirements may give a great support of strategic thinking of small and medium-sized enterprises, which have serious deficiencies in strategy formulation. The appreciation of sustainability and social responsibility have a similar role. Simplification of documentation system, as well as the common structure of various standards, may allow a better corporate acceptance. I believe that these changes are important and necessary even if skeptic expert emphasizes only the refinement of the terminology.

The number of certified management standards can be considered as an economic indicator because certification is usually a condition of participation in supply chains of some leading industries. In another interpretation, the number of certifications may show the presence of a national economy in international trade.

The cases and trends presented in this paper allow the following conclusions:

- A general stagnation is to observe in using certified ISO 9001 management systems worldwide as well as in Europe. Besides, the distribution of applications is not uniform. Europe and East Asia and Pacific are the most active, while the standards are much less popular in North America.
- In parallel with the declining popularity of ISO 9001, the ISO 14001 goes ahead. Attention seems to move from quality to environmental and social compliance. The new structure and approach of the standards are more harmonized with business thinking as well. It can be the key to survival and finding a new growth path of diffusion.
- Assuming that a certification is required by business partners, the international trade seems to move from the west to the east in Europe, especially in case of the automotive industry (a similar move is to see to East Asia and Pacific Areas).
- Development patterns are fundamentally different in Western and Eastern Europe. In case of previous countries, there was a fast growth in the 1990s, followed by a stabilization in the number of certifications. CEE countries show a scattered pattern, restructuring is in progress. I consider the figures in this region indicate properly the economic positions based on their positions in the industrial supply chains.

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