

Problems and tendencies in Innovation Activity of Slovakia's Enterprises during the last decade – The need of Innovation Management*

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The present paper briefly characterizes main problems and trends in innovation activity of Slovak enterprises during 1990s. It is based on three questionnaire surveys (1990, 1996, 1998) in the sample of large and medium sized, mainly manufacturing companies. Even the last survey shows that internal and external barriers to innovation are still strong. Some improvement has been achieved in managers' awareness of the importance of innovation and necessity to create an internal climate supporting innovation and quality improvement.

Dieser Beitrag beschreibt kurz die Hauptprobleme und Trends in den Innovationsaktivitäten der Slowakischen Betriebe in den 90er Jahren. Die Erkenntnisse basieren auf drei Umfragen (1990, 1996, 1998) in einer Auswahl von großen und mittleren hauptsächlich industriellen Betrieben. Selbst die letzte Umfrage zeigte noch starke interne und externe Barrieren gegen Innovation. Eine gewisse Verbesserung im Bewusstsein der Manager bezüglich der Bedeutung der Innovation und der Entwicklung eines internen Klimas zur Unterstützung der Innovation und der Qualitätsverbesserung hat sich gezeigt.

Key Words: innovation activity, innovation management, quality improvement, quality management, human resource management

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Lack of innovation activity was regarded as one of the main problems, as an important obstacle to increasing efficiency of Czechoslovak economy also under the old regime. Many government materials were dealing with these problems, some measures to foster innovation activity and shorten innovation cycle were undertaken (sometimes only declared), but without success. The main reason why these measures did not succeed was the character of the economic system, the economic environment which was not stimulating enterprises to implement innovation. For enterprises in a command economy, innovations were not an important condition of their survival. Innovations were regarded as a supplement: (often uncomfortable one) to their normal activities. There was a pressure from the government, so the enterprises tried to do something in this field as a manifestation of their obedience to central directives. But practically no attention was paid to the efficiency of the innovation process and under deformed price system and prevalent accounting system nobody knew whether the new product or process was really more efficient than the old one.

1. Characteristic features of the enterprises' innovation activity before the start of an economic reform

Our explanation will be based on the results of the survey carried out by the Institute of Social and Economic Information and Automation in Prague in 1990 (Kučera 1991; Kučera 1992). This research tried to apply in ČSFR methodology of surveys developed by an IFO-Institute in Munich. The aim of these surveys was to identify main trends in innovation activity in late 1980s and problems to be solved. At the time of the survey, enterprises understood that a transition to a market economy was inevitable, some radical changes in the political system already took place but the actual economic system was practically the old one.

Questionnaires were sent to 430 Czech and Slovak larger enterprises in different manufacturing industries and 44.9% of enterprises were willing to respond. Participating enterprises were representative enough: they were employing 34.1% of the total employment in manufacturing, their share in sales of the whole manufacturing industry was 35,6% and share in exports 40%. The main reason of not responding was an organisational change or the fact that the enterprise did not implement any innovation in 1989.

The innovation was defined as implementing new products or process or a combination of both and substantial improvements of old products and processes as well (that means incremental innovation was also included). The enterprises had to answer questions about the share of innovation in their sales, innovation expenditures, share of product, process and combined innovations, obstacles to innovation activity, sources of innovation, market strategy, market share, distribution channels, position of their products in the product life cycle, volume and structure of exports etc.

All responding enterprises carried out some innovation activity. At the first place were process innovations (introduced in 62% of responding companies), then followed product innovations and combined innovations. Main reason for process innovation was cost reduction, especially reducing materials and energy intensity of production (47.2%). Only 36.2% of process innovation was aimed at increasing flexibility of production. Product innovations were mainly incremental innovations (58.3%) improving some functions of the existing products or introducing new products within the existing product line. However, many enterprises (69%) planned to launch radically new products in the future years.

Main source of ideas for innovation was internal research and development (85.1%). The share of licensing was very small (only 0.9% of the innovation expenses). As the main barrier to innovation, enterprises mentioned lack of funds (both in Kčs and especially in foreign currency). The other barriers were: existing price system, inputs scarcity, long period from idea development to the launch of a new product, uncertainty regarding the market development, ecological costs.

About 1/3 of enterprises had some financial support from the government but they regarded the procedure of approving innovation project by central authorities and deciding on financial support as very bureaucratic and inflexible. Innovations were financed mainly from enterprises' own funds (60.7%), from bank credits (32.5%) and 6.8% by the government subsidies.

Innovation rate (ratio of expenditures on innovation to sales) was relatively high (4.29%) but without appropriate commercial effect. Innovation implemented was actually capital and investment intensive (57% of expenses on innovation were investment expenditures, mainly buying new machines and equipment – approximately one half of the new equipment was imported). This share was especially high in large enterprises. Expenses on research and development were lower (in average 29,8% of expenses on innovation).

An important indicator of actual innovation activity is the structure of output according to different stages in a product life cycle. The largest group were the products in the stage of maturity (48-56%), then in the stage of growth (24-37%) and in the stage of introduction (9.5%). In principle, in enterprises with higher innovation rate, the tendency to increase share of exports in total sales was observed. However, this correlation varied between different size categories of enterprises. Innovation rate and export share was higher in large enterprises.

As can be seen from the above mentioned data, innovation activity was not a strength of Czechoslovak enterprises (and in Slovakia, the situation was even worse – the share of products in the stage of decline was 22.3%). The main reason was of qualitative character. For majority of enterprises this behavior was a passive reaction to changes in their environment and to the requirements of

ministries and other authorities. It was not a proactive behavior, enterprises thought they could survive also without innovations.

Table 1. Innovation rate and share of exports 1989 (as % of sales)

	Innovation rate	Share of exports in sales	Share of exports to developed market economies
Czechoslovakia	4,29	23,92	8,79
Czech Republic	4,16	24,41	9,49
Slovak republic	4,93	21,52	5,33

Size categories of enterprises:

up to 999 employees	1.96	12.86	3.97
1000-1999 employees.	2.77	20.01	5.32
2000-2999 employees	4.36	24.64	6.12
3000-4999 employees	3.80	21.57	10.25
5000 and more empl.	4.86	25.77	10.00

Source: Kučera 1991, 293

Some important conclusions can be derived from the mentioned survey. Innovation activity was not a strength of Czechoslovak enterprises (and in Slovakia, the situation was even worse – the share of products in the stage of decline was 22.3%). The main reason was of qualitative character. For majority of enterprises this behavior was a passive reaction to changes in their environment and to the requirements of ministries and other authorities. It was not a proactive behavior, enterprises thought they could survive also without innovations.

2. The impact of first measures of economic reform

In 1990-1991 started the process of transformation of Czechoslovak economy from centrally planned economic system to a market economy. Central plan was abolished and most prices were liberalized. Restrictive fiscal and monetary policy was introduced and enterprises found themselves in a situation of (almost) hard budget constraint. These changes in domestic economic environment combined with a collapse of East-European markets and decreasing domestic demand caused the financial crisis of many enterprises. Administratively decided bank loans from the past were practically overnight transformed into commercial loans with high interest rates. With not yet existing capital market, underdeveloped financial infrastructure and high risk-aversion of banks, as well as high taxes, opportunities to raise funds to finance investment and innovation were very limited.

A lot of new laws regulating „the rules of the game” for enterprises were accepted. From institutional changes, the most important was the start of privatization process. But the „large privatization” (privatization of large state enterprises – predominantly by method of voucher privatization) began only in 1992. In years 1990-1991 Czechoslovak state enterprises were living in some form of institutional provisorium, expecting radical change in property rights. Managers did not know what would be their position after the privatization and they were very short-term oriented. In such a situation they were not willing to carry out long-term, investment intensive innovation.

Government had no investment and innovation fostering policy. If there was any government support to some enterprises, it was only occasional, ad hoc – in the cases where the social and regional impact of bankruptcy could be dangerous.

Foreign capital entry was insufficient (especially in Slovakia). However, in those cases, where joint ventures or fully owned subsidiaries were formed, the modernization, product and process innovation, was intensive. Moreover, a positive multiplier effect on innovation through activating local suppliers, was expected in the nearest future.

3. The situation in innovation activity in mid 1990s

To identify new tendencies in innovation behavior of Slovak enterprises, a new questionnaire research was undertaken in 1996 (Šestáková 1996). The research was performed by the Institute of Economics, Slovak Academy of Sciences in cooperation with The Slovak Association of Employers Organizations. Authors of the paper had the opportunity to participate in the design of questionnaires.

It is clear that the sample of enterprises could not be the same as in 1990. The reason was not only the split of Czechoslovak Federation (only Slovak enterprises were included into the survey), but also radical changes in ownership and organization structures of manufacturing companies. In many cases, there was no legal continuity of the companies, included into the 1990 sample. However, the number, industry profile and size of responding enterprises was comparable with the Slovak part of the Czechoslovak sample in 1990. The sample of respondents in 1996 consists of 86 companies, mainly large firms (72%), 87% of respondents were manufacturing companies. Even the content of questionnaires was as similar as possible to that of 1990.

It is interesting to compare main barriers to innovation, mentioned by respondents in 1990 and in 1996 (Table [2]). Lack of funds was regarded as the most important barrier in both surveys, however in 1996 this problem was regarded as even more pressing. Almost no changes were in the length of the period from the idea development to the product launch (in cases where innovation was based on enterprises' internal research and development). In average, this period was 2-5 years. Some other barriers were also mentioned in both surveys: organizational

problems, not adequate legal norms, lack of information on foreign markets (although these figures were negligible in the first survey).

Table 2. Barriers to innovation according to 1990 and 1996 surveys (Figures indicate the percentage of respondents that regard the mentioned barrier as very important)

	1990	1996
Lack of funds to finance innovation	62.9	67.0
Problems with suppliers	57.0	13.0
Long payback period	28.5	29.0
Lack of foreign cooperating partners		17.0
Problems with acquiring licenses		12.0
Organizational problems		9.0
Not appropriate legal environment		8.0
Lack of information on foreign markets		6.0

Probably, the most important difference in sources of innovation (Table [3]) was a radical decrease in enterprises' internal research and development. If in 1990 approximately 85% of innovation was based on internal research and development, in 1996 the corresponding share was only 31%. Most Slovak companies – because of financial difficulties – radically reduced their research and development facilities. On the other hand, importance of licensing and technology transfer from abroad increased significantly. However, financial difficulties of responding companies were the main reason of decline in the percentage attributed to the import of equipment.

Table 3. Sources of innovation (in percent of enterprises that regarded particular source as very important)

Source	1989	1995
Internal research and development	85.1	31.0
Import of machines and equipment	48.6	29.0
Licensing	0.9	17.0
Leasing of equipment		14.0

Surprisingly, in spite of the intensive growth of banking sector in Slovakia during the 1990s., the structure of financing innovation practically didn't change (Table [4]). More than 60% were internal funds of companies, the share of bank loans was almost the same as in 1990 and capital market was not used at all.

Table 4. Sources of Funding Innovation in 1990 and 1996 (as percent of total expenditures on innovation)

Source	1990 ¹	1996
Internal funds	60.7	66.0
Bank loans	32.5	33.0
Government subsidies	6.8	
Foreign capital entry		1.0

In both surveys, as one of the indicators of innovation activity, the structure of products portfolio according to different stages in the product life cycle was used. The share of products in the stage of introduction increased from 9.5% in 1990 to 21.67% in 1996. This can be a sign of intensifying product innovation, however, the degree of commercial success of these new products was not clear. The share of products in the stage of growth was in both cases almost the same. The share of products in the stage of maturity declined from 51.1% to 27.7% and the share of products in the stage of decline was 14.2% (may be, enterprises with higher share of products in the stage of decline in 1990, did not survive) Many companies still were not able to find an adequate production program that would correspond to new customers' requirements. This can also be a reason to the poor economic performance of many enterprises.

As can be clear from the questionnaire research in 1996, innovation activity of enterprises was influenced by some new factors (loss of traditional markets, radical reducing of government subsidies, high uncertainty, increasing the openness of the economy, etc.). However, the expected positive impact of economic transformation on innovation activity was not yet manifested.

The value system, attitudes and skills of managers could not change overnight. This was also clear from their reaction – mainly the belief that government will (and is obliged to) solve almost all their problems. Most managers were too short-term oriented, they were not able to strategically think and act and most of them were not aware of the importance of innovation management.

Many enterprises in mid 1990s understood that innovation activity was an important condition of their survival. They felt some competitive pressure (foreign competition). However, the orientation of innovation strategy and ways, how to intensify innovation, were not clear. Many companies hoped that foreign

¹ Figures from 1990 survey represent average percent share of the corresponding source for the whole Czecho-Slovak sample of enterprises. However, the difference in methods of financing between Czech and Slovak enterprises was not very significant. Probably, the share of internal funds in Slovakia was even larger.

partner in a joint venture would help them to solve this problem. But foreign investment in SR was not evolving according to expectations.

4. Situation in late 1990s

Research team of management teachers at the Faculty of Mechanical Engineering, Slovak University of Technology, performed in September-October 1998 a questionnaire research in selected manufacturing companies in Slovak Republic (Šestáková et al. 1999, 269-280). Although this survey was not a direct continuation of surveys mentioned above, problems of innovation activity were included into the research. The main objective of the 1998 research was to find out, what was the managers' and employees' attitude to radical changes (and even to business process reengineering that has become popular among Slovak managers), what were – in managers' opinion – main barriers to radical changes and innovation and what activities the companies planned in the nearest future to radically intensify innovation and improve their performance.

Questionnaires were sent to 88 manufacturing companies – large- and medium-sized firms. The response rate was 39.7% (35 enterprises). Wholly owned (or majority owned) foreign subsidiaries were not included into the sample because in these companies radical restructuring and innovation was initiated and actually managed by a foreign partner. Because of a low share of foreign investment in the country, approaches applied in foreign owned companies were not regarded as typical for Slovakia's business sector.

First group of questions in the questionnaire was oriented on the problems of forming company's strategy as a precondition to successful restructuring and innovation. From managers' reaction it seems that they are aware of the importance of a long-term strategy. 85.7% of respondents state that they have defined their vision, strategic objectives and particular measures to achieve these objectives. However, just one third of them indicates that a system of monitoring changes in external and internal environment exists in their companies. What are the strategies of the rest of companies based on? Moreover – as many respondents acknowledge – a satisfying feedback from customers is missing and these companies actually don't know how customers evaluate their products and what improvements they require. Another problem, connected with strategy implementation, is that employees are not informed about the company's strategic objectives and could not identify themselves with these objectives.

As main barriers to radical change and improvement in the companies' performance, respondents mentioned (Table [5]): organization culture existing in the company, prevailing management and motivation system as well as information system in the firm, macroeconomic and legal environment not supporting investment and innovation (Šestáková et al. 1999, 269).

Because some basic features of prevailing organization culture are regarded by managers as a very important internal barrier to improve performance, it could be interesting to find out how responding managers evaluate intra-firm communication. According to almost 80% of respondents, deficiencies in communication (mainly horizontal communication) are an important barrier to strategy implementation. Moreover, approximately 35% of respondents haven't got systematic communication with customers.

Although managers are aware of existing problems and barriers, only 34% of responding enterprises developed plans, how to overcome these (mainly internal) barriers.

Table 5. Barriers to innovation (percent of respondents that regard the particular barrier as very important)

Internal barriers	%
Organization culture	71,5
Management and information system in the firm	65,7
Insufficient horizontal communication within the company (mainly between functional departments)	75.0
Not effective enough vertical communication	57.0
Employees resistance to change, lack of motivation supporting innovation	72.0
Insufficient communication within individual departments	32.0
Insufficient communication with customers	35.0
Technical and technological problems	34,2
External barriers	
Macroeconomic environment not supporting innovation	57,1
Deficiencies in legislation	45,7
Insolvency of customers	48,5
Social barriers	
Problems with suppliers	31,4

Responding managers understand that „organization culture matters” and can support (or be a barrier to) innovation activity and radical changes. However, managers often don't know what is the value system and beliefs of their employees and how to use or modify this system (to overcome the resistance to planned changes) in order to improve company's performance.

In many companies, a co-existence of different subcultures (e.g. different cultures in individual organization units within the company, in individual

functions etc.) exists that makes more difficult horizontal communication. If managers themselves are members of a special subcultural community, they are not able to effectively perform the integrating function (Šestáková 1996). A co-existence of different cultures is, of course, typical for foreign-owned companies and can be a problem in innovation activity. However, these issues were not covered by the survey.

One part of the questionnaire was directly devoted to innovation activity. Large companies usually have got their own R&D department (62% of respondents), but R&D capacity was significantly reduced in comparison with the situation in 1990. Moreover, the commercial effect of existing research is low. The number of new domestic patents declined. Research and development expenditures of most companies are lower than 1% of their sales (some companies didn't answer this question). New products are mainly incremental innovations.

Frequency of introducing new products varied from once a year in 11 companies from the sample to once in several years in 8 companies. Large part of these new products was actually „me too innovation”. The period from the generation of a new idea to a new product launch was still long – in average 2-5 years (actually the same as before the start of economic reform). In foreign-owned companies this period is shorter, but new products and processes are actually transferred from parent company (together with know-how transfer, sharing experience, etc.).

5. Innovation activity and quality

The last decade of second millennium belongs to development of the quality management system building in accordance with some model, which is suitable for the firm (ISO standards family 9000, TQM model, EFQM model etc.).

The benefits of implementing any quality management system model covers many areas, including the improved quality performance, reduced operating costs, better financial performance, increased access to markets, regulatory relief, fewer accidents, enhanced community relations, improved customer relations, and employee involvement and education.

Most of mentioned areas are identical with those topical in innovation management approaches.

One decade of experiences – it is sufficient time for evaluation and analysis, what was good or bad in the effort of managers to build the quality management system. And why was necessary a revision of the standards and creating new models?

Therefore the last part of the questionnaire was dealing with problems of building quality systems in enterprises. Improvements in the quality of products, corresponding with customer requirements, are the important constituent part of

an innovation process (Hekelová 1998). Companies in the sample are aware of the importance of the quality of their products and services to improving their competitiveness; 77.14% of respondents (1998) states that they have already established a quality system in the firm and they plan to further improve it. However, in reality significant deficiencies in quality management and quality system exist. Following failures in the practice of quality system building can be mentioned (Hekelová 1999):

- underestimating the role of a supportive climate in the organization,
- delegating responsibility for quality management from top management to quality control department,
- opinion that ISO standards 9000 are a sufficient device how to create an effective quality system in an organization,
- adequate motivation strategy with respect to effective communication, individual workers' motivation and attitudes, has not been developed,
- some companies think that awarding quality certificate will automatically solve the sales problem of the organization and assure its permanently successful position at the market.

Overcoming all the mentioned barriers and coordinating the interactions between individual measures is important and can lead not only to improvements in quality management but also to creating an environment supportive to radical and desirable changes in all crucial dimensions of company's performance.

6. Relationship between quality management and human resources management

Quality of the firm means the quality of its people. From top management on down, all employees must focus on doing the right things, the right way, each and every time. Every employee is responsible for quality at each step of the work-flow. But he/she must be appropriately motivated, there must be good co-operation, good interpersonal relationship, good communication etc. That is the matter of human resources management in the organization. Developing solutions to quality problems and instituting quality improvements are not dependent on the availability of spare time and extra recourses. The great part in this matter can and must play management of the human resources, it means to concentrate on the motivation, communication, ethical behavior, co-operation and teamwork, training and education, commitment of top management etc.

It is only through effective human resources management, through effective management of people that long-term success can be achieved within industry and within a firm. Good human resources management in quality management

process is always an investment in the future (not only to obtain the certificate of quality management system, but to maintain its efficiency). This fact is still underestimated in many firms. Such an approach, oriented on the human factor in quality management process, needs careful managing, by managers who understand the inputs to the processes they manage. Often the least understood input to that process is the *human involvement*.

From point of view of the title and aim of this paper the most important is the *human factor*, which in authors' opinion has the most significant impact on the quality level in each area. Besides the concepts hardware and software, acquires even greater importance the concept humanware.

7. Firm culture and quality

The period before and after certification in the firm brings the necessity of changes in the management system (at each level), organization changes, different performance of some activities and processes, documentation creation etc. In addition to that it brings the necessity of changes in the training and education area (for every worker including the top managers), in behavior of the people etc. Simply there exist a necessity to create, change or adapt the adequate firm culture.

Effective quality management system building need not be understood as a technical activity but as a „social” or „human” activity. It is the task of the human resources management in the firm, relationships between managers and employees, their ethical behavior, communication, motivation strategy etc. That all we can name by two words: firm culture.

The firm culture depends on the people, who are in the firm, mainly on the managers. There are many definitions and descriptions of corporate firm culture. Let's mention in connection with the topics of the article these:

„By culture I mean the shared beliefs top managers have in a firm about how they should manage themselves and other employees, and how they should conduct their business. These beliefs are often invisible to the top managers but have a major impact on their thought and actions.” (Lorsch 1986, 95)

„Corporate firm culture is a general constellation of beliefs, mores, customs, value systems, behavioral norms, and ways of doing business that are unique to each corporation, that set a pattern for corporate activities and actions, and that describe the implicit and emergent patterns of behavior and emotions characterizing life in the organization.” (Tunstall 1983,15)

Each individual in the firm contributes to and partakes of the culture. That means that each individual brings to the firm his or her notions of, among other things, right and wrong, good and bad. This notions are combined with rules, policies, and regulations to become part and parcel of the firm's culture. In

accordance with this, the best approach is to focus on values of the firm, and then hire with consideration of existing personal, individual values, train carefully, and enforce employees' compliance to these values. With this approach, it becomes clear that the firm's values dominate while the employee is on the job. If employees cannot operate in such a culture, they will typically leave the firm or be fired.

For the adequate firm culture creating, supporting the quality and innovation, is useful to implement the TQM (Total Quality Management) philosophy and its principles. TQM has thousand definitions, one of them effectively summarizes the „gurus approaches” (Deming, Juran, Crosby, Feigenbaum, Ishikawa), as follows:

Total quality management is the management philosophy that seeks continuous improvement in the quality of performance of all the processes, products, and services of an firm. It emphasizes the understanding of variation, the importance of measurement, the role of the customer and the involvement of employees at all levels of a firm in pursuit of such improvement. A feature of the new philosophy is that management must play the key role. Total quality management lays the burden of responsibility for the bulk of the waste, error and that the bulk of the gains from quality improvement must come.

We can say, that creating an adequate firm's culture means the exercising of the TQM principles too. *Main TQM principles* are:

- Leadership
- Commitment of management
- Continual improvement
- Satisfaction of customers
- Involvement of everything and everyone
- Training and education
- Prevention of faults
- Good relationship to the firm
- Award and recognition
- Co-operation and teamwork

These principles are characterized – more then the ISO standards – by orientation on the human factor, participation and responsibility of all the employees. Respecting these principles has a significant influence on quality assurance and quality improvement in production and services. Surveys conducted in a number of Slovak enterprises in the past three years, indicate that large proportions of

managers and manufacturers still do not apply these principles and do not use the quality improvement techniques generally believed to improve performance.

The TQM principles must emanate from the top down and operate bottom up if they are to be fully effective. That calls for continuous assessment of how they are working at each level. For the implementation of the appropriate firm's culture and for implementation of the TQM principles as well, must be evident following (as mentioned above):

- There must exist a clear vision of the basic development of the firm, everybody in the firm must know what and where wants the firm to be, what are its mission and goals.
- There must exist a global strategy for achievement the firm goals, what is necessary to do better and other way, what are the planned changes.
- There must be formulated the principles of firm's culture, resp. the claimed manners of the work and social behavior („quality handbook of employee”).

When mentioned above is fulfilled, then for the successful implementation of the quality management system is suitable to perform the following activities (as the elements of the firm culture):

- to formulate the firm's mission from point of view of quality management system
- to elaborate and accept the ethical principles for behavior of the people inside and outside of the firm (the orientation to the internal and external customers)
- to be aware of the needs of employees
- emphasize the commitment of management to the quality
- to anticipate, to identify and solve the problems (it must be the basis of the quality management philosophy)
- to remove the tension in social and working relations (between individual departments and between individual management levels)
- to apply the motivation theory, tools and techniques of quality assurance and quality management to the firm
- to lead all workers to the participation, responsibility etc. in the quality movement in the firm
- to assure the information flow (top-down and bottom-up) as the main communication means in quality management system
- to respect the basic principles of the quality assurance and quality management (it must be uncompromising).

Creating or having the adequate firm culture results to:

- better internal (but external also) communication
- introducing the basic principles, which are the common general criterion for decisions on all management levels
- feeling increasing internal identification of employees not only with particular tasks and activities, but with the whole firm
- higher motivation of the people
- good environment for implementation of new methods, forms and tools, introducing of the changes to the firm etc.

The firm culture is central to the ability of the firm to perform efficiently and effectively. It is far too important to be left to chance. Effective total quality management needs the deliberate creation of a deep culture, structured on distinct values, definitions and objectives. The ideals necessary for a harmonized and unified firm must be embodied in this culture, by both custom and practice. The culture must be live, that is *total quality* must be live. *A quality culture must be created.*

This culture is at the heart of the TQM theory and philosophy. It is entirely defined by the intrinsic values that underlie every act, decision and attitude, and is exhibited within each of the many individual personal relationships that make the working environment of the firm.

The daily life of everyone within the firm will have to change for their perceptions to change, and thus, for the culture to change. Total quality provides such a focus, and the range of modern quality methods become the tools that change the relationship, practices and reality of work.

From our investigation in this area and results from more than 40 Slovak industrial firms, (Hekelová 1997) concentrated on the influence of human factor and firm culture in quality management process the following conclusions (in the shortened version) can be derived:

A) As the most important from the point of view of management ability in the quality management process framework is regarded:

- The ability to motivate the workers (76%)
- The ability to persuade workers (42%)
- The ability to communicate and create good interpersonal relationships (39%)
- The ability to lead (literally by personal example) (35%)
- The ability to know the duties, resulting from the ISO standards (28%)

B) As the most significant obstacles of the quality management process are regarded:

- Incompetence of management in this area (54%)
- The approach of the management, passing responsibility to the quality department (35%)
- Managers do not process information to workers (33%)
- Poor motivation (not only financial, but for example no interest in suggestions and opinions of the subordinate workers (33%)
- Unwillingness of subordinate workers to work better, more, by other way (33%)
- Poor financial situation in the firm (27%)
- No interest from the government bodies side (16%)

These results are valid for industrial firms, services etc. and they concern (resp. can concern) any activity, any process, any organization.

Our experiences shows, that the key factor in quality management and quality assurance process (irrespective of, whether it is ISO model, EFQM Excellence Model, TQM etc.), is the human factor and the product quality, process quality and the whole firm quality will be equivalent to the quality of people, that are performing particular activities.

On the basis of our existing experiences from the Slovak firms, we can state, that it is not the overwork, which results from the quality management and improvement in the firm, but the ways of forcing these requirements from the management side that hinders people and causes their unwillingness to participate in this process.

Overcoming all the mentioned barriers and coordinating the interactions between individual measures is important and can lead not only to improvements in quality management but also to creating an environment supportive to radical and desirable changes in all crucial dimensions of company's performance.

8. The need of purposeful and systematic innovation management

Although many Slovak managers are aware of the importance of internal climate and organization culture in the company to intensify the innovation process, systematic management of innovation is still missing in most companies. Even if managers state they have got an innovation strategy, this „strategy” is usually reduced to an idea to introduce one or two new products (or improve existing products) without seriously estimating the impact of planned innovation on general performance of the company and coordinating the innovation plans with

other aspects of firm's policy (functional strategies, organization structure, motivation of employees, etc.).

In authors' opinion, innovation management is a complex system covering all aspects of firm's activity that can contribute to successful innovation. Many aspects of an effective innovation management were actually mentioned in the previous part, in connection with quality management system and organization culture supporting quality. In innovation management, *human factor is of crucial importance*. Employees commitment, creative involvement, harmony between job tasks and personal professional interests and ambitions are important features of an internal climate supporting innovation. Some aspects of an innovation fostering climate can be institutionalized. They can be strengthened by the formal (however, more flexible) organization structure and formal procedures. Employees skills can be further developed by different forms of training. "Explicit knowledge" that is codified, measurable and „tangible”, is relatively more easy to manage and incorporate into formal information systems. Of course, this does not mean that in mastering this form of knowledge there is no need of improvement in Slovak enterprises.

„Tacit knowledge” that is connected with assessing and improving human skills and behavior – both individual and organizational – (Macintosh et. al. 1999) and is in principle an intangible asset, is more difficult to identify and almost impossible to directly manage. The best what a company can do, is to create a climate supporting development and sharing such type of knowledge. That actually means supporting employees' creativity and their willingness to share new ideas with colleagues, to form a structure that will enable organizational adaptation, survival and competence against discontinuous changes in business environment. Organizational processes are to be formed that „seek synergistic combination of data and information processing capacity of information technologies, and the creative and innovative capacity of human beings” (Malhotra 2001). Creating such an organization is, of course, a difficult task and is still more a “vision” than a reality for most companies in developed market economies. In Central and East European countries, some further specific barriers exist to forming such type of organizations. These barriers are partly an inheritance of the authoritarian culture of the past system and partly an attempt of new owners to check everything that occurs in the firm and suppress informal structures. In Slovakia, high unemployment rate is also a factor that leads to a situation when employees, in fear of their future, are not willing to suggest radically new solutions.

What has actually been done in Slovak enterprises in order to form an internal structure and climate, supporting innovation? Innovative organization structures are still scarce in Slovak enterprises and even if applied (e.g. some companies implement project teams), they are more formal and declared than actually working. Prevailing functional organization structure and lack of cross-functional

communication is a significant barrier to innovation. Managers and other employees are not motivated to innovate and creatively think.. Authoritarian management style still prevails (accompanied by bureaucratic procedures). Under high unemployment rate, employees are afraid of losing their job and usually don't try to criticize obsolete practices, even if it is clear that such approaches are a barrier to improved performance. Many companies formally introduced systems of collecting ideas and suggestions from employees, but most employees don't believe their ideas will be accepted and materialized and are not adequately motivated to come with new ideas.

In Slovak firms, main way how to accelerate new product (or relatively new product) launch, is usually buying a license from foreign company. Internal new products development is underestimated and if applied, traditional sequential model of development still prevails; concurrent engineering is only exceptionally implemented. Technology transfer from domestic research institutions to Industry – due to many reasons that will not be analyzed here – is not working effectively (compare Šestáková 2000). Some companies (especially medium-sized) hope that international cooperation under EU programs schemes – mainly the 5th Framework Program – will facilitate their access to new technologies and foster their innovation ability. However, actual participation of Slovak organizations in these programs is very low.

Nevertheless, some attempts to make the whole innovation process more effective and efficient, can be found. Top management in some firms tries to implement up-to-date techniques of management in their companies. There are consulting firms that help Slovak enterprises in restructuring activities and cultural adjustment (and some of them even directly in new products development). Attempts to achieve higher involvement of employees in the process of continuous improvement can be found. Numerous training courses are organized for employees to improve their skills and ability to use up-to-date equipment. With wider implementation of mentioned approaches innovation activity can become both more intensive and efficient.

9. What can institutions of higher education do to prepare graduates able to intensify innovation activity

If the human factor is of crucial importance in the process of innovation and quality improvement, quality of graduates, their professional and human skills, their creativity can significantly contribute (and if not developed appropriately – be a barrier) to intensifying innovation in companies. This is especially true for young engineers that will work as managers in manufacturing firms or be involved in research and development activities. Theoretical background, professional – and to some degree also human – skills of future engineers are formed in the process of their education (mainly during their study at universities).

It is obvious that appropriate theoretical background is a precondition to active participation in the innovation process. However, this is not enough. As managers, future engineers will work with people and will be supposed to motivate them, listen to subordinates' suggestions, mobilize „tacit knowledge” that is hidden in them. If managers themselves are not used to work creatively, they will not support creative approaches of their subordinates. If they prefer to monopolize their knowledge, they will not create a climate supporting knowledge sharing in the company. These abilities and skills of future engineers are to a significant degree formed in the process of their education.

Thus, as a logical continuation of the research into problems of innovation activity, the authors seek to find out, what are new employers' requirements to the education process, how to improve quality of education, especially at universities of technology that are preparing managers/engineers for the 21st century. A questionnaire survey in more than 100 Slovak manufacturing companies was performed in 2001 to find out how the practice evaluates recent graduates, their skills and abilities, their values etc. A feedback from employing organizations is very important for general orientation in improving the quality of education. This was regarded as a basis for continuous improvements in curricula, teaching methods and forms of education process.

From answers to the questionnaire it is clear that employing organizations prefer the wider range of knowledge (wider theoretical background) rather than traditional (or new) narrow specialization.

The list of preferred skills and abilities of graduates – as responding companies see it – is as follows (ranked according to assigned importance):

- creativity
- foreign languages skills
- ability to work independently
- computer skills
- reliability
- flexibility
- being in the know about the new trends in relevant branch
- ability and willingness for further education
- communication skills
- decency

As important factors for the good quality of education, corresponding to requirements of recent practice, responding companies mentioned:

- intensive co-operation between universities and practice
- students involvement in the research and solving practical problems

- innovation of the curriculum
- students involvement in international activities and projects
- improving students' communication skills.

All required skills and abilities are important also for innovation activity. Forming and improving these skills will require rather radical changes in teaching methods and curricula at institutions of higher education, as well as an intensification of universities-industry co-operation. To implement such changes is not a simple task. Resistance to changes can be strong, many traditional approaches are to be removed. However, this endeavor is worth while. It can significantly contribute to creating important *human preconditions* to intensifying innovation and improving performance of companies.

Conclusions

Due to many factors, continuous monitoring of an innovation activity of the same sample of Slovakia's enterprises was not possible. However, results of three questionnaire surveys, performed during the last ten years, may help to map the situation in innovation activity and outline main problems. Some problems identified more than ten years ago, are still topical and their solution can be even more pressing.

The value of research results (especially of the 1998 survey) is, of course, limited by relatively small number of companies in the sample. However, the most important Slovak manufacturing firms, without a foreign capital majority stake, were included into the sample. Problems identified on the basis of this research can be regarded as topical for all Slovak manufacturing firms.

As can be seen from research results, innovation activity is still not intensive enough to contribute to improving companies' competitiveness. Internal barriers to innovation are significant, but managers are today more aware of these problems than in 1990 and try to solve them.. External macroeconomic environment and legal system is, according to responding managers, not supportive to investment and innovation. Restructuring of the banking sector (that was to high degree performed after the last survey) and activating capital market in Slovakia, may contribute to solving problems of financing innovation.

From all mentioned surveys and also from other contacts with managers it is clear that applying up-to-date techniques and experiences of innovation management is badly needed in Slovak companies. Even if Slovak managers speak about innovation management, they don't understand it as a complex process covering all aspects of firm's activity that can contribute to successful innovation. Sometimes (or often) they don't see the crucial role of human factor and employees' motivation in this process. That's why forming an adequate firm's culture is extremely important. The „soft side” of innovation activity is in

practice still underestimated. On the other hand, attempts to impose a burden of responsibility on the government, are very frequent.

Nevertheless, it is clear that there will be a great need for an active and comprehensive government technology policy and innovation stimulating policy. Many Slovak economists, research institutes, organizations representing interests of industry are pointing out that government has to create general economic environment favorable for investment activity and innovation. Forming appropriate infrastructure could also be important (in this connection science and technology parks are to be built). Government and local authorities ought to encourage a cooperation between research institutions, universities and enterprises as a form of fostering technology transfer.

In Slovak Republic was created the „National Program of Quality to the year 2003” which is aimed at continual quality improvement of all spheres of the life, it means:

- production and services,
- small and medium-sized enterprises,
- education, sciences, research,
- public sector etc.

National Program of Quality directs to the following aims:

- increasing of quality importance and its contributions, including the ecological contributions,
- TQM support and propagation as the tool for permanent improvement of business performance, competitive ability increasing and export efficiency improving of the Slovak economy,
- propagation and support of the quality management systems implementation in small and medium-sized enterprises,
- propagation and support of quality management systems in services, public sector and Civil Service,
- harmonisation of the technical standards and regulations with the documents valid in EU,
- support of the TQM philosophy development in education system,
- support of the competitions and awards, aimed at quality improvement in accordance with European and world models,
- environmental management systems and health and safety management system development etc.

Recently, research into tendencies and problems of innovation activity and improving quality was enlarged by a specific survey (Hekelová 2002), aiming at improving quality of higher education, especially at universities of technology.

It is obvious that abilities and skills of future engineers can be important for forming human preconditions to intensifying and increasing effectiveness of innovation activity. The recent (actually fourth) questionnaire research had to provide a feedback from business practice, to show, how manufacturing companies evaluate university graduates' skills, what types of skills they require. In many aspects, answers to the questionnaire confirmed some authors' hypotheses about the role and requirements to human factor in management of innovation. However, practical implementation of required changes will not be an easy task.

In the period after the 1998 survey, a relatively significant increase in foreign direct investment in Slovakia occurred (although the level of FDI is still not satisfactory) and foreign owned companies became more representative for the business sector in Slovakia. This means that any further research into innovation activity must include into the sample also foreign owned companies. This can lead to some difficulties in comparison, because different problems can be important from foreign investor's point of view. Willingness to respond can also be limited in these companies. Nevertheless, some requirements to an effective and efficient management of innovation and human factor in the process of innovation, will probably be topical for all types of companies. The same is probably true for the required changes in the system of higher education.

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