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APPLICATION OF TQM IN HUNGARY AND IN THE US: ANALYSIS

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Abstract

The purpose of this article is to compare the Hungarian and US TQM practices at 27 firms. 5 clusters of companies will be identified considering their environmental, structural factors. We categorize the companies into these clusters. Then we analyze the companies orientation of management, use of TQM elements and tools at the different sets of environmental and structural variables, and finally give some suggestions to improve the Hungarian TQM practice.

Keywords: TQM, Hungarian TQM practice, process management, corporate culture, TQM tools, TQM principles, Quality, ISO 9000, competitiveness.

After the Change-over, in the last 10 years, a lot of significant changes have happened in the economic, political and social structure of Hungary. The Hungarian companies have to transform their operations to become more competitive. Those who cannot change and adapt to the new environment sooner or later, depending on their field of operation, go out of business. This requirement of transformation is not a unique Hungarian situation. The Western companies have already and gradually faced the change of the environment earlier and started to change earlier. This process was and is more dramatic in Hungary. The pace of change has increased drastically after the Change-over, and the competition has become even more severe. The ability to quickly react to the changes and to increase the effectiveness and efficiency of the companies has become crucial to survival.

Being a follower has both advantages and disadvantages. The major disadvantage is that we are falling behind those who started earlier and losing market share against those firms who are more prepared for the competition. But, there are also advantages, because someone is already ahead of us, and we can learn from his example. There are several lessons what the western firms have already learnt through a long and tiring trial and error process. We do not necessarily need to go through this process again, process we can learn from the best. There are several management methods and tools available to help us in the transformation and improvement. Some examples of these techniques are: Business Process Reengineering, Activity Based Management, World Class Manufacturing, Management Control, Balanced Scorecard, Automation and Information Systems, Total Quality Management (TQM).

I believe that TQM can contribute significantly to increasing the competitiveness of the Hungarian firms. I had the opportunity to visit 13 US and 14 Hungarian firms and analyze their TQM practices. The US firms have a longer experience with TQM what we can learn from. I would like to compare some features of the Hungarian and US TQM practices, at those firms whom I interviewed, and analyze the applicability of the US TQM experiences in Hungary.

In my understanding TQM is a philosophy and a methodology connected to it. So, TQM is a set of principles (philosophy) and a set of tools and techniques (methodology) that can be used for achieving the main objective of TQM, total customer satisfaction [8].

TQM should be viewed as a way of managing business, we tried to identify the major elements (principles and tools) of TQM and determine the extent to which these elements exist at the companies we interviewed.

The companies operating a TQM system follow several principles based upon which they are managing their operations:

We were looking at the level of existence of the following principles at our sample of companies [1,2,3]:

- Customer Satisfaction
- Process Management
- Management by Fact
- Continuous Improvement
- Total Participation and Empowerment
- Strategic Focus and Alignment
- Openness to Innovation and Changes

Some examples of the tools without the need of listing all: Pareto chart, Ischikawa diagram, Control Chart, Check Sheet, Histogram, Scatter Diagram, FMEA, SPC, QFD, DOE, Flowcharts, Benchmarking, Affinity diagram, Problem Solving tools, Surveys, Brainstorming, Poka-Yoke, JIT.

1. The Contextual Variables

TQM is not a universal panacea, in different situations (set of environmental conditions, and structural variables) different elements of TQM prove to be more useful (see *Fig. 1*).

Based upon the level of the elements we assigned points to each principle and the level of extent of using the tools and analyzed how the structural and environmental variables influence the application of TQM.

According to the contingency theory appropriate managerial action and organizational structure depends on the particular parameters of the situation.

We have identified 6 parameters determining the context, the situation in which TQM is to be applied. The following contextual (situational) variables were identified: the sales, the headcount, the age and the market share of the company,

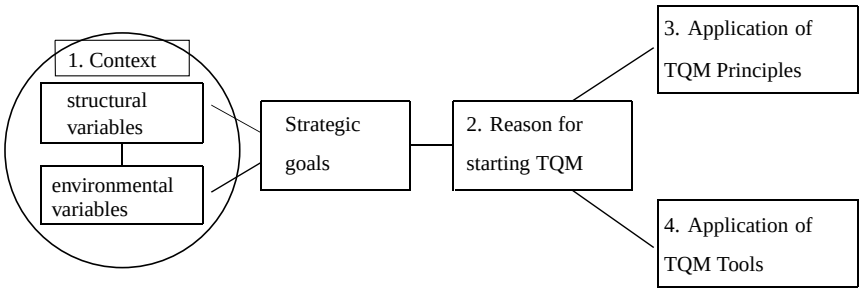

Fig. 1.

Rank	1	2	3	4
Headcount	<100	100-500	500-2000	2000<
Sales (M USD)	<25	25-150	150-1000	1000<
Market Share	Small	Significant	Dominant	Leader
Organic/ Mechanistic	Strong Organic	Organic	Mechanistic	Strong Mechanistic
Age (Years)	<10	10-30	30-50	50<
Market Prosperity	Collapsing	Contracting	Mature	Growing

Fig. 2.

the market prosperity and the organic/mechanistic structure of the company. The companies were ranked on a 1-4 scale on these variables (see *Fig. 2*).

The sales, size, market share, headcount variables have a high positive correlation. The age and organic/mechanistic variables have a high positive correlation with each other and a high negative correlation with the market prosperity variable (see *Fig. 3*).

	Market share	Sales	Headcount	Age	Market Prosperity
Sales	0.71	1			
Headcount	0.50	0.64	1		
Age	0.14	0.32	0.38	1	
Market Prosperity	0.32	0.22	0.20	-0.48	1
Organic/Mechanistic	-0.19	-0.02	0.18	0.57	-0.65

Fig. 3.

The contextual variables could have been clustered into two compound variables:

- the **combined size (C-size)** variable containing the sum of the size, sales, headcount and market share variables

- the **flexibility variable** containing the inverse organic/mechanistic scale variable, the market prosperity, and the inverse age variable.

Based upon the compound contextual variables the companies can be categorized as: type 1,2,3,4,5

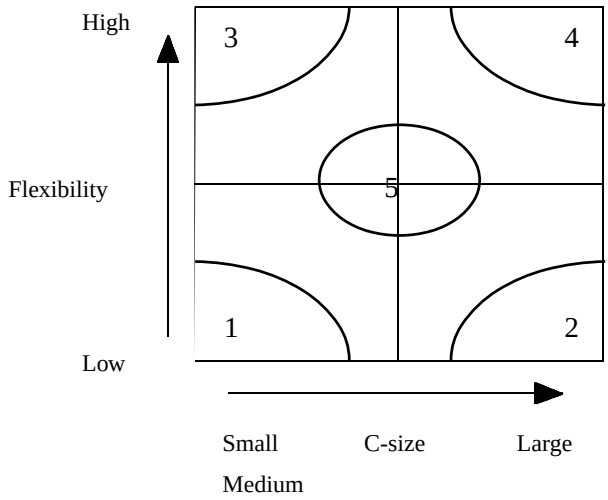

Fig. 4.

The composition of the sample:

There were no small firms in the sample, the smallest firms had about 100 employees and about USD 10 Million sales revenue. So, the conclusions of this study are only implying the medium and large firms, however, we can say that the smaller firms are less likely to apply TQM because of the lack of resources and because the management is too busy to embark on it.

We can notice that there are more Hungarian firms among the less flexible and

Category	1	2	3	4	5
	Tauril	Ikarus	77 Elektronika	Veeco	ILC DDC
	Perion	Taurus	Oxychem	Westel 900	ABB Láng
	Elit	GE Tungsram	Trident	Parker Hannifin	CTG
	Bakony Művek	Kodak	Ericsson	Symbol	Parsons
	Westwood Squib	Motorola	Oracle	Technologies	Brinckerhoff
	Herend	Matáv			Wilson Greatbatch
		Xerox			
Hungarian	5	4	3	2	1
US	1	3	2	3	4

Fig. 5.

small firms than Americans. It suggests that the characteristics of the Hungarian firms will be mainly composed of the characteristics of Category 1, 2. Category 5 firms are mainly US firms, they are in the middle of the change process, most of these firms belonged to category 2 and are trying to transform to become category 4 to be more adaptive and flexible. The composition of our sample implies that the US firms are operating on a more mature market and are facing a higher level of competition in average, they have already started to transform their operation to become more flexible, and they are ahead of us in this change process.

2. The Reason for Starting TQM

The structural and environmental variables determine the strategy of the company. TQM goals should be directly related to the company's strategy. We have assessed the reasons why different companies started the Quality Programs. In most of the cases the major reason was to increase the company's competitiveness. They also mentioned different ways to improve their competitiveness: Customer Satisfaction, Performance Improvement, Integration, Cultural Change. The larger firms in group 2 and 4 specified the competitiveness as the major drive for implementing TQM programs at their companies. The smaller firms (1,3) are focusing on Customer Satisfaction in order to get enough orders to maintain and grow their business. The less flexible firms (group 1) find the compliance with the standards (ISO 9000, QS 9000) as the major way to achieve this goal, the more flexible firms (group 3), those on a more prospering market are focusing on Customer Satisfaction.

3. The Application of Principles

Not all the 27 firms have declared TQM programs, but we certainly can analyze their management practices and determine the extent to which their management practice is in accordance with the TQM principles. We have ranked the firms on a 0-4 scale (*Fig. 6*) based upon their level of applying the 6 major TQM principles in their management practices. We have defined each level of principle and determined where the companies' current practices are at.

Rank	0	1	2	3	4
Customer Satisfaction	no	fitness to standards (ISO 9000), deliver what promised	fulfilling the customer's declared expectations	proactive, communicating with the customer	partnership, flexible, continuous communication and listening
Process Management	no	evolving, the first signs are visible, the major processes are defined	medium, there is a smaller expert group understanding and managing the major processes	good, the major processes are documented and managed to a good extent	excellent, processes are thoroughly documented, and extensively measured and managed
Management by Fact	no	the processes are documented, ISO 9000	the processes are measured, frequently, surveys, Cost of Quality	the management decisions are based upon measurement, the PDCA cycle is operated, some Benchmarking	the processes and the goal achievement are thoroughly monitored, Balanced Scorecard, 6 Sigma, Benchmarking
Continuous Improvement	no	the major failures are monitored and eliminated	the production processes are monitored and controlled	the whole value chain is monitored and controlled	The performance is continuously monitored and improved, benchmarking
Total Participation and Empowerment	no, functional, autocratic style	a few functional team, participation in the decisions	cross-functional teams and coordination, regular meetings	empowerment, wide use of teamwork, shared responsibility	total participation, self organizing teams
Strategic Focus and Alignment	no	formal, superficial vision and mission, not aligned with the operations	shared goals, the vision, mission and the strategic goals are communicated	the strategic goals are well conceived and thoroughly deployed	Clear and communicated strategic objectives, Deployment, good alignment and integration
Openness to Innovation and Changes	no	the top management tries to monitor the environment and react to the major changes	the top management is open, the employee suggestions are collected, some change programs are initiated	All the employees are involved in management, their suggestions are important, listened, the organization is quick in reacting to changes	The organization is able to renew itself, new suggestions are listened and implemented, everyone is searching for better practices and aware of the external changes
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Fig. 6

Flexibility	0.44	0.10	0.18	0.08	0.25	0.44	0.65
Principles	Process Management	Management by Fact	Total Participation Empowerment	Continuous Improvement	Customer Focus	Strategic Focus and Alignment	Openness to changes and Innovation
C-size	0.34	0.48	0.49	0.45	0.39	0.56	0.02

Fig. 7. The correlations between the application of principles and the c-size and flexibility variables

Rank	0	1	2	3
Level of using the tools	no	occasional use of some tools	regular use of a limited set of tools	several tools are widely used and understood

Fig. 8.

We have examined the correlation between the compound variables (C-size, flexibility, see *Fig. 7*) and the level of the different TQM principles at the companies. The larger companies are much more likely to follow the principles of the Management by Fact and Process Management, and have a Strategic Focus and alignment. The larger companies are more likely to apply the principles of Total Participation and Empowerment, they have more developed Continuous Improvement programs, and the Customer Focus also gets a greater emphasis. In general we can say, the larger the company the more seriously follows the principles of TQM. The more flexible companies are more Open to Changes and Innovation, they are also more likely to apply the principles of Strategic Focus and Alignment since it helps them to adapt to the external environment. The correlation analysis shows that the level of process management is also positively and significantly correlated with the flexibility of the company. The flexibility is also positively correlated with the Customer Focus and the Total Participation, but to a smaller extent than we would expect. This flexibility variable contains the market prosperity and the age of the firm besides its organic/mechanistic nature, and it seems that those firms who are on a growing market (like Oracle or Veeco) can stay very profitable even if they are not following all the principles of TQM. Our study suggests that the larger firms on a contracting or mature market with a more mechanistic structure are applying several TQM principles in order to enhance their flexibility, and adaptability, which seems to be a major constituent of competitiveness. So TQM seems to be a good solution for these firms.

4. The Application of Tools

We have interviewed all the 27 companies about what TQM tools do they use in their Management Practices and tried to get an impression of the level of using these tools.

We ranked the companies on a 0-3 scale depending on the extent of using the TQM tools.

Our analysis shows that the larger companies are more likely to apply the tools of TQM. The correlation between the level of using the tools and the c-size is 0.34. The flexibility does not seem to influence the use of tools significantly. However, the less flexible companies have more tools for quality control and to improve the internal efficiency. The larger companies are more extensively using such more elaborated techniques as benchmarking, the statistical techniques, the 6 Sigma and the Design of Experiments, FMEA. The smaller companies are using such simple techniques as check sheets, data collection, failure statistics, Pareto diagram to identify the major areas for improvement. In general, we can conclude that the use of tools is in accordance with the principle orientation of the company. The companies are mainly using those tools that are supporting the application of the principles they find more important to achieve their strategic goals. For example, if the company is focusing on continuous improvement then the problem solving tools and the benchmarking is more likely to be used.

5. Comparison of the Hungarian and US TQM Practices

There are excellent TQM companies in both countries, but TQM has a longer history and more tradition in the US. The Hungarian companies started to experience with TQM about 5 years ago. Some of the US companies like Motorola or Xerox have almost 20 years of experience with TQM. The majority of the US firms started their TQM initiatives at the beginning of the 90-s. There are several cultural and environmental differences between Hungary and the United States, that determines the application of TQM. We tried to generalize the Hungarian and US companies and prepare a list comparing the environments in which the TQM is to be applied, (see *Fig. 9*).

The environment where TQM can be implemented varies by country, but even in Hungary or in the US from firm to firm. Applying TQM in any environment is a continuous learning process with a lot of iterations. Every company has to go on his own way while implementing TQM. Besides the cultural differences, the contextual variables have a major impact on the application of TQM. The Hungarian companies tend to be less flexible and smaller than their American counterparts in our sample.

5.1. Principles

The application of the majority of the TQM principles increases with the flexibility and size of the firm. The application of TQM is a learning process, and the US firms have a longer experience with TQM. Consequently, we were expecting a higher level of TQM at the US firms. We assigned the values 1 to all the Hungarian and 2 to the US firms and examined the correlation between these values and the application of the principles. The following correlations were calculated, (see *Fig. 10*).

Environment

Factors	US	Hungary
Availability of TQM knowledge	Broad, for a wider range employees	Partial, for professionals
Common language of TQM	Exists	Doesn't exist
Supporting infrastructure (associations, organizations, quality awards..)	Mature, Existing	Developing
Availability of Best Practices	Yes	No
Size of the market	Large	Small
Experience with TQM	More than 5 years	Little, less than 5 years
Availability of data on performance	High-medium	Low
Readiness to share knowledge between companies	High	Low
Clear, concise vision and mission	At most of the firms	At some firm
Availability of Success Stories	Yes	Limited
Networking of TQM professionals	More than 15 years, Broad	Less than 5 years, Limited
Focus of the top management	Strategic and tactical, long-term issues	Operational, short term issues, fire-fighting
Experience with free market economy	More than 100 years	Less than 10 years
Reserve of resources	High	Low
Awareness of lower level managers of financial performance and goals of the company	High	Low

Individuals

Factors	US	Hungary
Readiness of individuals to take responsibility	High	Medium
Readiness to take risk	High - Medium	Low
Educational background	Practical	Theoretical
Openness to changes	Medium	Low
Quality awareness of the management	High	Low
Top management. Commitment	High	Medium-Low
Motivation power of monetary rewards	Medium	High
Experience with teamwork	Yes	No

[4,6,7,8]

Fig. 9.

5.2. Tools

The US firms were also ranked higher on the level of using tools. The correlation, calculated the same way as for the principles, is 0.41. The US firms are more extensively using the problem solving tools, the teamwork, the benchmarking, the Poka-Yoke, JIT. The goals are quantified and there is a more precise monitoring of the goal achievement. The Hungarian firms put more emphasis on the inspection and control, while the US firms are focusing more on the prevention and put more emphasis on the Design of Quality. There are signs of the Japanese quality approach in Hungary, Kaizen, 5S, suggestion systems were mentioned more frequently. The quality is primarily the responsibility of a smaller expert group in Hungary, while

	Process Management	Management byFact	Total Participation Empowerment	Continuous Improvement	Customer Focus	Strategic Focus and Alignment	Openness to changes and Innovation
HU/US	0.66418	0.355522	0.555772	0.448076	0.301244	0.380982	0.425043

Fig. 10.

the TQM tools have a wider penetration to the daily activities of the American workers (thanks to the top management's demonstrative actions and the extensive training programs).

5.3. The Culture

The success of the TQM application is also largely dependent on the prehistory of the company. The culture of the company has a major impact on the opportunities of TQM application. Without an appropriate culture TQM cannot function effectively; the tools and some principles can be applied at the company, but the whole TQM system won't be able to prevail. The application of TQM requires a cultural change at the company, this is why the implementation of TQM takes so long at most of the companies. Based upon our experience those companies who had the chance to implement TQM from their start up were much faster and more successful in applying TQM, because they did not need to transform their culture, but they had the chance to build a TQM culture from start. Westel 900 a Hungarian mobile communication provider won the Hungarian National Quality Award in 1996 three years after its foundation. Now, Westel 900 is possessing one of the best TQM systems in the country. Those companies whose culture is closer to the TQM philosophy can apply TQM faster usually. ISO 9000 supports some of the TQM elements (Management by Fact, Customer Focus, Process Management), but not all. Several Hungarian companies see ISO 9000 as a prerequisite of TQM, and first want to become good ISO 9000 companies [7]. ISO 9000 certainly has a positive impact on the companies quality culture. However, the inappropriate application of ISO 9000 can become a major obstacle of TQM implementation later on, it can discredit any quality initiative, increase the resistance of the workforce, it may bureaucratize the company and hinder the innovation and change. The US companies are following a different approach. Most of them started their TQM efforts earlier, than the ISO 9000 certification process. They said that after building their TQM system, it was easy to get their ISO 9000 certification. I think that the TQM principles and values should be integrated with the ISO 9000 implementation processes to facilitate the later introduction of TQM.

It is not easy to get commitment to the TQM program. The employees and managers have to be convinced about the importance of TQM. If the companies feel the necessity to change, and have the capacity to carry out the change, then the TQM gets greater support and is easier to be implemented. There are several

American Success Stories, where the company was in a crisis situation and used TQM as a way to get back its competitive position. Xerox and Motorola are fine examples of these firms. TQM is not a panacea of course. There were other actions and solutions used by these companies to arrive to their current situation, but both companies are testifying that TQM had a major role in their change process. TQM contains a very good set of principles and tools to support the Management in its actions.

6. Suggestions for the Implementation

If we want to apply TQM at a firm, we have to take the environmental and structural variables and the culture into consideration, because they have a significant impact on the success of the different TQM elements. The companies in the different categories have somewhat different approaches to TQM, they find different elements of TQM more useful. If we know where our company belongs to, we may find out what TQM elements proved to be more beneficial at other similar companies. We have to decide, how much do we want (goals) and can (resources, applicability) implement from the principles and the tools of TQM at our company. TQM is not just a program or a change effort that will transform our company to be more successful, TQM is a way of thinking and management, the implementation of TQM is a continuous learning process. There is no final destination, there are levels of application on our way of continuously improving our performance. When the companies have assessed their situation and decided what they want to implement from the TQM elements, then they have to introduce these TQM elements into their practices. This introduction involves a lot of training and education and trial and error, with the support and involvement of the top management. If some elements are functioning well at the company, then we have to get feedback about the processes and the results, so the next step is to implement a monitoring system. The crossfunctional cooperation and communication is a critical requirement of TQM. The value creating processes are crossing the functional boundaries within a firm, and the customer experiences the final outcome of these processes and judges our performance based upon his perception of value provided. If we want to satisfy the customer, everyone has to cooperate and communicate with each other and the customer should be understood. The employees should understand and feel that their performance and cooperation has an impact. So, the performance appraisal, and rewarding systems should be aligned with the TQM values [5]. The ISO 9000 implementation and the Quality Assurance process should also be integrated with the TQM values. The best way is to integrate the introduction of both systems, or if the company, does not have the sufficient resources to do it paralelly, the main TQM goals and values should be considered during the ISO 9000 implementation. The next generation of ISO 9000 standards takes this fact into consideration, and it will include more TQM elements. The implementation of TQM is a never ending journey, there is no final destination. This article may help the Hungarian companies

to assess their situation relating to the TQM implementation, find similar companies whom they can learn from, set up their expectations, and start or continue the implementation process with a higher chance of success.

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