

# CENTER FOR QUALITY



UNIVERSITY OF MONTENEGRO  
FACULTY OF MECHANICAL  
ENGINEERING PODGORICA



CENTER FOR QUALITY  
University of Kragujevac  
Faculty of Engineering

Association for Quality  
and Standardization  
Serbia



**10<sup>th</sup> International Conference**

# ICQME<sup>20</sup><sub>16</sub>

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*It is our pleasure to invite you, on behalf of the Organizational Committee, to the 10<sup>th</sup> International ICQME Conference that will be held in Petrovac between 28<sup>th</sup> and 30<sup>th</sup> September, 2016.*

*The idea of Conference has first come to life when a need was felt to have the eleventh traditional National Conference on Quality Management System (SQM) with the international participation evolve into an international conference, with an extension of thematic areas to be covered.*

*National Conference on Quality Management System (SQM) with the international participation has been gathering prominent experts from the field of quality over the last twelve years. In addition to the local, Montenegrin experts, the participation lists included a number of well-known scientists and experts from France, Spain, Canada, Portugal, Italy, Greek, Poland, Denmark, Slovakia, Slovenia, Serbia, Bosnia and Herzegovina, Croatia, so some of the vital issues of quality, management, engineering, education, and environmental protection will be discussed at 10<sup>th</sup> International ICQME Conference, and the participants from both the university and the commercial fields will take part, contributing to a more productive exchange of ideas and experiences.*

*The conference intends to shed further light on the complex and potentially conflicting choices that firms take, in order to acquire, exchange, and create knowledge in order to improve its performance. This theme relates to quite a wide variety of aspects relating to the increasing complexity (e.g. economic, management, engineering, sociology) of systems for knowledge creation and innovation. This complexity implies a more intensive and more frequent need to embrace as well as to connect both internal and external source of knowledge in the search for new technological achievements. ICQME became a part of Quality Festival, a manifestation that takes place in Montenegro, Bosnia and Herzegovina and Serbia.*

**In Podgorica,  
September 2016**

### ON BEHALF OF THE ORGANIZING COMMITTEE

**Prof. Zdravko Krivokapić, PhD**



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## ANALYSIS OF THE SITUATION IN THE TEXTILE INDUSTRY IN MACEDONIA THROUGH FOUR QUALITY PILLARS

**Abstract:** In this paper is elaborated and confirmed the need of projection and implementation of total quality management (TQM) system within Macedonian textile factories. Quality should be required not only in the production process, but in all parts of the business processes, even in the way the employees behave. An analysis is made on the situation in the textile industry in Macedonia and its progress through the four quality pillars: internal standardization, statistical process control appliance, education and motivation, and analysis of the quality costs. The results of the analysis have shown low progress of Macedonian textile companies according to the four quality pillars, therefore, this paper promotes methodology for increasing competitiveness among the textile companies and their pre- structuring in order to catch up with the new world trends.

**Key words:** textile industry, internal standardization, quality costs, education and motivation.

### 1. INTRODUCTION

The process of globalization and the bigger involvement of the national in the international economy are placing a large amount of challenges in front of the textile industry, for the national economy, and for the country in general. We are witnesses today of a process of pre-structuring in the textile industry in more developed countries in Europe, and migration of part of the capacities in European and some other countries. This trend may reflect beneficially for the Republic of Macedonia and it is an opportunity for entrance of different forms of foreign capital. The results of these migrations are already reflecting in the increased demand and more favorable of lean arrangements. However, the lack of strategic planning in Macedonian industry in the past has had unfavorable impact on the performances of the textile industry today and the level of its development. The findings from the past show that until today, the structural development, respectively the production of textile, garment and raw materials, has been largely modified Ad hoc, principally, under the influence of the foreign factors. It was also conditioned from the consequences of different unsuccessful models of privatization.

Today in Macedonia, there are 500 textile industries and other related to them, and all of them are private capital. The way which leads to promotion of processes and products quality within Macedonian textile companies should be looked for in the proper methodology for projection and implementation of TQM (Total Quality Management) system [1][2].

In this paper is made an effort, with the help of the principles of TQM, and based on the results of the analysis, to be developed a universal, integral methodology for projection and implementation of TQM system within Macedonian textile factories. This methodology should help and give useful

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guidelines to all of the Macedonian textile companies which are looking towards organizations of “world class” [3].

## **2. FINDINGS AND ANALYSIS OF THE FINDINGS FROM THE RESEARCH OF THE SITUATION WITHIN THE TEXTILE COMPANIES IN MACEDONIA**

On account of the decelerated processes of adaptation of the textile industry in Macedonia, the lean production is overwhelming, and it is mainly based on sewing as one of the most profitable kinds of cooperation with the foreign partners [4]. Lean production participates with 93 % of the total export in the textile industry, while with only 7 % participates the classic case of export.

According to information from the textile cluster and the experts, Macedonian textile factories are in a period of stagnation, destruction, although the statistical data show that the export stays on the same level, very slightly moving forward [5].

The analysis of this paper is a segment from the general research of the current situation in Macedonian companies in the domain of projection and implementation of the quality system, analyzed through four pillars of the house of quality, with the ultimate management on the peak of it, and the measurement, evaluation, analyzing and contrast of quality/poor quality in the foundations of it. House of quality is based on four subsystems: internal standardization, methods and technics in the non-defective work, education and motivation, and analysis of the quality costs [3].

Special attention is paid on collecting input in the research. The research is made with questionnaire and personal understanding of the real situation within Macedonian textile factories. The analysis of the results was done by evaluation algorithm and determination of the “age”, that is the development of Macedonian textile companies seen through the columns of the house of quality (from young and undeveloped system towards mature and developed system, and vice versa) and perception of the subsystem deviations of the TQM system through the “health” symptoms of the quality system. A Pareto analysis of frequency is being used, as well as analysis of participation of particular answers in percentage. 71 Macedonian textile companies from the eastern part of the country took part in the research, from total of 500 companies registered in the territory of Republic of Macedonia.

### **2.1. Application of the internal standardization within Macedonian textile companies**

In view of the evaluation of the company’s success, one of the parameters representing criteria for survival and appearance on the European market is the projection and implementation of internal standardization. For effective functioning of the applied quality system in accordance with ISO 9001:2015, Macedonian textile companies need access to specific information such as: plans and methodology for their realization, standard operation procedures (SOP) for all the business processes, job rules, regulations, textile standards, suggestions for corrective activities, etc. [2][6][7][8][9]. That is why; it is more than necessary for a good information system to be projected. In order to this arises the question: *Is there applied quality system in accordance with ISO 9001:2015 in Macedonian textile factories and where do they see the benefit of its implementation?*

The fact that is worrying is that only 39 % of the analyzed companies have applied quality system in accordance with ISO 9001:2015, which is a relatively small number.

The need of work qualifications in accordance with the international standards and strategic connections with the western countries urged some of the Macedonian managers and owners to implement a quality system. In order to this arises a question for the textile companies that have already certified quality system in accordance with ISO 9001:2015, where do they see the benefits of its implementation.

The companies that have already certified a quality management system (39 %), in contrast to those that haven't are implementing the following benefits: a quality of the products/services and the business processes is provided, the quality management system in accordance with ISO 9001 standards represents a basis for constant development, order and discipline is imposed in the work, and it represents a foundation for implementation of the Total Quality Management (TQM) strategy.

The benefits from the implementation of the internal standardization are registered by only 77,8 % of the companies, while 22,2 % have formally certified quality management system, but they do not fulfill the requirements of the ISO standards and they do not have any benefits from the formally certified quality system. There were a lot of companies in our countries that managed to certify a quality system in accordance with ISO 9001, but they didn't survive the transition, due to the poorly administered transformation.

In order to identify if the textile companies have efficient quality system, through monitoring the management method of the business processes and the established documentation for system efficiency, arises the question: *Do the employees expect standard procedures for all the business processes from their superiors?* Figure 1.

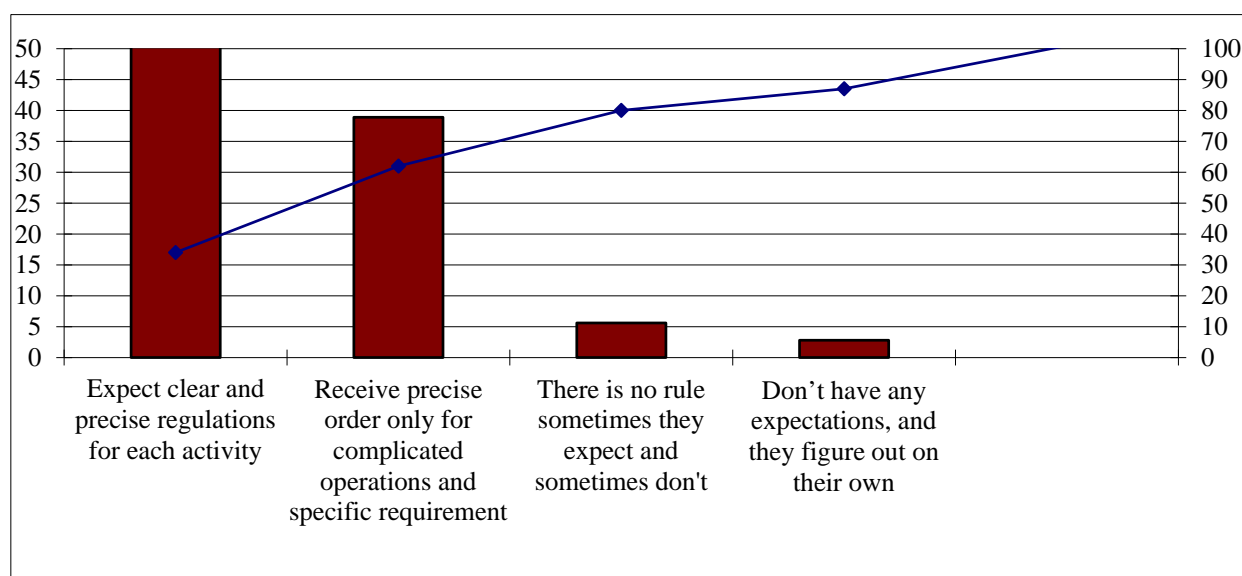


Figure 1. *Do the employees expect standard procedures for all the business processes from their superiors?*

- 52,7% of the analyzed textile companies have developed standard operation procedures (SOP) for all the business processes;
- 38,9%, of them, stated that they receive precise order only for complicated operations and specific requirement from the customers;
- 5,6% of them, stated that there is no rule, sometimes they expect, sometimes don't;
- 2,8% of them don't have any expectations, and they figure out on their own.

For the quality system to be effective and efficient, it is important for the employees to receive clear and precise standard operation procedures (SOP) for each activity, to be established criteria for measurement of the good results, and that is not only for specific and complicated procedures, specific solutions or specific requirements from the buyers/customers. These data lead to the fact that *quality system in Macedonian textile companies is only formally certified as a need imposed by the market, without any will for a real organization of the company, for definition of the obligations and responsibilities in order to promote the quality.*

## 2.2. Application of the methods and technics of quality within Macedonian textile companies

The methods and technics for quality management are instruments for implementation of activities for quality improvement and are integral part of the quality management, according to the defined politics, aims and responsibilities of the company, as well as creating comparative advantages on the market. With their appliance, it can be obtain efficient processes control, acquiring the defined quality at minimum work costs [1][3][10][11].

*In order to be identified the methods and technics for quality management that are used in Macedonian textile companies, arises the question: How do they (the companies) measure the quality of their products/ services, Figure 2.*

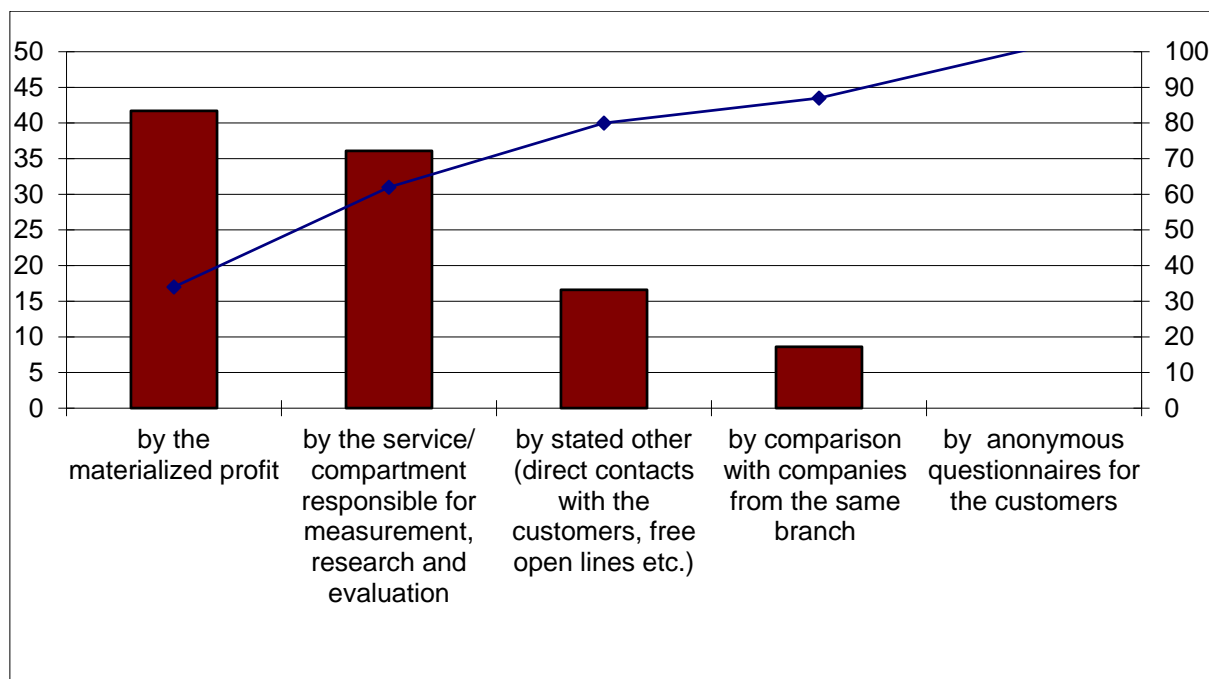


Figure 2. How do Macedonian textile companies measure the quality of their products/ services?

All of the companies answered this question, the gained results refer to the following:

- 41,7% of them, *quality is measured by the materialized profit;*
- 36,1% of them, *quality measurement of their products/ services is made by the service/ compartment responsible for measurement, research and evaluation;*
- 13,6% of them *stated other ( direct contacts with the customers, free open lines etc.);*
- 8,6% of them *stated that they measure the quality by comparison with companies from the same branch;* and
- *None of them measures the quality with anonymous questionnaires for the customers.*

In order the application of methods and technics of quality to have an effect, a proper choice and mutual coordination is required. In order to be seen the effect of the methods and technics of quality application within Macedonian textile companies, arises the question: *How do the companies know if their products/ services don't fulfill the customers' expectations?*

It is established from the survey that Macedonian textile companies do not find out for the poor quality of their products/ services from the quality control of products /services department, but from the complaints from the buyers/ customers, claimed almost 44,4 % of them. This information shows that poor quality has passed all the control points and arrived to the final holder. These information lead

to the fact that in a large number of companies there is non-efficient quality control of products/ services department, because the poor quality comes to the customer.

To find out if the textile companies have established efficient processes control, acquiring the defined quality at minimum work costs, arises the question: *What kind of quality control of products/ services do they implement?*, Figure 3.

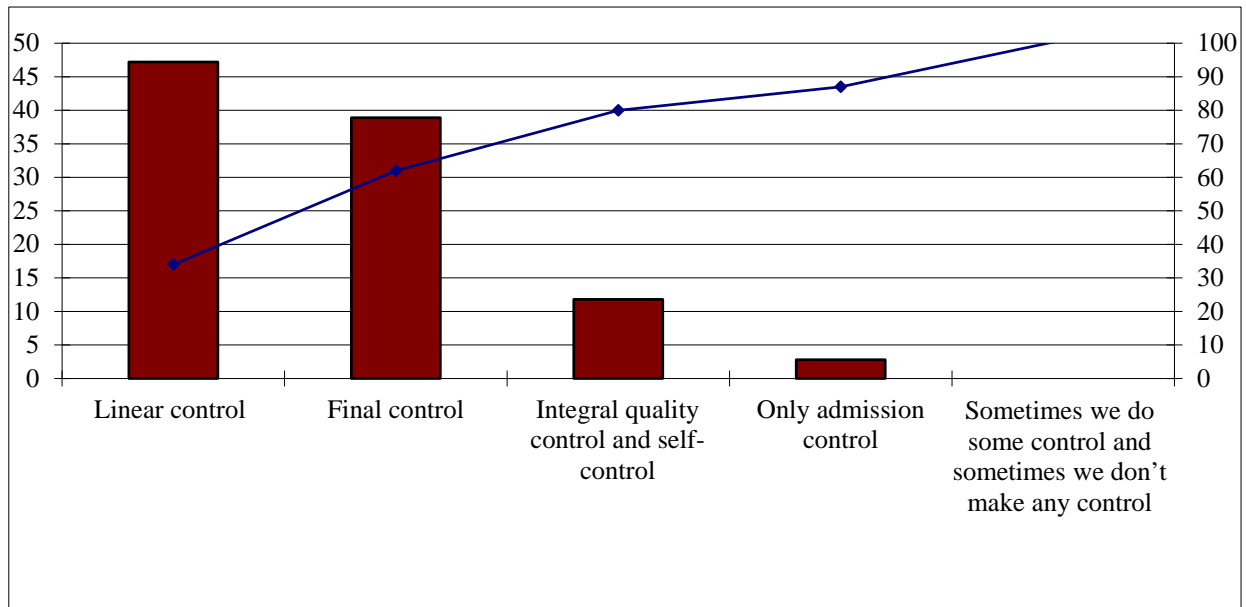


Figure 3. *What kind of quality control of products/ services is implemented within Macedonian textile companies?*

All the companies answered this question and here are the following results:

- 47,2% of them, implement *linear control*;
- 38,9% of them, have *final control*;
- 11,1% of them, stated that implement *integral quality control and self-control*;
- 2,8% of them, have *only admission control*.

In Macedonian textile companies the quality is on an unenviable level because of the poor managing with the business processes, non-efficient control with a large number of defects, larger even from the permissible. Technical-technological equipment of Macedonian textile companies is approximately on a satisfying level and satisfies the current requirements of the customers to a certain degree. Problems mainly emerge from poorly organized business processes and incapability of satisfying the required quality standards. Here, with the same technology, lower business results are achieved. The reason is not only in the lack of modern technology, but also in the poor managerial capacity of the managers, employees' qualifications and performance, quality of managing the business processes. *Mainly, linear form of company management is implemented (in separate phases) which are characterized with higher work costs.*

*Not putting into practice the statistical process control (SPC) can be seen from the figures obtained by the research: How much of the daily production is reworked, Figure 4.*

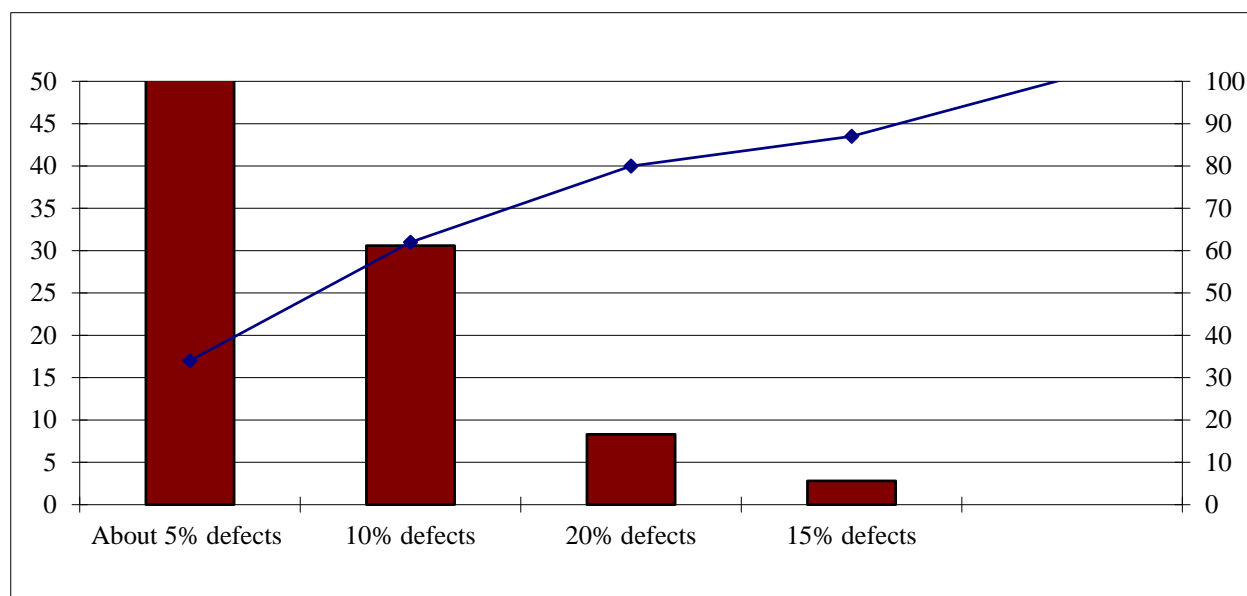


Figure 4. How much of the daily production in Macedonian textile companies is reworked?

- 58,3% of the textile companies register return of the daily production to rework by 5% defects;
- 30,6% of the textile companies register return of the daily production to rework by 10% defects;
- 8,3% of them, register return of the daily production to rework by 20% defects;
- 2,8% of them, register return of the daily production to rework by 15% defects.

In case of optimally organized quality control, it should not be more than 3 % defects.

In the actual circumstances in Macedonia, the quality of the textile products is provided by non-efficient work organization and a larger percent of defects from the permissible, and that is in different production operations.

From the analysis of the answers for implementation of quality system in accordance with ISO 9001:2015 standards, small number of companies implement efficient quality system, *almost in all of the textile companies there is linear and final control, the last one is applied almost 100 % in all of the textile companies.* The real defect percentage is between 5-15 %, however from the textile cluster believe that in conditions of optimally organized quality control, there should not be more than 3 % defects. *Although a lot of owners of textile companies claim that they have quality norms, it is arguable whether they are quality or quantity norms.*

### 2.3. Do textile companies learn?

Organizational study is a component of the Total Quality Management (TQM) strategy because, if new technics and methods are not learnt, there is no opportunity for progress and development. Knowledge strengthens the competitive advantage of the companies. The ultimate management has a major role, it should be prepared for learning and to transfer the need for learning to the employees [3][12]. In order a clear picture for Macedonia textile companies to be produced, whether they are companies that learn and stimulate individual and collective learning in order to improve organization results, in a way important for all the users, several questions arise: *Is there an in service training and additional skills training?*

On the question Does the company practice in service training, the gained results refer to the following:

- 47,0% of them, *have planned, organized and well implemented in service training*;
- 25,0% of them, stated that sometimes practice in service training;
- 19, 4% of respondents stated that they have obligatory training when applying new methodology;
- 8,6% of them, never practice training.

According to the results from the research it is noted that in most of the companies there is planned, organized and well implemented in service training of the employees.

The need for improvement of the employees' qualification level is very important in cases of investing in modern technology. Our experience indicates the necessity of constant training of the immediate employees, especially training programs appropriate to the EU requirements. The question whether the companies practice regular additional skills training, arises in order to examine the ultimate management awareness for the need of constant vocational training and development of the employees in the knowledge era, where the constant specialization of the employees is an imperative for competitiveness and further development of the company. Lifelong learning is a condition for survival of the modern business, Figure 5.

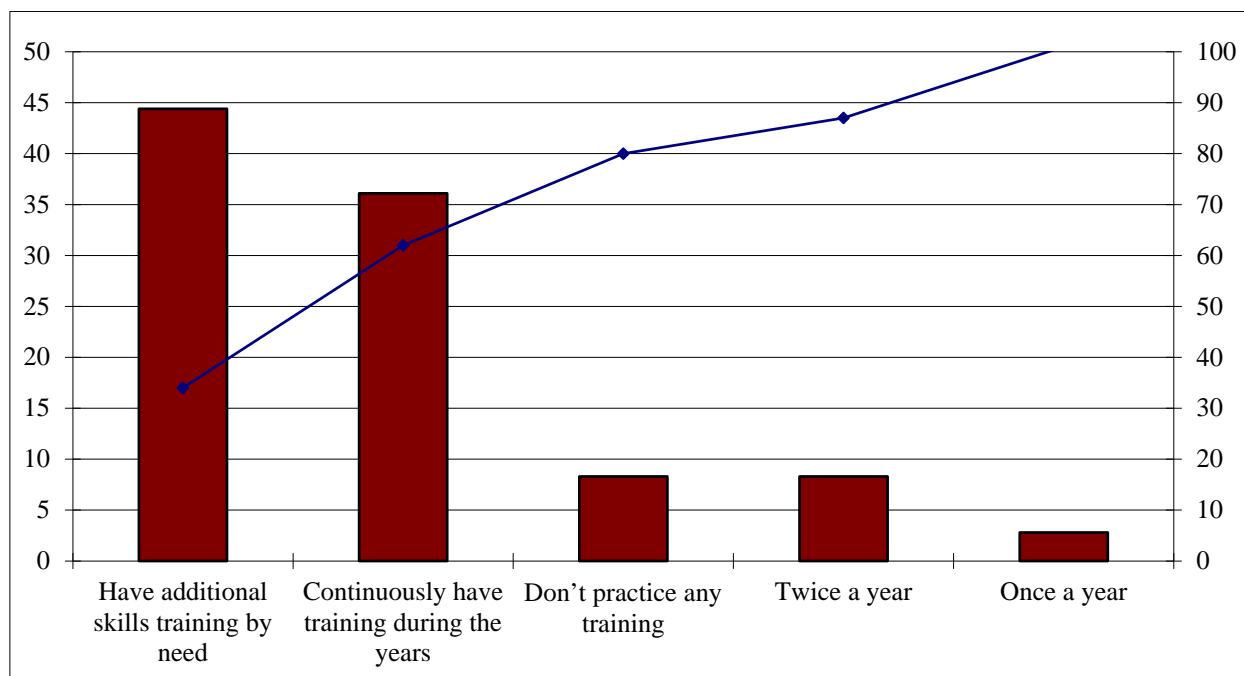


Figure 5. Does Macedonian textile companies practice additional skills training

On the question *does the company practice additional skills training*, the gained results refer to the following:

- 44,4% of respondents *have additional skills training by need*;
- 36,1% of respondents *continuously have training during the years*;
- 8,3% of them, *don't practice any training*;
- 8,3% of them *were present on vocational training twice a year, which is the minimum in the knowledge era*;
- 2,9% *have training once a year*.

The fact that worries is that 8,3 % or 44,4 % of the analyzed textile companies *don't practice additional skills training or they practice training by need*. These real indicators indicate that non



practicing regular additional skills trainings is one of the reasons for the poor competitiveness of Macedonian textile products on the global market.

If we take into consideration the fact that the existing knowledge must be updated with new knowledge or else it will fade away in 5 years, the question arises how competent are the employees who do not practice trainings, and are supposed to satisfy the needs of the modern management. Macedonian textile companies have not realized yet the necessity of knowledge improvement as a source of competitiveness, condition for survival on the market and moving power for further development. Among the many problems our companies face is the inadequate education of the ultimate management.

Our research points to a low cooperation and connection of companies with science institutions (only 2,9 % of them), which leads to the note that the companies are poorly informed about the opportunities these institutions provide, or there is no interest for scientific approach to work. That, in large scale is a result from the low information about the services these organizations and programs provide.

### 3.1.1. Motivation- important factor for providing quality within Macedonian textile companies

Motivation of the employees is the most sensitive part of the organizational behavior and is represented through the employees satisfaction [3][12]. *On the question How the companies motivate their employees to work more and better, the following information is received, Figure 6:*

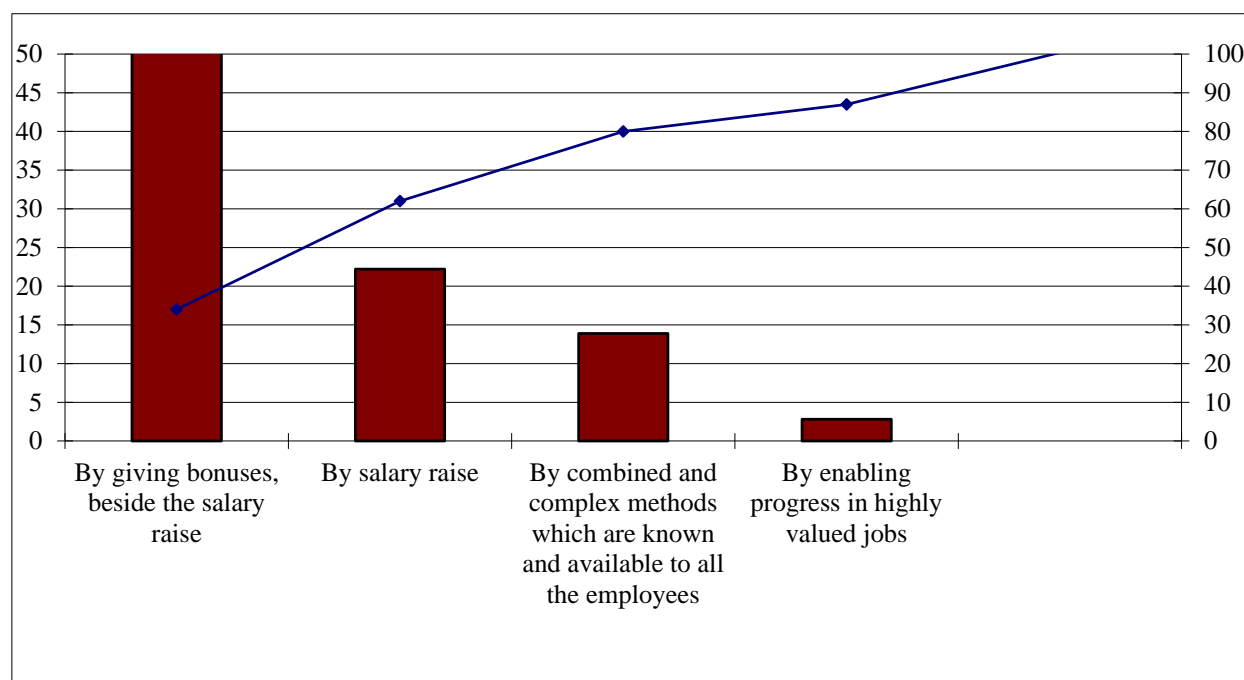


Figure 6. How the Macedonian companies motivate their employees to work?

In all of the companies, salary raise is the **key motive**.

- 61,1% of them, *motivate their employees by giving bonuses, beside the salary raise;*
- 22,2% of the respondents stated that *they motivate the employees by salary raise;*
- 13,9% of them, *motivate the employees by combined and complex methods which are known and available to all the employees;*
- 2,8% of them, *by enabling progress in highly valued jobs.*

Motivation with bonuses is present in most of the companies, but in a large number of them the salary raise is the key motive.

The minimum wage in Macedonia is the lowest in the region and it is 143 Euro. However, the reality is different because there are documented cases when the employer pays the total salary amount to the employees, and after that demands from the employees a certain sum of the salary. These cases impact the employees' dissatisfaction and that directly reflects on its performance and motivation.

According to the state statistical office last year the average net wage in the textile industry was 179 euro, however, most of the employees in this industry have monthly earnings between 100-150 euros. Compared to the average Macedonian wage which is 340 euro, textile industry is at the bottom. The situation in the textile industry is especially difficult for the female population, which is 86,5 % from the total number of employees in the textile industry. There are many different cases of mobbing and discrimination, as well as unpaid overtime work.

The necessity of creating good quality system and implementation of TQM strategy in Macedonian textile companies will be obtained only by creating motivation system as integral part of the house of quality, and that will mean: total motivation factors, as well as impetus measures and strategies, which will be incorporated in the working and organizational activities systematically and planned, in order to motivate the employees. In order to achieve this, the ultimate management must: attract and hold the most quality personnel; provide quality accomplishment of the undertaken activities; fosters the creativity and innovation, which will lead to fast and quality problem solutions; provide identification of the employees with the company and their involvement of the constant development of the company.

#### **2.4. Quality costs management within textile companies**

The analysis of the quality costs can help the managers to understand the impact of the poor quality on financial results and the bad image of the companies [13]. Principally, it will help the managers to increase their activities for improvement of the quality of business processes, products/ services. There are quality costs because of the poor or possibly poor quality and the quality cost analysis should be simple and practical, instead of administrative and chaotic [3][14].

*On the question do the companies do quality cost analysis (defects, complaints, trash, waste etc.), the gained results refer to the following:*

- 88,9% of the respondents *analyze the quality costs i.e. the waste from the complaints and the trash;*
- 11,1% of them, *reduce the analysis to a mere documentation of complaints from the customers, without analyzing the trash in the production, records of the place and the reasons for it.*

All of this leads to major loss, the planned financial result is not achieved, companies lose their reputation, additional time and correction materials are spent. *The practice of Macedonian textile companies suggests that they do not pay attention to quality costs analysis because of ignorance, and therefore their products/services aren't competitive on the market due to the high prices they have.* Our companies should aspire in minimizing the costs, which means, for certain level of production, not to use more sources than the necessary. For the organizations, this will mean bigger profit because the difference between the production price and the selling price at minimum costs is bigger. [15][16][17].

### 3. DEVELOPMENT PHASES OF TQM (TOTAL QUALITY MANAGEMENT) SYSTEM WITHIN MACEDONIAN TEXTILE COMPANIES

Based on a detailed analysis of the actual situation, the “age” was established, the development of Macedonian textile companies through the pillars of the house of quality, respectively (from young and undeveloped system towards mature and developed system, and vice versa). The deviations of subsystems of the TQM system were seen, through the symptoms of “health” of the quality system and it was noticed that the situation in Macedonian textile companies is different from the foreign companies which are based on the TQM principles, Table 1.

Table 1. Development phases of TQM system within Macedonian textile factories

		Development phases of TQM system within Macedonian textile factories			
		Starting	Medium	High medium	Advanced
House of quality	Internal standardization	■			
	Methods and techniques of quality		■		
	Education	■			
	Motivation	■			
	Cost of Quality		■		

Based on the received results from the research, it was established that Macedonian textile companies are not very concerned about quality, they do not pay sufficient attention on constant education, they invest too little in innovations, small number of companies have created quality system, the concern about the employees, customers, distributors and the community is on a very low level, there is low application of statistical process control, team work is considered to be returning to the past. In one word, the methodology of technological development is unfamiliar here, i.e. the integral model for projection and implementation of TQM system lacks.

The way which leads to improvement of the processes and products quality in Macedonian textile companies should be looked for in application of proper methodology for projection and implementation of TQM system [3].

In this paper is made an effort, with the help of the principles of TQM, and based on the results of the analysis, to be developed a universal, integral methodology for projection and implementation of TQM system in Macedonian textile companies. This methodology should help and give useful guidelines to all of the Macedonian textile companies which are looking towards organizations of “world class”. The model - methodology which is suggested is integral and universal, which means that is applicable in all the companies, regardless of the industry, and the success of its application will depend only if there is integration of the computer technology with: internal standardization, methods and technics of non-defect production, the system for costs analysis and with continuous education and motivation of the employees, a competitive advantage to be provided.

The integral methodology for projection and implementation of TQM system is consisted of several methodologies [3]: Methodology for the subsystem – internal standardization; Methodology for the subsystem- statistical process control (SPC), Methodology for total costs analysis of specific process;

Methodology for the subsystem – education; Methodology for success evaluation from the projected and implemented TQM system (Audit), Figure 7.

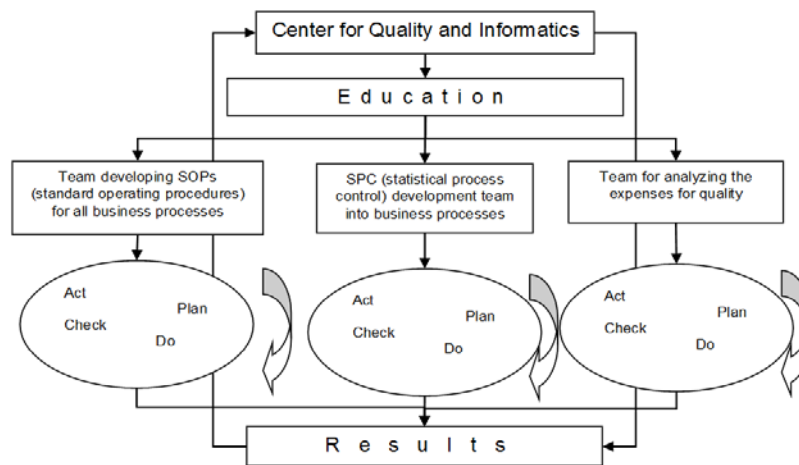


Figure 7. The integral methodology for projection and implementation of TQM system within Macedonian textile companies

The basis for creation of this model is re-design, respectively re-engineering of the business processes, after which starts a new phase in the business process-continuous promotion, that is spinning the Deming cycle of quality (Plan-Do-Check-Act).

The need of re-engineering can appear in major crisis companies or in companies where the crisis is about to come. The application of re-engineering is present even in companies in good shape that have development and growth potential, but also aim to be in trend with the global market requirements.

The integral methodology for projection and implementation of TQM system has a reversible connection as a result from the necessity of permanent promotion of the business processes. With repetition or spiral repetition of these cycles, the benefits of its application will be seen, which changes the organizational culture towards these initiatives and it is a motive towards higher aims of perfection. The application of this methodology in some companies produced great results in the last few years [15][16][17]. Application of computer technology is necessary in order this integral methodology to be efficient [9].

## CONCLUSION

*Expected benefits from the suggestion-methodology for projection and implementation of TQM system in in Macedonian textile companies are:*

- Application of the internal standardization improves the employees' responsibility in realization of the business processes;
- With application of statistical methods and technics, work defects are decreased and it is a significant benefit, especially when fixed quality in minimum work costs is required;
- With the application of the software packages the efficiency of application of statistical methods and technics is increased;
- Through analysis of quality costs, waste can be controlled and it can be minimized in terms of materials and energy consumption.

Beside these, other important effects are expected to be made, such as:

- Inclusion of all the employees in the quality realization;
- Employees commitment towards quality improvement;
- Total commitment of the top management towards the TQM system and its continuous development;
- Capability of problems solving on all the levels;
- Small, but important improvement in the processes and products;
- Optimization of the business processes;
- Transferring the responsibility of decision-making on a lower level.

Without commitment of the top management towards the set quality targets and consistence in their implementation, all these efforts will be wasting time and money, and at the same time they will reduce the possibility of success of the next similar initiative.

This methodology will not only give success in implementation of improvement of the business processes within Macedonian textile companies, but will also raise the awareness of the employees for the quality and their direction towards improvement of the customer's satisfaction. But, without support of the top management and without inclusion of all the employees, all the improvement efforts will be wasted [12].

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