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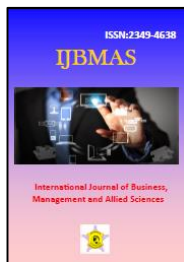
PROJECT TO IMPROVE PRODUCTIVITY AND QUALITY IN COMPANIES IN THE INDUSTRIAL SECTOR OF LIBYA

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ABSTRACT

Libya urgently needs to improve the performance of its industry and devote more resources to research and development projects that allow the transfer and implementation of technology to improve the productivity and quality of its production and consolidate its competitive advantage. There is a tremendous need for more scientific research in this field to support the transfer and materialization of these ideas to local and international industry. At present, companies have realized that in order to compete at a global level they must join efforts to improve and can no longer rely on individual efforts. The same is true in research since in individual projects efforts to achieve sectorial impacts are often frustrated frequently when projects are completed and the results cannot be disseminated or capitalized beyond those directly involved. During the nine months that the consultancy lasted (May 2002 to January 2003, since the activities of the eighth month were carried out during the course of December and January at the request of the participating companies), Quality and Productivity Management processes began in the companies oriented to continuous improvement and under the guidelines of ISO 9001: 2000. The general objective of the project is to develop systematic actions for research and implementation of changes to achieve world class efficiency in Libyan companies. To achieve this objective, research will be carried out to compare efficiency and understand the differences between Libyan companies and leading companies in the international arena. The project also includes a series of dissemination, training and transfer of the basic ideas and the results of the research through publications, seminars, workshops and direct implementation actions in companies. The global framework of this project also includes a series of actions aimed at promoting this collaborative research scheme towards new sectors, incorporating new companies and research projects in sectors such as mining and manufacturing, inviting companies from these areas to

formulate collaborative projects for future development. Finally, it is considered convenient to highlight the impact and opportunity of projects like this, in a country like Libya, which is immersed in a process aimed at improving its levels of competitiveness.

Keywords: Libyan Companies, Industrial Projects, Case study, Project management

Introduction

Libya is located in the Maghreb region of North Africa. It is the sixteenth biggest state in the world and fourth largest African state occupying an area of about 700,000 sq miles. The country has over 7,200,000 people with over a million Libyans living in Tripoli, the largest and capital city. The economy of Libya depends on revenue from the petroleum industry, which contributes over 95% of the revenue Libya earns from exports. Other important industries including mining, agriculture, and tourism. Libya's other manufacturing industries are small, lightly capitalized, and devoted primarily to the processing of local agricultural products (tanning, canning fruits and vegetables, milling flour, and processing olive oil), and to textiles, building materials, and basic consumer items. Industry is the backbone of Libyan economy because of the strong petrochemical industry. It accounted for 63.8% of GDP, employing 25.4% of the active population in 2018 - lowest rate since 2011 (World Bank). Production includes petroleum, petrochemicals, aluminium, iron, steel, food processing, textiles, handicrafts, and cement. Agriculture's share in Libya's economy is negligible, accounting for 1.3% of GDP in 2017, according to latest estimates of CIA World Factbook, and employing 11.2% of the workforce (2018 - World Bank). Main products include wheat, barley, olives, dates, citrus, vegetables, peanuts, soybeans, and cattle. Arid climate conditions and the poor quality of the soil severely limit agricultural production. Industrial sector represent nearly 80% of GDP. The country has enormous oil reserves which represent about 97% of total export revenue, 75% of government revenue and 54% of GDP. Moreover, gypsum, salt and limestone are produced in significant quantities. Industry is less developed, but the main sectors are oil refining, industrial food preparation, textiles and cement.

General Objectives of the current research

- According to the guidelines formulated for the current study, the general objectives were:
- Contribute to strengthen the export capacity of Libya
- Promote a process of change in the systems and organization of business management in the beneficiary companies based on modern techniques of continuous improvement.
- Encourage actors in the business field to be involved in the search for improvement of the operational and productive capacity of companies.
- Develop the program in the companies selected by the Chambers of Industry of Tripoli, Libya
- Train the personnel belonging to each of the participating companies as instructors and facilitators of the program within each organization.
- Advise participating companies in modern management systems and according to the globalized market; within this, route them in a Quality Management System, under the guidelines of ISO 9001: 2000.
- Raise the productivity levels of the participating companies, working on solutions to problems of effectiveness and efficiency.

The participating companies and the facilitators who concluded the program was Misurata Chamber of Commerce & Industry & Agriculture in Misurata, Libya

METHODOLOGY FOR PROGRAM DEVELOPMENT

It began with the Management awareness, since if you want to obtain results, it is important that the executives of the company, starting with their senior management, commit themselves and are willing to give the support in resources and organization, necessary for its development. In this phase, the company's macro indicators were defined, which were permanently analyzed to review the progress of the process.

Once obtained the management commitment, it was made the diagnosis Organizational, compared to companies with an ideal place in the following areas: Administration, Marketing and Sales, Human Resources, Financial Resources, Suppliers and Purchasing, Planning and Control of production, distribution of plant and Handling of Materials, Supplies, Design of the process, of the Product and Methods of Labor, Maintenance, Legal Department, Systems of Information, Security and Industrial Hygiene, Control of Quality and System of Quality.

The activities that are defined in the diagnosis helped create the structure for the companies to work properly, but not necessarily in the future. This projection was taken into account in this phase of the program and consisted in the realization of the Strategic Planning of the companies: the corporate philosophy (mission, vision, values and policies) on which its performance will be based was defined; is performed one internal analysis and of the environment; It is defined the objective director and the objectives of the areas that I support, as well as progress indicators, strategies and plans of action to achieve the same. Here they are unified the corresponding activities of the Strategic Planning and the System of Management Organizational facilitating the implementation and monitoring of the same.

Taking into account the need to involve to all the staff of the companies and ensure that this program after the completion, continue to the inside of the same, are internal facilitators formed that are in capacity to deploy the process towards the lower levels. They provided training and training on topics that will achieve the end proposed, such as: Training of Trainers, Leadership, and Work in Equipment, ISO 9000, and Cost of Poor Quality Projects in Solution of Problems, Management of Tools Statistics and Tools of Creativity. Then of the facilitators received the proper training, they unfurled the process towards the lower levels, starting with talks of targeted induction to all the staff of the companies participating, with the guidance of the experts. In this phase you were involved 2780 two thousand sixty seven hundred and eight people, immediately it began the work in which all involved the collaborators res in subsystems: Improving the Workplace, under the methodology of the 3S's, only as necessary, Order and Cleaning and implementation Regular meetings Internal Supplier Client. In addition, the facilities began the work in Projects Troubleshooting (efficacy) by the application of the path of quality and tools statistics. For a better follow-up of the activities, the developed methodology contemplated the development of five subsystems detailed briefly below:

Subsystem 1 (S.S1): Strategic Planning: Each of the companies defined their corporate philosophy (mission, vision, values and policies); in some cases they were created for the first time and in others the existing ones were reviewed. The companies identified their internal strengths and weaknesses, as well as external opportunities and threats, based on the concepts of Strategic Planning. The guiding objective for 2018 and the objectives for areas that support this objective were defined below. Strategies were defined that allow, in the first instance, the dissemination of philosophy at all levels in the organization and then achieve the objectives through action plans derived from these strategies with specific activities, deadlines and responsible. Many activities have already been developed during the program and there are others in execution.

Subsystem 2(S.S2): Organizational Management System: In this subsystem, through a diagnosis and using the criteria and the concept of Benchmarking, fourteen areas that an organization normally needs were analysed. This identifies the organizational structure that is available, and proposes activities that bring them closer to the ideal organization. Within this subsystem, the management of the customer satisfaction mentality, continuous improvement is managed and the organization is directed to the

Quality Management System, under the precepts of ISO 9001: 2000, including the lifting of minimum documentation required by said regulations.

Subsystem 3(S.S3): Problem Solving Projects: Companies have hidden costs due to poor quality such as waste, reprocessing, unscheduled shutdowns, guarantees, claims, etc. In this subsystem the main problems of the companies referred to poor quality were identified; the costs that they represent were quantified and projects to solve the main problems that could be of efficacy and / or efficiency were defined. For this, participants were provided with a methodology based on the Quality Route. It includes data collection tools, analysis of them for decision making.

Subsystem 4(S.S4): Work Environment Improvement: The work environment is a fundamental aspect in improving Quality and Productivity in organizations. Based on the Japanese 5 S's methodology, developed an environment improvement structure work physicist called SOL® (Only what is necessary, Order and Cleaning), which initially contemplated a diagnosis based on a series of digital photographs, after which the staff was made aware and mini companies were performed at the work sites, to culminate with a great care in which an ideal situation of the physical environment is achieved. Likewise, surveys and visits to places of common use such as dining rooms, sanitary batteries, of which improvement projects were implemented were carried out. In addition, the concept was insisted so that it is not only applied in their work environment but also in homes. Another important point of development in this subsystem was to perform an analysis of the work environment through an internal survey and define an action plan based on the results obtained.

Subsystem 5 (S.S5): Internal Customer-Supplier Relations: In this subsystem, a structure of internal client-supplier meetings was created in order to solve border problems and improve the performance of each of the areas. A calendar of meetings was established, according to the needs of the participants. They are periodic and documented to carry out a positive follow-up that leads to concrete results.

METHODOLOGY FOR TRAINING FACILITATORS

The facilitator training program basically covered two aspects:

1. A theoretical training, which consisted of knowledge and skills development work in relation to the philosophical and methodological part of Quality, problem solving, statistical and non-statistical quality tools, meeting management, skills development leadership, communication and management, management of ISO 9001: 2000. During the time that the consultancy lasted, nine practical theoretical meetings were held, in which own examples were presented for each organization. Thematic of the Seminars-Workshop details are as follows.
2. A practical work that contemplated the application of what was learned in the daily work and the dissemination of the concepts to all the personnel of the participating companies and whose total number of participants was two thousand seven hundred sixty-eight.

METHODOLOGY FOR MONITORING ACTIVITIES

The consultant, aware that the success of the program depends on the constant monitoring and feedback that can be provided to companies, defined a scheme of indicators for each company and for each of the five subsystems proposed. It was applied after having taught, in large part, the theory that supports the program, that is, it was implemented from the fourth to the seventh month, and whose results were part of the monthly activity report. The last evaluation and which is included in the results of the companies corresponds to the eighth and ninth month of consulting and whose parameters are set out in as following:

Ideal Results in Each Subsystem

Strategic planning

- Defined, approved, disseminated and known to all staff, this is the corporate philosophy (mission, vision, values and policies)
- Defined the Internal Analysis (strengths, weaknesses) and Analysis of the Environment (opportunities and threats) most important
- Defined the Governing Objective and the Main Objectives in each of its strategic areas
- Defined strategies to achieve objectives, activities, deadlines and responsible for implementing the strategies described (result of internal analysis and the environment)
- Defined indicators in the main objectives by area
- Performing monitoring of the PE subsystem at all levels
- Evaluating compliance with the indicators and taking corrective and / or preventive actions if necessary

Organizational Management System

- There is an inventory of documents, procedures, instructions and records existing within the company, as well as their use and validity
- The need to eliminate and / or create necessary documents to strengthen its performance has been reviewed
- The main management indicators for the different processes and their monitoring and control mechanisms have been defined
- Problems have been reduced by having standard working methods

Problem Solving Projects

- Work has been done on at least two problem solving projects and their results have been quantified
- At least two new projects have been defined

Work Environment Improvement

- An audit of the physical work environment was carried out through a visual observation and photographs of the plant facilities and administrative offices. Problem areas were determined and a plan for elimination, standardization and maintenance of the work environment was developed
- A work environment survey was carried out at all levels and should be analyzed with those involved to establish a concrete plan of activities, on points to improve

Customer-Supplier Relations

- The areas that will be involved in the pilot meeting plan have been defined
- The meeting plan is in operation as a mechanism to solve border problems

Global results

The most important results achieved globally in the program are summarized below, emphasizing what has been obtained in the Problem Solving Projects subsystem, which shows quantifiable results:

Strategic planning

It was achieved that all participating companies do it, some for the first time such as Royaltex, Graphic Center, Pichincha Industrial Chamber, GELATI, FILARET, PICA, Official Agricultural or review it, in the case of companies that already had all that which involves Strategic Planning, that is, definition of mission, vision, values, SWOT analysis and, together with that, the planning of activities that lead companies to project themselves into the future.

The corporate philosophy (mission, vision and policies) is defined, approved and disseminated in all companies except for the Graphic Center, whose approval is in process.

The Governing Objective has been defined, in all organizations, the main objectives and activities in each of the areas, whose fulfilment will allow us to achieve the stated goal.

Follow-up meetings have been determined and scheduled to analyze, correct and / or maintain the desired results. These are meetings, in 99% of the participating companies, of managerial type. A system of management indicators is used, raised in all areas, with their ideal and critical values.

From the follow-up mentioned, in all the companies a better control has been achieved in all the areas of the same.

Organizational Management System (involves the Quality Management System)

Companies that were already working on the ISO system, such as Centro Graphic and VECONSA, understood the system better, improved it and saw the advantages of the new approach of the ISO 9001: 2000 standard.

An internal documentary audit was carried out in the companies, and the structure that the companies have compared to the minimum documentation required by ISO 9001: 2000 was defined.

Thanks to this audit, unnecessary documents were detected and in turn the need for others that will help companies improve.

Problem Solving Projects

Projects that have been quantified represent approximately seven hundred twenty thousand dollars (US \$ 720,000) and whose breakdown is presented below:

Company 1: High delivery times of products, decreased 33% in delivery times and it has been observed that it can be further reduced. The savings in eighty thousand dollars (US \$ 80,000) per year were evaluated. Lack of production capacity, after executing the project an increase of 35% was achieved, which represents, once this capacity is used, about one hundred fifty thousand dollars (US \$ 150,000).

Company 2: Decrease in the percentage of second quality garments in the production plant, there was a percentage of second garments in 2.4% and it has been lowered to 1.8%, which implies a recovery of approximately eight thousand dollars (US \$ 8,000).

Company 3: Reduction of stops, there were 10% of unscheduled stops, which caused a loss of approximately nine thousand dollars (US \$ 9,000), calculated on average by machine and type of work that had to be done. Taking into account that there are about three unscheduled stops per year, twenty-seven thousand dollars (US \$ 27,000) could be saved. There are currently 5% of unscheduled stoppages, which has provided savings of approximately thirteen thousand dollars (US \$ 13,000). Internal rejection, which implies that the customer does not receive his complete order. This is a serious risk of loss of image first and foremost, and quantifying what was stopped being billed, it was approximately nine thousand five hundred dollars (US \$ 9,500) per quarter, which implies a year, thirty eight thousand dollars (US \$ 38,000). The problem has been reduced by 80%, which has meant an additional turnover of approximately thirty thousand dollars (US \$ 30,000).

Company 4: Development of three new jams, which produced an additional income of forty-five thousand dollars (US \$ 45,000). Development of a new "doypack" package, which improved sales by approximately twenty thousand dollars (US \$ 20,000).

Company 5: Reduction of stops in the lid forming machine, the average blows / hour of the machine was increased from 130.4 strokes / hour to 194 strokes / hour, which represents an increase in equipment efficiency by 49%. In addition to a reduction of setup changes by 27%, since response times have been reduced. This project represented the company a saving of two thousand dollars (US \$ 2,000). Reduction of leaks in closed tanks, managing to reduce the level of leakage presence of 1.59% in the seam welding operation and 2.74 of the sealing to 0.85% and 0.56 respectively. This has generated a saving of six thousand dollars (US \$ 6,000).

Work environment improvement

- A visual inspection was performed that was recorded in media such as digital photographs and videos.
- As a result of this inspection, activities that have improved the work environment in all organizations were planned and carried out.
- The SOL® concept has been taken to the workers' home, which has in most cases given excellent results.
- A plan for the maintenance and improvement of the SOL® has been made, which in general constitute surprise inspection visits and mini mingas at each work site.
- In 70% of the companies a work climate survey was carried out, which has helped improve internal relations and improve productivity.

Internal customer-supplier relationship

- A meeting plan was developed, in the organizations, in which the interrelation of areas, border problems and the needs of each organization were taken into account.
- In most companies, these meetings are running, the culture of internal communication has been promoted and concrete problems have been improved.
- Results in the participating companies
- The consultant's work consisted mainly of forming, within the organizations, a culture of planning that must be taken to action through programs with deadlines, responsible and follow-up of the raised. Within this scheme, and in order to comply with the provisions, in the first three months emphasis was placed on training and program planning and from the fourth month a system of indicators was used, which allowed quantifying progress in the five subsystems proposed .
- Ideal results in each subsystem, it is described how far the companies could have reached with 100% compliance and with the internal program carried out in its entirety.

Organizational diagnosis

Objective: Evaluate the situation of the company in all its areas and define a subsequent action plan, based on the comparison with an ideal company, according to the criteria of EFQM, ISO 9001: 2000.

Content

- Evaluation and determination of the position map in the following areas:
- Administration
- Marketing and Sales

- Human Resources
- Financial resources
- Suppliers and Purchases
- Planning and production control
- Plant Distribution and Materials Management
- Supplies
- Product process design and working methods
- Maintenance
- Legal department
- Information systems
- Safety and industrial hygiene
- QA
- Quality system
- Definition of an action plan.
- Strategic planning

Goals

- Help participants formulate and / or understand the mission, vision, values and policies of their company.
- Perform an internal analysis of the company and an analysis of the environment.
- Generate objectives and strategies, as well as an action plan for them.

Misurata Chamber of Commerce & Industry & Agriculture in Misurata, Libya

Results by Misurata Chamber of Commerce & Industry & Agriculture in Misurata, Libya (Figure1), a summary of the most important results in each of the participating companies is shown. The data were taken from the reports submitted by each of the organizations.

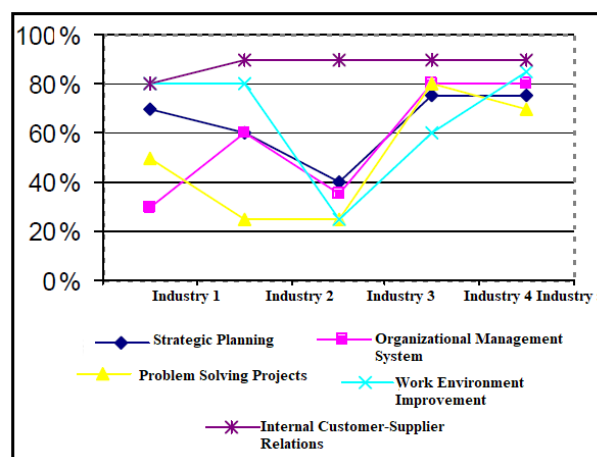


Figure 1: Results by Misurata Chamber of Commerce & Industry & Agriculture in Misurata, Libya

Achievement of goals

Generals: The selected companies in Ecuador were encouraged to increase their productivity and reduce the costs attributable to poor quality, improving their level of competitiveness.

A system of permanent improvement of quality and productivity was left incorporated into the aforementioned companies, which works by taking the new trends of organizational approach, that is, the organization as an integrated set, improving its internal communication levels.

It was deepened with the management of companies about the importance of human resources, the need for continuous training, linking it with a better performance of each worker. Here there were five companies in Misurata Chamber of Commerce & Industry & Agriculture in Misurata, Libya, whose leaders were not involved in the system and did not delegate such responsibility with sufficient authority. The need for training and self-training, as a basis for individual, family and organizational development, was encouraged in human resources. The quality levels of the products and services of the companies were raised, to strengthen their sales capacity both nationally and internationally. The managers of the companies were motivated to continue the program after the structural change started, turning it into a process, whose next step is to obtain an ISO 9001: 2000 certification, as a complement to greater competitiveness. It has been possible to raise awareness in companies that activity planning and subsequent monitoring are the basis for continuous improvement. The importance of leadership based on values, teamwork, the concepts of effectiveness and efficiency and total customer satisfaction was promoted.

Twenty-four people were trained: eleven belonging to the Company 1; and thirteen corresponding to the Company 2, in techniques and tools necessary for the implementation of the program, becoming internal facilitators in each organization.

Process approach: Decisions must be made based on facts and data, for which the use of statistical tools was encouraged. Humanistic approach, which takes into account the human being as a fundamental part of the company and makes it a strategic partner of it. The creation of the documentary structure of the organization was started using as a guide, the needs of the companies and the minimum requirements of the ISO 9001: 2000 standard. The working environment of the participating companies was significantly improved, applying the SOLR methodology, and creating a permanent support structure that involves billboards, maintenance and dissemination programs, periodic SOL® competitions, among others. They have managed to raise the levels of productivity and competitiveness of companies working on solutions to problems of effectiveness and efficiency. During the program several improvement projects were executed. There is a project bank in each company to work in the future. Through the client-supplier meetings, internal communication has been improved, knowledge of the processes of each organization was achieved in greater depth and border issues were addressed.

A self-training process has begun, with the reading of the books: "The 7 Habits of Highly Effective People" by Stephen Covey and suggested below, "The Fifth Discipline in Practice" by Peter Senge. We worked directly and / or indirectly with two thousand sixty-eight employees who have a working relationship with the participating companies. Each facilitator who finished the program received one hundred and thirty-six hours of training in seminars. At least one improvement project has been completed in each of the selected companies, using the methodology proposed by the 3D Corporation for this purpose, as evidenced in the results of the companies. A program that must be developed by the company, once the advice of the 3D Corporation has been completed, and which must become a process, is subject to analysis in order to permanently improve the organization. He became aware of the importance of managing management indicators at all levels and of using quality costs as a tool for improvement and as part of a rational and scientific quality management.

Results in the five subsystems

Strategic planning

Corporate philosophy was reviewed, approved and disseminated at all levels.

The SWOT was carried out.

- The guiding objective for 2002-2003 was established, obtaining a net operating 8% on sales, and then the objectives were established by area.
- The activities aimed at achieving the objectives of 2003 were defined and are being worked on.

Of the activities carried out, some concrete results are listed below:

- The guiding objective of the year 2002 was fulfilled, which was to obtain a net operating 8% on sales.
- The way of production planning was changed, so that the commercial area can rationally establish the delivery dates with its customers.

The form of production was changed through a minimum cost, obtaining a 35% increase.

- It was achieved that the information systems contribute to the achievement of the objectives, providing sufficient data so that in their analysis the corresponding preventive and / or corrective actions are effectively given.

Organizational Management System

- The quality manual of the organization was defined and linked to it, the process map of the organization was determined.
- The procedures, instructions and records necessary for the proper functioning of the company were defined.
- Management indicators were defined for monitoring the company.

Problem Solving Projects

- Two projects were defined on which they have worked and have been completed, as follows:
- High delivery times of the products, there was a time of 90 days to deliver the work, which caused inconvenience. After executing the project, it decreased by 33% over time and it has been observed that it can be further reduced. The savings in eighty thousand dollars (US \$ 80,000) per year were evaluated.
- Lack of production capacity, after executing the project, an increase of 35% was achieved, which represents once in 2003 this capacity was used for about one hundred fifty thousand dollars (US \$ 150,000).

The following projects have been defined for their respective execution:

- Expand production capacity by 50%.
- Reduce delivery times by 25%.
- Reduce administrative production errors by 80%.

Internal Client-Supplier Meetings

- A meeting plan has been defined.
- The plan is operational.

Work Environment Improvement

- A visual inspection of the work environment was performed, which was filmed.
- An induction was made to the staff and activities were defined to correct them.

The objectives of the program were exceeded, especially in the areas of production and sales where significant economic results have been obtained. Another satisfactory result was that the quality management system has been implemented and is ready to appear in the first quarter for a certification audit.

Conclusions

A growing awareness of concepts such as Quality, Continuous Improvement, and Productivity, as is happening in many companies in the country can be evidenced in the participating companies. In almost all companies, the five subsystems of the project have been initialized, which emphasize a permanent and continuous improvement of Quality and Productivity. The results obtained in the companies have been positive, although not all of them were allocated enough resources to improve their results. Despite the above, we can clearly differentiate the participating companies, and divide them into three groups: a) companies that have a highly trained, proactive and committed human element and that have followed the methodology and the work schedule with considerable effort. The results in these companies have perfectly met expectations; b) companies that, despite having a convenient human infrastructure, have not been able to strictly adhere to the proposed schedule, or due to internal and external problems, and therefore have a different degree of lag in the execution of activities. In these companies important results have been obtained that, however, could have been better; and c) companies in which a weak commitment of the general management could be evidenced in the understanding of the project and the necessary follow-up, which meant that the collaborators did not have the necessary support to properly implement the process. The need to know, manage and apply statistical tools has been instilled, since they allow to go according to the new management trends: decisions based on facts and data

Recommendations

Few companies are recommended to continue with this important support to the contribution it means to the development of the country. It is suggested to increase this first stage of counselling by at least four months, that is, it should last twelve months. With this, further progress could be made in the implementation of the ISO 9001: 2000 standard.

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