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Implementation of the Methodology for Flawless Operation at a Frozen Food Company in the Republic of Macedonia

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Abstract

This paper offers a methodology proposal for faultless operation as a subsystem of Total Quality Management (TQM) system which resulted as a great help for a snails processing company in the process of designing a good quality system. Throughout the designing of standard operating procedures there must be an appropriate methodology with methods and techniques for faultless production and methodology for optimizing costs applied. This methodology offers the support of the top management acquired due to presentation of the results of the implementation of the methods and techniques and the involvement and commitment of every employee, because the ones dealing with those processes are the ones that improve them.

The methods applied in this paper are: Checklist, Pareto access and Ishikawa method. The results of this demonstrated that the application of the philosophy of total quality management in the company for processing snails not only led to the improvement of product quality, but also towards an increase of the productivity and cost optimization of quality. In future, the implementation of this methodology would not only enable satisfaction of consumers, but also contentment of suppliers, employees and the community.

Keywords: *quality improvement, internal standardization, Pareto analysis, Ishikawa diagram, total quality management (TQM).*

1. Introduction

Total quality management (TQM) is a structural system designed to meet the internal and external needs of customers and suppliers by integrating them within the company and improving the business climate, the opportunity for innovation and development, and improving business processes and culture (Arsovski, 2002).

Those companies that projected good documented quality system that covers all business processes of the company have the necessary basis for a successful application of statistical process control (SPC) and team work, which otherwise could not be set in case of a bad quality system (Chepujnoska & Mitreva, (2008).

By defining the obligations and responsibilities of employees through standard operating procedures (SOP), there is an opportunity for every employee to participate in solving the problems that are evident after measuring certain properties of a successful application of statistical process control (SPC).

Thus the ability of the employees to solve problems increases (Casadesus & Gimenez, (2000). Each employee is trained to apply methods and techniques for faultless operation, which is very important for each company because in everyday work everyone encounters problems that need to be quickly and effectively addressed, thereby increasing the possibility of progress in the company as a whole (Prodanovska & Mitreva, (2012). The results of the implementation of this methodology in practice suggests that the introduction of a quality system should help companies overcome their problems in terms of definition, design, control and improvement of processes (Mitreva, et. al., (2015b). Companies that apply those methods and techniques for faultless operation achieved a higher level of quality in all business processes, reduced all types of costs, increased confidence among customers / users, and increased the knowledge of employees. At the same time these companies show increased motivation of their employees, increased productivity, and the presence at multiple markets (Chepujnoska & Mitreva, (2008).

2. The need to design a quality good system at a company for snails processing

The subject of this paper is the design and implementation of the philosophy of total quality management (TQM) in a frozen food company that performs processing, manufacturing, distribution and sale of products from snails, exclusively for export. The company is mainly focused on snails processing into finished products by processing the live snail meat and clean houses; as well as preparation of products Renco and Renco with butter from frozen meat and clean houses; and preparation of canned snail meat from frozen snails. In order to build an effective subsystem for internal standardization, the top mana-

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gement must create a business climate of cooperation and communication, because every idea besides having the potential for improvement or innovation is also generating new ideas.

The plan for design and implementation of the subsystem should be the simplest way to distribute tasks in a timely fashion and in a specific order with the intention to be able to work successfully and on time, and most frequently used tool for such task is the gantogram.

The design of the subsystem – internal standardization as part of the TQM system is a teamwork and in places where the rules of teamwork are not highly respected it could be assessed as unacceptable (Mitreva & Filiposki, (2012a). At the same time, the following methodology must be allowed not to block the decision-making due to excessive individualism, exaggerated expectations, lack of flexibility and the creation of consensus-building attitudes. Contemporary interpretation of the importance of the company system in TQM and staff lies in coordination between the system and the people.

The methodology in the design and implementation of internal standardization (Mitreva & Filiposki, (2012a) is given in *Figure* 1.

Through the standard operating procedures (SOP) the flow of business processes is defined and on that basis the obligations and responsibilities of all employees are defined as well. During the course of action it has to be taken care to keep the processes simple and efficient (more matters combined into one). The process should be performed in a natural and shortest route, aimed at results and not at tasks, and by specialization of the person performing the task. The number and scope of these procedures (SOP) depends on the number of activities in a given process. Regardless of the number of SOP, they should be connected, meaning that the output of one process needs to become an input to another. The procedures help achieving order and discipline in the operation, because it leads to proper communication between employees regarding solving problems related to quality. The best way to graphically display SOP is **through block diagram**, which consists marked phases of the business process flow, employees that perform activities as well as incoming and outgoing documents. It this manner any shortcomings are immediately perceived and quick reaction in removing the causes of them could be applied immediately. The block diagram is the simplest and most practical mode to describe the business process (Mitreva, 2011).

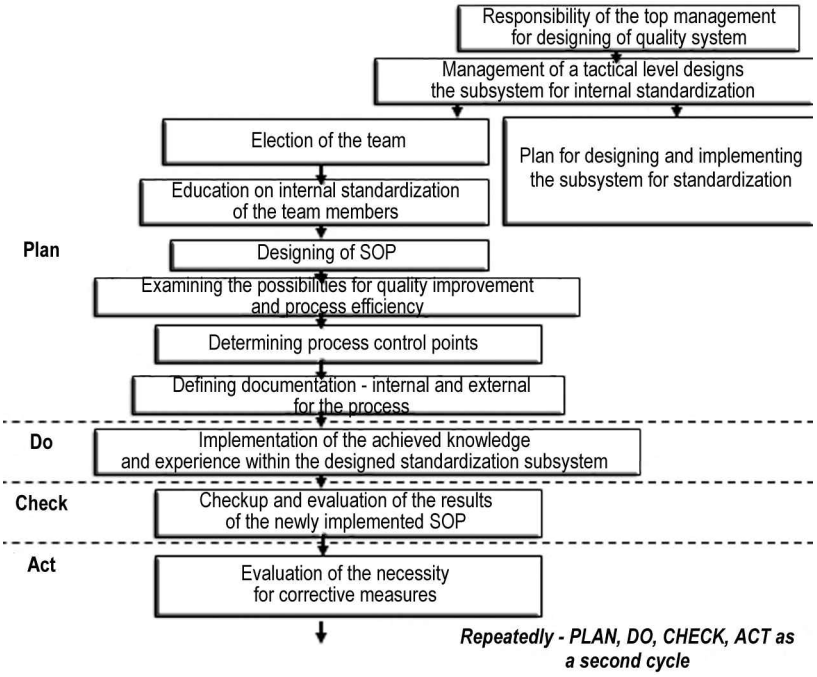

***Figure* 1. Methodology of process design and implementation of the subsystem of internal standardization in a company (Mitreva, 2011)**

3. Designing subsystem – internal standardization in the company for processing snails

This methodology results in practical application in the company for processing snails which emphasize the need for design and implementation of standard operating procedures (SOP) for all business processes in order to achieve a defined quality and safeguard customers/consumers from defective products. The top management at the factory has set the task to improve the system of quality management through consideration of the environment, reducing waste, reducing pollution of air, water and soil, saving resources by monitoring energy consumption and material, and adaptation to all national, local laws and normative acts. Starting from this basis, we analyzed the established system of quality in all business processes along with adjustments and amendments thereof, with the help of the QC-CE-Pyramid model, which improved its efficiency and effectiveness (Mitreva, et. al., 2014b).

According to ISO 9001:2015, the SOP are designed according the QC-CE (Quality Circle-Cause and Effect) model for all business processes and as a part of the standard operative procedure for the process of preparation of canned snail, *Figure* 2.

Figure 2 provides the standard operating procedure for the business process in preparing canned snails, which refers to the documents used in the process, employees which participate, and the ability to comment with additional explanation or indication of instructions which define the actual subsystem. The standard operating procedure starts with a planned activities and inputs baseline; it continues with the activities of the business process and each stage receives the output information which becomes an input for the next phase; eventually, the business process ends with information – the result.

By using the QC-CE model for quality the obligations and responsibilities of all employees are defined. Thus rules of conduct in order to achieve good interpersonal relations have been created. All business processes in the company through standard operating procedures in the form of current/flow cards can be standardized through the QC-CE- Pyramid model. Moreover there is a vertical and horizontal connectivity accomplished between employees, according to the structure of the pyramid (Mitreva, et. al., 2014b). Thus, quality assurance in the company is followed by the flow of information in accordance with standard operating procedures. The circle closes with adjustment, responding to the questions: what, who, where, when, who gives information to whom with complete supporting documentation where quality, commitments and responsibilities are specified. In order to have an effective quality system besides being defined, it also needs to be well documented.

In order to achieve the goals an appropriate supervision is necessary as well. The opportunities provided by the ISO 9001:2015 allow to define and activate checkpoints, which will prevent the product to reach the buyer/user. Thus it would enable time to prevent possible defects and to eliminate the problems by removing possible causes timely.

All steps from this technological process are controlled by the responsible people from the quality control department in order to meet the product specification, organoleptic properties (taste, smell), and the quality and stability of the product required by the existing regulations.

The critical control points in the manufacturing process of canned snails are set at the point of closing the can and in terms of autoclaving it. The person in charge of quality control makes a mandatory supervision after the closing of the finished product – the can. Using a micrometer the thickness and height of the fold ring of the cap is measured, then the external closure is

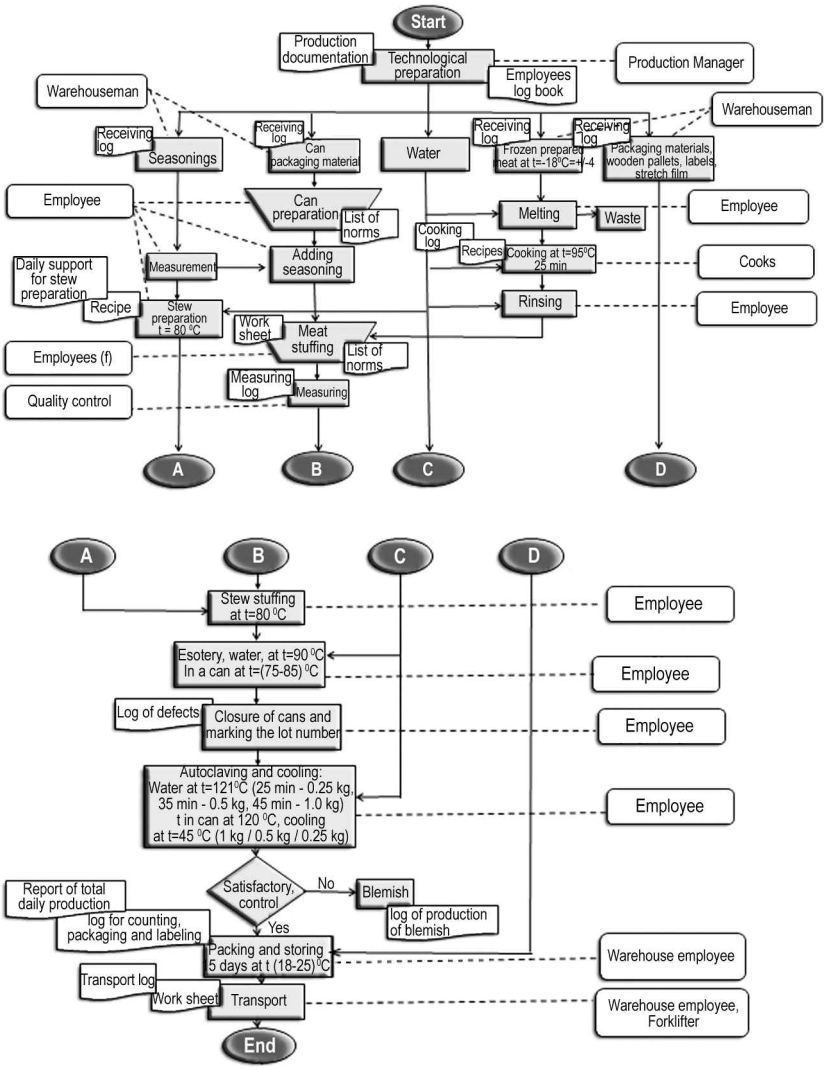

***Figure* 2. Standard operating procedure for business process in preparation of canned snail**

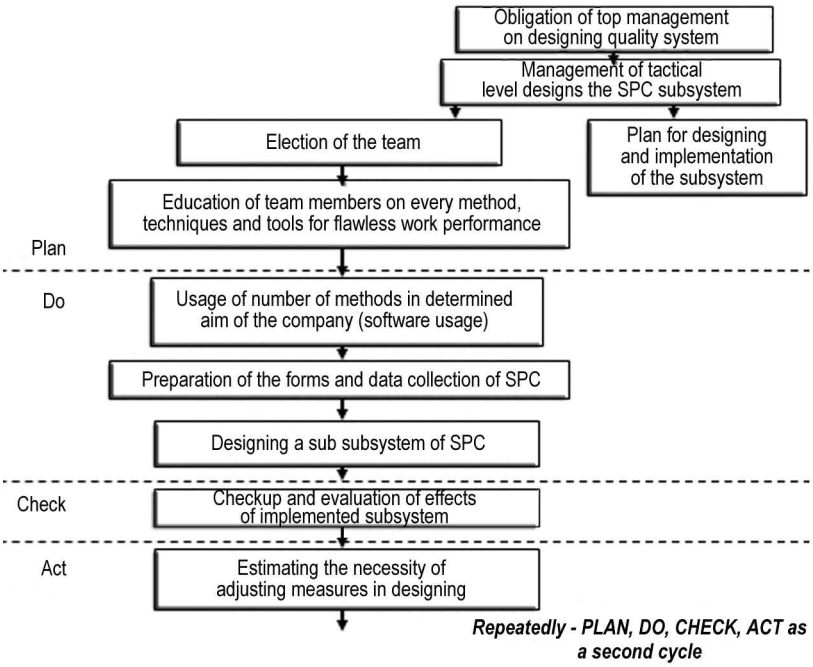

***Figure* 3. Methodology in the design and implementation of the subsystem for statistical process control (SPC)**

removed and finally the inner fold of the can and the lid is mea-sured with a micrometer. The obtained data is filed in the records.

The control temperature for autoclaving with a maximum registering thermometer is the second critical point. The person responsible for quality control inspects the process of auto-claving and the temperature, using a maximum registering thermometer, but at the same time measuring the autoclaving time as well. The temperature and the time are automatically recorded through a measuring instrument (thermograph) and these parameters are recorded so they can be presented at any time in electronic and paper form as well. All these activities impose the need of applying the methodology of statistical process control (SPC) in such company i.e. a company for processing snails.

4. The need for application of the methodology of statistical process control in the company for processing snails

The standard operating procedures during the process itself require measurement in order to check if the process can proceed or not, so it is necessary to establish the control points where they can gather data. Providing quality within the companies is connected not only with the people's work, but also the machinery, technology, production processes etc., so control is necessary in order to assess the stability and capability of the manufacturing processes. However control alone is not enough. It is necessary to improve the processes continuously by reducing variation. So, it sums up that through statistical process control (SPC) not only are the current performance processes measured but it also provides the basis for their improvement (Stenberg, 1999).

A useful technique for identifying critical points is: asking questions regarding the required performance of a given process.

Despite the standard defined business process at a snail processing company there are still mistakes perceived that make the process unstable. Therefore, we need the involvement of all employees in discovering the causes and corrective measures. In order to overcome the problems an appropriate methodology for methods and techniques for faultless production and methodology for optimizing costs should be applied (Stenberg, 1999). Based on the results of the research (Mitreva & Filiposki, (2012b) it has been established that this company has a poor application of SPC. The ongoing construction of the subsystem for statistical process control as a subsystem of TQM is done through the following activities, *Figure* 3:

- ***(Plan) Step 1: Plan for designing and implementing of the subsystem for statistical process control.***
- ***Step 2: Selecting the team members.***
- ***Step 3: Training the team members on every method and technique for faultless production.***

The methods and techniques used faultless operation at all levels of management because of: an assessment of business performance, optimi-

zation, evaluation of stability and the ability of the processes to detect and prevent defects in operation etc., therefore it sums up that all these levels are to be trained for effective enforcement.

- ***(Do) Step 4: Using a variety of methods and techniques for the tasks and the established aim in the company. It is noticeable that the application of software packages is used appearing as quick and simple to use.***

There are different types of methods and techniques for faultless operation which could be applied:

- methods of detecting the place where most defects occur (percentage);
- methods to detect the reasons for creating defects;
- methods for monitoring the course of the process;
- methods of decision-making;
- methods for evaluating the stability and capability of processes;
- methods for assessing the relationship between the features;
- assessment methods for dispersion of features and more.

Some of these methods were applied in the factory for processing snails. A check list is a simple method for recording and analysis of the irregularities that occur in various operations. With this tool it could be easily seen how well it is done and to draw attention to the weaknesses in the direction of continuous improvement. The costs of quality that occur in the process of preparing canned snails within ten days have been analyzed. *Table* 1 provides the total number of cans produced per day and the total number of damaged cans. Damaged cans that occur early in the process have either factory defects or are damaged during transportation.

***Table* 1. Total number of cans produced in days and the total number of damaged cans for 10 days**

Number of days	Number of employees	DAMAGED empty	CANS Stuffed with meat	Total amount of damaged cans Total amount of damaged cans	Full cans
1	22	78	20	98	11.815
2	21	86	10	96	11.474
3	21	36	48	84	12.900
4	22	36	48	84	12.988
5	45	96	48	144	24.138
6	20	53	99	152	13.344
7	20	56	38	94	12.578
8	15	35	10	45	8.645
9	37	62	60	122	19.500
10	39	104	80	184	23.600
Total:	262	642	461	1103	150.982

Empty cans and caps are imported at a cost of 0.166 € per can and 0.049 € per cap or total of 0.215 € (13. 00 MKD). *Table* 2 shows the daily losses from damaged cans in denars, per day loss in %.

Through the application of the methodology with the methods and techniques for faultless production there are production errors and losses that should be corrected (Mitreva & Filiposki, (2012b). Through Pareto analysis most influential reasons for deviations can be seen. The data collected in the checklist is analyzed and presented through Pareto diagram according to weight, *Figure* 4.

***Table* 2. Daily loss in denars due to damaged cans**

Number of days	DAMAGED empty	CANS Stuffed with meat	Total amount of damaged cans	Loss from the damaged cans in MKD currency	Loss %
1	78	20	98	1,274.00	9%
2	86	10	96	1,248.00	9%
3	36	48	84	1,092.00	8%
4	36	48	84	1,092.00	8%
5	96	48	144	1,872.00	13%
6	53	99	152	1,976.00	14%
7	56	38	94	1,222.00	9%
8	35	10	45	585.00	4%
9	62	60	122	1,586.00	11%
10	104	80	184	2,392.00	17%
Total:	642	461	**1103**	**14,339.00**	100%

***Table* 3. Cumulative loss and cumulative %**

Days	Loss in MKD currency	Cumulative loss	Cumulative %
10	2392	2392	17%
6	1976	4368	30%
5	1872	6240	44%
9	1586	7826	55%
1	1274	9100	63%
2	1248	10348	72%
7	1222	11570	81%
3	1092	12662	88%
4	1092	13754	96%
8	585	14339	100%
Total:	14339		

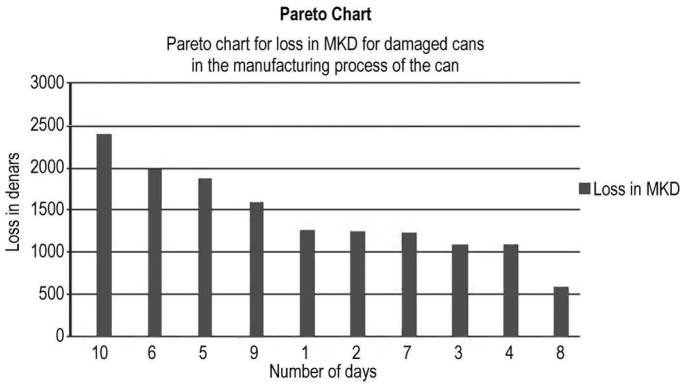

***Figure* 4. Pareto diagram for financial losses expressed in denars due to damaged cans in the manufacturing process of canned snail**

From Pareto diagram it is clearly seen that the company has the greatest loss in the **10th day of production (184 damaged cans)** that cost the company **2,392 denars**. In order to determine the reasons for the problems Ishikawa diagram was applied with an emphasis on "the process" or where exactly the changes need to be done to improve the performance of it (Mitreva, et. al., (2015a). A thorough review of the process revealed the key causes in response to the question: who, what, where, who, when it is wrong, *Figure* 5.

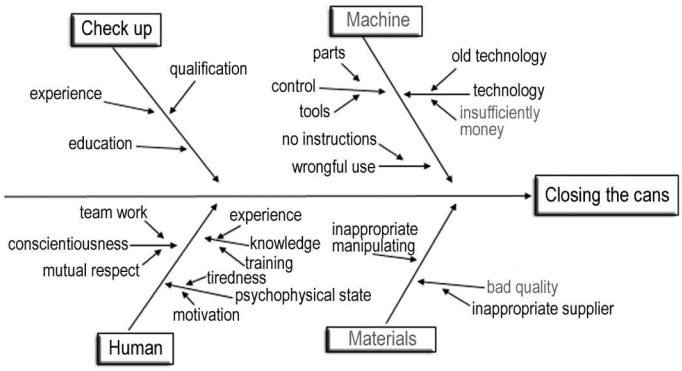

***Figure* 5. Ishikawa diagram to detect the causes of blemish products**

As with a detailed analysis the essence of the problems involved in the standard business process was introduced referring to errors resulting instability of the process. Addressing the problems is not a complicated process, but it does require a new mindset and use of simple tool (Stoiljković, et. al., (1996). The goal is finding the real cause of the problem and preventing its repetition. The best results are achieved when this tool has been applied by the team which is directly involved in the operational process. Hence the conclusion comes as: does it require a structured process in resolving problems (Mitreva, & Prodanovska, (2013). The structural methodology establishes a standard practice and is useful in order to improve the product and process as well as the daily activities. Besides that it is using facts and focuses on the origin of the problem by finding the original cause. The analysis was completed with proposed corrective measures and defining the responsibilities of each employee in the business process by creating internal coordination and cooperation.

5. Conclusion

In conclusion, the internal standardization is very important for any company. In order for the company to produce safe and quality product, internal standardization and SPC must be carried out, because the only way you can keep constant and potential customers is by meeting their requirements. The analysis showed that the application of the methodology for total quality management in the company for processing snails has led to increased effectiveness and efficiency. In this way, the traditional model of the development of business processes where they measured the errors, omissions and claims this company offers preventive, proactive work. The company benefits from the application of the methodology for the design and implementation of TQM system reflected in:

- the application of internal standardization to improve the staff's responsibility in the implementation of business processes;
- the application of statistical methods and techniques have decreased the defects in the work and is an important benefit, especially when seeking for specified quality at the lowest cost of operation;
- the application of software packages increase efficiency in the application of statistical methods and techniques;
- Through the cost analysis of quality control losses are to be reduced to minimal in terms of the consumption of materials and energy.

Without the commitment of top management towards the set goals for quality and consistency in their implementation, all these efforts would have only appeared as waste of time and funds and at the same time it would reduce the possibility of success in future initiatives.

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