7th INTERNATIONAL SYMPOSIUM ON INDUSTRIAL ENGINEERING

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FACULTY OF MECHANICAL ENGINEERING,
UNIVERSITY OF BELGRADE, SERBIA
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STEINBEIS ADVANCED RISK TECHNOLOGIES,
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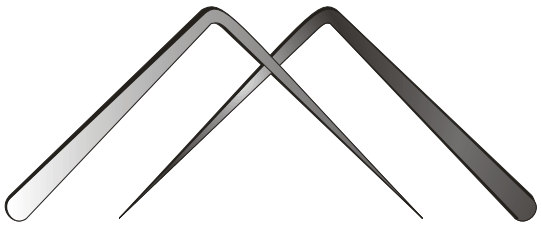

SIE 2018 PROCEEDINGS

Editors:

Vesna Spasojević-Brkić
Mirjana Misita
Dragan D. Milanović

27th-28th September 2018
Belgrade, Serbia

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1. Spasojević-Brkić, Vesna [уредник] [аутор додатног текста], 1971-
2. Faculty of Mechanical Engineering (Beograd). Industrial Engineering Department
a) Производња - Организација - Зборници b) Индустријски менаџмент - Зборници c) Индустрија - Систем квалитета - Зборници

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PREFACE

Since the first symposium in Belgrade, Serbia more than two decades ago, in 1996, International Symposium on Industrial Engineering - SIE has been held regularly every 3 years. It represents an opportunity for researchers in the Industrial Engineering community to review and evaluate their scientific achievements over the period since the previous SIE, share their most recent results and ideas, and discuss possibilities for new directions in research, joint experiments and observing campaigns.

The aim of the 7th International Symposium on Industrial Engineering – SIE 2018 is to contribute to a better comprehension of the role and importance of Industrial Engineering and to point out to the future trends in the field of Industrial Engineering. The Symposium is also expected to foster networking, collaboration and joint effort among the conference participants to advance the theory and practice as well as to identify major trends in Industrial Engineering today. According to these goals the Symposium addresses itself to all experts in all fields of Industrial Engineering to make their contribution to success and show capabilities achieved in the work that has been done are very welcomed. SIE 2018 provides an international forum for the dissemination and exchange of scientific information in industrial engineering fields through the large number of multidisciplinary topics.

The book brought together 58 papers and more than 170 authors from 12 countries, namely from Serbia, Portugal, Finland, Switzerland, FR Macedonia, Italy, United Kingdom, Thailand, Slovakia, Canada, Poland and Bosnia and Herzegovina. The submitted full length manuscripts were peer-reviewed, and selected for publication by experts in their respective fields. The authors ranged from senior and renowned scientists to young researchers. Only unpublished papers were accepted and the first author is responsible for the originality of the paper. All papers are classified into six chapters, including opening and closing plenary lectures.

We expect that papers and discussions will contribute to better comprehension the role and importance of Industrial Engineering in this and other countries, both in domain of scientific work and everyday practice.

Our efforts in organizing would not succeed without the considerable help of the members of Scientific Program and the financial help of Ministry of Education, Science and Technological Development was greatly supportive for the success of the entire project.

At the end, the editors hope, and would like, that this book to be useful, meeting the expectation of the authors and wider readership and to incentive further scientific development and creation of new papers in the field of Industrial Engineering.

Welcome to the 7th International Symposium on Industrial Engineering – SIE 2018! We wish to all participants a pleasant stay in Belgrade and are looking forward to seeing you all together at the 8th Symposium on Industrial Engineering – SIE 2021.

Belgrade, September 2018

EDITORS

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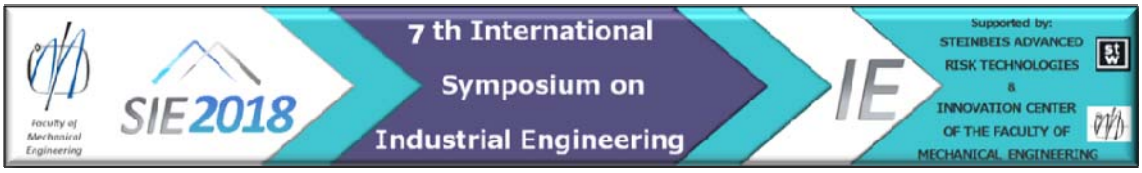
SESSION A1 - CHAIRPERSONS: Dragan D. Milanović, Sanja Stanisavljev, Dragan Ćoćkalo



THE ROAD TO PERFECTION THROUGH CONTINUOUS IMPROVEMENT OF THE BUSINESS PROCESSES IN THE HOTEL A- ROSA

Elizabeta Mitreva[1], Elena Lazarovska[1], Oliver Filiposki[1], Hristijan Gjorshevski[1]
[1]Faculty of Tourism and Business Logistics, Goce Delčev University, Štip, Republic of Macedonia
elizabeta.mitreva@ugd.edu.mk

Abstract. *In this study an analysis of hospitality services company - Hotel Resort "A-ROSA" in Germany was performed in order to identify whether it has an efficient quality system. The survey was done as an attempt to perceive the existing situation in this company in the domain of design and implementation of the quality system, analyzed through the four pillars of the house of quality at the top of which is the top management, while the base is consists of measuring, evaluating, analyzing and comparing quality / poor quality.*

The results of applying the Total Quality Management (TQM) methodology have shown that it is possible to achieve the company's vision and main goals towards meeting the needs of internal and external clients, right on time, while eliminating the processes which are not adding value or any promotion.

Key words: *House of quality, Internal standardization, TQM philosophy, Hotel industry, Customer satisfaction*

1.INTRODUCTION

Every organization should develop the activities of the quality system, which can be presented as a "house of quality". The pillars of the house of quality are: internal standardization, methods and techniques for operation with absence of faults, education, and motivation, and the cost of quality [1]. Top management is most responsible in the "house of quality" and it's "holding" the four pillars, which are subsystems of the system itself [2]. In the basis of the house of quality lies the measurement of the defined, collected business process data in order to understand and control them, as well as to gather important information about products and services for improving the quality and optimization of business processes. Monitoring does not only screen the quality of products/services, but also the adequacy of the entire TQM (Total Quality Management) system in the implementation of the quality functions [1][3]. Assuring quality of the company's activities is a key factor for its success, as well as its sustainability on the market. Total quality management requires full responsibility of all members of the company, as it is joint work of all [4]. In the process of implementation of the TQM philosophy, important aspect are the employees, processes and customers, as well as all interested parties in terms of protection, partnership, responsibility, guarantee, communication, service, security, support, as well as assistance and openness for cooperation [1][2][5].

This study was made to explain the importance of quality for hospitality services company - hotel resort "A-ROSA" in Germany. The survey is done by monitoring the way business processes are managed (identifying, documenting, and controlling) and whether documentation was put together for efficiency of the system.

In the hospitality industry, it is necessary to respect the standards for production, service and safety of people and products [6]. Adequate control is also required in order to achieve the goals set. The opportunities provided by the ISO 9000 series of standards enable definition and activation of control points, which will prevent defects, complaints, delays[7][8]. But a good quality system does not only mean a system that will provide projected

quality, but management and optimization of processes [7][9][10].

2. METHODOLOGY

2.1. Application of total quality management methodology in the hotel complex A-ROSA

The hotel complex A-ROSA was built on to the existing building infrastructure of the previous hotel "Kempinski", built after the Second World War in Eastern Berlin at that time. The hotel welcomes guests with the new brand from the distant 2004 with a tendency of continuous development. It is a chain of hotels under the brand A-ROSA and it's certain that this hotel stands out from the others with the ideal location, situated in a nature rich in forest, along the shore of Lake Scharmützelsee. Throughout the years, although the ownership structure changes, the management of the hotel manages clearly defined goals. The greatest achievement of the management was to get the coastal part of the local lake - for summering from the local government, as well as the few hectares of land in which, with a small investment, they got wonderful golf courses for recreation. Today, the A-ROSA Hotel is a place for recreation, leisure, entertainment and enjoyment of elite guests from all over Germany. The dedication of management and employees is intense, 24 hours a day, seven days a week. The hotel complex serves its clients with experienced and cordial staff from the parking lot to the reception, from the hotel rooms to the cafes, to the spa center, swimming pools, beaches. The company is the main artery for domestic tourists, and the management is proud that A-ROSA is a brand that gives satisfaction to customers, and ensures profit.

The structure of the company constitutes the management team as the highest body, while the report for the operation is received from the General Manager. The workload requires a structural division in six sectors, each with its own share of the operation. Dividing the operation into sectors enables independence in finding ways to facilitate the operation in the process of fulfilling hotel's services. All sectors are in interdependent horizontal communication and their processes are connected, Figure 1. Overall services are carried out with the coordination and collaboration of teams for all business processes.

2.2. Creating a business culture in a hospitality service company

The business world creates new values in the society [11]. The value consists of the well being created by the business world, business opportunities and the quality of the services. One of the company's missions is to advance the society in which they operate [1].

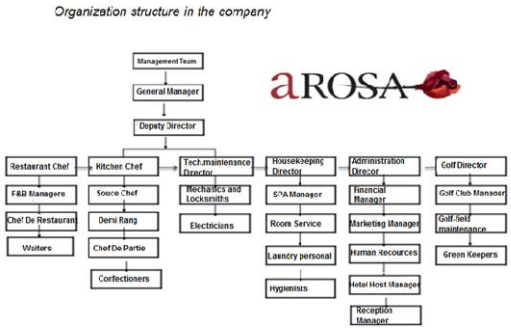


Figure 1: Organization structure in the company

In all projects implemented by A-ROSA hotel, the world's quality standards are at the top of each stage of development. By applying professional knowledge, experienced personnel, modern technology, care is taken to meet the needs and expectations of all clients with whom they cooperate in the society on the domestic and international market, in order to offer continuous quality. In all projects that have been implemented so far, A-ROSA always respects ethical values. For this purpose, the management team is working to improve issues related to quality, environment, occupational safety and health of employees, and for this purpose they organize continuous training for raising awareness among employees, following technological innovations and establishing relevant systems in the areas of project activities. In accordance with the current valid domestic and international rules and regulations, the main principle of managers is to provide quality assets and equipment for protection of human health and the environment. The goal is to use natural resources at an optimum level and to support and provide conditions for "sustainable development" of natural, social and economic resources.

When talking about the service in the hotel industry, it is essential that at the first visit guest's expectations are meet and exceeded [3]. The quality of the services includes all the parameters that will result in guests' satisfaction. One of the principled ways in which A-ROSA Hotel differs from other hotel industry companies is the quality policy of services, through consistent delivery of higher quality in relation to the competitors.

3.2 Defining the business processes in the hotel "A-ROSA"

In defining business processes, a person is a key factor in the quality of services, since he is the carrier of all activities in the hotel industry [1][11].

The company invests in the development and education of employees for successful execution of the business processes in the hotel. Proper performance of the work responsibilities of each sector individually is an important component of the hotel so that it can offer quality services, figure 2.

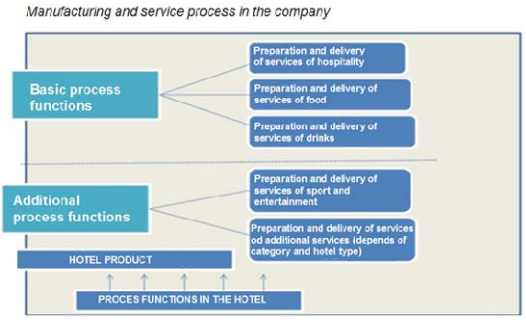


Figure 2: A schematic representation of the standard operational procedure during the preparation and provision of services at the hotel

Information is the basis for business management, i.e. the basis for decision making, organizing, forecasting, etc [4]. They are a key resource that hotel existence is dependent on, because depending on the way and the speed of collecting all relevant customer information will depend on the success in their work.

3.3 Standard operating procedure of one of the business processes in the hotel "A-ROSA"

The description of one of the business processes in the hotel "A-ROSA" is a series of logically related activities that use the resources of the hotel, whose ultimate goal is to services the guests with appropriate quality and prices, in an adequate timeframe, with simultaneous realization of values from the process of functioning, Figure 3.

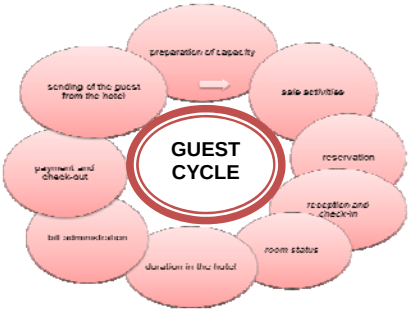


Figure 3: Production-service process in the company

Aside from the use of general documents in the realization of the processes local documents are also created for a more detailed explanation of the process and allocation of responsibilities, as well as the need for adjusting the process to the local state laws. Business documents can be work instructions, forms, databases, standards, list of instructions and specifications. Figure 4 provides a standard operating procedure for the business process - Preparation and provision of food services at the Marktrestaurant restaurant. The standard operating procedure specifies the documents used in the process, participation of the employees, as well as the possibility of comments with further explanations or guidance on instructions that are defining the sub-process. The sub-process is the main buffet breakfast and dinner, allowing guests to enjoy a fun cooking display.

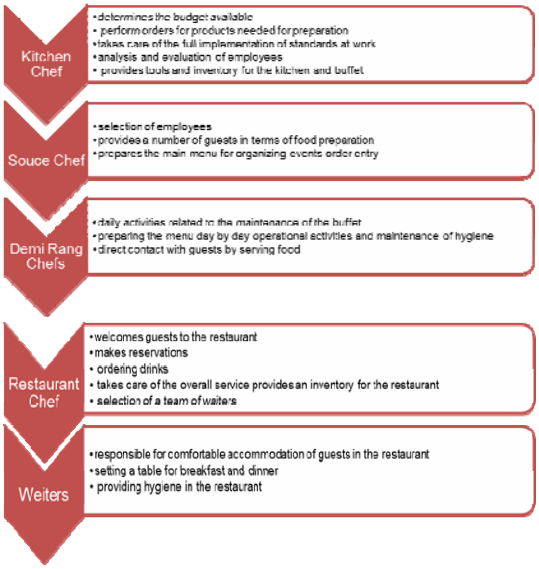


Figure 4: Schematic representation of the standard operating procedure in the hotel's kitchen and restaurant

The application of internal standardization improves the responsibility of employees in the realization of business processes. The application of the TQM system methodology means the design of a good documented quality system that is covering all business processes of the company and is an indispensable basis for the successful application of SPC (statistical process control) and efficient teamwork that otherwise could not be set up in case of a bad quality system [2]. Errors are recorded in tables and diagrams and are subject to analysis by managers. Based on the information obtained from the daily reports, the responsible manager can identify the oversights or complaints made by the clients, and depending on the type of problem, they are recognized, defined and recorded in the checklist. Based on the total operational errors, as well as criticisms and complaints from the clients, the **Pareto diagram** is being prepared from the **checklists**. This diagram should show which objections are of the highest frequency and

importance and in which direction the management team should pay attention and seek a solution to overcome the problem, Figure 5.

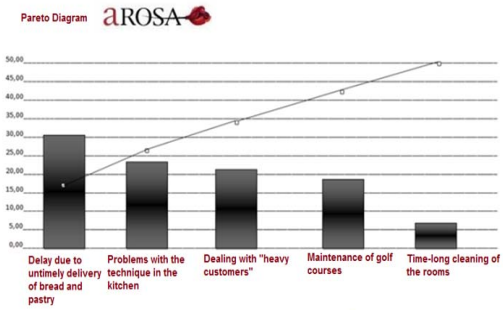


Figure 5. Pareto diagram in regards to the frequency of irregularities in operation

From Figure 5 it can be seen that the number of complaints is the highest in delays by deliverer's of bread and other bakery products. The first pillar of the diagram shows the delays of bread and other bakery products for the use in the hotel. The hotel complex does not produce its own and depends on the delivery by the suppliers. The proposal of the management team is to employ people with the necessary skills and to supply equipment for their own production for internal use. The second pillar of the diagram shows complaints due to frequent break-down of the kitchen equipment (malfunction of the ice machine, refrigerators, and stoves). The proposal of the management team is solving the problem by replacing existing ones with new technical equipment. The third pillar of the diagram gives the frequency of complaints by "VIP" clients in relation to hotel services, especially during the seasonal months or holidays when the hotel operates at full capacity. The guests' revolt arises as a consequence of the strict rules and regulations of the hotel regarding the code of conduct of the guests. The fourth pillar of the diagram gives the frequency of problems related to the current maintenance of golf courses as a result of the widespread area and the need for daily maintenance and irrigation. The proposal for a management solution is to increase the number of staff for horticulture (especially in the golf course and for organizing golf tournaments) and purchase of more mowers. The fifth pillar of the diagram gives the frequency of problems related to the equipment and cleaning of the rooms due to lack of necessary staff (housekeeping attendants). The management solved this problem by employing seasonal workers. After determining the causes of the problem, the actions to be taken are defined, the person responsible for the implementation of the actions and the deadlines for the implementation of the corrective measures.

3. CONCLUSIONS

The hospitality services company - hotel resort "A-ROSA" in Germany sees the benefits of applying the methodology for designing and implementing the TQM system in:

- the application of internal standardization which improves the responsibility of employees in the realization of business processes;
- the use of statistical methods and techniques reduces defects in operation and is a significant benefit, especially when requiring specified quality at the lowest operating costs;
- the application of software packages increases the efficiency in the application of statistical methods and techniques;
- by analyzing the cost of quality, losses can be controlled and minimized in terms of material and energy consumption.

Acknowledgments

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IMPLEMENTATION OF SIX SIGMA AND LEAN PRODUCTION CONCEPTS IN ORGANIZATIONS: A REVIEW OF CONCEPTS

Nikola Petrović[1], Dragana Sajfert[2], Dragica Ivin[2], Marija Mjedenjak[3]
[1]Ph.D. student, Technical faculty "Mihajlo Pupin" Zrenjanin, University of Novi Sad, Serbia;
[2]Technical faculty "Mihajlo Pupin" Zrenjanin, University of Novi Sad, Serbia; [3]Master student, Faculty of Business in Belgrade, University of Singidunum, Serbia

Abstract. *The six sigma concept represents an advanced function of the level of knowledge for advancement in managing the organization's business, with the aim of avoiding mistakes and malfunctions in technological and business processes. The six sigma system introduces tools and techniques to improve the organization's process in terms of quality systems and reduce the number of defect products. The implementation of the six sigma concept is an approach that influences the increase in the level of quality and profit of the organization. Lean concept has long been a competitive advantage. The concept of lean production aims to reduce the number of product errors and reduce the size of the warehouse, without reducing productivity. This paper presents the criteria for successful implementation and use of the concept, six sigma and lean production in different areas of the organization.*

Key words: *Six sigma, LEAN production, implementation.*

1.INTRODUCTION

The concept of six sigma and lean production has an important role in the implementation of these two models in organizations in recent decades. For any business enterprise it is important to achieve business excellence, which is based on meeting customers´ demands, improving the business productivity and corporative social responsibility [4]. Constant maintenance of high quality in the organization is significant as well.. There are many models of advanced systems: ISO 9001, Malcolm Baldrige Award, Continuous Improvement/Quality Management (QI/QM). SixSigma is a business model, which is oriented towards quality and profits [12].

The Six Sigma concept is a management approach which is focused on project development, continuous improvement of products, services and processes in the organization. These improvements are achieved through the reduction of defect products, lower maintenance costs, and higher production efficiency [3]. In addition, Six Sigma is oriented towards the understanding and satisfaction of customer needs; improving business systems; improving productivity, and financial performance [9]. Implementing Six Sigma has reported significant financial gains from their deployment efforts. For example, in 1999 General Electric (GE) reported $2 billion of net income benefits from Six Sigma initiatives [13].

Lean management represents a set of production management procedures designed for the customer to improve quality and reduce costs and production time [17]. To be successful, Lean implementation for competitive advantage requires organisations to apply Lean principles in all organisational functions, including accounting, sales and marketing, and human resources [7]. Lean production is a concept that tends towards reduction of defect products; waste reduction; higher value for customers; higher satisfaction of customers; robust production; cost reduction; quality improvement; and higher productivity [15]. Toyota Motor Company's high productivity and quality performance is routinely attributed to practices associated with Lean production [13].