

# BUSINESS INFORMATION MANAGEMENT SYSTEM FOR CONSUMERS – SPECIAL EMPHASIS ON THE SATISFACTION OF CONSUMERS OF HEAT ENERGY

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## Abstract

In this research paper, we will adequately address the sphere of information technology and systems in the consumer management company expressed through their satisfaction with the use of a legally regulated service. Management of business systems must constantly find solutions to the turbulent business environment, among other things, on the issue of developing their own strategy in the field of business, automation, integration and use of information resources. There is no area where there is no evident impact on the information elements of the system, especially in terms of technology, methods, standards and information. The very competition of utilities becomes more serious than the fact that there are more modern IT solutions that bring the service closer to the consumer. There is a need to develop a business strategy of the system, which is a strategy for the development of information systems. The basic application of information systems is in high productivity by providing new technological solutions.

## **Keywords:**

CRM, information technology, competitiveness, quality, service of heat energy

## 1. Introduction

The dynamics and complexity of modern business working, condition the need for adequate information for managers at all levels, because often the success of the work depends on the accuracy and timeliness of the available information on the basis of which the manager takes a business decision and undertakes appropriate activities. The simplicity and speed of manipulation with a large amount of data in terms of transmission, processing and access ensures efficient use

of operational data in the processes of solving the most diverse tasks provided by the management information systems.

The information system in the most general sense is any system developed for the purpose of creating, collecting, storing, transmitting, processing and interpreting information that represent knowledge or its addition, represented by data. A business information system is a system for processing matter, energy and information, in order and role for greater reproduction, where the active component of the system is the information. [1]. The data and information are used as synonyms, the data is objective, while the information is subjective because it depends on the way the subject understands and uses the presented data

Customer expectations are growing at a fast pace and depend on the timeliness and accuracy of e-business information. Studies show that web consumers will wait only 8 seconds to see the requested page even if they are in a weak connection that they do not have control. The development of information systems will continue to follow the achievements and the development of information technologies, which will achieve the complete electronization of information systems. The full use of electronic information systems is possible with the increase in their number and in the environment, and when business partners achieve high or similar technological development. It remains to be concluded that the company must be competitive in order to adopt an information system that provides lower operating costs and more efficient and effective results in its environment. [2]

## **2. Consumer in the global business world**

Consumers in today's business world face a wide range of services and products that can meet some of their particular needs. The choice between many market offers is that consumers form certain expectations about the value and satisfaction that the market offers will deliver and according to which they will make the purchase. Consumers who are satisfied re-buy the product or service and for this their pleasant experience informs other consumers, while dissatisfied consumers in most of the cases negatively express the product / service and return to the competition. The global consumer is a consumer without prejudice, tinted and layered needs, a clear preference and a pronounced sensitivity of the way and the quality of meeting their needs. [3]

The modern consumer, regardless of whether it is an individual or a global company, will always defend his right to free choice, that is, the level of his own satisfaction, the consumer in the global world puts before and above national loyalty, expressed through attachment to domestic sources of supply. Consumers forced by financial difficulties and global instability to become the creators of change, aiming to create a better world.

- Consumers face stereotypes and consumption patterns: The so-called "buyers-agnostics" ignore loyalty to "labels," "perfect products," and "uptime" dates, as they are looking for innovative ways to discover the values that the products offer.
- Creative "single buyers" combine the consumption of luxury products with those that are not conventional.
- Millions of people who have developed health consciousness prefer to consume "greener", healthier and locally produced foods.
- Mental well-being drives consumers to overcome their physical fitness and strive for optimum health. [4]

Consumer value and satisfaction are a key base on which each company needs to build relationships with consumers. The consumer in the global world is represented by global companies, because in addition to the numerous factors that create competitive advantages of

global companies, in the first place is the consumer focusing factor. Global companies are concentrated on the consumer through the identification of internal and external consumers in order to determine the best way to provide a service. Therefore, global companies strive for a horizontal organizational structure in order to be closer to consumers. Their goal is to direct in order to meet the needs of the consumers and create a relationship with them, because in the current work there is the creation of new requirements for perfect products and services. [5]

The concept of CRM is a direct consequence of the development and application of information technologies in the new digital environment, and their further accelerated development will play a significant role in this concept in the business of modern companies. Consumers are the company's main resource, they are the focus of all the company's diverse activities, with the ultimate goal of creating a superior value for consumers. Managing customer relations in terms of regulated activity also influences work satisfaction as an indicator of the company's climate, the manner / style of management, the system of allocation of awards and wages, as well as staff management policy.

### **3. Management of the relations with the consumers within the regulated activity - heat energy**

The strategy and goal of the company is aimed at its customers:

- To offer them good enough service at a low price, by reducing the cost of producing heat energy.
- To raise the level of service on all grounds, the company should be closer to its customers by building a mutual relation of mutual trust and understanding, so that the ultimate goal is satisfaction of the consumer of heat energy and maximum utilization of the production capacity.

Inexperience of services means that they can not be seen, touched, tasted, heard or smelled before being purchased, and accordingly, consumers based on the place, the people, the price, the equipment and the communications they can see, make conclusions about the quality of service to reduce uncertainty by viewing these signals. The company that offers the services is tasked with sending real signals about the quality of its services through organized, honest evidence of its capabilities. The difference between products and services is that products are produced, stored, sold and consumed at the end, while services are first sold, and are produced and consumed at the same time. Services are inseparable from their providers whether it is a person or a machine, and thus the variability of the service in terms of quality depends on who gives it, how, when and where it is given.

#### ***3.1. Measuring customer satisfaction by supplying heat energy***

The basic scope of the research project is measuring the satisfaction of the customers from the services of the company Supplier of Heat Energy in the 2017/2018 season through the analysis of the quality of heating. The purpose of the quantitative analysis is to obtain the main parameters of the consumer sense of the attributes of the company's supplier service, which should further streamline the marketing efforts and the development of the service. At the same time, the subject of research is:

- informing consumers of their own and the obligations of the company supplying heat in the context of the legislation,
- the interest of consumers for the use of additional services and improvements in order to meet their needs in the direction of the modern way of life,

- customer satisfaction and confidence in the company supplying heat energy with direct contact with its employees, with different consumer needs.

The research is based on a strategy to improve the satisfaction, loyalty and value of the used service by the consumer. All this is based on information received as feedback from the consumers themselves, who thus detect weak points or links in the processes. The aim of the paper is to see the impact of a quality information system integrated into the company by linking the work processes in one whole, with a particular emphasis on the customer relationship management section. Detecting the reasons for the satisfaction of the consumers of heating energy and their promotion, as well as removing the reasons for dissatisfaction through the prior detection of them, using real data, analyzes and surveys.

### **3.2 Methodology**

In the scientific - research procedure an analytical - synthetic method and method of communication is applied in order to cover all elements and aspects of the subject of research. In the paper we will analyze the advantages of a quality information system, we will see the need for its application for managing customer relations, presented and expressed through consumer satisfaction.

The data were collected by telephone call, based on a questionnaire composed of 11 substantive questions from a closed type. Questions 1 to 3 were with the choice or with and without, while on the questions from row 4 to 11, the respondents could give grades from 1 to 5, where 1 is the lowest and the 5 highest grade. The method of communication through a telephone survey on which this quantitative analysis is based provides:

- Researchers through simple questions and topics that will cover quickly gather a lot of information from consumers,
- Examiners to explain issues that are not well understood,
- Depending on the answers of the respondent, they may omit some questions or to continue the examination by asking other questions,
- Greater control over the sample,
- Subjectivity of the examiner,
- Different examiners interpret and respond differently, especially when pressed by the factor time. [6]

The sample was designed according to statistical rules, whereby it was achieved to be representative in relation to the total number of consumers, ie 5 criteria were determined on the basis of which 360 consumers were selected from the customer base according to the following algorithm shown in Table 1.

Table 1. Consumer selection algorithm subject to survey research.

Алгоритам на селекција на потрошувачите кои се предмет на анкета									
Критериум 1	Критериум 2	Критериум 3	Критериум 4	Критериум 5					
Подружница	120	стар објект	60	20-35	20	плаќа	10	нормално	3
						не плаќа		нормално	3
				36-50	20	плаќа	10	ПТТ	3
						не плаќа		ПТТ	3
				51-70	20	плаќа	10	е-пошта	4
						не плаќа		е-пошта	4
		нов објект	60	20-35	20	плаќа	10	нормално	3
						не плаќа		нормално	3
				36-50	20	плаќа	10	ПТТ	3
						не плаќа		ПТТ	3
				51-над	20	плаќа	10	е-пошта	4
						не плаќа		е-пошта	4

The criteria on the basis of which consumers are selected are as follows:

**K1** - criterion on the basis of territorial belonging to the consumer ie whether it belongs to the region of the subsidiary West, Center or East.

**K2** - criterion based on the year of construction of the object, after exactly the year when the object is entered into a regular active mode of operation, that is, by the date when the building is connected to the central heating system.

**K3** - criterion of the age limit of the consumer, surveyed,

**K4** - a criterion on the basis of whether the consumer to be surveyed is in the group of consumers who regularly settle their invoices for consumed heat or not.

**K5** - a criterion based on the delivery of the invoice for heat energy that contains a large number of information useful for consumers from the aspect of the monthly consumption of thermal energy to informative and educational data.

#### 4. Researching and analysis data with heat energy consumers

Synthesized assessment of the level of satisfaction of the consumers of heat energy, derived from the results of the research project, realized in March 2018, on a sample of 360 surveyed from all the regions in the City of Skopje, reads: the satisfaction is quite close to very good, what should qualifies as highly positioned. This assessment is based on the knowledge about the situation in the wider social environment, as well as according to the research experiences that the respondents are quite strict in the assessment. The key point, dimensioned and defined through

the answers to the question "How satisfied are you with the quality of heating?" Is the strongest argument for the global assessment.

Considering the obtained results, the fact that consumers in a high percentage of 82.5% (taken into account grades 4 and 5) are satisfied with the results is satisfied with the quality of the services that the company gives them.

**- How satisfied are you with the quality of heating?**

The comparative overview of the two survey surveys shows the company's invested effort in the direction of improving the quality of the heating through a 10% increase in the grade 5. It can be clearly seen that these 10% of the total 78.61% (taking into account grades 4 and 5) directly come from consumers who in the past heating seasons felt that the service they receive from the company is good or very good to make this heating season a great one. The remaining 21.39% are unhappy with the quality of heating, which is a bit for the utility company, but as factors that can contribute to this percentage are:

- Consumers did not have the option of adjusting the service to their needs,
- The company should work more on trust with its customers, because of that there is the satisfaction of the customers.

Such results are an incentive for the company to further increase the percentage of excellence in the next heating season, which almost reflects the overall work of the company.

**- Do you have any problems with the process / method of paying bills?**

The company continuously improves the manner and availability of payment for invoices for consumed heat, using all modern technological information systems and applications. Consumers, after the possibility of paying invoices through a bank, a post office, offers the possibility to pay the invoices through their own website where the consumer can have insight into the invoices that are due for payment. Due to all the benefits and opportunities that the company offers in this field, showing respect for the private time of its consumers, they award it with a high 73,06% excellent rating.

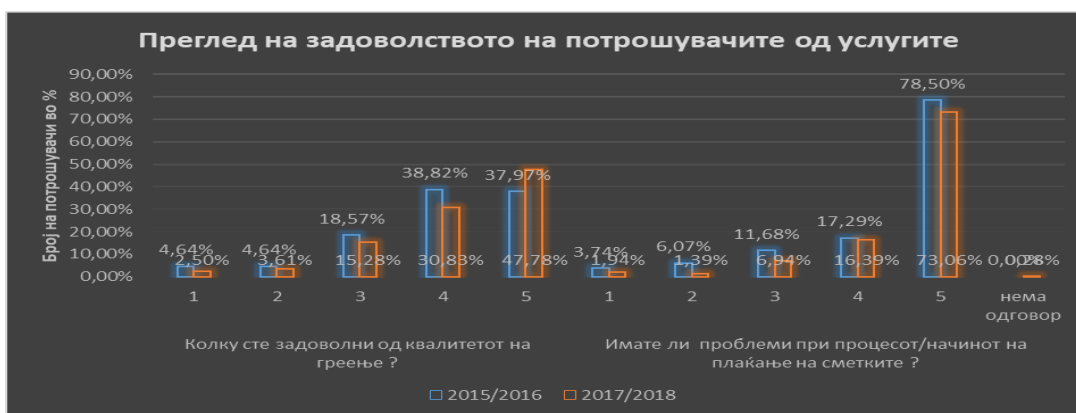


Figure 1. Overview of customer satisfaction with services

Table 2. Satisfaction of consumers from the quality of heating

1. Колку сте задоволни од квалитетот на греењето во оваа грејна сезона?											
Сезона/Оценка	1	%	2	%	3	%	4	%	5	%	Вкупно
2002/2003	26	8,15%	29	9,09%	72	22,57%	74	23,20%	118	36,99%	319
2003/2004	22	6,30%	27	7,74%	88	25,21%	121	34,67%	91	26,07%	349
2005/2006	23	7,19%	18	5,63%	91	28,44%	85	26,56%	103	32,19%	320
2006/2007	66	17,28%	52	13,61%	117	30,63%	90	23,56%	57	14,92%	382
2015/2016	11	4,64%	11	4,64%	44	18,57%	92	38,82%	90	37,97%	237
2017/2018	9	2,59%	13	3,75%	55	15,85%	111	31,99%	172	49,57%	347

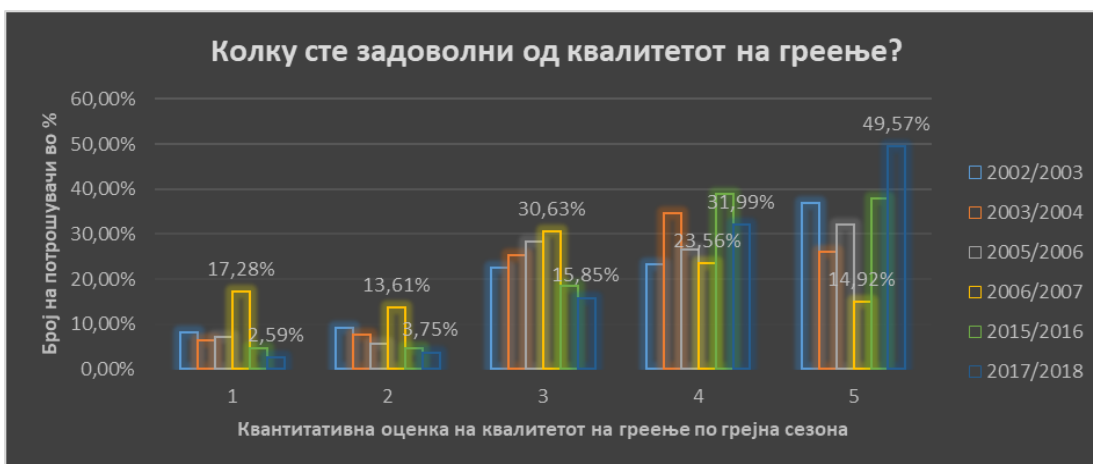


Figure 2 Satisfaction of consumers from the quality of heating

The first criterion for analysis is after **the regional or territorial division** of the entire district from the city to be heated. The company Thermal Energy Supplier in order to get closer to its customers with the intention of more efficient and effective resolution of common problems they encounter, has in its organizational structure three subsidiaries represented through toll centers named West, Center and East, and each of them serves a specific region or territory.

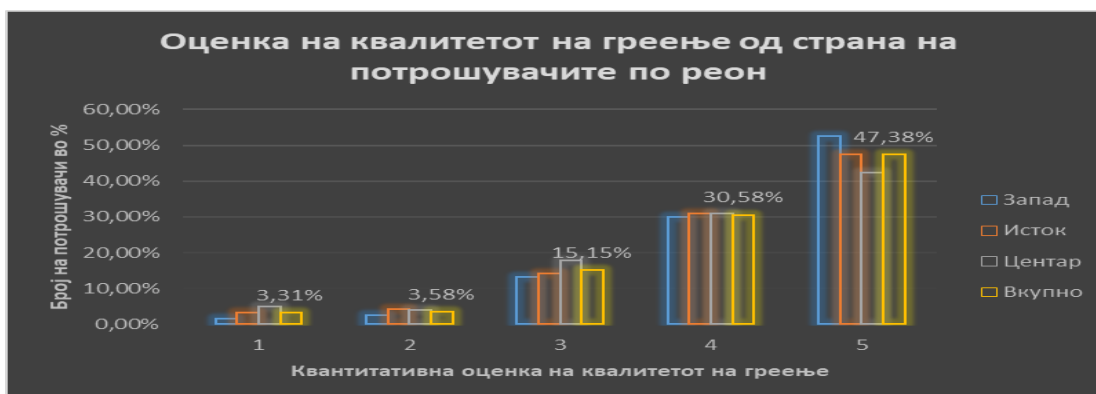


Figure 3 Evaluation of the quality of district heating

The quality of the service by region the highest percentage difference shows the highest rating that does not lead to the deepening of the analysis, through **the year of construction of the facilities**, that is, the year when they came to the network of the central heating system. The new

collective residential buildings are energetically more efficient and thus the price / quality ratio of the service received by the consumer owners in these residential buildings under the same conditions is drastically better in relation to the buildings that are built before 15 years or more.

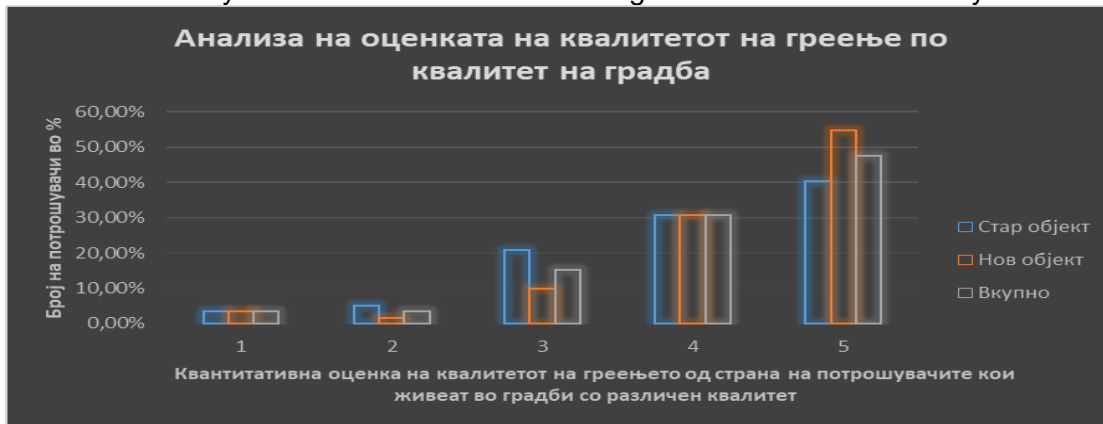


Figure 4 Evaluation of the quality of heating according to the quality of construction of facilities

In the direct conversations with consumers from the same collective housing unit with the identical square of the housing object and the same orientation of the housing object, the difference is only in the category of consumers giving contradictory data on the quality of the service, ie one characterizes as the other one as the average. After checking all measurable flats for that measuring point, that is, for that collective residential object as well as by measuring the internal temperature in the premises of both residential buildings, it was found that the temperature in the apartments is within the legally prescribed temperature. This led me to conclude that the quality of the heating, the service, ie the comfort that the consumer wants to feel in the residential space is subjective, which directs to make an analysis of the answers to the question by **gradation by age**. The analysis of this criterion confirmed the thesis that the feeling of comfort and the necessary heat on the heating surfaces is a subjective feeling, depending on the extreme limit of the consumers, namely, the greater the dissatisfaction with the quality of the heating / service greater.

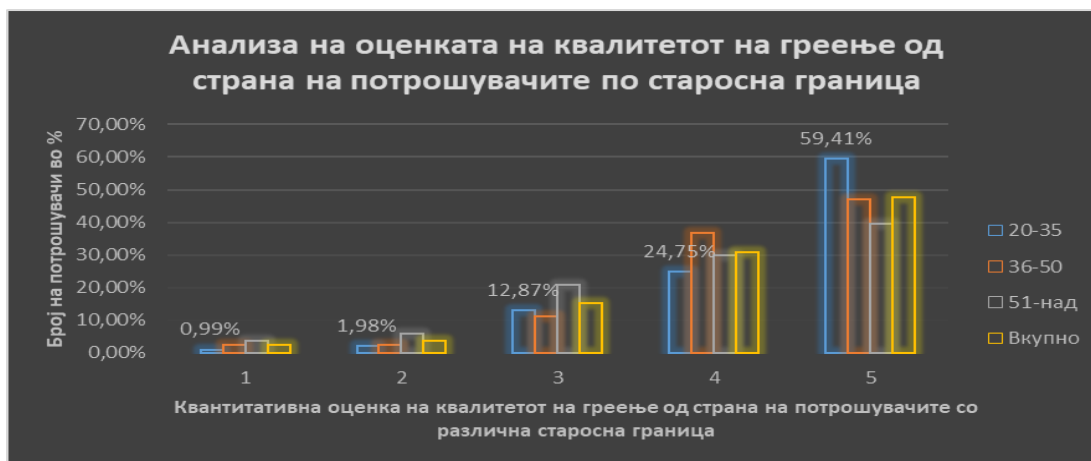


Figure 5 Evaluation of the quality of heating along the age limit of consumers

As part of the analysis of this criterion for the quality of heating, the possibility of installing a temperature regulation system which should eliminate dissatisfaction with consumers with a higher fixed limit and further increase consumer satisfaction with a lower level border.



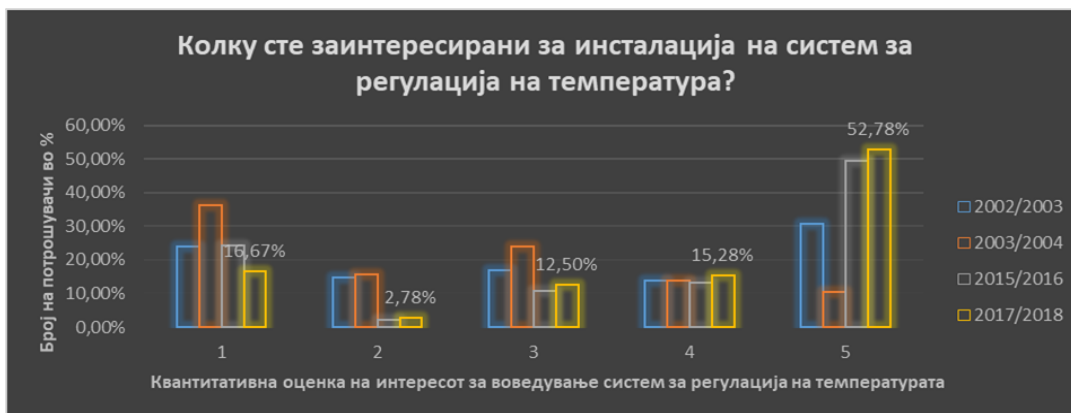


Figure 6. Interested in installing a temperature regulation system

In order to increase the comfort in the warmed up space, the company conducted an inquiry into whether consumers of thermal energy would like to increase their temperature in their homes. The question contained in itself the information that **increasing the temperature in the units** of storage will increase the cost of the same, ie it will be reflected by increasing the monthly invoices for consumed heat. Inquiry survey was carried out regionally in the City of Skopje and in accordance with the obtained results it can be noticed that consumers are not interested in increasing the temperature at all if this means an increase in costs. It is reaffirmed that the price or the amount of the monthly invoice that the consumer receives plays a crucial role in the satisfaction of the consumer when using this service.



Figure 7 Overview of the need to increase the internal temperature

According to the answers received from the survey survey, the fact that consumers with lower quality of heating have a weaker **financial discipline to pay the invoices** for a monthly fee for thermal energy is confirmed. The reason lies in the fact that:

- Consumers who consider that they do not have a satisfactory quality of heating also consider that the invoices should be reduced or not paid at all, as stipulated in the Rulebook on Supply of Thermal Energy and interrupted by a percentage reduction in the invoices at the heating season level in depending on the measured temperature in the flats.
- Consumers who do not have sufficient quality of heat are usually the owners of apartments in collective residential buildings that are on the upper or lower floors, where the losses of thermal energy are more pronounced, especially in the older built objects.
- Consumers who for various reasons have missed and unpaid certain fractures that are subsequently charged on a court basis with increased expenses, causes a great deal of revolt

in them and encourages them in the direction of negative response or poor assessment of this issue.

For the quality of heating, financial discipline is not decisive, but crucial for customer satisfaction, because the quality / price ratio is decisive for an increased percentage of regular invoices, which in itself are evidence of consumer satisfaction.

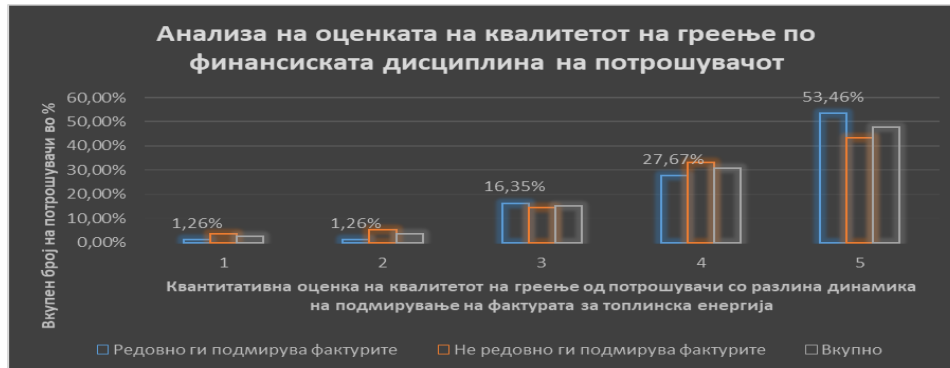


Figure 8. Assessment of the quality of heating in accordance with the financial discipline of the consumer.

According to the results obtained, the conclusion is as follows:

1. Improvements must exist in the segment of brand management, communications and new services, where weakness is evident.
2. Then, there is the recovery section, the environment and the employees where the scores are not so bad, but to improve them will need more effort, while the benefits are still good.
3. The quality of the heating is of the best performance, although there is still scope for improvement, but the maintenance of quality is of great importance.

This assessment is based on the knowledge about the situation in the wider social environment, as well as according to the research experiences that the respondents are quite strict in the assessment. The key point dimensioned and defined through the answers to the question "How satisfied are you with the quality of heating?" Is the strongest argument for a global assessment. Surely it can not be left unnoticed that there is a registered increase in consumer satisfaction with the services of the company taken comparatively to the previous survey survey. It is therefore logical to try to elaborate the reasons for this and that state. The research findings and considerations offer the following insights:

1. The fact that the same populations from the previous survey have not been examined has no impact on the data and knowledge, so they should be considered objective, real present and found.
2. The percentage and its quantitative value are influenced by the less positive statement or the more frequent negative, more rigorous determination of the respondents due to the unfavorable social general situation whose emergent forms are: the reduced standard of living, the slow resolution of the crucial problems in the society, the general apathy, unemployment, present nervousness, undiscovered perspectives, etc.
3. The interviewed respondents are not in a position to accurately differentiate what is due to subjective behavior, and from the objective state.
4. The surveyed name makes it easier to work, because they only say the grades without needing to explain or argue them.
5. Regardless of the outcome, the company must undertake internal activities to promote and improve the situation and relationships with consumers, aspiration for progress.

## 5. Conclusion

Modern business is characterized by rapid changes in the working environment and increasing pressure from competition. Business system management must constantly find solutions to all turbulences in the working environment, which at the same time represents the development of its own strategy in the areas of operation, automation, integration, information and resource utilization. Management Information Systems (MIS) provide the necessary information for the needs of decision-making at the level of middle management that deal with operational management, planning, control, decision-making and execution of certain business functions. The basis of these systems is based on systems that are based on knowledge and who are able to create reports with quality and timely information for mid-level managers.

The goal of the new technologies in modern business communications is to connect the technological possibilities with what consumers demand and not change the behavior of consumers in accordance with the new technological solutions. The point is that consumers are the main resource of the company, that they are the focus of all the company's diverse activities for the ultimate goal of creating a superior value for consumers. This approach to work in these systems gives the possibility of signaling for certain deviant occurrences during the business, which relate to the achieved results and set goals. Customer relationship management is focused on managing customer data through the process of building and maintaining relationships with them by delivering consumer value and satisfaction by meeting consumer expectations.

In the sphere of companies dealing with heat supply, numerous experiences and analyzes have shown that the basic condition for improvement ie increasing the satisfaction of the consumers of thermal energy is to maintain and strengthen the essential functioning of the company with gradual or accelerated improvement of the operation through providing more quality, reliable and regular services through:

- Monitoring and responding to the requirements, needs and expectations of the consumers and new incorporation in the work process,
- Enhanced content communication with consumers for their complete and complex information and education,
- Continuous research on the needs, attitudes, behavior, motives, emotions and satisfaction with the services provided by the company,
- Conceived, regular and maximally productive relations with the media,
- Public address with flyers, brochures, posters, billboards, etc.,
- Establishing a Customer Care Center,
- Establishment of a service department,
- Electronic delivery of invoices,
- Electronic payment of invoices through the Supplier's website,
- Continuous reduction of the price of thermal energy through effective and efficient operation of the company,
- Improving the quality of the work of the Distributor of heat energy through enhanced monitoring of the heat supply supplier so that there are no major differences in the quality of heating between the collective residential buildings,
- More frequent measurements of consumer satisfaction, through surveys, website, etc.

The level of satisfaction with using the service is high, which means that the company significantly improved the quality of service in the part of the quality of heating by:

- Prolonged heating time in the daily heating period from 21:00 to 22:00,

- Better quality of service by Producer and Distributor who delivers heat energy to the heating substation and to consumers,
- Increased reliability of the system resulting in minor defects in the distribution network,
- Quick and expert removal of defects in the internal installation, thanks to the newly created service department.

For these reasons, the need for a CRM system in work processes and activities largely reflects the need for each survey question. With its implementation, transparency in internal and external communication with consumers will increase and in this way uniformity in the provision of information will be achieved. By applying and using the CRM information system, all employees who are in direct or indirect contact with consumers will have an insight into the company's work activities and in the customer database.

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