

Contributions concerning the improvement of the quality management of communication and information technology at the level of central public authorities

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Foreword

The thesis entitled "Contributions concerning the improvement of the quality management of communication and information technology at the level of central public authorities" is the result of research whose objective is to improve the quality of communication within a central public authority via a proactive approach. It is probably the first time, at the national level, that techniques and methodologies used by engineering sciences and operated in business were used for the processes carried out by a central public authority. This research can become the subject of great importance for any central public authority that aims to increase the quality of the government act by providing efficient public services.

The conception of the doctoral thesis took place under the careful guidance of Prof. Univ. Dr. Eng. Aurel Mihail ȚĂȚU, in his capacity as scientific coordinator, and to whom I wish to express my deepest feelings of respect, consideration, and gratitude for the extraordinary guidance and for creating a collaborative framework in which respect, kindness, and support of moral values were immutable throughout the research, including the completion of this doctoral thesis.

All intellectual property rights in this doctoral thesis belong equally to the scientific supervisor and Mrs. Iuliana Gheorghe (née Moiescu).

I would like to extend my thanks to Prof. Constantin Oprean, Emeritus Ph.D. in Engineering from the University; Prof. Nicolae Ionescu, Ph.D. in Engineering from the University; Mr. Cristian Doicin, Prof. with a Ph.D. in Engineering from the University; and Prof. Mihail Dragomir, also with a Ph.D. in Engineering from the University. Their insightful analyses and recommendations, arising from their extensive expertise in the field of scientific research, have played a crucial role in helping me achieve the set objectives during my research journey.

I also want to thank my colleagues for the recommendations presented, which were significant for the research evolution, and, at the same time, for the support shown towards the implementation of the methodology presented in this research at the level of the institution I'm working.

The support of my dearest people, my son, Andrei-Iuliu, my father, and the scientific coordinator represented a real impulse that pushed me and that contributed decisively to the achievement of this academic project.

Iuliana G. GHEORGHE (Căs. MOISESCU)

Introduction

Improving the quality of public services is a wish of every European citizen. Thick files containing different sorts of documents are requested from citizens to obtain notices or approvals issued by public institutions. This procedure of imposition is founded on the rigor of the law and is amplified by the existence of processes developed at the level of central public authorities. The complexity of the rules and the impossibility of respecting the deadlines assumed by the procedures, in most cases, converge towards an institutional blockage by exceeding the deadlines for issuing the requested opinions, constantly generating dissatisfaction among the beneficiaries of public services.

The attempts of the governors, who succeeded one another at the state leadership in recent years, to establish different bodies at the level of public institutions, such as the "Paper Shredding Commission", have failed. The elimination and simplification of documentation with the aim of transforming complicated and arduous processes into efficient processes at the level of public administration did not have the expected result. Public officials, public managers and dignitaries have not currently identified the necessary solutions to contribute to the improvement of the quality of public services.

The research topic comes with a new approach, focused on the efficiency of a process, starting from a rigorous analysis and ending with the application of tools and techniques that come from the sphere of management and engineering. At the same time, by streamlining the activity of a public authority there are all the prerequisites for improving communication processes by demonstrating that public authorities are proactive, are sensitive to citizens' complaints and persevere in actions aimed at providing efficient and quality public services.

The architecture of the first part of the thesis is outlined in four chapters, intended in such a way as to reproduce the current state of research regarding the management of the quality of communication and information technology in public institutions. In the chapter entitled "Basic theoretical considerations regarding organizational management. Critical aspects of management in central public authorities", the concepts and principles of management valid for any category of organization will be presented characteristics related to management processes and the evolution of managerial thinking will be presented. By means of knowledge in the field of management, various organizational and implicitly governmental objectives can be accomplished. The experience of specialists who have dedicated themselves to the study of the art of management, is essential to be able to understand the entire management system process that aims to contribute to the success of the mission undertaken by any organization.

Through the chapter entitled "The current approach to quality management in the context of the doctoral research topic" are brought concepts and analyses regarding quality and the principles of quality management remain brought to attention, including information on quality management systems. At the same time, different standards used in the field of quality and a series of documents that represent an essential component of the quality management system are presented.

Chapter three exposes in its contents "Communication quality management at the level of a central public institution". Communication is essential for the optimal functioning of any organization, including a central public authority, as it connects all managerial functions, and the success of the management of a public institution also derives from the quality of the communication processes that take place both internally and externally, with the target audience.

Chapter four, entitled "The current approach to the issue of information technology at the level of a central public authority", focuses on studying the current state of knowledge in the field of information systems and analyzing the possibilities of exploiting information technology within the framework of central public authorities. In this context concepts such as the computer system, the information system and digitization were addressed in the context of analyzing the evolution of the quality of public services offered to citizens.

Also, the presentation of the current situation of the e-government system regarding the provision of digital services for citizens was carried out at the level of a ministry in its sphere of competence for promoting and protecting culture.

The last chapter of the first part of the doctoral thesis includes a series of "Conclusions on the current state of knowledge on improving the quality management of communication and information technology at the level of central public authorities".

The second part of the thesis is reserved for presenting the contributions through which the public services available to citizens can be made more efficient, thus generating improvements in the management of communication and information technology at the level of central public authorities.

A chapter is dedicated to present the "Direction, main objective and research methodology used to improve the quality management of communication and information technology at the level of central public authorities".

In the chapter "Contributions regarding the improvement of communication quality management through the lens of applicable strategies and policies" a SWOT analysis, from the perspective of communication, was presented contributions were included regarding the improvement of the quality of the communication process regarding access to information of public interest and measures presented through which both efficiency and effectiveness can be achieved, through the lens of communication quality management at the level of a central public authority.

Chapter nine, entitled "Contributions regarding the mathematical modeling of the endorsement process for the establishment of museums and public collections within the Ministry of Culture" includes contributions regarding the analysis of experimental data, using the factorial experiment method. The mathematical modelling process benefited from the assistance of software programs specialized in data analysis and processing, namely Statgraphics and Minitab. By explanation of the experimental data, we managed to establish how a process can be optimized, taking into account the significant variables for that process.

Another important chapter was the one through which the "Contributions regarding the confirmation of the mathematical modeling of the approval process for the establishment of museums and Public Collections" were presented. Thus, the need to confirm the proposed mathematical model was brought to attention and the confirmation of the mathematical model for the objectively imposed and necessary functions was presented.

In the last chapter, "Final conclusions, main contributions and future development directions", the most significant conclusions resulting from the research are included, highlighting what were the original contributions of the thesis, presenting, at the same time, the topicality of the topic addressed, the complexity and how that can be implemented tools not used in public administration, but which have proven their effectiveness and are now used in the private sector. The research departments open up new possibilities of approach and implementation in different specialized areas, and the bibliography includes studies and works in the field of research, being made up of more than 180 titles, including scientific works published by the author and which are the product of the research carried out for the objective of this thesis.

PART I. THE CURRENT STATE REGARDING THE MANAGEMENT OF COMMUNICATION AND INFORMATION TECHNOLOGY AT THE LEVEL OF CENTRAL PUBLIC AUTHORITIES

CHAPTER 1. THEORETICAL CONSIDERATIONS REGARDING ORGANIZATIONAL MANAGEMENT. CRITICAL ASPECTS OF MANAGEMENT IN CENTRAL PUBLIC AUTHORITIES

1.1 The organization as a system. Types of organizations

In the specialized literature, the organization can be considered to be an entity with its specific structure, within which a collective carries out its activity in an organized way to obtain products or services which are offered for consumption to different categories of customers. (Oprean & Țițu, 2008)

Certain specialists define the organization as "a social system designed to achieve specific objectives, having different structures, and developing certain processes to fulfil the proposed mission. Each organization has distinct strengths, different limitations and specific applications." (Brătianu, Mândruleanu, & Dumitru, 2011) To define an organization it is necessary to meet, at the same time, at least three specific elements which distinguish between a group and an organization, and these are:

- at least two people to form a group;
- to have a common objective for group members;
- the actions taken by the members of the group must be concentrated and coordinated, like a system, to fulfil the proposed mission or to achieve the proposed objective.

According to specialized literature, the factors that determined the emergence of organizations were the following:

- there is no possibility that the proposed objectives can be fulfilled individually by only one person;
- the intended aims can be accomplished in a shorter time;
- the possibility of ensuring that, through the distribution of attributions, group members can also enjoy other social activities;
- through the association, there is the possibility of using the experience possessed by each member, and, also there is the possibility of acquiring new skills and knowledge;
- the existence of an internal culture or belief.

Types of organizations

The specialized literature identifies five types of organizations, which can be differentiated from each other by their general purpose. Consequently, we find the following "types of organizations:

- voluntary associations;
- military organizations;
- corporate organizations;
- philanthropic, spiritual organizations, social assistance associations;
- family business organizations, such as small businesses or the Mafia". (Iacob & Cismaru Diana-Maria, 2012)

In the book *Business Management*, the authors presented four models of organizations, represented in figure 2.1, which are:

➤ **The mechanical model** developed in the industrial age when machines were the most significant factor in progress. During that period, the concept of bureaucracy appeared, presented by Max Weber, who identified a parallel between industrial function and office work. Thus, bureaucracy becomes the mechanical model of an organization, which emphasizes precision, speed, clarity, regularity, reliability and efficiency. The characteristics of the mechanical model of an organization are as follows:

- a fixed structure with well-established boundaries for departments and detailed job descriptions;
- an upright hierarchy of management with a predetermined chain of authority so that each individual has only one superior from whom to receive orders;
- detailed and elaborate rules for organizational behaviour, with standard procedures, to govern activity and to be specified in documents and files. This organizational model emphasizes adherence to procedures rather than professional development, being unable to adapt to new business requirements. (Brătianu, Mândruleanu, & Dumitru, 2011)

❖ *The biological* model highlights the importance of flexibility in the internal structure, providing employees autonomy and the capacity to adjust to environmental changes. Consequently, the organizational structure can be partially or completely changed. (Brătianu, Mândruleanu, & Dumitru, 2011)

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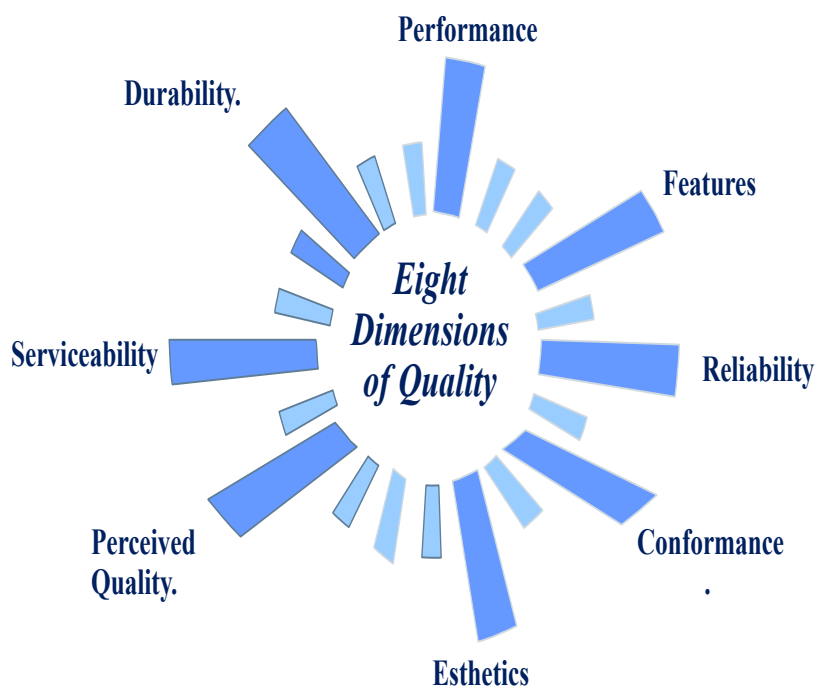
CHAPTER 2. THE CURRENT APPROACH OF QUALITY MANAGEMENT IN THE CONTEXT OF DOCTORAL RESEARCH THEME

2.1 Quality and quality management in a modern view

2.1.1 The concept of quality in modern vision and the concept of quality management

Quality is what we're looking for every time, whether buying an item like a TV or food. Today's trend is to buy organic or ecological food because information often appears, in various channels, about it being "better quality" than the usual food products that we find in supermarkets, considered to be unhealthy, as they are injected with different substances. People want to attend a show or music festival because there is a belief that only that event will provide a quality artistic act.. Classical music of exceptional quality only can be heard at the Romanian Athenaeum during the George Enescu Festival, where the most talented and illustrious instrumentalists in the world elevate the audience's auditory senses on the wings of the most delightful chords. Quality is desired and sought by every person, whether we are talking about services or products. Access to modern communication media has allowed consumers of goods and services to prospect the market and obtain accurate information on the goods and services they are going to purchase. It is considered that the one who can appreciate the quality of a product or service is the consumer himself, according to the specialized literature.

Simultaneously with the development of technologies, the desire of manufacturers to offer consumers the highest quality products has generated fierce competition between service and goods providers.



In the specialized literature, various definitions were presented for the so-called "quality dimensions", as shown in Figure 2.1:

- performance;
- esthetics;
- conformance;
- serviceability;
- features;
- durability;
- reliability;
- perceived quality".

(Garvin, 1987)

The specialized literature brings to attention five main guidelines used in the definition of quality, and they are:

Fig. 2.1 Eight Dimensions of Quality (Garvin, 1987)

- *transcendental orientation*, each person perceives quality subjectively, which prevents the well-defined meaning of product quality and its measurement;
- *emphasis towards the product*, a principle that focuses on the quality characteristic of the product, an approach called calimetry in economic theories;
- *orientation towards the production process*, quality remains examined from the producer's point of view, the product being of quality only if it respects certain specifications, so the quality conforms to the requirements ("conformance to requirements" the definition formulated by Philip Bayard Crosby);
- *cost orientation*, a product becomes quality if it performs well and the price of that product is reasonable;

➤ *orientation towards the user*, according to the "fitness to use" concept, formulated by Joseph M. Juran, "a product is of quality if it is suitable for use". (Oprean & Țîțu, 2008)
The significance of the term quality can be found in the Explanatory Dictionary of the Romanian Language, which offers the following definition: the set of characteristics and fundamental aspects based on which something is especial compared to the others.. (Academia Română, 2016)

Among the leading specialists in quality management, the following authors stand out: Kaoru Ishikawa, Joseph M. Juran, W. Edward Deming, etc.

The concept of quality was defined, too, by the American professor of Romanian origin, Joseph M. Juran, who explained the following in his book:

❖ "Quality" means those characteristics of products that meet customer needs, ensuring customer satisfaction. Thus, the meaning of quality is oriented towards increasing income. The purpose of such superior quality is to provide greater customer satisfaction, hopefully increasing revenue. However, providing better besides/or better quality features usually requires an investment and hence usually involves increased costs. Higher quality, in this sense, "costs more".

❖ "Quality" means the elimination of deficiencies, release from errors requiring rework or resulting in field failures, customer dissatisfaction, customer complaints, etc. In this sense, the meaning of quality is cost-oriented, and higher quality usually "costs less". (Joseph M. Juran, 1998 , the 5th ed)

...

„According to the specialized literature, Juran paid especial attention to the permanent improvement of quality, proposing a plan with the following sequence of stages:

- demonstrate the need for improvement;
- establish the infrastructure;
- establish the project team;
- provide the project team with resources, project team training and motivation to establish causes and identify solutions;
- establish controls to maintain earnings.” (Joseph M. Juran, 1998 , the 5th ed)

Regarding services, in the specialized literature, different features or qualities of services can be distinguished, and these are reliability, responsiveness, competence, access, courtesy, communication, security, customer understanding or knowledge, tangibility or empathy.

Different definitions of Quality Management can be found in the specialized literature. Quality management represents the totality of those activities aimed at achieving certain objectives using all available resources. (Oprean, Țîțu, & Bucur, 2011, pg. 415-417)

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2.1.2 Analysis of the principles of quality management at the level of a central public authority

Certain specialists (Hoyle, 2007, pg. 24-33) draw attention to the following aspect, namely that producers of services or goods can obtain a certification, such as ISO 9000:2015, but this will

not guarantee that the income generated will be the expected ones. Starting from ISO 9001:2015, the author presented seven principles of quality management, which are those presented in figure 2.2.

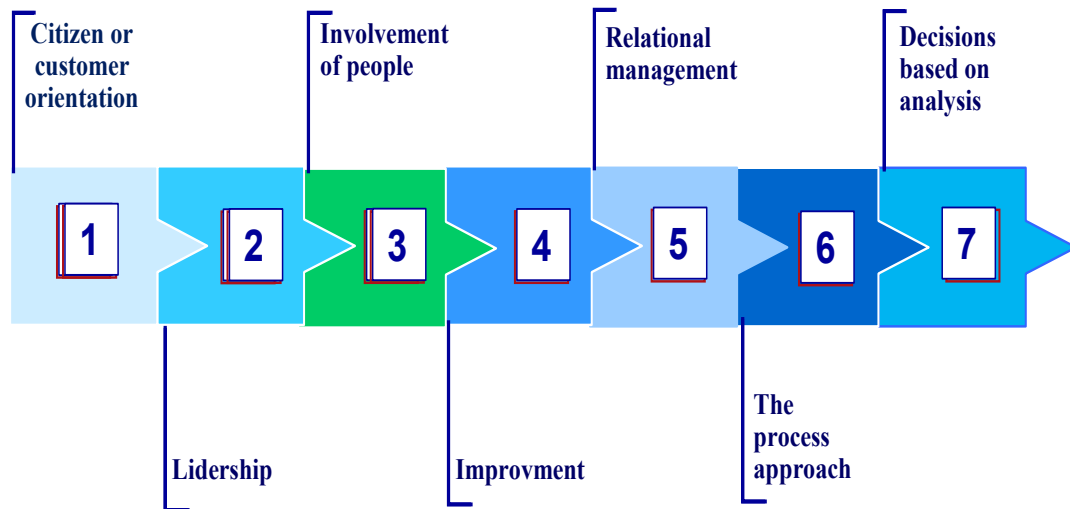


Fig. 2.2 Principles of quality management (Hoyle, 2007, pg. 24-33)

- A. *Citizen or customer orientation.* The customer-oriented organization is the organization that::
- understands the needs and expectations of the citizen;
 - responds to the needs and expectations of all interested parties;
 - communicate these needs and expectations throughout the organization;
 - measures the degree of satisfaction of citizens and acts based on the results;
 - could link its objectives and targets directly to the needs and expectations of citizens/customers;
 - acts on the basis of the results of measurements of the degree of satisfaction for the citizen.

...

2.2 Total quality, total quality management and related principles

Satisfacerea cererii unui client, care implică, totodată, un impact voit sau nevoit asupra diferitelor părți interesate și importante, reprezintă consecința unui proces care are la bază capacitatea unei organizații de a produce bunuri și servicii de calitate. Percepția valorii și beneficiului obținute de către clienți reprezintă o parte integrantă a calității bunurilor și serviciilor, alături de funcția și performanța avută în vedere de către producător. (9000:2015 ASRO, 2015)

Total quality has been defined differently over time, either as a philosophy, a system of processes or an organization's strategy.

To define total quality concepts can be considered as follows:

- total quality represents the strategy adopted by an organization in the sphere that implies quality;
- total quality can be considered a philosophical approach;
- there is a similarity between the notion of total quality and management;
- total quality can be associated with a goal, and management can be associated with how the objective can be achieved. (Olaru Marieta, 1999, Ed. a 2-a)

Total Quality Management represents, for certain specialists, "an organizational culture characterized by increased customer satisfaction, through continuous improvements, in which all employees actively participate.

- ❖ quality is the result of continuously meeting customer expectations.

- ❖ total quality is the process by which quality is obtained at low costs.
- ❖ total quality management describes the action of obtaining a total quality through the participation of all". (Dahlgaard, Kristensen, & Kanji , 2005)

According to specialized literature, the most important specialists who contributed to the development of quality management are considered, globally, to be W. Edward Deming, Juran, Kaoru Ishikawa and Philip Crosby.

A definition for Total Quality Management (TQM) was as follows: The integration of the effort of a group within an organization into an effective system, to optimize the quality of production, marketing, and design, with the final result of satisfying a consumer from all points of view. (Feigenbaum, 1991) In Feigenbaum's view total quality can be ensured if the following conditions:

- quality represents the expression of the customer's perception of quality, and not what an organization is convinced to be;
- quality is not different from cost;
- quality is the result of combining individual and team efforts;
- quality and innovation are unitary;
- business management reflects how quality is achieved;
- quality itself is fundamental;
- quality comes from a constant process of improvement, not occasionally;
- quality involves managing a system that must include both suppliers and customers;
- investment in quality leads to productivity and profitability. (Feigenbaum, 1991)

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CHAPTER 3. QUALITY MANAGEMENT OF COMMUNICATION AT THE LEVEL OF A CENTRAL PUBLIC INSTITUTION

3.1 The concept of communication and communication management in the current context

Throughout the evolution of humanity, philosophers and anthropologists have tried to formulate definitions that capture the quintessence of the difference between man and other life forms, and the ability to articulate words remains perhaps the most relevant.

The intrinsic value of the uniqueness of the faculty of communication with different types of collectivities should not stand at the foundation of the attitude of superiority of humans versus other non-speaking beings. The superiority of the human being should reside in the evolution of his thinking and implicitly in the development of the individual communication process.

Oratory and the art of effective communication have been constant concerns of society since ancient times, and therefore the science of communication has found its place among the other significant sciences, being studied in the most prestigious universities. Communication in the new era has been more meaningfully studied and applied in areas with an impact on civil society, such as sales through marketing, but especially in the most important, worldwide, electoral campaigns, which take place in the territory USA. At the European level, numerous studies and books in the field of communication have been published and disseminated, and the explosion of social media tools has determined substantial research in identifying and deepening the science of communication from the best experts in the field.

In the specialized literature, the concept of communication has been given the following definition: communication is the process that allows a sender to transmit information to a receiver, using a medium or a channel, to produce some effects on the recipient of the communication. (Cuilenburg, Scholten, & Noomen, 2001)

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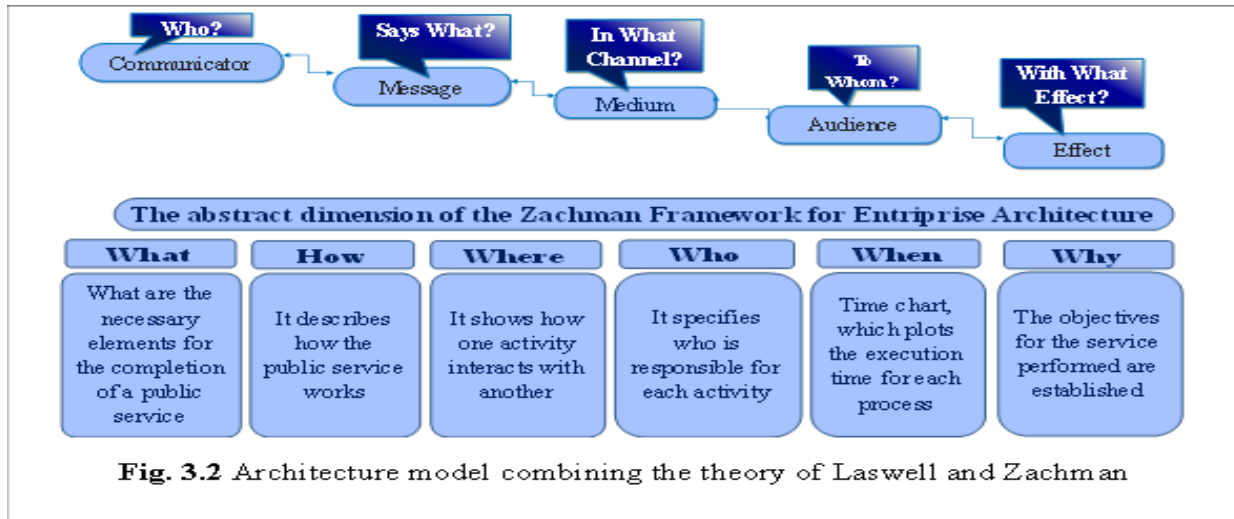


Fig. 3.2 Architecture model combining the theory of Laswell and Zachman

Communication specialists also developed one of the first models of communication, and to truly understand communication processes, it is necessary to understand each step within these processes. (Lasswell, 1948) The elaborated model thus included the five elements, shown in figure 3.2, found in works in the field of communication under the name "Theory of the 5Ws" and these are the following: Who? Says What? In Which channel? to Whom? With what effect?" (Lasswell, 1948). This model was later translated by John A. Zachman into a model of architecture (Architecture, 1990)

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CHAPTER 4. THE CURRENT APPROACH TO THE PROBLEM OF INFORMATION TECHNOLOGY AT THE LEVEL OF A CENTRAL PUBLIC AUTHORITY

4.1 Information system versus information system

"The information system is a set of interrelated components that collect, manipulate, store, transmit data and information and that can provide a feedback mechanism to achieve an objective, either to increase profit or to improve the services provided to customers". (Stair & Reynolds, 2010, p. 4)

All the elements that participate in the primary data processing operations and the transmission of these data through an electronic system make up an IT system. (Zota, 2018) A representative rendering aimed at the computer system is sketched in Figure 5.3, adapted from John von Neumann (Poundstone, 1998), the American mathematician who, together with Alan Turing and Claude Shannon, formed the group of conceptual inventors for the first program of memory held by the first digital electronic computer built for general use by the United States of America (Electronic Numerical Integrator and Computer).

Input

Within a computer system input describes the process of gathering and capturing raw data or primary attributes as they are further defined. For example, to produce a report on public information, a document that any central public authority must publish according to the legislation in force, it is necessary to enter data, day by day, into a *.xls file, and at the end of the year the respective data will be processed or processed for the preparation of a report.

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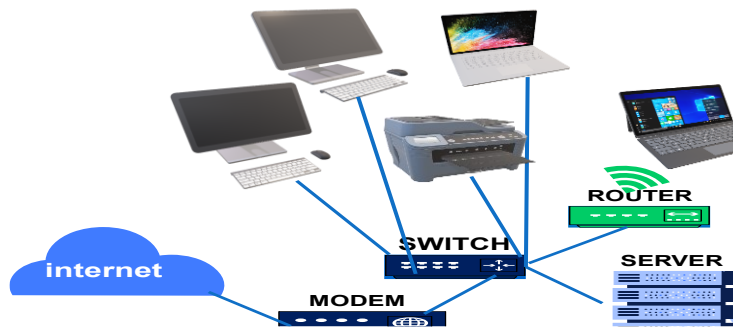


Fig. 4.13 Representative technological infrastructure model for Web 2.0 (O'Reilly, 2006)

«In 2006, Web 2.0 appeared and was defined as follows: it is the business revolution in the computer industry caused by the transition to the Internet as a platform and an attempt to understand the rules of success on that new platform. „Chief among those rules is this: Build applications that harness network effects to get better the more people use them. (This is what I've elsewhere called "harnessing collective intelligence."» (O'Reilly, 2006)

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CHAPTER 5. CONCLUSIONS REGARDING THE CURRENT STATE OF KNOWLEDGE ON IMPROVING QUALITY MANAGEMENT AND INFORMATION TECHNOLOGY AT THE LEVEL OF CENTRAL PUBLIC AUTHORITIES

The architecture of the current stage, presented in the first part of the thesis, has the role of outlining the context in which a government organization, a central public authority carries out its activity, analyzing organizational management, quality management and information technology issues, all of which have close connections with the communication process.

At the beginning of the industrial era, Max Weber introduced the concept of bureaucracy, part of the so-called "Mechanical Model" was based on particular characteristics, such as standard procedures and strict rules, all recorded in the form of documents and files, were intended to manage the activity of an organization. Today, although the concept of bureaucracy is considered an outdated one, for which the governments of our country have made considerable efforts to eliminate it from the public system, nevertheless, at the European level, the standardization of a process has become a top-level practice for any type of organization, including for the institutions of the European Union.

I believe that a public authority needs clear regulations, instructions, methodologies and procedures, supported by laws, which are as detailed and explicit as possible so that they can be understood correctly and simply by public officials, but also by any citizen, as an equivocal normative act can lead to misunderstandings, lawsuits or violations of the legislation in force. Respecting all the stages in the processes carried out at the level of a ministry can lead to the efficiency of the activity, simultaneously with the transmission of the message that there is genuine transparency and integrity in terms of the public service offered to citizens. Some management specialists have determined that only rule-based organizations can develop predictable and optimal services, even in circumstances where global change is imminent.

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PART II CONTRIBUTIONS TO THE IMPROVEMENT OF COMMUNICATION AND INFORMATION TECHNOLOGY MANAGEMENT AT THE LEVEL OF CENTRAL PUBLIC AUTHORITIES

CHAPTER 6. DIRECTIONS, MAIN OBJECTIVE AND RESEARCH METHODOLOGY

6.1 Research directions

To carry out its specific duties, according to the legislation in force, the Ministry of Culture should align itself with the governmental and European strategies, which emphasize the provision of quality public services. The permanent monitoring of the quality of the government act is carried out, first, by citizens, who, in exchange for the taxes paid to the state, want to have access to public services similar to those existing at the European level, respectively efficient. Debureaucratization, in general, but specially reducing the time it takes to obtain an opinion from a central public authority is among the most requested aspects by citizens. At the same time, the Government of Romania has established as its objective, in recent years, high-performing public services, which would improve the public image of the public administration at the national level among citizens. Recent history has demonstrated that, regardless of the political orientation of members of the government citizens can cause the dismissal of the executive. Also, an important aspect to specify is the one related to the public image of the ministers, which, in most cases, reflects the ability of political parties to perform in government, and can decisively influence the vote in parliamentary elections. Thus, even at the level of the Ministry of Culture, which is led by a minister, there is a need to improve the institution's image in the context where around 95 public institutions of national interest in its authority, subordination or coordination, and a way to achieve governmental objective is that of streamlining the various approval processes.

One of the research directions would be the development and implementation of a model that would allow the analysis of complaints submitted by the beneficiaries of public services regarding the quality of the services provided by the ministry. Thus, it is possible to identify which processes need improvement.

Another direction of research that can be followed is that regarding the realization of a graphic modelling of an approval process, which would render visually an x-ray of all the inputs and outputs that are an integral part of the system, with the highlighting of all the sub-processes involved, thus resulting, the generation of conclusions that impose particular efficiency solutions.

Creating a mathematical model for a specific approval process can constitute a new direction of research, aiming to identify the essential variables that can have an impact on the efficiency of an approval process. These research directions can be applied to all processes taking place at the level of the Ministry of Culture, using both graphical and mathematical modelling as an approach to improving management for a central public authority.

Finally, we will consider the development of a procedure that will aim to implement this research project at the level of a central public authority, particularly graphic and mathematical modelling, which we consider to be compatible with all categories of processes of endorsement or approval issued by an authority.

6.2 The main objective of the research and the specific objectives

The general objective of the research theme is to propose technical solutions that will contribute to improving the management of the quality of communication within cultural institutions by implementing a digital platform that will lead to the efficiency of the approval processes that take place at the level of the central public authority.

The specific objectives of the research are the following:

- elaborating a mathematical model that allows an estimated calculation of the level of improvement of the quality of the chosen approval process, which can be replicated for any other approval process;
- validation of the mathematical model by using experimental data;
- the development of graphic modelling for one of the processes taking place at the level of the ministry;
- the development of a flow diagram with the logical structuring of the methodology used to achieve the proposed objective;
- elaborating a SWOT analysis regarding communication processes at the interdepartmental level to identify the problems that can influence the activity and efficiency of the processes carried out by the specialized structures within the ministry;
- evaluation of the current status regarding the endorsement procedure and transmission of those to the beneficiaries;
- design of a Process Map for the Minister of Culture;
- digitizing documentation, structuring and storing it in an interconnected database;
- establishing some measures for the digital preservation of the endorsements issued by the ministry to ensure storage for a long time;
- connecting databases to the digital platform or using it by institutions that do not have their IT system;
- researching the technologies to be used to create the digital platform;
- founding the categories of documents to be entered, processed and stored on the digital platform;
- creating and implementing a system procedure regarding the management of the digital platform;
- improving the system of records and digitization of the immovable national heritage.

6.3 Research methodology

The construction of the research methodology, which was used for this thesis, had as a landmark the application of the principle of the six steps, which consists of reaching the following stages;

- Establishing the objective of the research thesis;
- Analysis of the current state of the addressed field;
- Statement of some hypotheses regarding the analyzed field;
- Developing an experiment;
- Analyzing the results obtained after experimentation;
- Issuing conclusions regarding the relevance of the conducted research.

To achieve the objective of the research, which aims to develop proposals that are intended to contribute to the improvement of the management of the quality of communication and information technology in public institutions, in the first phase, a project of the current state of knowledge in the field will be developed.

The research focused, in particular, on the analysis of the essential processes that take place at the level of a public institution and that have an impact at the national level so that, subsequently, within these processes, one of the approval processes that is carried out at the level of the Cultural Heritage Directorate within the Ministry of Culture. In this context, the processes carried out at the level of the central public authority were evaluated from the perspective of their positioning within the QMS. At the same time, an analysis was carried out regarding how the principles of quality are currently applied in the studied field. Another integral part of the current study was the one related to the current possibilities of connectivity and the achievements so far as an element of information technology at the level of the analyzed central public authority to evaluate the perspectives of the implementation of government projects regarding the digitization of public institutions.

After analyzing the processes carried out at the level of the public authority, the graphic modelling of the process under analysis was carried out using specific methodologies to emphasize the interaction between the sub-processes that take place within the approval process. The advantage of visualizing the entire approval system, which implies clarity about each stage, from input to output, can contribute to improving the quality of the process carried out at the level of a central public authority.

In addition to the graphic modelling, an experiment will be carried out that aims to mathematically model the chosen approval process to establish which are the significant variables that can contribute to the improvement of the approval process that takes place within the authority. The results obtained from the simulations will be analyzed and compared with genuine data, and an important aspect will be the submission of these conclusions to the level of experts who have attributions regarding the development of specific system procedures and who can decide on the approach of the management of the approval system. At the same time, if the experts within the ministry, who have provided the secretariats of the specialized commissions for more than ten years and who have contributed to the development of various regulations in the field, will consider this new approach useful, they can implement it at the level of all the processes regarding the opinions/approvals issued by the Ministry of Culture, thus becoming new research directions.

The research method exposed in the research, which can be found in the contents of the four research reports, as presented in Annex 1, used the approach of mind maps, which had as initiators the authors Ionescu N. and Vişan A. (Ionescu & Vişan, 2016). Through this method, the exploitation of the fields of study for the current stage was achieved, and its connection with the objective of the research was realized, so it allowed the recurrence of a logical line of the doctoral thesis. In this context, through this method, each keyword was transformed into research directions becoming, later, research objectives for the reports that succeeded one another, thus generating a logical approach to the thesis. The originality of this research method can create the conditions for its successful application in any other research process.

CHAPTER 7. CONTRIBUTIONS REGARDING THE IMPROVEMENT OF COMMUNICATION QUALITY MANAGEMENT THROUGH SOME APPLICABLE STRATEGIES AND POLICIES

7.1 Designing a SWOT analysis from the chosen perspective at the level of a central public authority

Various tools or techniques of strategic management and planning are accessible to any organization to analyze its situation, and one of these simple yet powerful techniques is the SWOT analysis. This type of analytical tool is also used at the level of the central public administration because it offers the possibility of identifying the key elements necessary to fulfil the purpose for which the institution was established. Knowing the strengths, weaknesses, opportunities, and threats is essential information for decision-making in economic and social contexts to converge later with the objectives assumed by government programs.

Likewise, pointing out the weak points through a SWOT analysis can lead to the employment of the most suitable and meaningful strategy, which could optimize the activities carried out at the level of a central public authority. Public institutions need improvement subsequently a SWOT analysis could create the prerequisites for effective communication and performance in terms of public service delivery.

The first step in any effective communication program is to carefully and accurately identify the situation facing an organization. A situation may be identified as an opening, an opportunity that offers a potential advantage to the organization, or something to be embraced. (Smith R. D., 2002)

Strategic management is initiated on the adoption of decisions and the undertaking of managerial actions, which will have the role of influencing, over a long period, the success and performance of an organization. The study of strategic management emphasizes monitoring and

evaluating external opportunities and threats in light of the elements that bring strength or weakness to a corporation to generate and implement a new strategic direction on behalf of an organization. (Hunger & Wheelen, 2011) Different strategic factors such as strengths, weaknesses, opportunities and threats, known by their acronym "SWOT", should be analyzed by every organization on various occasions to make the best strategic decisions.

CHAPTER 8. CONTRIBUTIONS REGARDING THE GRAPHIC MODELING OF THE APPROVAL PROCESS FOR THE ESTABLISHMENT OF MUSEUMS AND PUBLIC COLLECTIONS WITHIN THE MINISTRY OF CULTURE USING THE IDEF0 METHODOLOGY

8.2 The place and role of the IDEF0 methodology in the context of the approached research

The Integration Definition for Function Modeling (IDEF) methodology was developed by the United States Air Force, starting with the Integrated Computer-Aided Manufacturing (ICAM) program, which was developed in 1970 (National Technical Information Service - U.S.A., 1993) IDEF 0 is a methodology created specifically to model a system, including decisions and work carried out within an organization, streamlining the system through functional analysis and the development of internal and external communication. IDEF 0 provides the opportunity to identify important functions within a system. Also, by the IDEF 0 method can be highlighted the errors in the analyzed system, and also the processes that are carried out properly. Thus, by using IDEF 0 you can model the functions of a system, which includes processes, actions, operations, activities, and also the relationships between the information and objects that underlie those functions. The advantages of using an IDEF 0 modeling are multiple, such as:

- flexibility, as different stages in the life cycle of a process can be sustained;
- conciseness, providing an easy understanding;
- rigor and precision.

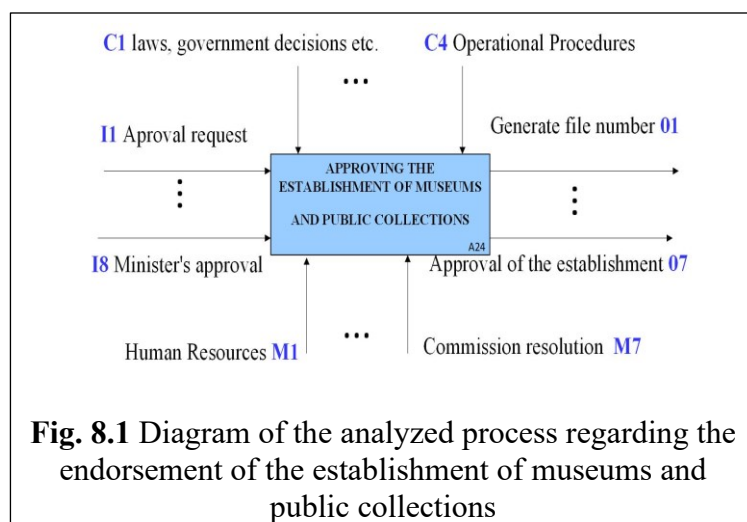
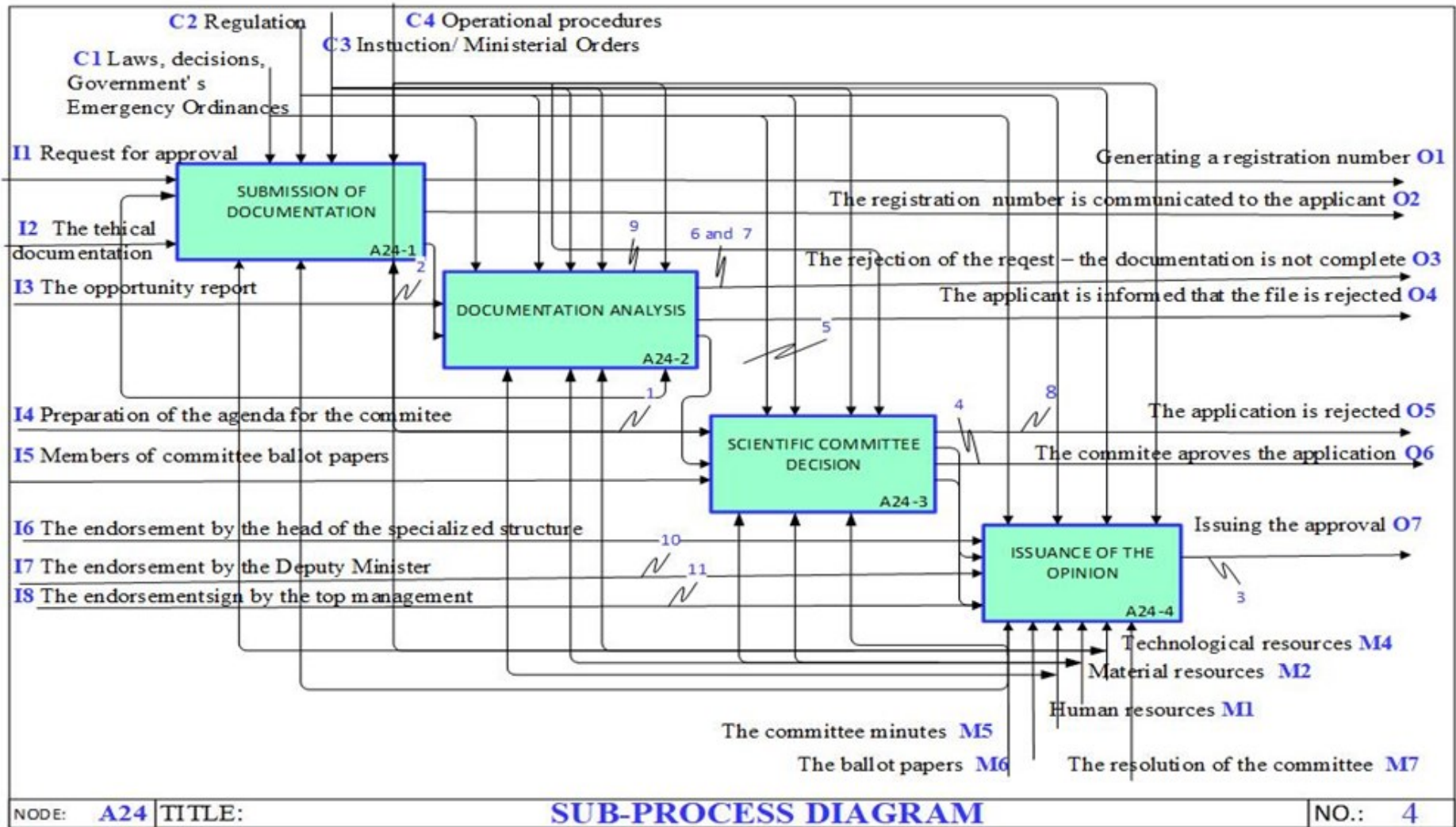


Fig. 8.1 Diagram of the analyzed process regarding the endorsement of the establishment of museums and public collections

An important element of the IDEF 0 graphic modeling is represented by the “Activity box”, shown in figure no. 8.1, which has the role of defining which is the analyzed activity or process. The box, as it is called in the specific language IDEF 0, must be rectangular in shape and the corners must be represented in a square shape. To each box is assigned a number, which is used to quantify a function. Cassettes represent every major function of the modeling process. These functions are broken down or broken down into more detailed sub-processes, until the studied

process is described at the necessary level in order to support the objectives set by the researcher. The top-level diagram in modeling provides the most general or abstract description of the process represented by the model. This diagram is followed by a series of diagrams called child diagrams, thus providing more details about the analyzed process.

Contributions concerning the improvement of the quality management of communication and information technology at the level of central public authorities



CHAPTER 9. CONTRIBUTIONS REGARDING THE MATHEMATICAL MODELING OF THE APPROVAL PROCESS FOR THE ESTABLISHMENT OF MUSEUMS AND PUBLIC COLLECTIONS UNDER THE MINISTRY OF CULTURE

9.1 Mathematical modeling of the approval process for the establishment of museums and public collections within the Ministry of Culture - methodology, indicators and variables

The quality of public services provided by the central public administration is constantly under the evaluation process of the beneficiaries of public services. At the level of the central public administration, the individual professional performance of the civil servant is evaluated annually by the public institution in which he works. There are also evaluations of the activity of all central public authorities by the General Secretariat of the Government. In essence, it seeks to make the activities of the public administration more efficient and to evaluate the quality of public services, it is mandatory to carry out an analysis process, but especially a comparison between various indicators.

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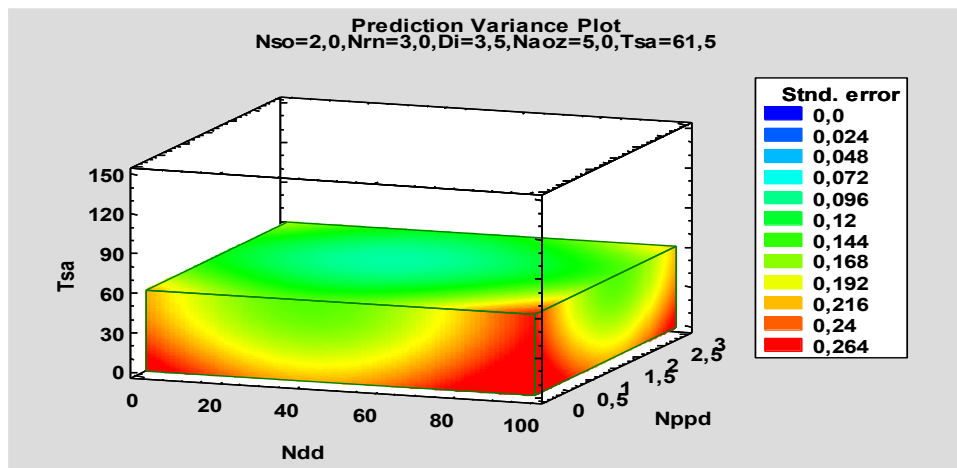


Fig. 9.5 Prediction Variance Plot

The graphical representation in figure 9.5 shows the standard error of the expected response against different variables. For the experiment reproduced in this thesis, the smaller values of the standard error are the ones that are important and precise for the experiment, respectively when the variables have the following values: $N_{so}=2$; $N_{rn}=3$, $D_i=3.5$; $N_{aoz}=5$ and $T_{sa}=61.5$, they being represented in figure 9.5 in blue color and found in the centre of the surface. The smaller the values of the standard error, the more accurately the evaluated average response indicates and has importance for the experiment performed.

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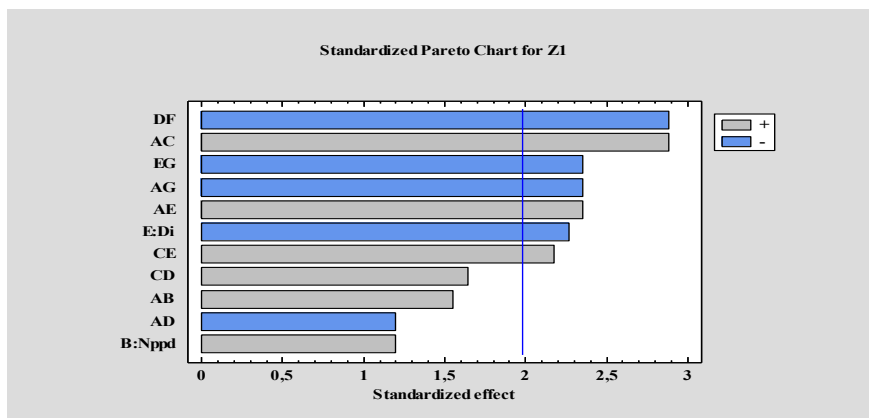


Fig. 9.6 Standarized Pareto Chart for Z1

Figure 9.6 The Pareto chart shows each of the estimated effects in decreasing order of importance (Velfredo, 1919). For our model, for the response of the objective function Z1, the longest bars are significant because they reflect the standardized effect, representing the calculated impact divergent from its standard error. Only the bars to the right of the vertical line are relevant to our experiment and are, according to Figure 9.6, seven interactions of the variables as follows: DF, AC, EG, AG, AE, E:Di, and CE.

Tabelul 9.7 Analysis of Variance for Z1

<i>Source</i>	<i>Sum of Squares</i>	<i>Df</i>	<i>Mean Square</i>	<i>F-Ratio</i>	<i>P-Value</i>
A:Ndd	0,048828125	1	0,048828125	0,05	0,8316
B:Nppd	1,423828125	1	1,423828125	1,33	0,2524
C:Nso	1,220703125	1	1,220703125	1,14	0,2891
D:Nrn	0,001953125	1	0,001953125	0,00	0,9661
E:Di	5,080078125	1	5,080078125	4,73	0,0321
F:Naoz	0,001953125	1	0,001953125	0,00	0,9661
G:Tsa	1,033203125	1	1,033203125	0,96	0,3292
AB	2,392578125	1	2,392578125	2,23	0,1388
AC	8,251953125	1	8,251953125	7,68	0,0067
AD	1,423828125	1	1,423828125	1,33	0,2524
AE	5,486328125	1	5,486328125	5,11	0,0260
AF	1,220703125	1	1,220703125	1,14	0,2891
AG	5,486328125	1	5,486328125	5,11	0,0260
BC	0,330078125	1	0,330078125	0,31	0,5806
BD	0,564453125	1	0,564453125	0,53	0,4703
BE	0,330078125	1	0,330078125	0,31	0,5806
BF	0,564453125	1	0,564453125	0,53	0,4703
BG	0,705078125	1	0,705078125	0,66	0,4198
CD	2,673828125	1	2,673828125	2,49	0,1179
CE	4,689453125	1	4,689453125	4,36	0,0393
CF	0,158203125	1	0,158203125	0,15	0,7020
CG	0,330078125	1	0,330078125	0,31	0,5806
DE	0,017578125	1	0,017578125	0,02	0,8985
DF	8,251953125	1	8,251953125	7,68	0,0067
DG	0,439453125	1	0,439453125	0,41	0,5239
EF	0,439453125	1	0,439453125	0,41	0,5239
EG	5,486328125	1	5,486328125	5,11	0,0260
FG	1,033203125	1	1,033203125	0,96	0,3292
Total error	106,3652344	99	1,074396307		
Total (corr.)	165,4511719	127			

R-squared = 35,71200907 percent

R-squared (adjusted for d.f.) = 17,52954698 percent

R-squared (predicted) = 0,0 percent

Standard Error of Est. = 1,0365309

Mean absolute error = 0,7313842773

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For the analysis of the experimental data, we also resorted to the use of software specially created for such operations, namely the Minitab program, which is efficient in entering data, manipulating them, possessing the valence of identifying trends and providing answers for different experimental research.

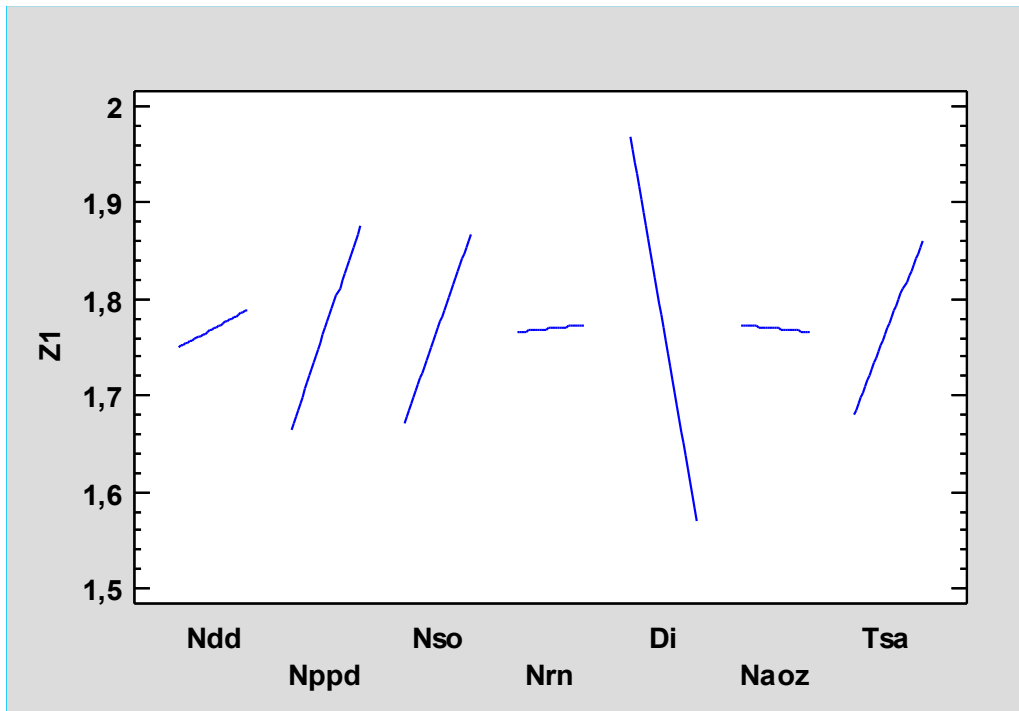


Fig. 9.7 Main Effects Plot for Z1

➤ **Regression analysis for the objective function Z1 [no.]** according to Nrn (Number of complaints for not issuing the endorsement) and Naoz (Number of types of endorsements entering a single committee). An explanation of the names of the abbreviations used in the regression analysis for the objective function Z1 is presented in table 9.8.

Tabelul 9.8. Legend for abbreviations used in the regression analysis for Z1 [no.] by Nrn [no.], Naoz [no.]

Legend	Abbreviation	Full name of abbreviations for objective functions and variables	Unit of measurement
	Z1	Funcția obiectiv - No. endorsements issued by the NCMC	no. of endorsement
	Nrn	The number of complaints for not issuing the endorsement to establish museums and public collections	no. of complaints
	Naoz	Number of types of endorsements entering a single committee	no. of endorsement

Using regression analysis, an equation is generated, which fulfils the attribute of representing the relationship between a variable or multiple variables and the objective function.

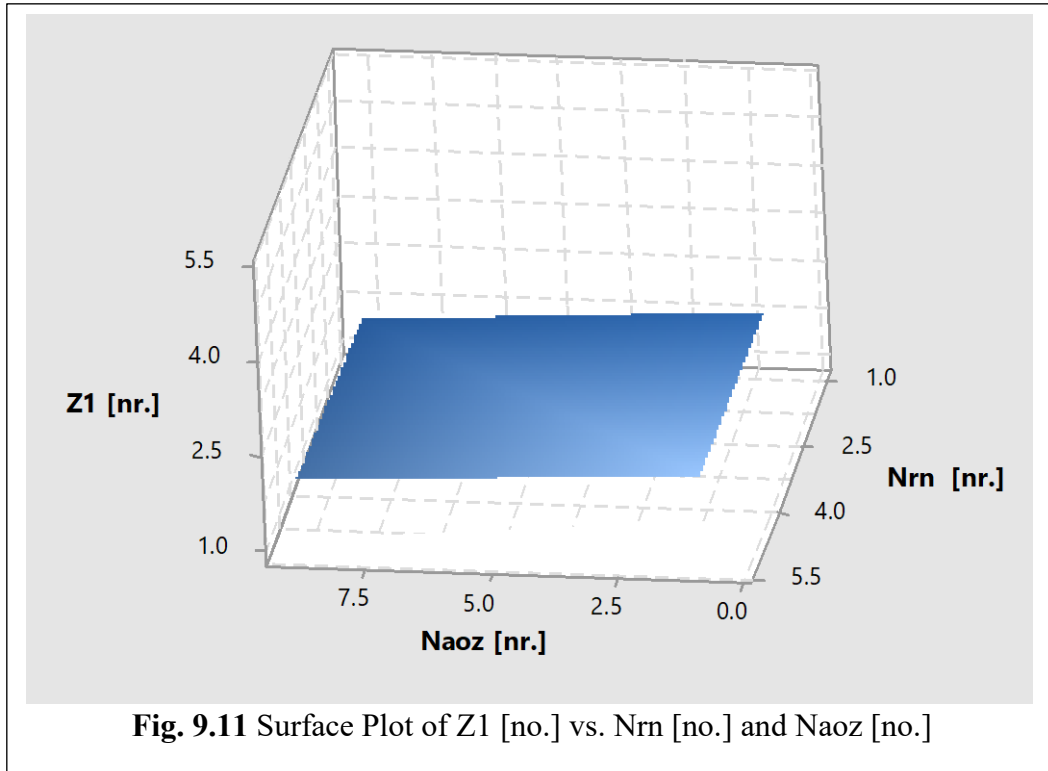
The regression equation for the interaction of the variables Nrn and Naoz, with the values shown in Table 9.9, in the context of the objective function Z1 is as follows:

$$Z1 \text{ [no.]} = 1.815 + 0.0562 \text{ Nrn [no.]} - 0.0424 \text{ Naoz [no.]} \quad (9.5)$$

Tabel 9.9 Analysis of variance: Z1 versus Nrn [no.] and Naoz [no.]

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Regression	2	5,226	2,61325	2,04	0,134
Nrn	1	1,615	1,61517	1,26	0,264
Naoz	1	3,686	3,68631	2,88	0,092
Error	125	160,225	1,28180		

Lack-of-Fit	1	0,054	0,05357	0,04	0,839
Pure Error	124	160,171	1,29170		
Total	127	165,451			



The figure 9.11 shows the surface plot of Z1 [no.] vs. Nrn [no.] and Naoz [no.]. Minitab software was used to generate the response surface plot in three-dimensional form and through this diagram, it is possible to locate which is the optimal yield for the objective function Z1, the point where the maximum number of issued notices can be obtained by the specialized commission, in the context of the interaction with the variables Nrn and Naoz. Thus, in figure 9.11 it can be seen that the optimum can be reached at the point where the variable Nrn is at the values 4.4 and 5.5.

CHAPTER 10. CONTRIBUTIONS REGARDING THE CONFIRMATION OF THE MATHEMATICAL MODELING OF THE APPROVAL PROCESS FOR THE ESTABLISHMENT OF MUSEUMS AND PUBLIC COLLECTIONS

10.1 The need to confirm the proposed mathematical model

"The need to confirm and validate the mathematical model emanates from the main objective of a research namely the fact that what exists expressed in a conceptual form must have applicability and become, subsequently, used through repeatability for the benefit of communities. Otherwise, the conceptual world would only remain at the stage of hypotheses or abstract notions regarding a process or a phenomenon, which would not bring any added value for the development and evolution of contemporary society.

In fact, through this research project, the aim was to streamline a process that takes place at the level of the Ministry of Culture, namely the approval process for the establishment of museums and public collections, by maximizing the number of approvals issued by the specialized commission, whose objective function was established Z1, and minimizing the time to transmit the opinion issued

by the National Commission of Museums and Collections (NCMC) to the applicant, who was assigned the objective function Z2, as detailed in detail in the ninth chapter of this thesis.

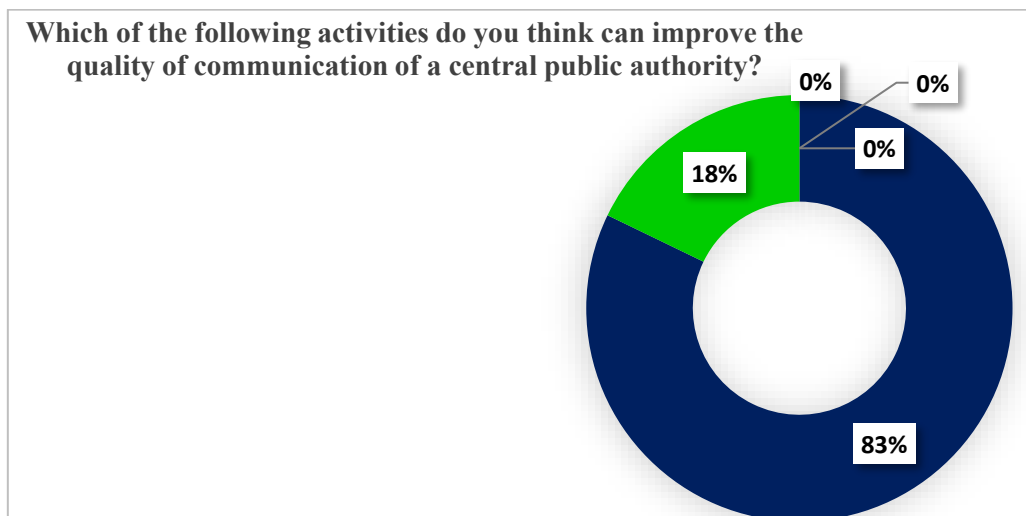
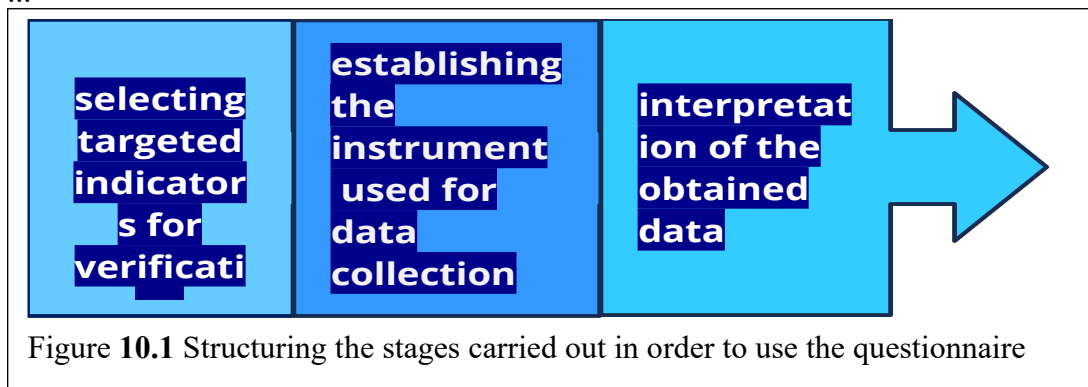


Fig. 10.3 Activities that can influence the quality of communication of a public institution

”Regarding the activities that could influence the improvement of the quality of communication of a central public authority, the respondents of the questionnaire estimated, in a proportion of 83%, that this can be achieved by increasing the efficiency and effectiveness of the authority's activity, respectively by providing public services in a short term. For 18% of the respondents, an improvement in the quality of communication can be achieved by publishing information relevant to the activity of the central public authority, as shown in Figure 3. This result reiterates the main idea of the doctoral research topic, the fact that there is a large impact of the efficiency and effectiveness of the activities carried out by an institution on its public image.

In other words, you can have good communication unless you have, also an effective and efficient activity.

We believe that the basis of the quality of communication for a public institution resides in the way it manages to fulfil its specific duties, as well and quickly as it can.

For example, the term in which a request is solved is essential because opportunities pass, and for citizens failing a contract to sell a building classified as a historical monument implies the loss of amounts received in advance.

Although the institution issued an opinion within an extended period, material damages may be caused to the citizen. Even if the institution could justify the extended term, the citizen's discontentment and damage remain, so the image of the institution will be negative. In this context, even if the number of press releases will multiply.

CHAPTER 11. CONTRIBUTIONS AND FUTURE RESEARCH DIRECTIONS REGARDING THE IMPROVEMENT OF THE QUALITY MANAGEMENT OF COMMUNICATION AND INFORMATION TECHNOLOGY AT THE LEVEL OF THE MINISTRY OF CULTURE

11.1 Contributions regarding the improvement of the quality of communication at the level of a central public authority

The main objective of the doctoral thesis is to design and implement a mathematical modelling and later to confirm the results obtained from the modelling to streamline the activity of approving the most important specialized structure within a public institution. Therefore, through an efficiency activity an improvement in the quality of communication at the level of a public institution.

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11.2 Conclusions, original contributions and further research directions on improving the quality of communication and information technology at the level of central public authorities

The original contributions that emerge from this thesis and from the content of the published scientific works, which came from the activity carried out within the research program, are the following: Realizarea unui stadiu actual în ceea ce privește procesul de management, proces de comunicare și procesul de avizare care se derulează la nivelul unei autorități publice centrale;

➤ Realization of a current stage in terms of the management process, the communication process and the approval process that takes place at the level of a central public authority;

➤ Elaboration of a process diagram with all the activities carried out within the approval process for the establishment of museums and public collections;

...

➤ Application of the specific language used within the IDEF0 methodology on the analyzed process, through which we rendered the following elements: I= Inputs; C= Control; O= Outputs (Output); M= Mechanisms (Mechanism);

...

➤ Establishing the objective functions for the analyzed process;

➤ Establishing the values of the objective functions, respectively the minimum and maximum values for the analyzed process;

Further research directions

...

➤ Analyze the Romanian and EU policy aspects in the field of public services offered through digital platforms;

➤ Analyze the current state of national public policies for submitting documentation to obtain an endorsement by using an integrated digital system

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Annex 1

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Annex 2

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Annex 3

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Annex 4

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