

# Cognitive Communications: Information Support of Management Decisions

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**Abstract**—The information flow of data has become an indispensable tool for supporting managerial decisions in economic practice and has a significant impact on them. At the same time, the rate of self-generation and, accordingly, the cumulative volume of diverse and diverse data (Big Data) are steadily increasing. In this case, only about 5% of the available data is structured, of which less than 8% is analyzed. The Russian economy generates a significant amount of this information and soon the share in the total volume of Big Data will reach a significant level. The avalanche generation of various information is rightly called the "information explosion" for its uncontrolled spread. The indicated phenomenon has a phenomenon of lagging behind the pace of information consumption from the information production of mankind.

This article examines the project for the justification and design of convergent technology for intellectual support of management decisions on an interdisciplinary basis. The products of this project are called a cross-sensory personal communication of the non-verbal type. The theory of narrative information design, developed by N. Holmes (1990-2010), is used as a fundamental approach to be achieving the research objective and solving the problems posed in it. The development of this theory is carried out based on the convergent (NBIC + C) -communicative approach and the methodology of system analysis. These two scientific directions allowed the development of a technology for the design of cross-sensory materials (cross-infograms) intended for intellectual information support of management decisions. Such a methodological approach is unique and has not previously been used to achieve the stated goal.

**Keywords**—*Management decisions, Communications, Cognitive system.*

## I. COMPLEX INFORMATION IN MODERN BUSINESS

Information communication is an effective tool for supporting managerial decisions in economic practice. At the same time, the rate of self-generation and, accordingly, the total volume of various information and multi-format data (Big Data) are steadily growing. At the same time, only about 5% of the available data are structured, of which less than 8% are analysed. Thus, only 0.5% of the total volume of world

information is available for people who make management decisions in the real economy.

Another problem is what modern science explains as a crisis of misunderstanding of information, which is currently at the disposal of decision-makers (decision-makers). This crisis is acute in the processes of managerial decisions in the economic sphere. Incomplete information and misinterpretation create uncertainty in which key decisions lead to irreparable errors. Research recently conducted by the scientific school of the multisensory of the Plekhanov University convincingly demonstrates the possibilities of creating information support systems of an innovative nature - translating messages coded for cross-sensory channels for their recognition by people. The effectiveness of such intelligent systems is ensured by a special mode of their perception by the human psyche and the specificity of the response.

Such a design of information support through sensory perception of difficult to understand data was called the infogram.

Means of information programs are diverse and diverse - from archetypal symbols and simple images to multi-level digital cross-sensory diagrams. Combines their common property - directed (in terms of the level of management tasks) and a comfortable (from the point of view of the communication process) representation of Big Data.

Infograms interpret information in significant for managers phenomena, processes, conclusions, etc.

## II. INFORGRAMMING IN MANAGEMENT DECISIONS

The infogram is based on a narrative approach aimed at perceiving information, demonstrating the advantages of the conclusion that the manager must develop. Such an approach in communication is designated as convergent-communicative. The toolkit of such an approach should be as diverse as possible through the channels of translation of the coded information.

Research in the scientific field of sensory communications is carried out by researchers (W. Glasser, D. Lewis, M. Lindstrom, S. Langer, PM Lester, E. Sampson), however, all the above scientists investigate behavioral responses without linking to the interdisciplinary nature of managerial decisions, without considering the specifics of the multifaceted process of selecting one of several options for the possible consequences of such solutions.

The scientists closest to the field of this scientific research are those belonging to the scientific school of game theory. A brilliant example of this scientific school can be considered Nobel laureate in economics (1994) J. Nash (J.F. Nash) - the author of the theory of equilibrium in non-cooperative games. At the same time, his theory is not universal and is widely applicable in the design of information materials for intellectual support of management decisions, since this mathematical model assumes the interaction of several parties (players) in the process of which the possibility of coordination of actions is excluded. Management practice in most of cases, on the contrary, provides for a unilateral process of making managerial decisions, and for this reason requires other support tools.

Based on the desk study of the theoretical heritage of the fundamental sciences (NBIC + C), theoretical and methodological aspects were identified that contribute to the achievement of the goal and the solution of the research tasks. The revealed aspects are reasonably considered as criteria and conditions for the subsequent computer modeling of the elements of the infogram-system.

The theory of narrative information design, developed by N. Holmes (1990-2010), is used as a fundamental approach to be achieving the research objective and solving the problems posed in it. The development of this theory is carried out based on the convergent (NBIC + C) -communicative approach and the methodology of system analysis. These two scientific directions allowed the development of a technology for the design of cross-sensory materials (cross-infograms) intended for intellectual information support of management decisions. Such a methodological approach is unique and has not previously been used to achieve the stated goal.

In the mathematical model of the vector type, the author's algorithm for optimizing the structure of info communication materials (cross-infograms) is applied by combinatorics of the system elements of the convergent-communication nature. Sociological studies (in-depth interviews, focus groups, etc.) were carried out with the subsequent ZMET analysis of the results (Zaltman's method) in potential target audiences in order to identify the target criteria and parameters of these materials (multistring, levels of achievement of optimality, psychography, etc.). For the prototyping of cross-infograms, cross-sensory channels have been selected, for which unique information-communication codes are broadcast. Coding of information is carried out considering the priority and justified limitations of the limits of system elements of the cross-sensory nature. Successful prototypes have been tested in the real economic environment through experiments in the chemical and coal-mining industry of the Russian Federation. The variations of the content and contextual design of the

developed prototypes are refined through expert surveys. As a result of the engineering of cross-sensory systems, prototypes of information materials (cross-infograms) for intellectual support of managerial decisions in the economic sphere were obtained. Previously conducted research and the scientific publications made on their results reveal important questions on the optimization and methodological formation of complex data in the form of optimal models and prototypes, including graphic images, as well as text modules (text trademarks), flavoring, olfactive (smells) and textural (tactile) data with the aim of directing the impact on management decisions.

The scientific novelty of the results of the research is to obtain new experimental data in the field of convergence of sciences (NBIC) and their subsequent interpretation and engineering on this basis methodological tools for effective translation of complex data to decision-makers. The results of this study are of practical interest for the sphere of the real economy of Russia, especially its chemical complex, by the example of which these results will be tested. The received theoretical, methodical and practical data can be used in the educational process.

The availability of an effective methodological tool necessary to support management decisions in the economic sphere is a requirement of a real economy, therefore, the scientific schools of management form their responses to this challenge in different ways.

The scientific school of system engineering for many years of its development has formed a set of effective methods of intellectual support of managerial decisions. In the arsenal of these methods, there are mainly rational approaches aimed at broadcasting the target audience the necessary information through centers of analytical and rational thinking. Because of this kind of communicative process, effective methods of infographics have been adopted, suggesting the minimization of visual means of providing the necessary information (infographics). Such informational materials do not require special training in manufacturing and for this reason are produced unprofessionally, at the level of intuition of employees who do not have special competence. That is why such decisions (infographic) have become generally accepted in management practice. Practitioners of system engineering as a scientific school of management develop design of these materials, proceeding, mainly, from the rules of graphic design and corporate style of organizations.

### III. MNEMOTECHNICAL INTELLECTUAL SUPPORT

As is known, the modern method of mnemotechnical intellectual support has obvious shortcomings. The main one is the inability of infographics to produce managerial decisions that have a high degree of effectiveness and efficiency in the economic sphere due to the laconicism of their informativeness and the complexity of their understanding and interpretation of the decision maker. An exit from the existing situation may be a change in the approach to the design of information materials for intellectual support of management decisions. Instead of the traditional research approach with infographic "visualization" of auxiliary information when designing information materials for decision-makers in the economic sphere.

The above functions are implemented based on the principles of visual communications:

Focus on the result - all actions on visual communications should be pragmatic in nature, which involves estimating the costs for the whole process of the visual component of integrated communications and their correlation with the expected result of the impact.

Target orientation as localization of efforts of a visual component of the integrated communications, providing exact conformity of the form, force, a place and time of communication to expectations, appropriateness and time of a finding of target client audience.

Normative forecasting as a projection into the future of the initial model of the visual component of integrated communications in accordance with specified goals and norms according to specified criteria.

Knowledge and understanding of the target client audience as the basis of the strategic nature of the formation and development of visual factors of integrated communications based on knowledge and understanding of the needs of the target customer audience, the features of the perception of visual communications, the perception of the integrity of the image of the promoted supply.

Progressiveness for the development of goals and tools of the visual component of integrated communications from simple forms to more complex and effective, based on the use of advanced achievements of science, technology and technology

Complexity as a combination, combining in a single set of all possible visual factors to increase the effectiveness of achieving the goals of integrated communications in client areas.

Synergism for a significant increase in the effectiveness of the visual component of integrated communications, resulting from the rational provision of the complexity of the factors that form it.

Eclecticism as an inorganic compound of heterogeneous visual orientations in the framework of integrated communications, providing diversity and diversity of the achieved effects, which can activate not only the predicted response to communication, but also create new, fruitful ideas in the sphere of client demand within the allocated tasks.

Technology as a set of resources (information, knowledge, experience, etc.), procedures, operations, their rules and sequences, which ensure an increase in the effectiveness of achieving the visual component of integrated communications.

Process approach in the form of a set of all the processes of visual communications, including collection, processing, accumulation, storage, information retrieval, design, development, production and distribution of circulation, etc. At the same time, interaction within the given set is ensured with the purpose of efficiency and effectiveness of conversion of incoming parameters, formed by communication participants in outgoing, adapted to the requirements, opportunities and expectations of recipients of communications. An essential part

of the process approach is the identification of the target audience for the client, the identification and formalization of the procedures for the process (ways of carrying out actions), the criteria for measuring its results, the ways of monitoring and correcting it, and the allocation and consolidation of responsibility for achieving results and developing processes.

Integration in the chain of relationships consisting of a concept that provides for interactive activities in the integrated chain of interactions of participants in the communication process: communicator - the mediator of the communication process - the recipient.

Ensuring the priority of interests of the target client audience, which includes the differentiation of the interests of participants in the integrated communication process and its subsequent ranking based on the criteria of the importance of interests. At the same time, the interests of the target client audience have a maximum rating, as a result of which the interests of other participants in the integrated chain of communications are subordinated to its interests.

The focus on the formation, maintenance and development of diverse needs of the target client audience, that is, the needs of the target audience are considered as an object of management. At the same time, the dominant role is assigned to one of the most interested participants of the integrated chain of visual communications with the responsibilities to form, support and develop diverse needs of the target client audience, benefiting other participants of the integrated communication chain.

#### ACKNOWLEDGMENT

The reported study was funded by RFBR according to the research project No № 18-07-00275. 2018.

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