RPTSS 2017

International Conference on Research Paradigms Transformation
in Social Sciences

SOCIOTECHNICAL SYSTEM IN COMMUNICATIVE ENVIRONMENT: MANAGEMENT FACTORS

Ivan V. Kolomeyzev (a), Olga D. Shipunova (b)*
*Corresponding author

(a) Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russian Federation,
zelen_2133@yahoo.com, +79112716666
(b) Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russian Federation, o_shipunova@mail.ru,
89111945042

Abstract

The article is devoted to sociotechnical system management in the network society. The characteristic peculiarities of the sociotechnical system functioning are described by means of systemic methodology within the socio-anthropology approach. It has been empathized that the sophisticated system can not function without human involvement and outside the sociocultural environment where it exists. A multicomponent sociotechnical system includes noneconomic intangible assets in the form of the nominal capital to which, in particular, ecological, intellectual, ethnocultural and ethical ties are referred besides traditional technological structures and economic indicators. Coordinating all these aspects of such system functioning has become an unconventional scientific, engineering and organizational task. Artificial objects and systems created based on modern technologies, particularly biotechnologies and genetic engineering, as well as the informational and intellectual technology, can not be considered conventional either for technologies or sciences and humanities. It has been proved that system management factors are rooted in the communication system possessing a matrix structure, ultimately based on value paradigms and conventional norms of the intellectual, professional and corporate culture.

© 2018 Published by Future Academy www.FutureAcademy.org.UK

Keywords: Communicative environment, management resource, social engineering system, network society.

1. Introduction

Embedding new systemic conditions and humane principles into engineering (taboos are the most characteristic of reality assimilation) leads to new professional requirements. Modern designing, as analysts note, goes far beyond the conventional scheme: science—engineering—production, encompassing the most varied social and cultural practice types. The basic concept of casuality has been extended: restrictively mechanical, neutral ground of technical activities is to be supplemented by the probabilistic target and configured by the final target (or the ideal result). The major focus is addressed not solely to mechanical components, but human activity and its social and psychological aspects.

One can state that humane criteria transform innovative activity into a very complex sphere of social practice that presupposes a systemic approach to planning technical projects and their social evaluation. A general scientific approach to dynamics analysis of human-sized objects relies on the dominant concept model of a complex self-regulating and spontaneously developing system in modern sciences (Luhmann, 2007). On the whole, modern sociology identifies interconnection of three developing subsystems: economy, a social-political structure and culture when applying this model to the society (Parsons, 1937; Giddens, 2013/1984; Habermas, 2001).

1.1. Sociotechnical system as the target of research

A new concept and term – *sociotechnical system* – have become a focus for various sciences, e.g. economics, natural sciences and humanities. In a wide context, a sociotechnical system can be defined as an organization development system, the aim of which consists in achieving an optimal correlation between a technical system, existing in an organization, and its social structure. Being somewhat certain and material, an organization can not function outside the sociocultural environment. In practice, an organization becomes a pool of well-established behavioral codes and actions for making decisions that unite human groups around certain spheres of life at the certain time in a certain place within a certain set of professional competencies. Daily life of any organization is based on different models that form the network of its internal communicative environment. Successful functioning of an organization bases on a general cultural level of its employees and intellectual climate in the team. Thus, major factors of efficient sociotechnical system functioning are intellectual (knowledge) asset management, as well as communication competence (Chen & Redaz, 2014).

Earlier, culture was not included into technical and economic parameters of the projected systems and not considered as a management resource. Having studied the functional characteristics of the sociotechnical system, it is impossible to become isolated from information and communication processes and cultural environment impact of such system.

1.2. Communication environment as a factor to manage a sociotechnical system

Any society, on the whole, can be described as a sociotechnical system. Habermas emphasised implicitly the importance of *socio-cultural environments* for managing the society, considering the society to be studied either as a system or a life world. Focusing on the interaction targeted at mutual understanding as a universal type of shared cooperation in the social environment, Habermas correlates

the three forms of the social reality: *society* (as a special sociotechnical system), *life world* (as a conceptual sphere) and *communication reality* (connected the first two realities in interactions). A communication step, or interaction, is the main tool that connects conceptual and life world of a person with other spheres within a certain culture (Habermas, 2001). The communication reality, uniting a social mechanism with the life world of a person, relates to objective facts and social norms, as well as personal experiences.

The theory of communicative action considers some social management resources that can be described as an environment. Any interaction presupposes the person's inclusion into the sociocultural environment to be represented by legal, moral and linguistic traditions. Habermas supposes that society's ability to be manageable increases in the course of social evolution owing to the structured world life and symbolic intercorrelation of multipliable interpretations and interactions (Habermas, 2001).

A cultural environment functions as a communicative management factor based on such notions of modern macrosociology as social capital (G. Coleman), cultural capital (R. Collins), symbolic capital (P. Bourdieu). The stock of emotionally charged symbols makes, according to R. Collins, that cultural capital, the value of which in the emotional energy, is necessary for maintaining a creative level of intellectual communication in the professional and scientific community (Collins, 1998). P. Bourdieu correlates the notion of symbolic capital with creditworthiness, «honor and prestige capital», that simplify any action of social interaction and economic benefit of which is usually not revealed (Bourdieu, 1980).

The environment component analysis of organization functioning in the modern world should be considered as an indispensible part of defining of its compatibility. System positioning and gradual demonstrating policy of positive sides of the system in the environments of its existence are becoming a necessary factor of its economic success in the world of total competition (Hared et al., 2013).

Any organization functions simultaneously in several spheres. The aggregation of spheres (cultural, social, humane and ecological) is also related to symbolic capital of the socitechnical system, accumulating its intangible assets. This capital can be used as possessing organization to promote its product by influencing the decision-making process to a make a choice. Environment components have a significant role in limiting such choice. Thus, conceptually «non-manipulative» principle of management technique becomes a presumption of choice liberty, and the area of choice formation is the focus of information and technology communication environment.

2. Problem Statement

Implicit characteristics of environment components of management stress such well-spread notions as intellectual and human company potential specifying its intangible assets. In the new millennium, the competitive advantage evaluation of a company is moving towards the symbolic capital. Information processing is becoming the main work source in the postindustrial society (Gritsenko & Malkova, 2012). Intellectual and human potential components are gaining the market recognition and cost values. Their share in the company's economic estimation is constantly increasing. The topical task is to combine economic criteria of efficient management with the political and cultural phenomena analysis, review sociocultural norms and controversial communication processes as a basic condition to manage human resources (Keyton & Shockley-Zalabak, 2010).

2.1. Information codes to manage a sociotechnical system

The choice area for every certain action in the certain situation is always limited. A person can plan his/her actions (what is more, implement them) solely within the certain limits, identified by the existing system of values, norms and examples. Information codes, encoded into the system of values and actions norms, reconstruct the social life (Shipunova & Kuznetsov, 2015). A human acts as a doer, i.e. a carrier of social roles that initiate its actions in this or that situation in accordance with the sample (McLain et al., 2014). Culture, preserving «latent examples» in its forms implicitly manages the social system, controlling actions and human behavior besides economics. Economics functions as an organizing tool providing the environment assimilation and the social and political system, integrating the society and ensuring legitimate conditions as somewhat freedom of choice (Sahin, 2015). The structural functionalism offered by T. Parsons is developing in this content that emphasizes the impersonal self-regulatory mechanism for social systems. According to T. Parsons's Theory of Action, the variety of human actions is limited by examples (action patterns) that presuppose certain social roles (Parsons, 1937).

3. Research Questions

In this context, the emergence and spreading of new technical communication tools in the technogeneous society at the beginning of the third millennium can be considered as a factor of social and cultural dynamics that significantly transforms the traditional communication sociocultural environment (Floridi, 2014). The formation of new information spheres in the global arena of modern civilization is accompanied by the phenomena requiring their analysis. First of all, the fact of virtual networks distribution, structures and communities, causing the outburst of publications on virtual reality and the new sociality type in the form of social networks should be noted.

3.1. Matrix structure to manage the sociotechnical system

In contrast to the structural functionalism, the concept of autopoiesis of self-regulating systems, offered by Luhmann for the social theory, emphasizes the internal dynamics importance of the social system elements as the main condition of its unity and functionality. Having identified the basic role of the communication processes, Luhmann highlighted the genetic problems in sociology, considering the issues such as the culture origin in its symbolism and generated meanings, defining the human subjective world. Cultural patterns, strictly forming the individual social action in the structural functionalism, according to Luhmann's theory, are substituted by the generalized communication patterns that can function as a condition forming the meaningful horizon of the individual life world. The availability of the perceived but not articulated meaningful borders – so-called unofficial norms – is viewed as the horizon in the real life situation, limiting the system of intentions, thoughts and actions. This side of the individual and social life is stressed by concepts in the philosophic literature: semantic sphere (W. Hildebrand), habitus (P. Bourdieu), cogitation fields (P. Ricœur) and discursive formation (M. Foucault).

Communicative generalized codes (in particular, reign code and truth code) – meaningful schemes driving the selection process to find this sole possibility that in this possibilities horizon is meaningful,

actualizes by further defining individual's internal and external actions system (Luhmann, 2001, p. 51-94). A human being in his/her behavior is mainly motivated by the reign code that identifies a legitimate boarder of possible communications and, thus, implicitly guided by his/her actions and emotions. The truth code is not less meaningful, influencing the evaluation formation for the cause of action.

4. Purpose of the Study

In modern conditions, sociology needs new conceptual notions, allowing forming the theoretical model of socitechnical system management based on communication tools of regulating subjective interactions in dynamic conditions of mobile virtual communities and social networks. The communication environment study as a systemic management resource within the interdisciplinary approach is focused on internal subsystems dynamics of the sociotechnological system and its self-organization.

4.1. Article targets

- Categories identification of the interdisciplinary analysis of the management factor of the sociotechnical system
- Network formation characteristics and cyberspace subcultures study.

5. Research Methods

Within interdisciplinary approach to the management analysis of the socio-technical system, the socio-anthropologic grounds are based on combining ontological, communicative, mental, information and technological factors to research network subcultures dynamics. It should be stated that in modern philosophy the notion of *sociality* relates to communicative and structured reality. The key idea is focused on implicit factors to manage functional systems within the interdisciplinary approach (in the form of unities, spheres and subcultures), emerging based on new information technologies and such notions as «communication, «mentality», «discourse» that have been widely acknowledged, are becoming more and more crucial. At that, implicit factors of the communication environment, particularly the role of subjective intersubjective contexts, become important as things gain, change or multiple their values within these limits (Lukianova & Fell, 2015). Emergence, transmission and contradiction of meanings can become the dynamics tool of the sociotechnical system within the contextual paradigm. The notion of *communication* stresses the existence conditions for systemic objects in the community, specifying their potential for self-development. The complex process of social and information exchange in the communication in the technogenic society has sign and symbol connections between frames that are defined by certain semantic fields.

So, the research focuses on the interconnection analysis of social, communicative meaningful environment with individual's subjective world phenomenology to be correlated with the notion of *mentality* in this or that aspect (Garrera-Tolbert, 2015). *Mentality* includes emotional and imaginative, volitional, axiological and deliberate acts besides knowledge, world outlook and ideology, as well as super individual realias in the form of thinking logic, characteristic of this or that community, ethnical

group or culture. The principle of referring to the values, which acts as the criterion of intellectual-emotional evaluation of situations based on understanding and freedom of choice (Shypunova, 2014) can be regarded as a hidden management factor guide motivation of individual action.

6. Findings

6.1. Implicit social and cultural influence mechanisms

Modern researchers single out two important mechanisms of implicit social and cultural impact: behavioral typology reconstruction by means of the identification procedure (substitution) and behavioral patterns reconstruction that have not been implemented due to certain reasons. Both directions, as well as communicative and semantic environment notions, stress the role of environment factors as implicit and unidentified reasons for phenomenology of social, cultural and mental action. The development of communication technologies is accompanied by the construction of personal identities in the info-sphere. Human life is rapidly becoming a matter of «onlife experience», which reshapes the traditional views and limitations, emphasizes the informational nature of the person and offers new possibilities of embodiment in the digital virtual world (Floridi, 2011).

Information technologies, constantly improving distant communications and expanding the communicative environment on the global scale access, form the real conditions to penetrate into the society structure of the network form of the social organization, which is characterized by the rejection of the structuring of social institutions at different levels of the society relations. Network structures show the asymmetric multi-complex character of the social networks. Network structures overlapping, networks informal character, lack of statistic structural formations and possibility for new forms of distant interactions in the Internet have changed the notion of norming cultural format during the communication act: the by-stander and censor's images are disappearing. The dynamics of the network created the conditions that eliminate the boundaries between objective perception and subjective reality. Modern communication technologies form the special reality of the cyberspace and lead to loss of the reality: everything becomes as virtuality.

The challenge that arises in this situation is human inability to control the information and technology communication network. A human is lost in information flows. He cannot analyze and becomes as manipulation object. It is important that Manipulators lurk in the Info Sphere.

6.2. Socio-technological system in the cyberspace

Dynamic development of information and communicative networks in the form of cyberspace acquires the topical character of self-organized virtual communities as a new class of sociocultural communities. A network phenomenon in the form of virtual communities and computer resources (united based on Internet services and knowledge management tools) represent the dynamic sociotechnical system that functions as a virtual organization in the form of communities consisting of virtual agents. The specific characteristics of a virtual organization are as follows 1) complex interconnection of real and virtual structures, 2) borders blurring between social and technical systems and 3) synergistic effects (new functional options emergence). A virtual organization, existing outside the physical reality, acts as a

«metaorganisation», uniting targets, resources, traditions and experience of some similar virtual communities and coordinating their activity and development (Tarasov, 2002, p. 237).

6.3. Social networks and communities as subcultural phenomena

Subculture in its wider notion is understood as the values subsystem (a peculiar part of the existing culture) transmitting behavioral archetypes, ideas, valuable orientations in the developed and developing communities. The crucial characteristic of the subcultural microsphere is a communicative area that is referred to by means of signs possessing semantic meanings and contexts. Network spheres can be studied as subcultural phenomena of the technogeneous civilization. Consequently, the globalization of intellectual networks in the modern world assists in forming special expert professional spheres (knowledge networks) capable of influencing the governmental decision-making processes. *The epistemic community phenomenon* consisting of socially acknowledged «knowledge networks» refers to self-organizing intellectual and professional sphere.

Intellectual communities in the form of international professional network claiming to possess knowledge in certain spheres, generated publisher's interest at the beginning of the 1990s. Such communities, whose members share common outlooks of certain issues or have mutual worldviews, strive to transform their values into a dominant cultural discourse and social activity. And such groups are often created deliberately to pressure the economic and political situation (Yachin, 2009).

Significant solutions at the state policy level, as a rule, are made according to the experts' recommendations, i.e. professionals. The epistemic communities' phenomenon illustrates the vivid connections between the management efficiency and sociocultural environment, emphasizing that sociocultural environments accumulate and trigger explicit and implicit information and communicative resources.

As a result, network self-organization of knowledge carriers occurs in the sociocultural environment of the information society, and the discourse and shared values become the special centre and the mechanism of self-organization. The axiological aspect turns out to be the leading one to form sociocultural network environments, as it can connect different specialists and heterogeneous knowledge (human, economic, technical etc.) based on shared values.

7. Conclusion

The communicative environment in the global perspective of the technogeneous civilization represents the systemic resource of social development that is not subjected to the precise prognosis. The process of social informational exchange in the technogeneous society is complicated by new virtual significant and symbolic connections causing communication barriers. Meanings are not solely transmitted; they are also encoded and transformed, causing misunderstanding and cognitive dissonance when the situations are estimated by individuals.

The sociocultural environment analysis, mentality and intellectual networks of functioning characteristics in the conditions of globalization and the information flow increase form theoretical backgrounds to develop management models of the sociotechnical system.

Dynamic information and communicative characteristics of the sociotechnical system (as the man-sized and discursive systems) do not allow being separated from informational and technological impact and sociocultural environment when analyzing and planning its activity. The complex study of communicative environments of the information society causes implicit management resources, providing interconnections for personal, social and cultural influence levels on individual's behaviors and the sociotechnical system.

References

Bourdieu, P. (1980). *Le sens pratique*. Paris: Les Editions de Minuit.

Chen, S. & Redaz, J. (2014, April). Ageing workforce knowledge management and transactional & transformational leadership: A socio-technical systems framework and a Norwegian case study. *International Journal of Business and Social Science*, *5*(5;1), 11-21. Retrieved from http://www.ijbssnet.com/journals/Vol_5_No_5_1_April_2014/2.pdf

Collins, R. (1998). *The sociology of philosophies: A global theory of intellectual change.* Cambridge, UK: Harvard University Press.

Floridi, L. (2011). The informational nature of personal identity. *Minds & Machines,* 21: 549. doi:10.1007/s11023-011-9259-6.

Floridi, L. (2014). *The fourth revolution. How the infosphere is reshaping human reality.* Oxford, UK: Oxford University Press.

Garrera-Tolbert, N. (2015). On the phenomenological structure of ethical testimony. *Horizon: Studies in Phenomenology*, *4*(1), 158-170. Retrieved from http://cyberleninka.ru/article/n/on-the-phenomenological-structure-of-ethical-testimony

Giddens, A. (2013/1984). *The constitution of society. Polity Press*. Cambridge, UK. First published (1984) in Cambridge, UK: Blackwell Publishing Ltd.

Gritsenko, V. S., Malkova, E. V. (2012). Information as the main subject of labor in post-industrial society. *St. Petersburg State Polytechnic University Journal. Humanities and Social Sciences, 143*(1), 229-234. Retrieved from http://ntv.spbstu.ru/humanities/article/H1.143.2012_43/

Habermas, J. (2001). *Moral consciousness and communicative action.* St. Petersburg, Russia: publ. Science.

Hared, B. A., Abdullah, Z. & Huque, M. R. (2013). The role of qualitative research methods in understanding management control systems. *International Journal of Social Sciences and Entrepreneurship, 1*(8), 28-41.

Keyton, J. & Shockley-Zalabak, P. (2010). *Case studies for organizational communication: Understanding communication processes.* New York, NY: Oxford University Press.

Luhmann, N. (2001). *Power.* Moscow, Russia: Praxis.

Luhmann, N. (2007). *Introduction to systems theory*. Moscow, Russia: Publishing House "Logos".

Lukianova, N., & Fell, E. (2015) Internet of things as a symbolic resource of power. *Procedia - Social and Behavioral Sciences*, *166,* 521-525.

McLain, M., Bell, D., Smith, J. & Martin, M. (2014, April 30). Reviewing the impact of the national strategies design and technology framework for key stage three. *The European Journal of Social & Behavioral Sciences, IX*(2), 1355-1366. Retrieved from http://dx.doi.org/10.15405/ejsbs.119

Parsons, T. (1937) *Structure of social action*. New York, NY: publ. McGraw Hill.

Sahin, K. (2015, August). The legitimacy of codes of corporate governance: Perspectives from developed and emerging economies. *Journal of Management & Governance*, *19*(3), 687-708. doi: 10.1007/s10997-014-9289-6. http://link.springer.com/journal/10997/19/3/page/1

Shipunova, O. D., Kuznetsov, D. I. (2015, May). Communication and the natural social order. *Mediterranean Journal of Social Sciences MCSER Publishing*, *6*(3S), 251-260. doi:10.5901/mjss.2015.v6n3s3p. https://yadi.sk/i/W26DYS5fgAE8z

Shypunova, O. D. (2014). The role of relation to values principle in the social management practices. The existential-communicatory aspect. *Middle-East Journal of Scientific Research, 19*(4), 565-569. doi: 10.5829/idosi.mejsr.2014.19.4.123684.

Tarasov, V. B. (2002). *From multi-site systems to intellectual organizations.* Moscow, Russia: Editorial URSS.

Yachin, S. E. (2009). On the role of epistemic communities in the modern world. *Personality. Culture. Society, XI, 3*(50), 648-649. doi:10.7763/IPEDR.2012. V58.13. Retrieved from http://www.ipedr.com/vol58/013-ICHCS2012-S10008.pdf