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## ERGONOMICS COMMUNICATION IN ORGANIZATIONS. A LINK BETWEEN ERGONOMICS AND COMMUNICATIONS USING CRONBACH'S ALPHA THEORY

Rebecca CHINCEA, Matei TAMASILĂ

**Abstract:** In a century of globalization, organizations are the main driver of interest for young people seeking employment. Organizations (companies of different types) are also the main nucleus where young people (20-35 age) are improving their professional life for the labor market. In this way, we must study the way in which these organizations communicate and the main elements that this type of communication has. Furthermore, organizational communication must be ergonomic to be one of the success factors of companies. To determine which functions should be performed by ergonomic communication, we have used the systematic review of the literature part and the Cronbach-Alfa method of analysis for the questionnaire. Following the summary analysis of the literature it emerged that ergonomic communication must have four characteristics (according to Table 2) The share of these characteristics in organizations in Timisoara, Romania, was calculated using the analysis Alpha Cronbach, resulting in a value of 0,60. The main conclusion of the research is that the communication process of the investigated organizations, according to their employees, does need more than four characteristics to be ergonomics.

**Keywords:** communications, Cronbach Alfa method, ergonomics, organizations.

### 1. INTRODUCTION

The research described in this article correlates the concepts of organizational communication and ergonomics with the help of Cronbach's Alpha method. We consider the current study to be of interest because organizational communication encounters different barriers in a post-pandemic era [1]; one of the functions of ergonomics is to help employees perform in the workplace [2]. Although the approach to the concept of ergonomics is not classical (on work objects) but abstract in reference to the communication process in organizations, the research methods used give the study a close approach to the technical side.

Thus, the article is structured in four parts to determine the correlation between organizational communication and ergonomics.

The first part of the article focuses on the definitions of "organizational communication" and "ergonomics". Defining concepts is the starting point for answering the question "What

is the link between organizational communication and ergonomics?"

In addition, in the first part of the article we outlined the four characteristics of ergonomic communication according to the literature, formulating the hypothesis that "ergonomic communication must have four characteristics". With the help of these valences offered to ergonomic communication, we realized the 4 statements that are found in the research tool used. The second part analyzes organizational communication, presenting the main types of communication. We choose to analyze the types of formal/informal horizontal/vertical communication because they are the basis of organizational communication. The third part of the article presents the methods used to study both the link between organizational communication and ergonomics, but also to confirm or disprove the hypothesis that emerges from the analysis of the literature. The two aspects were analyzed using the distribution of a questionnaire and the application of Cronbach's

Alpha method. The fourth part of the article presents the conclusions of the study and outlines the need for other studies related to this article.

## 2. ORGANIZATIONAL COMMUNICATION AND ERGONOMICS

### 2.1 Definition of concepts

As a result of a systematic review of the literature, organizational communication is one of the main research topics of many scholars as can be seen in Table 1.

*Table 1*

**A systematic review of the literature on organizational communication.**

#	Source of the literature	Organizational communication definition
1	Rogers and Rogers (1976)	'The behavior of individuals in organizations is best understood from a communication point of view'
2	Weick et al. (1979)	'Organizational communication is the core process of organizing'
3	Kanter et al. (1992)	'Communication processes also change both to create and to reflect new structures, processes, and relationships'.
4	Allen et al. (1993)	'Researchers must develop more complex research designs that take into account the social and contextual factors that affect organizations and their communication process'
5	Drenth (1998)	'As sending and receiving messages through symbols and seeing organizational communication as a key element of organizational climate'
6	Lewis (1999)	'Communications process and organizational change are an inextricably linked process'.
7	Iedema et al. (1999)	'Organizations do not exist independently of their members... but are created and recreated in the act of communication between members'
8	Grenier et al. (2000)	'Effective communication can be seen as the foundation of modern organizations'.
9	Barge (2001)	'Organizational communication is a practical discipline'
10	Gardner et al. (2001)	'The central means by which individual activity is coordinated to develop, disseminate, and pursue organizational goals'

It follows from the definitions given that organizational communication is the basis for the organization of a company because “organizational communication is the foundation of modern organizations” [3].

Analyzing the importance of organizational communications, we believe that improvements can be made using ergonomics [2-4]. The ergonomics is defined as “ergonomics or Human Factors (HFE) is the scientific discipline concerned with the understanding of interaction among humans and other elements of the system” [5]. This definition is for ergonomics in general, but organizational ergonomics “considers the structures, policies and processes of any organization” [5].

Although organizational communication and organizational ergonomics have a common scope, most of the ergonomic study is focused on objects that employees use [6]. Even though one of the functions of ergonomics is the physical function, we must focus on the other two functions: cognitive and organizational for better communication in organizations.

### 2.2 Types and channels

In organizations, communication can be formal and informal. Also, it can be vertical or horizontal.

Formal communication is “communication through predefined channels set by organizations” [7] and using formal communication within an organization helps create an efficient flow of information between upper and lower levels of employees. On the contrary, informal communication 'is more relational than formal' and the goal is to preserve and establish relationships with colleagues, superiors, and subordinates [8].

In the past, informal communication, generally associated with horizontal interpersonal communication, was primarily seen as a potential obstacle to effective organizational performance [9]. But studies show that informal communication has become more important to ensuring the effective conduct of work in modern organizations, and formal communication is used in bureaucratic organizations. Despite this, formal communication as well as informal communication have challenges. The challenges

of formal communication are acknowledging a new generation, inflexibility, and slow decision-making. Also, the barriers to informal communication are that rumors can spread rapidly, lack of control, lack of secrecy [10, 11].

Organizational communication is characterized by different communication channels. These channels are differentiated between formal and informal channels. The two types of channels are conceptually and practically opposite. Thus, if a channel is intentionally created by the organization, it is formal, and if a channel crosses formal barriers, it is informal. The two types of channels are dichotomous in terms of appearance. Formal channels are planned and conceptualized, while informal channels are spontaneous [9]. According to [9], there are 4 types of formal channels: wheel network, Y network, chain network, and circle network.

Furthermore, vertical communication occurs between hierarchically positioned persons and can involve both downward and upward communication flows. Downward communication is more prevalent than upward communication. Researchers suggest that downward communication is most effective if top managers communicate directly with immediate supervisors and immediate supervisors communicate with their staff. Upward communication is the process in which employees directly communicate with upper management to provide feedback, share ideas, and raise concerns about their day-to-day work [9]. In addition, vertical and horizontal communication have some disadvantages. Disadvantages of vertical communication include can cause delays, workflow, and overstepping deadlines, if the staff lacks respect for the top-level management, the chain of command is likely to be broken. The problems that may arise in horizontal communication are territoriality, lack of motivation, and rivalry.

### 2.3 The characteristics of ergonomics communication

Following the analysis of the specialized literature, we can outline the hypothesis that communication must have four characteristics to be ergonomic or to “fit people” [10]. In the

second part of the article, we present the definitions of ergonomics and organizational communication. Thus, it turns out that the common value of the two concepts consists of the main purpose they have: creating an efficient working environment. Also, the two areas (ergonomics and organizational communication) should be concomitant, not complementary.

The third part of the article shows that both informal and formal communication involve certain risks. Thus, for the new communication model that will be proposed, it will have a mixed mode of communication.

Given that there are disadvantages to both vertical and horizontal communication, ergonomic communication must remove these social obstacles. These issues can be removed if the new communication model is neutral in terms of hierarchy, culture, or labor market experience. In addition, the four formal communication channels do not meet the needs of employees from a social point of view at work. To ensure a suitable organizational climate, we must develop a differentiated communication process depending on several factors (culture, age, experience, etc.).

To better outline the characteristics that guide us in designing the ergonomic communication model, we present them in Table 2.

Table 2

**Design of the ergonomics communication model.**

Characteristics
Concomitant
Mixed
Neutral
Differentiated

Table 3

**Determined values of the Alpha coefficient.**

Cronbach's Alpha	Internal consistency
$0.9 \leq \alpha$	Excellent
$0.8 \leq \alpha < 0.9$	Good
$0.7 \leq \alpha < 0.8$	Acceptable
$0.6 \leq \alpha < 0.7$	Questionable
$0.5 \leq \alpha < 0.6$	Poor
$\alpha < 0.5$	Inacceptable

## 3. METHOD

To determine the reliability of the four characteristics of the hypothesis, we used the questionnaire as a research tool by applying Cronbach's Alpha method.

The questionnaire was distributed to a heterogeneous group of subjects, aged 25-38 years. The subjects are employed by two companies in Timisoara and the approximate time to complete the survey is 10 minutes. The 4 questionnaire statements are formed into 4 affirmations to determine the reliability of the features for employees. The survey contains 4 statements structured as follows: 'I believe that organizational communication must be simultaneous with organizational changes'; 'I believe that organizational communication must be both online and offline'; 'i believe that organizational communication must be formal or informal depending on the type of organizational communication (vertical/horizontal); 'I believe that organizational communication must differ depending on age, culture, or experience'. For each question, the subjects' answers were given in the form of a scale of 1 to 5. The value of 1 means that the claim is not valid at all, and the value of 5 shows that the claim is very valid for the subjects. Following the distribution of the questionnaire, the summary of the responses is given in Table 4 entitled "table of attitudes to characteristics". The table above summarizes the sum of all the answers to each question. As you can see, every statement has a definite value. To determining the reliability of each characteristic, the value of the claims is compared with Table 2. Therefore, the value of statement 1 responses is a coefficient of 0.9. According to Table 2, this value determines excellent reliability of the first feature among subjects. It can be said that most employees believe that organizational communication is ergonomic when it is concurrently with the crisis.

Table 4

Table of attitudes to characteristics.					
	S1	S2	S3	S4	Total
Reliability	0.9	0.87	0.70	0.81	4.37
	Coefficient				0.60

According to Table 4, the value of the answers to statement 2 is 0,87. Using

comparison, the assigned value is good. Employees believe that to be ergonomic, organizational communication must be both formal and informal at work. The reliability of this feature outlines the direct relationship between the mode of communication and the need for its diversification.

Statement 3 refers to the neutrality of communication based on the age or experience of the employee. According to the synthesis of the results, claim 3 has a value of 0,70, which is acceptable reliability according to Cronbach's Alpha method.

The last statement is about the differentiation of communication. This feature has a value of 0,81 according to the synthesis of the results. Like the two statements, the feature has good reliability for employees.

Although each claim taken individually has an above average coefficient, these characteristics taken together show a value of 0,60. According to Table 2, the alpha coefficient with a value of 0,60 determines poor reliability among employees. Thus, the hypothesis that organizational communication to be ergonomic must have only four characteristics is refuted.

After synthesizing the answers, to measure the reliability of the four characteristics of the hypothesis, we used the Cronbach's Alpha method. According to Robert. F Devellis [11] Cronbach's Alpha coefficient is used primarily as a means of describing reliability of multiitem scales. Also, "Cronbach's Alpha is equivalent to taking average of all possible variables." [12]

According to the researchers [13] the value of "alpha" depends largely on the number of variables in the questionnaire. However, the alpha coefficient has certain determined values as we can see in Table 3 [13].

The results of the 33 subjects were calculated in Excel according to the alpha formula:

$$\alpha = \left(\frac{k}{k-1}\right) * \left(\frac{s_y^2 - \sum s_i^2}{s_y^2}\right) \quad (1)$$

where k represents the number of items on the scale, sy2 represents the value of all totals, and the sum si2 represents the total value of each item. Thus, according to the calculations of the values obtained from the questionnaire, the

alpha coefficient is 0,606. The value of 0,60 according to Table 3 is quasi-stable.

Depending on the method used, the alpha value can be saved by adding more variables to the formula. A low coefficient of the formula indicates the following: the values are not well defined in the conscience of the employees, the values referred to in the questionnaire are not met by the two organizations where the subjects work, and the values are insufficient in number.

For the future, the current research will be complemented by related studies to create a new communication model that is reliable for organizations and suitable for employees. The current article will be correlated with a future study using the grounded theory.

#### 4. CONCLUSIONS

This article outlines the 4 variables of ergonomic communication according to the literature. Using the Cronbach's Alpha method for the four variables, we can say that the resulting coefficient is on a mediocre level in terms of acceptability. According to the study, at present the organizational communication of the companies in Timisoara, Romania, is not based on the four values presented in the article. The 33 subjects (research sample) surveyed responded with values from 1 to 5 on the degree of confirmation of the characteristic. Each feature was formulated in the form of a statement. Characteristics had scores as follows: concomitant: 0,94; mixed 1,87; neutral 0,70; differentiated 0,81.

Thus, the resulting values indicate that the characteristics are good individually but connecting them is difficult. We can conclude that an ergonomic communication model can only be formed with these variables if they are added to them or reduced.

Future research will be considered more applicable by investigating the real economic environment of a real company or a group of companies. This will be possible based on university-industry collaboration [14] with mutual benefits for research and the practical implication of its findings. Furthermore, a potential research direction is related to capital

development in relation to organizational ergonomic communication; This direction could be a valuable contribution to the development of intellectual capital management [15-17] and organizational competitiveness.

#### 8. REFERENCES

- [1] Rozman, *The impact of behavioral symptoms of burnout on work engagement. The case of Slovenian companies*, ISSN 2385-8052, De Gruyter Open, Warsaw, Vol.64, pp. 3-11
- [2] In Jun Kim, *The functions of ergonomics*, Journal of Ergonomics, ISSN 2165-7556.
- [3] Grenier, E., Fair, C., Schumaker, R., *Social Media: Is It a Valid Source for Creating New Business?*, Journal of Creative Communications, 9(2), p. 147, 2014.
- [4] Jones, E., Watson, B., Gardner, J., Gallois, C., *Organizational communication: Challenges for the new century*, Journal of Communication, 54(4), 722-750, 2004.
- [3] Pincus, J. D., Acharya, L., *Employee communication strategies for organizational crises*, Employee Responsibilities and Rights Journal, 1(3), 181-199, 1988.
- [4] Lindstrom, M., *The Ministry of Common Sense*, John Murray, ISBN 9781529332490, 2021.
- [5] International Ergonomics Association, <https://iea.cc/>.
- [6] Colin G. Drury (1997). *Change and Measurement in Applied Ergonomics*
- [7] Richard L.Simpson (1958). *Vertical and Horizontal Communication in Formal Organization*.
- [8] Jones Garnett et al. (2000). *Strategic change in organizational communication: emerging trends for wealth formation in the new millennium*.
- [9] Baker, K.A., *Organizational Communication*, 2002, <http://wachum.org/eBook/1065106/commutheory3.pdf>.
- [10] Status Net, *Formal vs. Informal Communication (Examples, Challenges, Best Practices)*, <https://status.net/articles/formal-communication-informal-communication/>.

- [11] Midgley, D. F., Morrison, P. D., Roberts, J. H., *The nature of communication networks between organizations involved in the diffusion of technological innovations*, ACR North American Advances, 1991.
- [12] Cho, E., Kim, S., *Cronbach's coefficient alpha: Well-known but poorly understood*, Organizational research methods, 18(2), 207-230, 2015.
- [13] Taber, K. S., *The use of Cronbach's alpha when developing and reporting research instruments in science education*, Research in science education, 48(6), 1273-1296, 2018.
- [14] Draghici, A., Baban, C. F., Ivascu, L. V., Sarca, I. (2015). *Key success factors for university-industry collaboration in open innovation*, Proceedings of the ICERI2015, ISBN: 978-84-608-2657-6, 7357-7365, IATED, 2015.
- [15] Gogan, L. M., Duran, D. C., Draghici, A., *Structural capital-A proposed measurement model*, Procedia economics and finance, 23, 1139-1146, 2015.
- [16] Harpan, I., Draghici, A., *Debate on the multilevel model of the human capital measurement*, Procedia-Social and Behavioral Sciences, 124, 170-177, 2014.
- [17] Gogan, L.M., Rennung, F., Fistis, G., Draghici, A., *A proposed tool for managing intellectual capital in small and medium size enterprises*, Procedia Technology, 16, 728-736, 2014.

### **Comunicarea ergonomică în organizații. Legătura dintre ergonomie și comunicare folosind teoria Alpha Cronbach**

**Rezumat:** Într-un secol al globalizării, organizațiile sunt principalul motor al interesului pentru tinerii care caută un loc de muncă. Organizațiile (companiile de toate categorii) sunt, de asemenea, nucleul principal în care tinerii (cu vârsta de 20-35 de ani) se dezvoltă profesional, pentru piața forței de muncă. Așadar, trebuie să studiem modul în care aceste organizații comunică și principalele caracteristici pe care le are acest tip de comunicare. În plus, comunicarea organizațională trebuie să fie ergonomică pentru a asigura succesul companiilor. Pentru a determina ce funcții ar trebui să fie efectuate prin comunicare ergonomică, am folosit realizat o analiză și sinteză sistematică a literaturii și am folosit metoda de analiză Alfa Cronbach în cazul unui sondaj pe bază de chestionar. În urma analizei literaturii de specialitate s-au constatat următoarele: comunicarea ergonomică trebuie să aibă patru caracteristici, ponderea acestora în organizațiile din Timișoara, România incluse în eșantionul cercetării a fost calculată folosind analiza Alpha Cronbach, rezultând o valoare de 0,60. Concluzia principală a cercetării este aceea că, procesul de comunicare actual al organizațiilor din eșantion, conform părerilor colectate ale angajaților, are nevoie de mai mult de patru de caracteristici pentru a fi ergonomice.

**CHINCEA Rebecca**, PhD Student, Politehnica University Timisoara, Faculty of Management in Production and Transportation, rebecca.chincea@student.upt.ro, 14 Remus str., 300191 Timisoara, Romania.

**Matei TAMASILA**, Eng. PhD, Politehnica University Timisoara, Faculty of Management in Production and Transportation, Management Department, Research Centre in Engineering and Management, matei.tamasila@upt.ro, 14 Remus str., 300191 Timisoara, Romania.