THE INFLUENCE OF INFORMATION TECHNOLOGIES ON THE HUMAN FACTOR WITHIN AN ORGNANIZATION
INFORMĀCIJAS TEHNOLOĢIJU IETEKME UZ CILVĒCISKO FAKTORU ORGANIZĀCIJĀ

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Abstract.. *The article discusses a number of important changes of influence of information technologies on human factor within the organization. The focus of the article is on human factor and IT using problem. According to the theoretical and empirical material of IT influence on human factor, aspects of information technology are analyzed.*

Keywords: *information technologies, organization, management, human factor.*

Introduction

New scientific knowledge, informatization, and the high level of assimilation of information resources are becoming the basis for the existence of highly effective and competitive organisations. An analysis of research related to the information technologies' (IT) influence on the human factor, demonstrated that IT, while making the transformation of organization resources, make the transformation of employee's behaviour inside the organization as well.

During the recent years, the majority of organizations in the whole world, and especially in countries with transition economics, place increasing importance on the formation of the methods of work that would allow for activity in the context of new economical conditions created by a rapid process of globalization, business automatization, and the use of information technologies. A number of companies choose virtual environment for their business [15, 10], where they form not only qualitatively new relationships with the external environment, but also organize conventional working relationships. Thus the influence of the human factor in symbiosis with information technologies creates a creative factor in the organization. Therefore the priority of development and maintenance of competitiveness in modern organizations is the search for a new approach to the complex of the main factors of an organization (capital, personnel, management structure, and finances), this approach being based on information technologies.

Today we can see an increasingly prominent tendency when direct communication between people in both personal and working relations is replaced by communication mediated by information technologies, from mobile phones to computer networks. This tendency has a certain effect on the human factor, their development, and maybe even existence, at least in the traditional sense. Therefore organizations that want to remain viable and not to lose the human factor now face a real challenge related to the achievement of these goals. This was also confirmed by empirical studies. One of the important consequences of the usage of information technologies is the disappearance of traditional boundaries between work, recreation, learning, information, and activity [16]. The Internet and other information technologies are seen by many authors as "revolutionary" and are compared to the industrial revolution of the 18th – the 19th centuries. On the individual level this revolution is associated with the social effect of information technologies, including new forms of relationship between people and maintaining social contacts [12].

The problem of influence of information technologies on human factor, and its management under is not sufficiently disclosed, and there are not enough systemic studies in this field.

The object of the article - the influence of information technologies on the human factor.

The goal of the article is to analyze the tendencies of influence of usage IT on human factor.

The methods of the study. The analysis of the theoretical premises of IT influence on human factor was performed when employing general scientific research methods: *analysis of scientific literature, synthesis, abstraction, induction, and deduction.*

The empirical study was performed using the quantitative research method – *questionnaire-based inquiry* and *quantitative analysis of the obtained findings (methods of mathematical and statistical data processing with the help of SPSS software package).*

Technology and people at work

There are many factors to which the organization must respond. One of the most important is that technology, for as technology increases, organization finds itself bombarded with change [5]. The relation ship of technology to people at work is known as socio technical system, and modern managers are finding that they must give increased attention to this technical-human interface.

Information technologies have an effect on people at work for two reasons. First, IT is causing a change in people values, which they bring to the workplace with them. Second, information technologies is leading to changes in the work environment, from the machines people use in creating output and making decisions to the way in which their offices and workstations are designed. R.M.Hodgetts [5] in analyzing this people-work environment-technology interface, considered five areas:

– changing organizational cultures;

Organizational culture is the environment in which people work. When this environment changes, people must learn to adapt, to learn new jobs, create new skills of employees' interact and communication.

– alienation in the workplace;

Alienation is the one of the most important behavioral implications of information technologies. This concept incorporates (1) powerlessness, (2) meaninglessness, (3) isolation, (4) self-estrangement.

– the fear of replacement by machine;

Employees' fear, that they will be replaced by machines, is another problem created by technology. This fear is typical among people who are not highly skilled or who are performing paperwork functions.

– how employee's feel about there jobs;

– the quality of work life issue.

E.Turban, E.Mclean, J.Wetherbe [19] also assume that the use of IT has brought many changes to organizations. These changes are being felt in areas like structure, authority, power, and job content; employee career ladders and supervision; manager's job. IT affects individuals in various ways:

– job satisfaction;

– dehumanization and psychological impacts;

– information anxiety;

– impacts on health and safety.

To prevent the spread of above mentioned bad IT influence on human factor aspects, R.Hodgetts [5] suggested steps for the managers that can be followed to help with the personal challenge:

– become familiar with jobs people are doing;

– be aware of the negative impact technology can have;

– get employees input regarding how to use technology;

– keep employees apprised of what is going on;

– be hones with employees.

Organization structure and IT

A.Majchark, Q.Wang [8], E.Turban, E.Mclean, J.Wetherbe [19] analyzed the concept of networked organizations, where organizational structures are related by computer networks and are supported by information systems. Table 1 shows the major characteristics of the networked organization and compares them with the characteristics of the hierarchical organization.

Table 1.

Networked versus hierarchical organization

Classical/Hierarchical organization		Networked organization
Forma	→	Informal
Highly structured	→	Loosely structured
Manage	→	Delegate/lead
Control	→	Ownership/participation
Direct	→	Empower
Employees a cost	→	Employees an asset
Information management – owned	→	Information shared ownership
Hierarchical organizations	→	Flatter/manageable organizations
Risk avoidance	→	Risk management
Individual contributions	→	Team contributions

The hierarchical and networked approaches to management obviously present significant contrast, and each has its successes and failures. However, today some organizations are turning away from the hierarchical organization toward the networked organization. This trend is being brought about by the evolution from an industrial-based economy to an information-based economy. And in this case, in nowadays most people do knowledge work, in which the intellectual content of the work increases to the point where the subordinate often has more expertise than the "hierarchical" supervisor [19]. Employees in an organizational network are not just "cogs" in a hierarchical machine. Each employee that does knowledge work has special expertise and information.

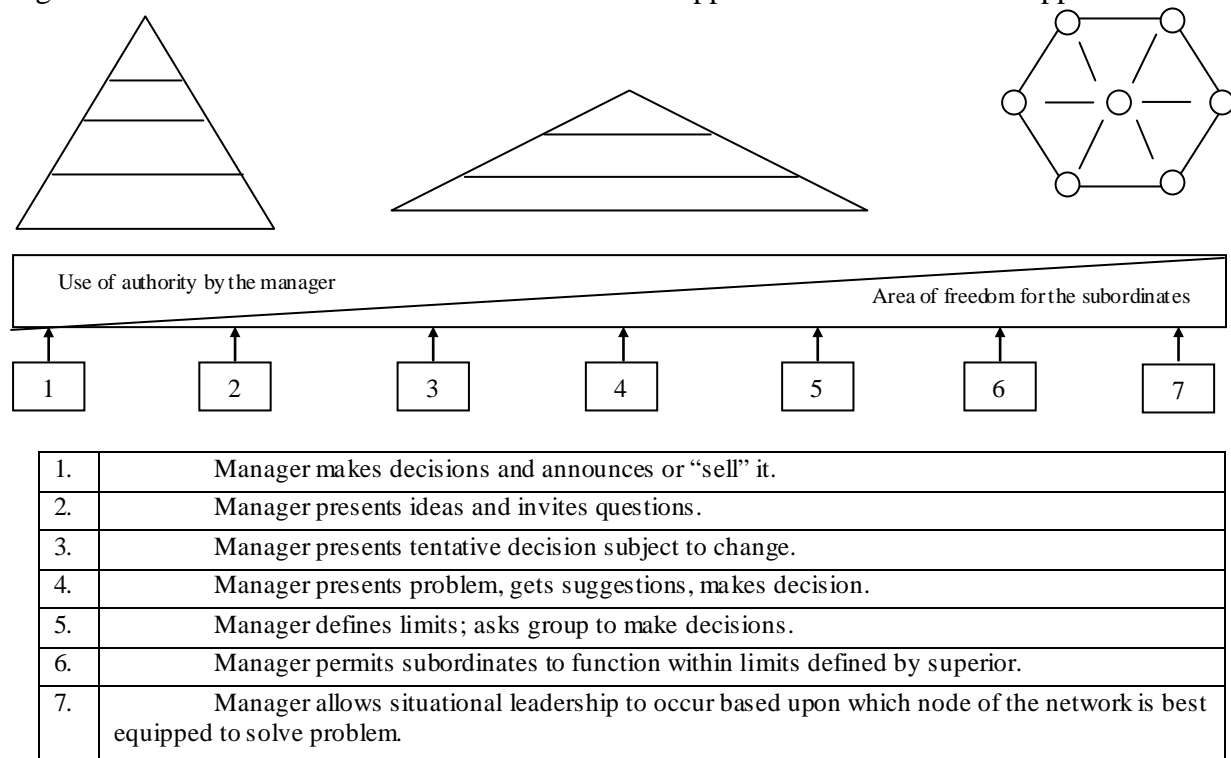Figure 1 shows the continuum from the hierarchical approach to the networked approach.

1.	Manager makes decisions and announces or "sell" it.
2.	Manager presents ideas and invites questions.
3.	Manager presents tentative decision subject to change.
4.	Manager presents problem, gets suggestions, makes decision.
5.	Manager defines limits; asks group to make decisions.
6.	Manager permits subordinates to function within limits defined by superior.
7.	Manager allows situational leadership to occur based upon which node of the network is best equipped to solve problem.

Fig. 1. **The roles of managers and subordinates in the different types of organizations (by [19]).**

According to W.Niepce, E.Molleman [14], J.A.F.Stoner, R.E.Freeman, D.Gilbert [18], the design and reorganization of organization could help to make successful transformation inside the organization and to make its proper compatibility with surrounding environment. There is highlighted employees "plugging" into the network concept, when the majority of organization management functions are moved to the information systems level and an employee becomes a member of information storage, distribution and processing IS, which is created and integrated in the organization. In such case for him becomes accessible not only information by itself, but as well its processing tools. There is applied the participants principle, when an employee is involved in all the processes in real time – "here and now". At the same time there are applied the classical logistics principals: right information, right processing tools, right complex of relations, for the right employee, on the right time and with the right characteristics that corresponds with the position, competence, responsibilities and humans personal characteristics [1]. Such principal is very good for the formalization of relations – employee is always in the working state and he physically has no time for non work activities.

It is stated, that this transformation changes the work of organization irreversibly – organization is approached not through the separate functional units and its relations, but it is approached as united operating system, with its own information sources, its own users and internecine multi – level relations.

The transfer of employees' communication into IS base lets to make real evaluation of systemic view bases in the organization, when the organization starts to work synchronically and in real time. This causes synergy effect and lets either to save time and expenditure, or to reach better results in the same time and with the same expenditure.

Unfortunately in many cases the employee is suffering – intensive working environment fatigues the person, especially if he is older [20, 11]. Because of this reason, it is important to understand (especially for the managing level) that the part of surplus value, created in synergy principle by the IS structure and its communications links, has to be returned to the employee, especially in the recreation form [2, 3].

After moving organization activity into IS base, in the personnel relations point of view, it can be disaffirmed many vices and syndromes, which are related to human factor – the personnel relations become more formal, the probability of conflicts is decreasing [9]:

–   there are the irregularities;
–   the discrimination of employees, which appear form the middle level managers, disappears;
–   the whole history of employees' actions inside the organization can be seen.

After making theoretical evaluation of information technologies influence on human factor, it was determined, that this action strengthens the need of employees responsibilities, initiative, self action, as well it raises new requirements in the point of view of organization. Information technologies, while making the transformation of organization resources, as well make the transformation of employee's relations inside the organization. The result of such is the transformed output of organization (for example: the higher quality production, services, wellness of the organization, higher quality external relations etc.).

After making an analysis of literature a on information technologies relation to human factor and after making empirical investigations [13, 16, 7, 12, 6, 4, 17], it was determined, that all the investigations are concentrated on the following aspects of people social life: leisure time, singleness, day agenda (working day and weekend), communication, unemployment level. In these investigations there is missing a viewpoint of IT usage appearance in the working activity. While at the same time, in the after work time, IT influence reaches much bigger level and make much bigger influence on the social human activity.

IT influence on human factor in Lithuanian organizations

The organization of the research. The employees and managers of Lithuanian organizations related with the use of information technologies were interviewed in the process of the research. The organizations were selected according to the kinds of activity, listed in the catalogue of companies "Visa Lietuva".

The total number of questionnaires sent comprised 700; 663 responses were received; 23 of them were unduly filled in or not filled in at all. Therefore, the data of 640 questionnaires were used in the research. The respondents represented 35 organizations. The questionnaire response rate is 91,4 per cent.

Results of the research

In order to check the assumptions created in the way of theoretical analysis, there was created the following question:

- *How the use of information technologies in the work place conditions the betterment of employees' relations?*

In order to test this question, it was analyzed by using respondents' answers to the following questions:

- *How much time do employees spend using IT?*
- *How many IT do they use for the work?*
- *How employees use the possibility (in percent) to exchange informal information by using IT?*
- *Do employees like to participate in the events organized by an organization?*
- *Do employees care about each other?*
- *Do employees share knowledge received at their workplace with their colleagues?*
- *Are employees satisfied with employees' relations?*
- *Do IT have influence on relations with colleagues?*
- *Do employees* want to work in virtual workplace?

Certain statistically important correlations were determined in Table 2.

Table 2.

Correlation between relations with colleagues and level of using IT

	Relation between the quantity and level of IT usage	Relation between IT application for informal information exchange and IT usage level	Relation between satisfaction with employees' relations and IT usage level
Attribute (IT usage level)	*Relation strength*	*Relation strength*	*Relation strength*
Number of e-mails sent	0,417**	0,429**	0,339**
Number of Internet using hours	0,323**	0,490**	0,291**
Number of telephone/mobile telephone calls made	0,213**	-	-
Number of messages sent	0,138**	0,354**	-

**p<0,01

The χ^2 (chi-square) criterion was used to investigate the independence of two attributes (Table 3).

Independence between attributes

Attribute	"What IT do employees use at their workplace?"	"How employees use the possibility (in percent) to exchange informal information by using IT"	"What is the average number of e-mails you send per day?"	"What is the average number of hours you use Internet per day?"	"What is the average number of hours you speak on telephone/mobile telephone per day?"	"What is the average number of messages you send per day"
Do employees' like to participate in the events organized by an organization?"	p=0,001	p=0,000	p=0,000	p=0,000	p=0,000	p=0,000
Do employees care about each other?	p=0,979	p=0,000	p=0,232	p=0,000	p=0,482	p=0,865
Do employees share knowledge received at their workplace with their colleagues?	p=0,921	p=0,000	p=0,001	p=0,000	p=0,001	p=0,028
Do employees' want to work in virtual workplace?	p=0,007	p=0,218	p=0,031	p=0,027	p=0,427	p=0,687

▨ - independent attributes.

Discussion

The results of investigation show, that higher level of IT usage conditions variety of IT used. Thus, it is possible to admit, that employees' need for interaction with other people realises through various IT tools. Especially it is important for employees, who can contact with colleagues working in other places. On the other hand, it conditions requirement of interaction with other people" face to face", without technical promotion.

The investigation shows, that the most popular are IT intermedia - internet, e-mail and communication tools - mobile telephones. Those tools are usually used by respondents for individual requirements, i.e. e. for informal communication with people. Mostly these informal communication exchange methods are used by 22 - 30 year old respondents, most rarely by 41 - 50 year old respondents and older. Also specific software, data bases, programs and safety-net are used. Interesting fact, that actually 21,7 per cent. of respondents overall do not use IT for their needs. This means, that they do not know how to use IT or prefer communication without technical promotion.

The answers of respondents also proved that higher IT usage level conditions higher intention to participate in the events organized by an organization. Consequently, by using IT employees can exchange informal information more and faster, find out new information, news, make arrangements, and it conditions higher need to meet people "face to face".

Respondents emphasized the importance of employees' attendance. The results of investigation showed, that higher possibilities to exchange formal information by using IT, provided for employees better possibilities of attending their colleagues. And this on its turn conditions the betterment of employees' relations.

This hypothesis is proved by respondents' satisfaction with employees' relations in the aspect of higher usage of IT and the influence of IT on relations with colleagues.

Having started to use IT for doing work, certain changes in the employees' communication sphere, i.e. e. in relations with employees, appeared. 72 per cent. of respondents think, that changes exist and they influence the relations with employees. According to them, it is communicated in more modern ways, which improves communication and information exchange, giving new communication opportunities (video conferences, contact with colleagues working in a geographically different area, do work on-the-job, there is no need for "face o face" communication with managers, etc.), it is possible to suppress reactions, when negative information is received, to exchange with work results faster, to use new mind/idea expression opportunities and encourage informal interaction. On the other hand, people face troubles while

conveying their moods or feelings and danger of a too formal communication tone appears, besides, invisible real speaker reaction, too high amount of information, it may also appear competition and antagonism among those who are able to soak up IT and those who are incompetent, too high control possibility, a feeling of insecurity for personal information sending and checking, extra tiredness, staying too long at silly works. Also, subject to IT using style, relations can be more formal and vice versa. 28,1 per cent of respondents pointed, that IT do not make any influence on relations or this influence is very small.

It is emphasized in the answers that working with IT employee does not stand behind computer advance. Also, it is determined by the investigation, that IT usage helps to share knowledge, which is received in the process of work with employees (p=0,055). Consequently, employee having higher possibilities of using IT, creates favourable relations for himself and for otaher employee, because he can more simply and informally perform different kinds of communication functions.

It was determined in the process of investigation, that employees, spending more hours on the Internet, sending more e-mails, do not reject a possibility to work in the virtual workplace (44,2 per cent. - "pro", and 40,3 per cent. - "con"). In conclusion, the influence of IT usage level on employees' relations is dynamic, because respondents almost equally estimate possibility to work partially isolated from colleagues and at the same time speak against this form of work

Generalizing the results of the study, the following conclusion can be made: **higher level of the usage of information technologies influences the positive transformation of relations between employees' and at the same time on employee human factor.**

Conclusions

- The evaluation of the theoretical principles of changes of human factor in the process of transformations of organizations showed that these changes are conditioned by changes in the socio-technical system of the organization. An emphasis is placed on the concept of the employee's "plugging" into the network, where the majority of the management functions in the organization are transferred to the level of information systems. Thus, the employee of an organization becomes a member of the integrated system of data accumulation, distribution, and processing.

- The theoretical evaluation of information technologies influence on the human factor showed that this influence increases the need for such employee's features as responsibility, initiative, and independence; in addition to that it raises new requirements for the organization's attitude to its employee. When influencing the input of the organization, information technologies at the same time transform the relationships between employees within the organization, which, in turn, result in an altered output of the organization (e.g. higher quality production, services, viability and wellness of the organization, higher quality external relationships, etc.).

- The empirical investigation showed, that the higher level of the usage of information technologies influences the positive transformation of relations between employees' and human factor. This let to make the conclusion, that the higher use level of information technologies conditions the improvement of employees' relations with each other.

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