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Impact of ICT on the Structural and Contextual Organizational Elements: Case of the Varaždin County

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Abstract

The influence of certain factors on the organizational components has been in researchers' focus for years, together with their impact on the overall organizational efficiency. Traditional view commonly divided the factors on internal and external ones, which became improper in modern conditions. With contemporary division on structural and contextual factors, as a specific determinant the authors have to extract information and communication technology (ICT) which impacts elements of structural and contextual dimension in every organization. Therefore it is becoming generic factor which cannot be classified into one of these groups. In this research, the authors observed impact of ICT on organizational elements of public administrations offices (public sector) on the case of the Varaždin County. Results show that this impact is present in various forms in all observed factors and thus makes ICT a generic organizational factor.

Keywords: Varaždin County, structural and contextual factors, ICT, public administration

1. Introduction

This paper focuses on the impact of ICT on certain type of organization. The focus is on public administration offices in the Varaždin County (public sector). No matter of the type of organization, all organizations are formed by groups of people with purpose of achieving effects that one person can not achieve individually. Better results are created as a consequence of organizational effect which directs organization to achieving some organizational goals. Regarding the purpose of the organizations' founding, they can be described as profit or non-profit ones. To achieve these goals organizations create inner order and relations among organizational parts that can be described as an organizational structure. All organizational parts together with relations and mechanisms of their coordination are important for proper functioning of any organization. Organizations are influenced by many factors that are coming from their dynamic surrounding or from organization itself, but because the organizational structure is static, it sometimes cannot meet requirements of efficiency and adoptability. That is why studying of organizational structure is one of ways to improve organizational effects.

The article compiles influence of different factors on the focused type of organization. In the first part of the research paper, the authors emphasize different view or different aspects of influence factors. Also, the authors explain the form of generic factor and describe ICT as one of those generic factors. The authors put an impact on the analysis of public administration

and the influence of generic factor on the public administration. The research object was local unit of public administration - Varaždin County. In next part of the research paper, the authors explain how data were collected. Also, in the final part of the research paper, the authors explain research results which came out of the survey and give an answer to research question.

2. The influence of different factors on the organization

The influence of certain factors on the organizational components is in the traditional view divided into external factors and internal factors. Sikavica [16, 153] divided internal factors into several groups: goals and strategy, tasks and technology, size, employees, organizational life cycle, products and location. External factors [16, 156] comprise market, institutional environment, integration processes, development of science and technology.

Traditional view became improper in modern conditions. Numerous factors, which can be seen as structural and contextual, influence at the same time both structure and the organizational efficiency. Daft [5, 17] describes two dimensions of each organization: structural and contextual. These dimensions describe organizations the same way that personality and physical traits describe people. Structural dimension can be illustrated by structural factors that reveal internal characteristics of an organization. They create a basis for measuring and comparing organizations. On another side there are contextual factors that create a contextual dimension of organization, including its size, technology, environment, organizational goals, strategy and mission and organizational culture. There are some factors that can be included in both structural and contextual factors and one of these factors is ICT. ICT impacts not only all the organizational structure elements, but comprehensively changes the effects of all the other mentioned structural and contextual factors, therefore becoming generic factor. In the research paper influence of ICT on the public administrations offices in the Varaždin County was analyzed.

2.1. Structural and Contextual factors

As shown in the Figure 1. Daft [5, 18] divided structural factors into several groups: formalization, specialization, hierarchy and authority, centralization and professionalism. The contextual factors relevant for organizational forms are the following: organization size, technology, environment, purpose, mission, goals, strategy and organizational culture.



Figure 1. Structural and Contextual Dimension of Organization [5, 17]

Formalization can be described as an amount of written documents in organizations, like defined procedures, rules, regulations, job descriptions and policy manuals. All of these documents describe activities and behavior in organization. **Specialization** is the degree to which tasks are subdivided into separate jobs. When specialization is high, each employee performs only a small amount of similar activities and tasks that are in their job description. **Hierarchy of authority** can be described as a number of management levels in organization. It can also be described as a span of control, number of employees that are under control of one manager or supervisor. When the manager controls a larger number of employees, the hierarchy tends to be shorter. When the manager controls a smaller number of employees, the hierarchy tends to be tall. **Centralization** refers to hierarchical level that has the authority to make a decision. When process of decision making is on the top level, organization is centralized. When process of decision making is possible and it is happening on lower levels of hierarchy, then the centralization is weak or the organization is decentralized. **Professionalism** can be described as a level of education and additional training and education. It's measured by number of years of employee's education.

Daft [5, 18-20] divided contextual factors into: organizational size, technology, environment, strategy, purpose, mission, goals and organizational culture.

Organizational size can be described as a magnitude reflected in number of employees in organization. It can be measured by total sales or total assets. **Technology** can be defined as tools, techniques, and actions used to transform inputs to outputs. It concerns how the organization actually produces the products and services and it includes things as information system, flexible manufacturing, etc. **Environment** includes all elements outside the boundary of the organization. Environment is a factor that can't be influenced by organization, but it influences the organization. It can be described as an industry in which we are doing business, government, customers, suppliers, and the financial institutions. **Organizational goals, strategy and mission** are factors which define the purpose of organizational existence. Strategy is defined as plan of actions for reaching the organization's goals. **Organization's culture** can be described as a set of organizational values, beliefs, understandings and norms shared by employees. Organizational culture is informal and it is not written but it can be observed in organizational stories, ceremonies, dress code and employees commitment to company.

After defining the main factors that influence organizational structure components, there is a presumption that ICT influences all these factors. Since the authors have already studied effect of ICT on organizational structure elements in private companies in the context of projects [28, 29], in this research the authors focus on the public administration organizations to determine if and how ICT affects structural and contextual dimensions in analyzed organizational units.

3. Public sector

Public sector can be divided in two sections [17, 10-15]: General government and Public corporations. General government is a part of the economy that incorporates institutional units which are non-market producers, and whose output is consumed individually or collectively by other economy sectors (financial and non-financial corporations, households). Financing of general government mainly comes from compulsory payments of other sectors; therefore it can also be described as the units engaged in distribution of national income. General government comprises public authorities and the agencies in their composition that were established by political decisions. Components of public authority are legislative, judicial and executive bodies that are empowered within a certain territorial area.

According to IMF [17, 10-15] general government consists of four sub-sectors including following: (a) Central government - such as government department ministries, agencies etc.; (b) State government - characteristic for the countries based as a federation or confederation of larger number of the states (e.g. Cantons, Bundesländer etc.); (c) Local government - involving bodies on the cities, or other lower level territorial units such as the Counties in Croatia; (d) Social security funds - which include pension, social of health care funds, but in

different countries this particular sub-sector can be incorporated in any of the afore mentioned sub-sectors.

As the Afonso [1] implies recent research of the public sector and the role of the government have concentrated on the assessment of the efficiency and usefulness of public sector services. His findings are in line with other studies which mostly show that public services should be much smaller and more efficient than they are at present. One of the proposed solutions is the outsourcing of the non-core activities to the private sector. Another way of solving efficiency of governmental entities [20] is the implementation of the ICT in these entities and the pursuit of so called e-government. Such a shift fundamentally changes relations between the government and its clients, which in the end tries to establish new knowledge government.

In Croatia ICT and e-government in public sector represent relatively new trends pursued in last few years. Varaždin County is one of the leaders among other counties, due to the fact that the Faculty of Organization and Informatics is placed in Varaždin. Therefore Varaždin is an important source of IT experts in Croatia and has good starting point to be among the first to implement ICT into everyday practice in numerous organizations.

3.1. Varaždin County

Croatian territory is administratively divided into 20 Counties and the City of Zagreb [26, 27], which is also considered as the 21st county. Varaždin County [19] is situated in northwestern Croatia covering 2.2% of the Croatian territory. Executive assignments of the county are the task of a County prefect with two deputy prefects, and the county government consisting of 11 members. Citizens' representative body is the County assembly made of 41 members.

Organizationally County works through 10 administrative units (offices) that run everyday administrative and expert work. These offices are as follows: (1) Prefect's office – organizes prefects everyday work and coordinates all of his obligations, deals with protocol and PR issues; (2) County secretary – makes normative acts for functioning of county bodies, deals with legal and secretary work; (3) Department for budget and finance – organizes county financial issues; (4) Department for education, culture, science and sport; (5) Department for health care and social care; (6) Department for environmental issues and utility management; (7) County institute for physical planning; (8) Department for agriculture, forestry and hunting; (9) Department for European integration, entrepreneurship and tourism; (10) Department for physical planning and construction. Another two bodies connected with the County activities that were established as the county projects are AZRA - The Varaždin County Development Agency, and GARA – Varaždin County Guarantee agency. These executive units of the local government were taken as the units for the testing of our hypotheses discussed in the research question.

Varaždin County has been very active in the cooperation on different projects [24], whereas some of their international projects (such as Modern Public Administration whose executive part is eGovCRO) are directly involved with implementation of ICT in everyday work of County offices. For example, the project eGovCRO that is being financed by European commission through TEMPUS programme aims to encompass third pillar of the public administration efficiency. First pillar comprises informatization of public administration (on state, and local level), and is either done or in some institutions enters the final phase. Second pillar considers legal framework, which is completed in compliance with EU standards. Third prerequisite for the efficient public administration are educated employees for working in the e-government environment, which Varaždin County should achieve after successful implementation of eGovCRO. Modern Public Administration achieves awareness of the service users, two-way communication and openness of the County towards its Cities and Municipalities, media, citizens and all the other users of Varaždin County's services.

4. Research question and the literature review

Before the presentation of the results of the survey regarding the perception of generic factors, it must be noted that the main object of our analysis in this research paper is the organization of public administration (or organization units) - Varaždin County. Research question is: *What is the relationship between the implementation of ICT and its influence on structural and contextual dimension of organization, especially in public administration?* The hypothesis in this research paper is based on the fact that ICT impacts not only the organizational structure elements, but also changes the effects of all the other structural and contextual factors (formalization, specialization, hierarchy, authority, centralization, organizational size, technology, environment, mission, organizational culture).

First the authors present the results of the broader and thorough review of the literature on the ICT implementation in public sector and offering of public e-services, and how this induces organizational changes in this kind of organization. After that the authors present the results of their own research through primary data analysis.

4.1. E-service in the public sector

More efficient public administration is of importance for every country, as shown in the Bađun's research [3], because it is one of the vital components of economic growth. By proper organization of public services, government can decrease uncertainties, transactional costs and the time needed to carry out certain procedures. It results in enlarged business sector efficiency and encourages their investments, thus becoming the generator of the overall growth. Better efficiency can be achieved by the increased quality of the public services. For instance, Đulabić [6] presents numerous ways to increase the quality, such as the adoption of modern ICT (e-government, e-services), setting up of clear standards for service performance, comparison of actual work done with standards, etc. In the case of usage of ICT, it can raise the speed of reactions to altered circumstances in the environment, therefore inducing better functioning of public administration.

Reinhard, Sun and Agune [10, 1] in their research work find that ICT has an important role for all the levels of administration. They find out that implementation of ICT is a driver for other investments, focused managerial and political actions, and that it leads to creation of new services for organization and citizens. These kinds of actions result in better performance of government process, but also in better service to citizens. As the Afonso [1] implies recent research of the public administration and the role of the government have concentrated on the assessment of the efficiency and usefulness of public sector services. His findings are in line with other studies which mostly show that public services should be much smaller and more efficient than they are at present. One of the proposed solutions is the outsourcing of the non-core activities to the private sector.

These findings are in concordance with overall European policies especially with European broad-based innovation strategy, where they point out the significance of adopting of new technologies and procedures in public administration. "Information and communication technologies (ICT) are largely under-exploited in the EU as a whole, but in the public sector in particular. This is crucial for the development of public services: wider uptake and exploitation of ICT in public services (e.g. in the health sector) would not just improve the productivity of the public sector; it could open up large markets for innovative ICT products and services." [18, 11].

Also, most of the recent research papers find out a strong relationship between ICT and improvements in organizational and economic performance. Many research findings show that usually after ICT have been implemented, organizations have benefited from the use of information and communications technology in their business processes. For definite, the same results could be seen in public administrations but the most important influence depends mainly on the size of the organization or departments but also of the availability of ICT.

Even though many researchers state positive effects of ICT on the performance of public sector, critical voices can also be found. The research work of Sorrentino [13, 9] shows that

implementation of ICT in public sector organizations is placed at the centre of the process of change in public administration. But still, she believes that technological innovation in public administration will not automatically be translated into an improvement in organizational performances. In their research work Gupta, Dasgupta and Gupta [7, 17] make an investigation of adoption of ICT in a government organization. They emphasize that information systems analysts and web designers should create ICT which is easy to use, and that way directly impact individual and organizational performance. The research which was made in a Slovenian company shows that the broader ICT environment decides whether or not an ICT investment will be successful. Those mean that the size of ICT investments determines the ICT managers' perceptions. [15, 547]

If public organizations aren't well prepared in delivering e-services, there is a real possibility that ICT implementation would become a failure [9]. E-government can undoubtedly offer more innovative services to other sectors it serves, but ICT should be deployed with much concern, and by its careful integration into the public service system as a whole. Another major obstacle in realizing full potential of ICT based e-services is the penetration of the internet among users of public services [14], because you cannot introduce such a service in the regions where only a minor part of inhabitants regularly use computers and/or internet. However, these issues in Croatia are rapidly changing due to fast growth of internet usage.

For instance, there are e-Croatia 2007 projects [21] and Europe i2010 eGovernment Action Plan [22] and other strategic plans to involve public administration to use and spread online services to citizens. E-government presupposes the usage of ICT to make public administrations more efficient and effective, and promotes growth by cutting the red tape. This is something which anyone who has spent hours waiting in line in a government building can appreciate. [23]

4.2. ICT and organizational change in public sector

The modernization of public sector with new and modern ICT has produced a new paradigm, which is called "electronic government" or "e-government". [13, 1] This is the main reason why local, state and national governments started functioning differently. And also, why it affects their organizational structure and other important either structural either contextual factors. Through the investigation of relationship between ICT and organizational changes, it can be also found out how ICT progress organizational performance. For instance, Gustafsson et. al [8, 53] identify four areas where ICT can complement and support the organization. The first two are vertical and horizontal communication between organizational units and members. The other two are the systems that control the processes - either partially through work flow procedures where the actual work is still performed by a human, but the process is coordinated by a machine; or completely through automation where the human operators perform only supervisory tasks. In the Table 1., there are presented Gustafsson et. al's conclusions on values that ICT affects when implemented in one of these four areas:

Horizontal communication	Vertical communication	Work flow	Automation
Organizational flexibility Coordination	Coordination Organizational culture Decision making	Efficiency Effectiveness Coordination	Efficiency Effectiveness Coordination

Table 1. Summary of which business values each system type affects [8, 56]

Bekkers [4, 89] linked the global introduction and the use of ICT in public administration with new forms of virtual organization. In his opinion, implementation of ICT is an important element for the emergence of virtual organizations in the public sector. Implementation of

ICT in the functioning of local government, in order to attain higher level of public service quality, certainly can generate significant organizational changes. As Ancarani [2] implies ICT in general, as well as the internet in particular, involves feedback in communicating with public services clients, thus encouraging and reinforcing progressive organizational changes. In his work e-services are leveled into three stages where firstly ICT provides information on available services (one-way communication), secondly it increases and improves interaction with clients (two-way communication), and in a third stage it enables performing full transactions. By providing sufficient information public service achieves better transparency, while ICT supported interactions and transactions improve efficiency of offered services.

Before ICT was incorporated as a standard way of modernization, the public administrations were suffering from the compartmentalization and fragmentation. The public service was organized according to needs of administrators instead of citizens' needs. [12, 1] So, one of the main changes is that through the use of ICT, it is possible to better organize the public service.

Many researches which were done before show that introduction and use of ICT in public administration has led to the founding of new organizational forms. ICT is supposed to be an important element for the emergence of virtual organizations in the public sector. [4, 89] The certain form of virtual organization that can also be found in administrative offices in Varaždin County where the use of ICT established better collaboration between separate organizational units or departments. This is just one specific characteristic of a virtual organizational form which is evident in organizational units in Varaždin County. This kind of a virtual organization is known as a network organization. [11]

5. Data collection and survey results

The data collection was performed by authors of this article. Data were collected in 12 organizational units in Varaždin County. It was done by two means: an e-mail survey and interviews. The questionnaire was e-mailed to Heads of the departments in Varaždin County and after it; a short interview was made with them. An interview was a way to get more complete information about form of organization and the way how it interacts in comparison with some other public administration offices.

The survey with 28 items regarding use of ICT among employees in County organizational units was administered to a sample of 9 subjects. This low number of research subjects is main limitation of the research, but still presents a valuable source of information on the examined research field. The data for 9 out of 12 offices and agencies were collected, and afterwards one of them was sorted out due to incompleteness. The respondents were all top positioned managers in their units (Head of department or director). All units have 2 (GARA) to 34 employees (Department for education, culture, science and sport). Each organizational unit (department) in the Varaždin County has on average 6,5 employees. The convenience sample in the survey consisted of 8 subjects which is more than 66% of all interesting subjects for this research.

The educational structure of employees is very high. The highest percent of employees (68%) have university degree of education, 21% of employees finished high school and 11% of employees finished college. All employees in each organizational unit have direct connection to the Internet, and also each employee has its own computer. This also shows high percent of informatization in all organizational units of Varaždin County. All subjects use ICT in everyday work and communication between themselves and in communication with their clients. The most used ICT support is an e-mail.

Detail analysis of 8 questionnaires shows the following research results.

5.1. Structural factors and ICT

Formalization in the organization is on very high level (9/10), which favors adoption of ICT, and software support in relation to the degree of formalization is also considerable (See

Figure 2.). The question was formulated as: What part of the rules and procedures in your work is supported by the software, digital forms etc.

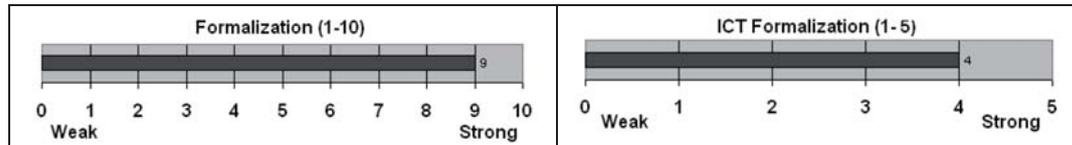


Figure 2. Formalization and ICT influence

To substantiate this finding it has to be pointed out that County employees have mean 1,01 computer/employee ratio, respectively every employee has at least one computer available for her/his work. All the heads of departments use computers in their work, averagely in 82% of their working assignments, which confirms strong influence of ICT on formalization.

In the specialization factor the results show that jobs in the Varaždin County are highly specialized (mean is 8/10), and ICT wasn't impacting it neither in a positive, nor in a negative way (See Figure 3.). Public administration with 6.5 employees per unit actually has a high degree of job specialization.

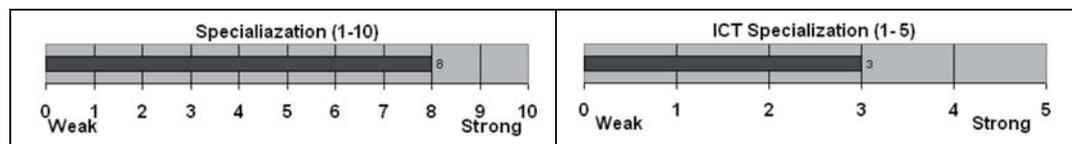


Figure 3. Specialization and ICT influence

As it was already mentioned, Varaždin County consists of 10 offices and 2 agencies, while at the head of the organization are County prefect and the County Assembly. When considering the hierarchy, respondents described it as slightly high, rated as 6/10 (See Figure 4.). Average number of hierarchy levels through the organization is 3 levels. Since the authority hierarchy can be reflected as the span of control, heads of department with averagely 4 subordinates have narrow span of control. Impact of the ICT on the hierarchy levels was rated as 2/5, which is not high, i.e. ICT did not lead to the major change of the number of hierarchy levels.

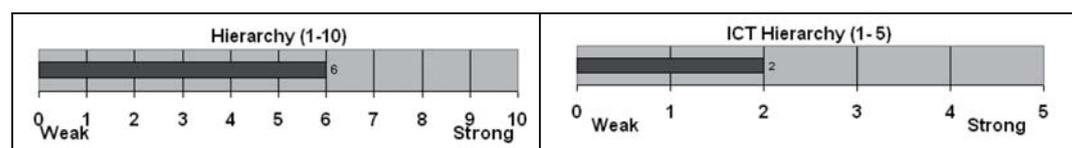


Figure 4. Hierarchy and ICT influence

Centralization was rated as 6/10, which means that decision making is more centralized than decentralized. Influence of ICT on the centralization was not significant, but it most certainly exists (See Figure 5.). This can be linked to the part of the questionnaire about communications among superiors and subordinates. All departments in communications inside the organization use ICT, as well as they use internet in their work, 63% of them use it in very considerable manner, while other 37% use it significantly. Verbal communication makes 27% of entire inner communication, telephone usage is in 20% of cases, and classic mail service represents only 10%. Among ICT supported means of communication E-mail is used in 27% of cases, but instant messages with only 7% and voice over IP with 10% are underrepresented. Outer communication with organization's clients is divided more evenly among verbal (22%), telephone (23%) classic mail service (20%) and e-mail (20%) while instant messaging and voice over IP aren't so important. These results show that ICT support for the exchange of information is well established inside the organization as well as with

outer subjects. Access to all the important data on lower levels of hierarchy allows this decentralized decision making.

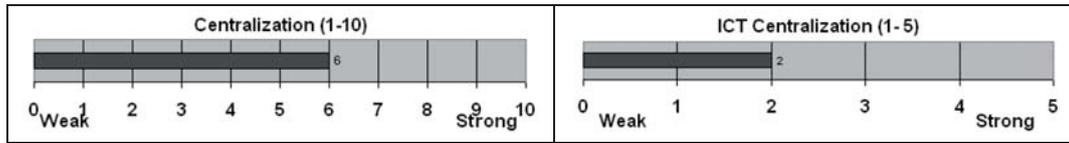


Figure 5. Centralization and ICT influence

Professionalism is on the high level (8/10), and the impact of ICT isn't of so great importance (3/5). This is evident from the fact that everyone uses computers in everyday work and communications, so knowledge about ICT usage is inevitably needed and makes mandatory part of education and training, as shown in Figure 6.

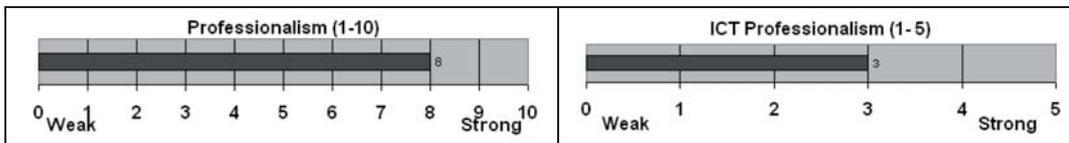


Figure 6. Professionalism and ICT influence

Most of the County employees are university graduates (68% of them), 11% have finished 2 years of college, and 21% have high school education. Data collected show that most of employees have high degree of education and this could be one of the possible reasons for relatively high usage of ICT.

5.2. Contextual factors and ICT

Organizational size (rated at 4/10) as a contextual factor can be measured by number of employees or total assets, and according to these measures Varaždin County with 73 employees could be in category of medium sized companies (50 – 250 employees) [25]. With regard to implementation and usage of ICT in relatively big organization, ICT has no influence on downsize or growth of employee number (See Figure 7.).

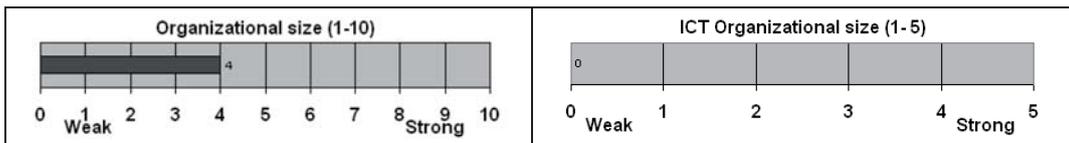


Figure 7. Organizational size and ICT influence

With regard to technology (rated 10/10), it is evident that all the employees in Varaždin County use computers and Internet in performing their jobs (See Figure 8.). Impact of ICT on technology is very strong (4.4/5) because they use computer in 82% of their work activities and they use internet in their work, 63% of them use it in very considerable manner, while other 37% use it significantly.

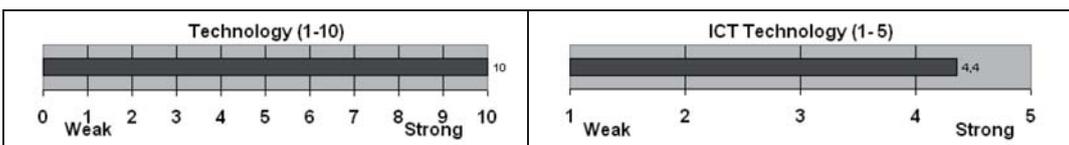


Figure 8. Technology and ICT influence

everyday work (See Figure 9.). It was observed through ways of citizens' communication with County offices (orally, by telephone, e-mail, ordinary mail, instant messaging, and VOIP telephony). Environmental changes like eGovernment projects and other ICT related changes can provide new services in public administration. In our case in 63% of units ICT induced new services, in an amount of about 30% compared to previously offered ones. ICT as an impact factor on relations with environment can be measured by following characteristics: response time to request, work scope increase, number of solved requests, quality of service and deadlines fulfillment. This way ICT improves functionality of public services and its total impact can be described as 3.8/5 - strong influence.

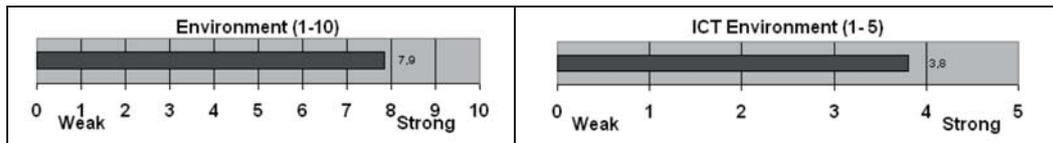


Figure 9. Environment and ICT influence

Organizational goals, strategy and mission are factors which can not be easily measured and it is not easy to obtain these information, as it is shown in Figure 10. But the authors managed to get answers about how employees assess that ICT influenced on those factors: by improving information accuracy, information availability, quality and quantity of information and decision speed. All those parameters show strong impact of ICT (rated as 4.3/5) whereas it surely affects reaching organizational goals, realization of strategy and mission fulfillment.

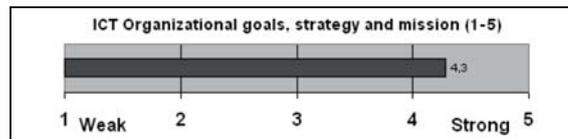


Figure 10. ICT influence on organizational goals, strategy and mission

Last observed factor was organizational culture, shown in Figure 11, which also can not be absolutely measured but can be recognized as influence of ICT in communication of superiors with subordinates. Two-way communication is supported by ICT means such as: e-mail, instant messaging and VOIP Internet telephony. It was found out that internal communication on top-to-down level or between employees in each department 27% of all communication goes usually through e-mail, 7% through instant messaging and 10% by VOIP (internet telephony) or software messaging clients, which is significant percentage of all communications in organization. These new means of internal communication changed formal communicational channels to more informal and thus improved employee cohesion.



Figure 11. Impact of ICT on organizational culture

6. Conclusions and implications for further research

The influence of information and communication technology on modern organizations (profit or non-profit) is today in centre of public interest of a great number of researchers worldwide, and the importance of researching can be proved by estimations on increase of investments in ICT in most world organizations. Through this research which is a part of bigger scientific project (Influence of generic factors on structure and efficiency of organizational forms)

approved by The Ministry of Science, Education and Sports in the Republic of Croatia, the authors have exposed the type of factors that impact the organization from structural or contextual dimension and each of them can be connected with ICT and its implementation in organization.

From the research results the authors conclude that ICT is the generic factor and that it influences the organizational structure and the elements like formalization, specialization, hierarchy of authority, centralization and professionalism. Also, it impacts organizational size, technology, goals, strategy, mission, environment and organizational culture. This impact is in some cases small but it exists and it has to be included in the complete picture about the organization. Although, low number of research subjects is main limitation of the research, it still presents a valuable source of information on the examined research field. The hypothesis, that ICT influence structural and contextual dimension of organization, is confirmed. The collected research results will in other research papers serve for defining organizational parts and coordination mechanisms which will mostly contribute to achieving goals of the respective organizational form.

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