

Impact of ICT on the organizational structure 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 we have to extract information and communication technology (ICT) which impacts organizational structure elements, but also comprehensively changes the effects of all the other mentioned factors. Therefore it is becoming generic factor which cannot be classified into one of these groups.

In this research, we shall observe impact of ICT on organizational elements of public administrations offices on the case of the Varaždin County.

Keywords: Organizational structure, structural and contextual factors, ICT, Varaždin County

1 Introduction

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, and 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 influence of certain factors on the organizational components is traditionally divided into external factors and internal factors. Sikavica [15, 153] divided internal factors into several groups: goals and strategy, tasks and technology, size, employees, organizational life cycle, products and location. Also, Sikavica [15, 156] divided external factors into 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 and goals. 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 our research we analyze influence of ICT on the public administrations offices in the Varaždin County.

1.1 Structural and Contextual factors

Daft [5, 18] divided structural factors into several groups: formalization, specialization, hierarchy and authority, centralization, professionalism and employees structure. 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, and how to do certain things. **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. Also it can 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 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. **Employees' structure**

is a number of employees with some qualification usually divided by educational level. Daft describes this factor as a personnel ratio. It is staff ratio of employees that can be described with a number of indirect and direct labour employees.

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

1.2 Public sector

Public sector can be divided in two sections [16, 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 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 are 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 [19] 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.

2 Research question and the literature review

The main element of our analysis in this research paper is the organization. We try to find out some answers about organization of public administration (or organization units) in Varaždin County. Research question is: What is the relationship between the implementation of ICT – organization stage of formalization, specialization, and centralization - and on the other hand organizational structure and organizational performance, especially in public administration? The hypothesis in this working 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).

2.1 E-service in the public sector

More efficient public administration is of importance for every country, as shown in the Badun'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 [9, 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." [17, 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 [12, 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. [14, 547]

If public organizations aren't well prepared in delivering e-services, there is a real possibility that ICT implementation would become a failure [8]. 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 [13], 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 [20] and Europa i2010 eGovernment Action Plan [21] 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. [22]

2.2 ICT and organizational change

The modernization of public sector with new and modern ICT has produced a new paradigm, which is called "electronic government" or "e-government". [12, 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, we can also find out how ICT progress organizational performance. 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. [11, 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 we can also find 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. [10]

3 Varaždin County

Croatian territory is administratively divided into 20 Counties and the City of Zagreb, which is also considered as the 21st county. Varaždin County 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 offices that run everyday administrative and expert work. These bodies 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, whereas some of their international projects (such as 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.

4 Data collection and survey results

Data were collected in 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 some of them. A survey questionnaire was used to collect information regarding use of ICT among employees in County organizational units. 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 data for 9 out of 12 offices and agencies were collected, and one of them was sorted out due to incompleteness. Answers to questionnaires were provided by heads of the units. Analysis of 8 questionnaires shows the following research results:

Each organizational unit (department) in the Varaždin County has on average 6,5 employees. 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. The question was formulated as: What part of the rules and procedures in your work is supported by the software, digital forms etc.

To substantiate this finding we have to point out the fact 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.

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. Public administration with 6.5 employees per unit actually has a high degree of job specialization.

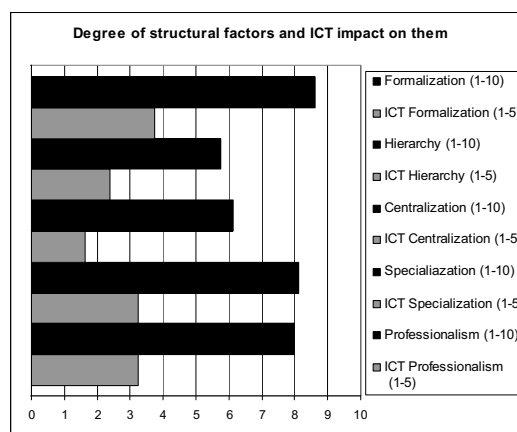


Figure 2. Degree of structural factors and ICT impact on them

As we have 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 more shallow and rated it as 5/10. 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.

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. 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.

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. Most of the County employees are university graduates (68% of them), 11% have finished 2 years of college, and 21% have only high school education. The educational structure of employees is very high. 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.

Organizational size as a contextual factor can be measured by number of employees or total assets, and according to these measures Varaždin County could be in category of medium sized companies. With regard to implementation and usage of ICT in relatively big organization, ICT has no influence on downsize or growth of employee number. With regard to technology, goals, mission and strategy, on the next figure we can see influence of ICT on some aspects of organizational performance and goals achievement.

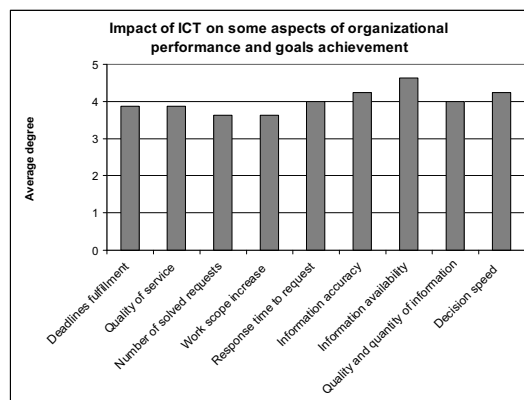


Figure 3. Impact of ICT on some aspects of organizational performance and goals achievement

On Likert scale this impact is in range from 1 to 5, where 1 means very negative influence, 2 – negative influence, 3 – neither negative nor positive influence, 4 – positive influence and 5 – very positive influence.

In this figure we can see impact of ICT on deadline fulfillment, quality of services that are provided to citizens, impact on number of solved requests, increase of working scope, response time for some request, accuracy of information, information availability, quality and quantity of information and decision speed. All these aspects are parts of

fulfillment of organizational, goals, strategy and mission. From the research results we can see that ICT has positive or very positive impact on these organizational factors.

From environment factor as a contextual factor we can conclude that 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. Also, we tried to investigate the organizational culture in this case, and we found out that internal communication on top-to-down level or between employees in each department goes usually through e-mail (27% of communication), 7% through instant messaging and 10% by voice over IP telephony or software messaging clients, which is significant percentage of all communications in organization. This type of communication changes the ordinary ways of communication and this communication are usually more free and informal so it also changes the organizational culture through the time.

5 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, we 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.

We can conclude that ICT is the generic factor and that it influences the organizational structure and the elements like formalization, specialization, hierarchy of authority, centralization, professionalism, and employee structure. Also, it impacts organizational size, technology, goals, strategy, mission, environment and organizational culture. This impact is in some cases small but it is current and we must include it in the complete picture about the organization. The hypothesis that ICT influences on structure and efficiency of organizational form is confirmed. The collected research results will in some other research paper serve for defining organizational parts and coordination mechanisms which will mostly contribute to achieving goals of the respective organizational form.

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