

# How ICT Affects Business Processes

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## ABSTRACT

ICT generates changes on the business processes in a way management has not expected, subsequently the importance to understand them is extremely important. The research included 209 companies in Croatia, classified by size, total revenue, business sectors and number of employees; as four variables used in the research. The research investigates whether the introduction of computers, computer net-works, Internet, Mobile internet, e-mail, common databases or electronic business has led to change the business processes of the company. In 79% of the surveyed companies, those changes occurred. Whether there is a relationship between the presence of business processes changes and four individual independent variables in this study, was analyzed by the chi-square test. Descriptive method, quantitative and qualitative analysis, statistical methods, generalization and specialization, comparative analysis, mathematical and graphical methods were used in this paper.

**Keywords:** ICT, Business processes, Business processes change

## INTRODUCTION

The survey included 209 companies in the Republic of Croatia from different sectors and business fields, classified into five groups by total annual revenue. Companies belong to 18 different sectors and fields, with an employee number from one to

10.500. The surveyed companies have an average of 331 employees; standard deviation is 1,095, three times the arithmetic mean. A quarter of the company employs 5 employees and less, and as many companies employ 155 employees and more, median is 19 employees (very right-to-right asymmetric distribution). The median and quartile values were used to classify the enterprises into three groups. Seven types of ICT have been used to find the impact of their implementation on business processes change: computers, computer networks, the Internet, Mobile internet, e-mail, com-mon databases and e-business. Five types of business processes change were investigated: introduction of new activities in business processes, abolition of certain activities in business processes, accelerating business processes, introduction of new business processes and abolition of certain business processes. The goal of the paper is to research the affect of ICT on business process change in the company.

## **LITERATURE REVIEW**

In literature, we can find previews works researching the impact of ICT on business processes. Gelinas et al. pointed out concerns regarding IT and business process changes, concluding that systems professionals and users must collaborate on the implementation of the new IT system and it must include the IT system itself and the processes that will be change during its implementation (Gelinas et al., 2008). Stepanova and Erins in their research point developing technologies have a major impact on business processes (Stepanova and Erins, 2020). Matthew and Ibikunle point out that ICT help banks to improve the efficiency and effectiveness of services and enhances business processes (Matthew and Ibikunle, 2012). Lee et al. proves ICT enable business process change in terms of costs savings, quality break-through, better customer services, time reduction, and revenue increases (Lee et al., 2011). Attaran points out that ICT is one of several enablers, including human resources and organizational change, that all must be considered together to bring about change in business processes (Attaran, 2004). Susanto et al. point out that IT provides vital value to the organization by offering support to the business infrastructure and processes. IT is the best innovation for business process re-engineering (Susanto et al., 2020). Scholl proves that ICT changes business processes, emphasizing that ICT might play a major enabling role in business process reengineering (Scholl, 2003). Euripidis and Konstantinos point out that ICT investments requires complementary investments and changes in business processes, organization and human capital (Euripidis and Konstantinos, 2008). We can conclude that the impact of ICT on business processes is constantly actual. Due to the rapid development of ICT and changes in the business environment, arises the need for researching the ICT impact on business processes. All the above-mentioned authors, in their papers, pointed out the importance for further research on the ICT affect in this and in other fields. Ziółkowska proves that two of the most important characteristics of digital transformation by implementing IT, are the optimization of existing and the creation of new business processes (Ziółkowska, 2019).

## THE IMPLEMENTATION OF ICT CAUSES CHANGES IN BUSINESS PROCESSES

The data were analyzed conducting chi-square tests, and the results are shown in Table 1. Those results that prove correlation, i.e. statistical significance ( $p < 0.05$ ), were commented in more detail. The first chi-square test found that there was a statistically significant correlation between the presence of changes in business processes of the company and the size of the company. The obtained results in the indicate a statistically significant correlation. Changes are present in 82% of small, 89% medium and 100% of large companies. The second chi-square test found that there was a statistically significant correlation between the presence of changes in business processes of the company and the total revenue of the company. Changes are present in 75% of companies with low, 92% of companies with medium and 100% of companies with high total revenue. The third chi-square test found that there is no statistically significant correlation between the presence of changes in business processes and the business sector of the company. The fourth hi-square test research whether there was a connection between the presence of changes in business processes and the number of employees in the companies. The observed frequencies in this test and the results show that this correlation is statistically significant. Changes are present in 71% of small, 92% of medium and 93% of larger companies.

Table 1: Results of chi-square tests

Variables in the contingency table	Conting. table format	N	$\chi^2$	df	p	Stat. sign.
Presence of changes in business processes - Company size	2 x 3	190	7,329	2	0,026	*
Presence of changes in business processes - Total company revenue	2 x 3	190	17,773	2	<0,001	**
Presence of changes in business processes - Business sector	2 x 3	190	3,404	1	0,065	
Presence of changes in business processes - Number of employees	2 x 3	190	15,441	2	<0,001	**

Note: \* statistical significance up to 5%; \*\* statistical significance up to 0.1%

Source: Own research.

Table 2 shows that changes in business processes are usually of moderate, greater, but quite often extremely large.

Table 2: Surveyed companies by the size of business processes change (n = 209)

Size of business processes change	Number of companies
Without change	11
Minor change	22
Moderate change	69
Greater change	62
Extremely large change	45
Total	209

Source: Own research.

When we assign values of 1 (without change) to 5 (extremely large change) to the magnitude of the change, we can calculate descriptive magnitudes. The arithmetic mean is 3.52 mod is 3, the median is 4, and the standard deviation is 1.101. Regarding the size of the change, the question arises whether the size is statistically significantly different with respect to the size of the company, given the different levels of total revenue, different business sectors and different number of employees. Such questions can be answered using a t-test (when comparing two arithmetic means) or using an F-test (when comparing three arithmetic means). A total of four tests were conducted, that four independent variables were defined in the paper. The test results (one t-test and three F-tests) are presented in Table 3.

Table 3: Results of t-tests and F-tests comparing arithmetic means

Variables	Company group	N <sub>1</sub> N <sub>2</sub> N <sub>3</sub>	Arithm. mean	Standard deviation	t or F	P	Stat. sign.
Company size	Small	128	3,38	1,171	6,295	0,002	**
	Medium	44	3,45	0,875			
	Large	37	4,08	0,924			
Total company revenue	<10 mil.	81	3,23	1,217	5,674	0,004	**
	10-250 mil.	79	3,58	0,982			
	>250 mil.	49	3,88	0,971			
Business sector	Production	144	3,48	1,033	0,242	0,623	
	Non-production	95	3,56	1,182			
Number of employees	<5	56	3,04	1,279	7,829	0,001	***
	6-155	101	3,67	0,971			
	>155	52	3,73	0,992			

Note: \* statistical significance up to 5%; \*\* statistical significance up to 1%; \*\*\* statistical significance up to 0.1%; N<sub>1</sub>, N<sub>2</sub>, N<sub>3</sub> – Number of companies.

Source: Own research.

The intensity of business processes changes is lowest in small and highest in larger companies, lowest in low-revenue and highest in high-revenue companies, lower in companies with a smaller and highest in companies with a larger number of employees, lower in production and higher in non-production companies. The difference in the intensity of business processes changes among companies with different size, business sector or employee number are statistically significant. The difference in the intensity of changes in business processes among company business sector is random-

Table 4: Surveyed companies by business processes changes due to computer use in business (n = 200)

Business processes change type	Yes	No	Not sure	% Yes
Introduction of new activities in business processes	128	45	7	76%
Abolition of certain activities in business processes	126	42	11	75%
Accelerating business processes	155	18	7	90%
Introduction of new business processes	120	52	8	70%
Abolition of certain business processes	112	57	11	71%

Source: Own research.

Table 4 shows that out of 200 companies that use computers in business, most of them had acceleration of business processes and introduction or abolition of new activities in business processes. However, other types of changes are also very common. Any of these five changes occurred in 92% and all five changes in 66% companies.

Table 5: Surveyed companies by business processes changes due to computer networks use in business (n = 180)

Business processes change type	Yes	No	Not sure	% Yes
Introduction of new activities in business processes	128	45	7	71%
Abolition of certain activities in business processes	126	42	11	70%
Accelerating business processes	155	18	7	86%
Introduction of new business processes	120	52	8	67%
Abolition of certain business processes	112	57	11	62%

Source: Own research.

Table 5 shows that out of 180 companies that have a computer network, most of them had the acceleration of business processes. However, other types of changes are also very common. Any of the above five changes occurred in 87% companies.

Table 6: Surveyed companies by business processes changes due to Internet use in business (n = 203)

Business processes change type	Yes	No	Not sure	% Yes
Introduction of new activities in business processes	139	52	12	68%
Abolition of certain activities in business processes	127	61	15	63%
Accelerating business processes	163	27	13	80%
Introduction of new business processes	127	63	13	63%
Abolition of certain business processes	116	73	14	57%

Source: Own research.

Table 6 shows that out of 203 companies that use the Internet in their business, most of them had acceleration of business processes. However, other types of changes are also very common. Any of the above five changes occurred in 85% companies.

Table 7: Surveyed companies by business processes changes due to Mobile internet use in business (n = 148)

Business processes change type	Yes	No	Not sure	% Yes
Introduction of new activities in business processes	63	69	16	43%
Abolition of certain activities in business processes	59	70	19	40%
Accelerating business processes	99	36	13	67%
Introduction of new business processes	61	72	15	41%
Abolition of certain business processes	56	75	17	38%

Source: Own research.

Table 7 shows that out of 148 companies that use mobile internet in business, most of them had acceleration of business processes. However, other types of changes are also very common. Any of the above five changes occurred in 69% companies.

Table 8: Surveyed companies by business processes changes due to e-mail use in business (n = 204)

Business processes change type	Yes	No	Not sure	% Yes
Introduction of new activities in business processes	140	52	12	69%
Abolition of certain activities in business processes	125	63	16	61%
Accelerating business processes	166	28	10	81%
Introduction of new business processes	131	61	12	64%
Abolition of certain business processes	109	77	18	53%

Source: Own research.

Table 8 shows that out of 204 companies that use e-mail in business, most of them had the acceleration of business processes. However, other types of changes are also very common. Any of the above five changes occurred in 85% companies.

Table 9: Surveyed companies by business processes changes due to common databases use in business (n = 140)

Business processes change type	Yes	No	Not sure	% Yes
Introduction of new activities in business processes	107	26	7	76%
Abolition of certain activities in business processes	100	29	11	71%
Accelerating business processes	117	14	9	84%
Introduction of new business processes	102	28	10	73%
Abolition of certain business processes	96	34	10	69%

Source: Own research.

Table 9 shows that out of 140 companies that use common databases in business, most of them had the acceleration of business processes. However, other types of changes are also very common. Any of the above five changes occurred in 86% companies.

Table 10: Surveyed companies by business processes changes due to e-business use (n = 103)

Business processes change type	Yes	No	Not sure	% Yes
Introduction of new activities in business processes	73	22	8	71%
Abolition of certain activities in business processes	61	33	9	59%
Accelerating business processes	84	10	9	82%
Introduction of new business processes	71	22	10	69%
Abolition of certain business processes	54	37	12	52%

Source: Own research.

Table 10 shows that out of 103 companies that use e-business, most of them had the acceleration of business processes. However, other types of changes are also very common. Any of the above five changes occurred in 85% companies.

## CONCLUSIONS

The research results point out that 79% of surveyed companies occurred business processes changes due to the implementation of some certain ICT type. The surveyed companies estimate that the changes in business processes are usually medium size (moderate), but many companies also believe that these changes are larger. All types of ICT have led to significant changes in business processes (from 85% to 92% of the surveyed companies), least of all the use of mobile Internet (69% of the surveyed

companies). The most common changes in business processes were related to their acceleration, which was recorded in all seven ICTs. There is a statistically significant correlation between changes in business processes and company size ( $p = 0.026$ ). Changes in all ICT technologies occurred less frequently in small companies, more often in medium-sized companies, and most often in large companies. There is a statistically significant correlation between changes in business processes and the amount of total company revenue ( $p < 0.001$ ). Changes are more frequent in companies with higher revenue, and less frequently in companies with lower revenue. There is a statistically significant correlation between changes in business processes and the number of employees ( $p < 0.001$ ). Changes are more frequent in companies with a larger number of employees, and less frequently in companies with a smaller number of employees. The analysis of research results confirms the fact that ICT significantly affects the process of positive changes in business processes of the companies covered by the research, which confirms the hypothesis that: Implementation of Information and Communication Technologies changes business processes in the company.

Although previous literature and this paper investigate the correlation between ICT and business processes change, there are some open questions in this research field: how fast the change occurs, how to evaluate the size and the importance of change, what is the impact of other ICT not used in this research etc.? The paper can be an incentive for other researchers to enlarge this research and explore the impacts of ICT minutely in this area, or to explore the impact of ICT on other areas. The paper also provides a good base to critically process, replicate, modify and apply the results. Further researches should investigate in more details the size of business processes change after ICT implementation, trying to specify the change in more exact variables. Because, in this research, the size of change was based on the management opinion, regarding the importance of that change for the company business.

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