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ORGANIZACIJA

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- new and innovative organizational structures and approaches;
- managerial aspects of quality management;
- organizational behavior;
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Interest in Currency Trading Learning – Preferred Methods and Motivational Factors

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Background and purpose: This paper analyzes the interest of potential users for learning in the field of currency trading or foreign exchange (forex, FX). The purpose of our article is a) to present currency trading, b) to present different options, methods and learning approaches to educating in forex, c) to present the research results discovering the interest of potential users for learning in the field of currency trading.

Methodology: For gathering data, an online questionnaire was used. It was distributed so that the survey sample covers socio-demographic variables (gender, age, working status, relationship status, financial status of credit and educational level). Interest in learning in the field of currency trading was assessed. Descriptive statistics, t-test, paired samples test, homogeneity test of variances, and ANOVA were used.

Results: It was determined that people are interested in learning about currency trading, especially younger ones (< 30 years), who prefer e-learning as their learning approach. Obtaining and possessing the right information is the strongest motivation factor and fearing not having enough necessary prior knowledge is the strongest discouraging factor for learning about currency trading.

Conclusion: Education of users in the field of currency trading is becoming increasingly popular with the development of e-learning.

Keywords: *currency trading, forex, e-learning*

1 Introduction

Currency trading is a very popular and new form of investing of financial resources, which is inherently different from traditional methods of investing. Therefore, high potential for education in the field of currency trading exists. With the development of information and communication technology, the forex market is expanding rapidly, and constant learning in the currency trading field is essential.

2 Literature review

Since the beginning of floating exchange rates, trading has become widespread in the currency trading (forex) markets, and academic investigations of this field have largely been limited to daily data (Dempster, Payne, Romahi & Thompson, 2001). This currently remains valid because we are limited to daily recognition of currency market when researching the interest in learning about forex. Loginov and

Heywood (2013) think that currency trading is not just for educated and experienced investors, but also for all who can consider their investment options and are motivated to participate in the forex market. Being the largest financial market in the world, the foreign exchange market significantly affects employment and inflation, thus rightly draws much attention from researchers (Lallouache & Abergel, 2014). Everyone has a chance to evolve as a trader, practice his skills, develop instincts, and plan tactics in currency trading. Therefore, there is no guaranteed formula for success in currency trading even if people are constantly learning and are a part of all known methods and learning approaches in forex.

The currency market (foreign exchange market, forex, FX) is used for the trading of different currencies. In the forex market, trading is done by selling and buying currency pairs (Talebi, Winsor & Gavrilova, 2014). An international forex market is assumed, in which traders (regardless of nationality) can freely trade domestic and foreign currencies (Proano, 2011). Currency trading is available to every individual who has access to the platform and knows how to use it. According to Talebi, Winsor and Gavrilova (2014), the currency market is the largest trading market in the world. The foreign exchange market is also one of the most liquid markets in the world (Evans, Pappas & Xhafa, 2013). The forex market is organized as a decentralized multiple dealership market (Høidal Bjønnes and Rime, 2005), which consists of currency spot, forwards, futures, options, and swap markets (Kumar, 2014). Unlike other financial markets, the forex market has neither a physical location nor a central exchange and it operates through a complex electronic network of banks, corporations, and individuals trading one currency for another (Amiri, Zandieh, Vahdani, Soltani & Roshanaei, 2010). In currency trading, it is necessary to consider all of the latest information available, especially considering that each individual can obtain the desired information very quickly and practically anywhere and anytime in a relatively easy manner with the help of modern technology (Chau, Deesomak & Lau, 2011).

Around the world, traders in the currency market are constantly connected to each other. Decision-making about buying and selling in this market depends on several effective factors that cause the high risk in it and make it a sensitive job (Amiri et al., 2010). Therefore, it is crucial to study currency trading markets and learn about their movements to be able to generate wealth by avoiding financial losses and making financial gains (Nassirtoussi, Aghabozorgi, Wah & Chek Ling Ngo, 2014).

Accessibility of the forex market and the opportunity to make a profit are very attractive for all users. New providers that also offer education in currency trading or foreign exchange are being established daily. They offer learning, providing the latest necessary information about trading to users. Constant learning in the field of forex means there is less room for errors and greater opportunity for success in

the currency trading market. Knowledge gained by studying currency trading improves understanding of the structure of the forex market.

The development of information and communication technology has drastically changed currency trading. Other studies have found strong relations between the usage of technology-enhanced learning tools and organizational change (Čudanov, Savoju & Jasko, 2012). For many years, currency trading has been in the domain of banks and financial institutions. However, information technology and software tools adjusted for ease of work in the field of forex have enabled currency trading to engage both companies and individuals. Increasing the number of providers and users of forex has resulted in increased competitive struggle in the field of acquiring customers and users. Companies that deal with foreign exchange trading use different means. In addition to marketing, many companies that deal with foreign exchange trading increasingly use the strategy of providing education as a method of customer acquisition. It is necessary to understand the interest of potential customers and existing users for learning in the field of forex to see which kind of learning best suits them. In recent years, the popularity of currency trading has been increasing intensely (Pintar, 2013). This is in parallel with the growing number of users participating in the forex market and with higher demand for learning in this field.

A perfect education strategy for learning about currency trading does not exist. A large number of different users have a high number of individual learning needs and styles. According to Pintar, Jereb, Vuković and Urh (2015), information on websites that offer education in the field of foreign exchange could be using adaptive learning, which is adapted to the individual's needs. Users have to be continually informed about innovations in foreign exchange trading and are therefore using different learning approaches. Trends in educational processes are aimed at technological development and rapid transmission of information. We have determined that people are interested in learning in the field of currency trading. Moreover, the online learning of forex is most common among users, but we cannot totally ignore the personal (auditory teaching) approach. Through the research and literature review, we wanted to answer the following research questions (RQ):

RQ1: In what kind of learning in the field of currency trading are people interested? Moreover, are there any differences in the interest in learning regarding gender, age, and education level?

RQ2: What would motivate them for learning in the field of currency trading? Moreover, do people with financial credit have different motivation factors compared to those who do not have credit?

In the next section, the methodology and results of the research of interest in learning in the field of currency trading are presented.

3 Methodology

3.1 Instrument

We gathered the data through an online questionnaire. The questionnaire contained 55 questions relating to 1) data of the respondent (age, gender, credit, working status, relationship status and education), and 2) factors relating interest in learning about currency trading. The questionnaire was of the closed type. All statements of the interest in the type of currency trading learning were measured on the 5-point Likert-type scale of presence, in which »1« means »very low« and »5« means »very high«.

To answer all the research questions, the overall reliability of the questionnaire with Cronbach's alpha reliability test was first tested; shown in Table 1, these tests were made for three segments of the questionnaire involving people's interest in the type of learning in the field of currency trading, which types would motivate and discourage them from learning about currency trading, and the importance of learning elements for learning forex online.

Table 1: Cronbach's alpha test of four questionnaire segments

Questionnaire segments	Cronbach's alpha	Cronbach's alpha based on standardized items	No. of items
Evaluated Interest in the type of learning in the field of currency trading	0.881	0.884	8
Evaluated motivation factors for learning in currency trading	0.963	0.963	9

Table 1 presents the Cronbach alpha values based on standardized items for all three segments of the questionnaire used in this research. The values are all calculated higher than 0.7; this means that they are acceptable values and that the scale used in our questionnaire is reliable (see Tabachnick and Fidell, 2007).

3.2 Sample

The survey was performed in spring 2015 in Slovenia among unsystematically contacted respondents. The questionnaire was randomly sent and delivered in an electronic form, structured in the lka online program (<https://www.lka.si>). A total of 107 questionnaires were completed fully and properly. The sample consists of 107 people, 54% were female, and 46% were male. The respondents were aged between

20 and 76 years (mean: 32 years and 10 months), 51% were younger than 30 years old, and 49% were aged 30 years or older; 80% of respondents did not have credit, and 20% had a credit; 30% of the people questioned were single (never married), 44% were in a relationship (unmarried), 23% were married, 1% were widows and 2% are divorced. According to their working status, 43% were permanently employed for an indefinite period, 14% were temporarily employed for a limited time, 13% were currently unemployed, 29% were students, and 1% were pensioners who had already retired. Education among respondents was classified with hierarchical clustering into three groups: group one (31%) consists of people who finished elementary school, high school, and vocational school; group two includes respondents that had finished their bachelor's degree (43%); the most educated group had a master's or doctoral degree (26%) (Table 2).

Table 2: Demographic data

Gender	male	46%
	female	54%
Age	up to 29	51%
	30 or more	49%
Have credit	yes	20%
	no	80%
Status	single	30%
	in a relationship	44%
	married	23%
	widowed	1%
	divorced	2%
Working status	permanently employed	43%
	temporary employed	14%
	unemployed	13%
	student	29%
	pensioner	1%
Education	elementary, high or vocational	31%
	bachelor	43%
	doctoral	26%

The results of this study can be generalized to the population of interest in the area of Slovenia, with the proposition that the random sending of the questionnaire resulted in a random sample of participants. A socio-demographic descriptive statistical analysis of the sample supports that proposition since there is no observable deviation in the gender, age, or educational distributions within the sample. Furthermore, but with less reliable external validity (Calder, Phillips and Tybout 1982), the results are expected to be applicable in the context of developed countries that have successfully passed through economic and

political transition in recent past like Poland, Hungary, the Czech Republic, Estonia, Chile, Uruguay, Taiwan, Slovakia, Romania, Bulgaria, Mexico, Brazil, Ghana, the Philippines, South Korea, as well as, due to recent development, countries from the former »gray zone«, such as Serbia and Croatia (Carothers, 2002).

3.3 Data analysis

Data gathered from the survey were first analysed with hierarchical clustering in order to determine different groups of respondents according to their age (two groups) and education (three groups). The clustering was made with Ward's method and standardized variables. For further analysis we, therefore, obtained two groups regarding their age (Group 1: ≥ 30 years old; Group 2: < 30 years old) and three groups regarding their current educational status (Group 1: elementary school, high school and vocational school; Group 2: bachelor's degree; Group 3: master's and doctoral degree).

Furthermore, we analysed descriptive statistics for the age, sex, credit, working status, relationship status and education level of respondents. In the next step, we also made descriptive statistics for three segments of the questionnaire (Table 3 and Table 4). Further analyses were made with t-test, paired samples test, a test of homogeneity of variances, and ANOVA.

4 Results

4.1 Descriptive statistics

In the following section, descriptive statistics are presented. In Table 3, descriptive statistics for interest in eight different types of learning in the field of currency trading is shown. People showed the most interest in e-learning method for currency trading learning ($\bar{x} = 2.50$), followed by individual

personal consulting ($\bar{x} = 2.49$), books and magazines ($\bar{x} = 2.39$), social networks ($\bar{x} = 2.25$), conferences ($\bar{x} = 2.21$), auditory learning in a group ($\bar{x} = 2.20$), e-mail learning ($\bar{x} = 2.07$), and tele-conferences ($\bar{x} = 1.69$).

Table 4 presents descriptive statistics for nine different motivation factors for learning in the field of currency trading. People would be the most motivated to learn about currency trading if they would have had information regarding the risk of trading in forex ($\bar{x} = 3.28$). A recommendation from friends would motivate them ($\bar{x} = 3.00$) a bit more strongly than having favourable trading terms ($\bar{x} = 2.98$) and if the education or training would be free of charge ($\bar{x} = 2.97$). Lower estimated motivation factors for learning in forex were the inclusion of free software for trading ($\bar{x} = 2.87$), the inclusion of further counselling ($\bar{x} = 2.83$), access to specialised and professional literature ($\bar{x} = 2.79$), the inclusion of programs and platforms with Slovenian translation ($\bar{x} = 2.64$), and online learning ($\bar{x} = 2.54$).

Table 4: Descriptive statistics for motivation factors for learning in the field of currency trading ($n=107$)

Motivation factors for learning in currency trading	Mean	Std. Deviation
free education and training	2.97	1.306
online learning (via internet)	2.54	1.200
inclusion of free software for trading	2.87	1.304
inclusion of further counselling	2.83	1.270
given access to specialised and professional literature	2.79	1.259
inclusion of programs and platforms with Slovenian translation	2.64	1.284
favourable trading terms	2.98	1.296
recommendation of friends	3.00	1.281
information regarding the risk	3.28	1.399

Table 5 presents tests of normality distribution for constructs of interest in learning, related to Research Question 1, and items comprising that construct. Kolmogorov-Smirnov tests show that none of the items fits the normal distribution, while the construct has a Sig value of 0.200 (i.e. larger than 0.05), and the results suggest it fits the normal distribution (Lilliefors, 1967). The Shapiro-Wilk test, which is more appropriate for smaller samples (Shapiro & Wilk 1965), confirms the results except for the last column, so the Q-Q plot, a commonly used and effective diagnostic tool for checking normality of the data (Razali & Wah, 2011) was used to check the issue. Since the Q-Q plot shows only a smaller deviation at the end of the spectrum, which can be treated as an outlier, a normal distribution was assumed. Furthermore, non-parametric tests were used for the items, and parametric tests were used for the constructs, as rec-

Table 3: Descriptive statistics of interest in the type of learning in the field of currency trading ($n=107$)

Interest in the type of learning in the field of currency trading	Mean	Std. Deviation
individual personal consulting	2.49	1.160
auditory learning in a group	2.20	1.013
books and magazines	2.39	1.147
e-learning	2.50	1.152
conferences	2.21	1.172
tele-conferences	1.69	0.840
e-mail learning	2.07	0.974
learning through social networks	2.25	1.091

Table 5: Analysis of distribution for items and construct of interest in learning – test of normality (n=107)

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
individual personal consulting	0.214	107	0.000	0.891	107	0.000
auditory learning in a group	0.184	107	0.000	0.864	107	0.000
books and magazines	0.185	107	0.000	0.888	107	0.000
e-learning	0.174	107	0.000	0.895	107	0.000
conferences	0.233	107	0.000	0.851	107	0.000
tele-conferences	0.299	107	0.000	0.765	107	0.000
e-mail learning	0.227	107	0.000	0.843	107	0.000
learning through social networks	0.211	107	0.000	0.862	107	0.000
Interest in learning	0.072	107	0.200*	0.958	107	0.002

* This is a lower bound of the true significance.

a. Lilliefors Significance Correction

ommended by Krishnaswamy, Sivakumar, and Mathirajan (2004).

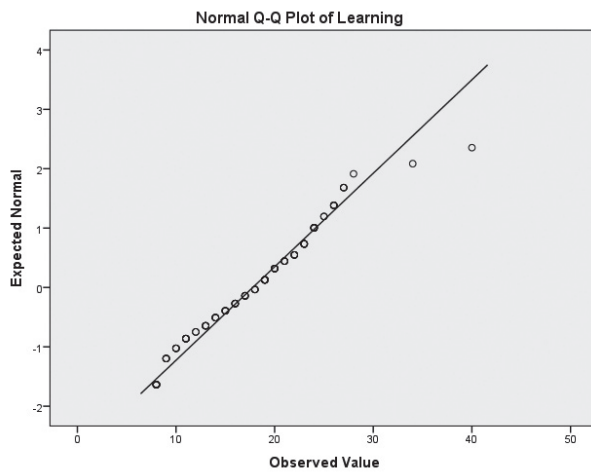


Figure 1: Q-Q plot of Interest in learning construct

Analysis of the distribution of items and constructs related to motivation for learning are presented in Table 6. No items or the construct have significance above 0.05, so the null hypothesis that distribution fits normal distribution is rejected for all items and for the construct. Non-parametric tests were used for the items and the construct in the further analysis.

4.2 Analyses of research questions

RQ1: In what kind of learning in the field of currency trading are people interested? Moreover, are there any differences in the interest in learning regarding gender, age, and education level?

To answer the first research question, a paired sample t-test for interest in the type of learning about currency trading was performed. We verified potential users' interest with the help of a statement containing eight different variables (see Table 3) assessed on a 5-point Likert scale. The results in Table 3 show that none of the average values is outstanding. The e-learning method for learning about currency trading was assessed the highest ($\bar{x} = 2.50$), followed by individual personal consulting ($\bar{x} = 2.49$), books and magazines ($\bar{x} = 2.39$) and learning through social networks ($\bar{x} = 2.25$). We tested whether the differences between the average of the variable »e-learning« and the other three variables are statistically important with a paired sample t-test.

The averages of the four variables that are related to the interest in the type of learning in the field of currency trading were compared. Seven paired Wilcoxon tests were performed with each pair of variables having their null and alternative hypothesis stated:

- variable »individual personal consulting«:
 $H_0: \mu_{\text{e-learning}} = \mu_{\text{personal consulting}}$, $H_1: \mu_{\text{e-learning}} > \mu_{\text{personal consulting}}$
- variable »auditory learning in a group«: $H_0: \mu_{\text{e-learning}} = \mu_{\text{auditory learning}}$, $H_1: \mu_{\text{e-learning}} > \mu_{\text{auditory learning}}$
- variable »books and magazines«: $H_0: \mu_{\text{e-learning}} = \mu_{\text{books and magazines}}$, $H_1: \mu_{\text{e-learning}} > \mu_{\text{books and magazines}}$
- variable »conferences«: $H_0: \mu_{\text{e-learning}} = \mu_{\text{conferences}}$, $H_1: \mu_{\text{e-learning}} > \mu_{\text{conferences}}$
- variable »tele-conferences«: $H_0: \mu_{\text{e-learning}} = \mu_{\text{tele-conferences}}$, $H_1: \mu_{\text{e-learning}} > \mu_{\text{tele-conferences}}$
- variable »e-mail learning«: $H_0: \mu_{\text{e-learning}} = \mu_{\text{e-mail}}$, $H_1: \mu_{\text{e-learning}} > \mu_{\text{e-mail}}$
- variable »learning through social networks«:
 $H_0: \mu_{\text{e-learning}} = \mu_{\text{social networks}}$, $H_1: \mu_{\text{e-learning}} > \mu_{\text{social networks}}$

Table 6: Analysis of distribution for items and construct of motivation for learning – tests of normality (n=107)

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
free education and training	0.205	107	0.000	0.893	107	0.000
online learning (via internet)	0.200	107	0.000	0.880	107	0.000
inclusion of free software for trading	0.172	107	0.000	0.896	107	0.000
inclusion of further counselling	0.179	107	0.000	0.889	107	0.000
given access to specialised and professional literature	0.169	107	0.000	0.897	107	0.000
inclusion of programs and platforms with Slovenian translation	0.160	107	0.000	0.891	107	0.000
favourable trading terms	0.186	107	0.000	0.893	107	0.000
recommendation of friends	0.156	107	0.000	0.909	107	0.000
information regarding the risk	0.210	107	0.000	0.876	107	0.000
Motivation	0.124	107	0.000	0.917	107	0.000

a. Lilliefors Significance Correction

The results of the Wilcoxon test are shown in Table 7. For the first pair, e-learning-individual personal consulting, the t-value is -0.095 and the p-value is 0.925. For the third pair, e-learning-books and magazines, the t-value is -0.957 and the p-value is 0.339. For all the other pairs, the two-tailed asymptotic significance is less than 0.05. On the basis of these results ($p < 0.05$), there are no significant differences in measures of centrality between »e-learning« and the other two variables (individual personal consulting, books and magazines). We can conclude that potential users of learning in currency trading are equally interested in e-learning, individual personal consulting, as well as books and magazines. However, all the other pairs have statistically significant differences in the average, which can be confirmed at the 5% significance level. Further analysis of averages for all eight items, as well as ranks calculated in the Wilcoxon test, directs us toward confirming H1 in cases of auditory learning in a group; conferences; tele-conferences and e-mail

learning, i.e. potential users of learning in currency trading are more interested in e-learning than in learning through any one of those methods.

Furthermore, a t-test was used to determine whether there are any differences in the interest in learning regarding gender. We again set the null and alternative hypothesis for each variable:

H_0 : Men and women are on average not equally interested in specific learning types in the field of currency trading (individual personal consulting; auditory learning in a group; books and magazines; e-learning; conferences; tele-conferences; e-mail learning; learning through social networks).

H_1 : Men and women are on average equally interested in specific learning types in the field of currency trading (individual personal consulting; auditory learning in a group; books and magazines; e-learning; conferences; tele-conferences; e-mail learning; learning through social networks).

Table 7: Paired sample Wilcoxon for interest in the type of learning in the field of currency trading

	e-learning - individual personal consulting	e-learning - auditory learning in a group	e-learning - books and magazines	e-learning - conferences	e-learning - tele-confer- ences	e-learning - e-mail learning	e-learning - learning through social net- works
Z	-.095 ^b	-2.796 ^b	-0.957 ^b	-2.635 ^b	-6.460 ^b	-4.116 ^b	-2.460 ^b
Asymp. Sig. (2-tailed)	0.925	0.005	0.339	0.008	0.000	0.000	0.014

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

Table 8a: Results of Mann-Whitney U test for differences between genders regarding interest in the specific learning type in the field of currency trading

	individual personal consulting	auditory learning in a group	books and magazines	e-learning	conferences	tele-conferences	e-mail learning	learning through social networks
Mann-Whitney U	1342.500	1260.500	1397.500	1386.500	1398.000	1373.500	1256.000	1356.000
Wilcoxon W	3053.500	2485.500	3108.500	3097.500	3109.000	2598.500	2481.000	2581.000
Z	-0.507	-1.051	-0.152	-0.223	-0.150	-0.326	-1.086	-0.425
Asymp. Sig. (2-tailed)	0.612	0.293	0.879	0.823	0.881	0.745	0.277	0.671

a. Grouping Variable: Gender

Table 8a shows the results of the Mann-Whitney U, Wilcoxon W and Z tests for differences between genders regarding interest in the specific learning type in currency trading. Significance values for all test are the same, and we can conclude that there is no difference in the median value for any of the eight observed factors because all significances are valued $p > 0.05$.

Furthermore, a t-test has been used to analyse whether any differences exist between genders regarding the interest in learning construct. Results are given in Table 8b. Based on the results of Levene's test for equality of variances we cannot reject the null hypothesis of equality of variances at the 5% significance level, because the F-value is 0.286 with the significance of 0.594. Based on the results of t-tests, the null hypothesis of equality of means cannot be rejected at the 5% significance level (as p is 0.916). On the basis of the information received, there are no differences between genders regarding interest in the type of learning in the field of currency trading, nor for the general construct interest in learning.

Next, a t-test was used to determine whether there are any differences in the interest in learning regarding age. Data gathered from the survey were already analysed with hierarchical clustering;; therefore, there are two groups according to age (Group 1: ≥ 30 years old; Group 2: < 30 years old). In Group 1, there are 52 respondents; in Group 2, there are 55 respondents. We again set the null and alternative hypothesis for each variable:

H_0 : People younger than 30 years and people that are 30 years old and older are, on average, not equally interested in learning (individual personal consulting; auditory learning in a group; books and magazines; e-learning; conferences; tele-conferences; e-mail learning; learning through social networks) in currency trading.

H_1 : People younger than 30 years and people that are 30 years old and older are, on average, equally interested in learning (individual personal consulting; auditory learning in a group; books and magazines; e-learning; conferences; tele-conferences; e-mail learning; learning through social networks) in currency trading.

Table 9a shows the results of Mann-Whitney U-tests with groups according to age, regarding interest in the type of learning in the field of currency trading. Based on the significance values, we can conclude that differences do not exist in the categories of individual personal consulting; books and magazines; e-learning; e-mail learning and tele-conferences. Participants have ranked ($p < 0.05$): auditory learning in a group; conferences and learning through social networks significantly differently. As expected, the ranks are higher for the group of younger participants, below the age of 30, who show more interest in these types of learning in the field of currency trading learning, than older people.

Table 8b: Results of t- test for differences between genders regarding interest for learning in the field of currency trading

Interest in learning in the field of currency trading	Levene's test for equality of variances		T-test for equality of means		
	F	Sig.	t	df	p. (2-tailed)
Values	0.286	0.594	-0.105	105	0.916

Table 9a: Results of Mann-Whitney U test for differences between ages regarding interest in for the type of learning in the field of currency trading

	individual personal consulting	auditory learning in a group	books and magazines	e-learning	conferences	tele-conferences	e-mail learning	learning through social networks
Mann-Whitney U	1133.000	1009.500	1216.500	1209.500	1056.000	1240.000	1151.000	890.500
Wilcoxon W	2511.000	2387.500	2594.500	2587.500	2434.000	2618.000	2529.000	2268.500
Z	-1.912	-2.745	-1.377	-1.423	-2.431	-1.299	-1.831	-3.514
Asymp. Sig. (2-tailed)	0.056	0.006	0.169	0.155	0.015	0.194	0.067	0.000

a. Grouping Variable: Age30

Table 9b shows analysis for the general, construct variable interest in learning. Based on the results of Levene's test for equality of variances we cannot reject the hypothesis of equality of variances at the 5% significance level. Based on the t-tests, we can conclude that there are significant differences in interest in learning in the field of currency trading among people who are younger than 30 years and those who are 30 years old and older.

Furthermore, a Kruskal-Wallis Test was used to determine if there are any differences in the interest in learning method regarding education level. In Group 1 are included respondents with elementary school; in Group 2 are included respondents with high or vocational school; in Group 3 are included respondents with a university degree. We again set the null and alternative hypothesis for each variable:

H_0 : There are no statistically significant differences between the educational levels of their interest in learning (individual personal consulting; auditory learning in a group; books and magazines; e-learning; conferences; tele-conferences; e-mail learning; learning through social networks) in the field of currency trading.

H_1 : There are statistically significant differences between the educational levels of their interest in learning (individual personal consulting; auditory learning in a group; books and magazines; e-learning; conferences; tele-conferences; e-mail learning; learning through social networks) in the field of currency trading.

The results in Table 10 show the results of the p-values as being higher than 0.05 for all variables; therefore, we can conclude that statistically significant differences between the three groups do not exist at a 5% significance level. ANOVA analysis for the constructed variable yielded the same result, i.e. that there were no differences between the groups according to educational levels. Therefore, regardless of their level of education, all respondents are equally interested in all types of learning in the field of currency trading and in learning in general.

RQ2: What would motivate them for learning in the field of currency trading? Moreover, do people with financial credit have different motivation factors compared to those who do not have credit?

In order to answer the second research question, a paired sample t-test for motivation factors of learning in the field of currency trading was performed. We verified potential users' motivation with the help of a statement containing nine different variables (see Table 3), assessed on a five-point Likert scale. The results in Table 3 show that none of the average values is outstanding. People on average assessed that information regarding the risk would motivate them the most for learning in the field of currency trading ($\bar{x} = 3.28$), followed by recommendation of friends ($\bar{x} = 3.00$), favourable trading terms ($\bar{x} = 2.98$) and free education and training ($\bar{x} = 2.97$). We tested whether the differences between the average of variable »information regarding the

Table 9b: Results of t-test for differences between ages regarding general for the type of learning in the field of currency trading

Interest in learning in the field of currency trading	Levene's test for equality of variances		T-test for equality of means		
	F	Sig.	t	df	p. (2-tailed)
	0.052	0.821	2.961	105	0.0004

Table 10: Results of the Kruskal-Wallis Test for differences between educational levels in their interest in learning in the field of currency trading

	individual personal consulting	auditory learning in a group	books and magazines	e-learning	conferences	tele-conferences	e-mail learning	learning through social networks
Chi-Square	1.907	0.562	0.199	0.041	0.047	0.361	1.111	1.632
df	2	2	2	2	2	2	2	2
Asymp. Sig.	0.385	0.755	0.905	0.980	0.977	0.835	0.574	0.442

risk« and other three variables are statistically significant with a paired sample t-test.

The averages of the four variables that are related to the motivation factors for learning in the type of currency trading were compared. Three paired tests were performed with each pair of variables, having their null and alternative hypothesis stated:

- variable »recommendation of friends«:

$$H_0: \mu_{\text{information}} = \mu_{\text{recommendation}}$$

$$H_1: \mu_{\text{information}} > \mu_{\text{recommendation}}$$

- variable »favourable trading terms«: $H_0: \mu_{\text{information}} = \mu_{\text{trading terms}}$ $H_1: \mu_{\text{information}} > \mu_{\text{trading terms}}$

- variable »free education and training«: $H_0: \mu_{\text{information}} = \mu_{\text{free education}}$ $H_1: \mu_{\text{information}} > \mu_{\text{free education}}$

The results of paired sample Wilcoxon tests are shown in Table 11. For all three pairs, p-values are lower than 0.05, which means that the average of the variable »information regarding the risk« has a different rank from the average of all other variables at a 5% significance level. Analysis of the ranks show higher ranks for information regarding the risk variable, and we can conclude that respondents would be most motivated for learning in the field of currency trading if they obtained and possessed accurate information regarding the risk.

Furthermore, a Mann-Whitney U test was used to determine if there are any differences in the motivation factors in learning among people with financial credit and those who

do not have credit. We set the null and alternative hypothesis for each variable:

H_0 : People with financial credit and people without financial credit are, on average, equally motivated by motivation factors (free education and training; online learning; inclusion of free software for training; inclusion of further counselling; given access to specialised and professional literature; inclusion of programs and platforms with Slovenian translation; favourable trading terms; recommendation of friends; information regarding the risk) for learning in the field of currency trading.

H_1 : People without financial credit are, on average, more motivated by motivation factors (free education and training; online learning; inclusion of free software for training; inclusion of further counselling; given access to specialised and professional literature; inclusion of programs and platforms with Slovenian translation; favourable trading terms; recommendation of friends; information regarding the risk) for learning in the field of currency trading, than people with financial credit.

Table 12 shows the results of the Mann-Whitney test for these variables; because P values are larger than 0.05 for all three observed statistics, we can conclude that there are no differences between respondents who have credit and respondents who do not have credit.

Table 11: Wilcoxon Signed Ranks Test for motivation factors for learning in the field of currency trading

	information regarding the risk-recommendation of friends	information regarding the risk - favourable trading terms	information regarding the risk - free education and training
Z	-3.192 ^b	-3.846 ^b	-3.056 ^b
Asymp. Sig. (2-tailed)	0.001	0.000	0.002

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

Table 12: Results of the test for equality of means between people situation of having or not having a financial credit in motivation factors for learning in the field of currency trading.

Test Statistics ^a									
	free education and training	online learning (via internet)	inclusion of free software for trading	inclusion of further counselling	given access to specialised and professional literature	inclusion of programs and platforms with Slovenian translation	favourable trading terms	recommendation of friends	information regarding the risk
Mann-Whitney U	749.500	783.500	705.000	802.000	706.000	786.500	736.000	702.000	695.000
Wilcoxon W	980.500	1014.500	936.000	1033.000	937.000	1017.500	967.000	933.000	926.000
Z	-1.237	-0.970	-1.593	-0.816	-1.587	-0.938	-1.347	-1.615	-1.672
Asymp. Sig. (2-tailed)	0.216	0.332	0.111	0.415	0.113	0.348	0.178	0.106	0.094

a. Grouping Variable: Financial credit

5 Discussion and conclusion

Interest in the type of learning about currency trading and differences in the interest in learning regarding gender, age, and education level are critical factors. On average, people assessed the e-learning method for their interest in learning in the field of currency trading the highest ($\bar{x} = 2.50$). There is also high interest in learning about forex with individual personal consulting and by using books and magazines. Current trends in educational processes are aimed at technological development and the rapid transmission of information; consequently, e-learning has been proved to be preferred and popular among people, offering advantages such as geographical reach, learner control, cost effectiveness, control over students' activities, and others (Hu & Hui, 2012). On the basis of the analysed information, there are no differences between genders and the levels of education regarding interest in the type of learning in the field of currency trading. These results are somewhat aligned with the study of the Moodle learning management system that found that there were no differences between genders in the satisfaction with quality characteristics, but differences were found according to student's age (Horvat et al. 2013; Horvat et al. 2015). The research has indicated that people of all ages have the same interest for the type of learning about currency trading with individual personal consulting, books and magazines, e-learning, tele-conferences and with; furthermore, those people who are younger than 30 years (< 30

years) value the types of learning including individual auditory learning in a group, conferences and learning through social networks more, and are therefore more interested in these types of learning about currency trading learning than older people (≥ 30 years) are.

The results of the research show that people would be most motivated for learning about currency trading if they retrieved and possessed the right information regarding risks. Retrieving this information is a highly sophisticated process, which is a combination of current information, macro-economic indicators and the situation on the currency market. Trading in forex, with its high potential profitability, is essentially risky (Amiri et al., 2010). Furthermore, there are no differences between credit holders and people with no credit with regard to the factors of free education and training, online learning, the inclusion of further counselling, access to specialized and professional literature, the inclusion of programs and platforms with Slovenian translation and favorable trading terms. For the other factors (inclusion of free software for trading, recommendation of friends, information regarding the risk), the results show that people who do not have financial credit value these variables more and are, therefore, more motivated in these motivation factors for learning in the field of currency trading, than people who have financial credit. We must be aware that underinvesting in any form of education can have consequences in many aspects, but in many cases having credit means that

there are fewer funds to be spent on the education of an individual (Del Rey and Estevan, 2013).

People are most discouraged about learning about currency trading because of their fear of having the lack of prior knowledge. The results also show that people regardless of their working status (unemployed, students, temporary employed, permanently employed) are furthermore equally discouraged by the factors of lack of time, family, and lack of funds. Differences exist in the evaluation of the discouraging factor for learning in the currency trading »job« where this factor discourages the most those people who are permanently employed. Furthermore, the results show that people (single, in a relationship, married) are equally discouraged by factors of lack of time, job, lack of funds, and lack of prior knowledge, regardless of their relationship status. We can conclude that the differences exist in the evaluation of the »family« discouraging factor for learning in currency trading, where this factor discourages the most those people who are married.

This study has its limitations and weaknesses. For further data capture and processing, we should aim to gain more answers from respondents to obtain a greater sample. Another disadvantage of the research is the recognition and general reputation of forex. The providers of education in currency trading should first consider assuring learners' satisfaction in order to improve the popularity of currency trading. When focusing on the aspects of learning about currency trading in the future, e-learning is the obvious solution for rapid expansion. Such learning requires much focus and attention; therefore, motivation is essential.

Together, the results show that the interest in educating and learning in the field of currency trading among people exists; however, many possibilities to increase this interest remain. Further research should be focused towards expected increases in the number of potential users of currency trading, and if the requirements will be provided for the relevant learning. Due to the extremely rapid development of technology and the rapidly changing information affecting the currency market, it is necessary to improve the existing trends of the educational processes in forex. With great potential for learning, education in this field should focus in the direction of the development of new applications and programs. The methods and techniques of education that are now accessible to users are often unattractive and uninteresting; therefore, they should be simplified, in particular through the development of a software trading platform that would allow faster understanding of currency trading. For the users interested in trading in the forex market, it is important to reduce the costs of learning. In order to become successful and effective traders, beginners in particular should not underestimate the importance of education. Constant learning in the field of currency trading contributes significantly to positive outcomes and is too often disregarded.

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Interes za učenje valutnega trgovanja – izbrane metode in motivacijski dejavniki

Ozadje in namen: V znanstvenem prispevku analiziramo interes potencialnih uporabnikov za učenje na področju valutnega trgovanja (forex, FX). Namen članka je a) predstaviti valutno trgovanje, b) predstaviti različne možnosti, metode in pristope k učenju za izobraževanje valutnega trgovanja, c) predstaviti rezultate raziskave, ki izraža interes potencialnih uporabnikov za učenje na področju valutnega trgovanja.

Metodologija: Za zbiranje podatkov smo uporabili spletni vprašalnik. Vzorec, ki smo ga zajeli v raziskavi vsebuje socialno-demografske spremenljivke (spol, starost, delovni status, odnos status, finančno stanje kreditnih in stopnjo izobrazbe). S pomočjo opisne statistike, t-testov, testa homogenosti varianc in testa ANOVA smo ocenili interes ljudi za učenje na področju valutnega trgovanja.

Rezultati: Ugotovili smo, da obstaja interes za učenje iz valutnega trgovanja, predvsem pri mlajših ljudeh (< 30 let), katerih najljubši učni pristop je e-izobraževanje. Pridobivanje in posedovanje pravih informacij je najmočnejši motivacijski dejavnik za učenje med uporabniki valutnega trgovanja, medtem ko je najmočnejši odvrčajoči dejavnik, slabo predznanje o samem trgovanju.

Zaključek: z razvojem e-izobraževanja, izobraževanje uporabnikov na področju valutnega trgovanja postaja vse bolj razširjeno in priljubljeno.

Ključne besede: valutno trgovanje, forex, e-izobraževanje

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Awareness and Attitude Towards Green IS in Slovenian Enterprises

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Background: This study draws upon the use of Information Systems in support of achieving sustainability, known as Green IS. Furthermore, this study builds on the premise that Green IS offers the opportunity for organizations to act proactively in terms of environmental preservation as well as to mitigate the effects of global climate change and other environmental problems.

Aim: In particular, this study aims to assess the extent of awareness among managers regarding the use and the acceptance of Green IS in Slovenian enterprises.

Method: Using empirical data based on a large-scale survey among senior managers within Slovenian enterprises this study utilized several statistical methods (such as t-test, analysis of variance and multiple linear regression) to analyse the research questions.

Results: In general, findings seem to suggest that institutional mechanisms might be a plausible explanation for differences regarding the attitude towards Green IS adoption. For instance, enterprises with at least one implemented sustainability related certificate expressed higher levels of willingness to use Green IS in order to facilitate the achievement of sustainable development. Moreover, the results of the regression analysis revealed that both Institutional Mimetic pressure and Internal Environment Impact has positive impact on Green IS adoption.

Conclusion: The main conclusion is that the internal environmental impact is considered the most influential factor of the attitude towards Green IS adoption. The culture or individual perception of managers and employees play an important role in the Green IS adoption. Indeed, enterprises that have no intention of improving their environmental performance, but adopt Green IS by the means of seeking legitimacy among external stakeholders, cannot provide a sustainable improvement in environmental management.

Keywords: *Green Information System, Sustainability, Environment, Information System*

1 Introduction

Global warming and other environmental threats have lately increased the level of environmental awareness (Dedrick, 2010). Individuals, organizations and governments are becoming aware of the necessity of sustainability for performing and managing work (Siedel, Recker, Pimmer & vom Brocke, 2010). Since information technologies and information systems represent 2% of CO₂ emissions (WWF, Gartner Group, 2008) and this share is supposed

to increase to 3% until 2020 (McKinsey Global Institute, 2008), the shift towards green or sustainable economy seems inevitable. Environmental issues have forced the information technologies and consequently information systems to become more environmentally friendly, enabling energy efficient business processes (Brooks, Wang & Sarker, 2012). It is also evident, that business process management (Siedel et al., 2011) and the shift towards the sustainable business practices can benefit substantially from Green information systems (Green IS) practices with Green

information technology (Green IT) as an enabler (Esfahani, Rahman and Zakaria, 2015).

Watson, Boudreau, Chen and Huber (2008) were the first to carefully distinguish between Green IS and Green IT. The concept of Green IS can be defined as the usage of information systems to enable sustainable development in economy (Boudreau, Chen & Huber, 2007; Watson et al., 2008). Green IS are enabled by a unique structure of people, processes and IT with a goal to achieve eco-capacity, eco-

efficiency, eco-effectiveness and eco-collaboration (Butler, 2011). Whereas Brooks et al. (2012) sees Green IS as an incentive of using IT infrastructure to change organizational processes and/or practices in order to improve energy efficiency and decrease the level of environmental impact, while introduce environmental friendly products and services at the same time.

To be even more precise, Green IS represent a wide spectre of solutions, where an information system (a

Table 1: Operationalization of constructs

	Item
GPP	Green IS Adoption - Pollution Prevention
GPP1	Our company encourages the usage of software for reduction of emissions
GPP2	Our company encourages the usage of software for reduction of waste
GPP3	Our company encourages the usage of software for reduction of hazardous and toxic materials
GPL	Green IS Adoption - Product Lifecycle
GPL1	Our company encourages the usage of software for product life cycle management, which enables environmentally friendly sourcing and acquisition
GPL2	Our company encourages the usage of software for product life cycle management, which enables environmentally friendly product/service development
GPL3	Our company encourages the usage of software for product life cycle management, which enables environmentally friendly planning of production/service processes
GPL4	Our company encourages the usage of software for product life cycle management, which enables environmentally friendly distribution and delivery
GSD	Green IS Adoption – Sustainable Development
GSD1	Our company encourages the usage of software for online collaboration
GSD2	Our company encourages the usage of software for teleworking
GSD3	Our company encourages the usage of software for paperless business processes
GSD4	Our company encourages the usage of software for measuring and monitoring of organizational environmental performance
ICP	Institutional Pressure - Coercive Pressure
ICP1	The regulations are forcing our company to use green IS
ICP2	Suppliers are forcing our company to use green IS
ICP3	Important customers are forcing our company to use green IS
IMP	Institutional Pressure - Mimetic Pressure
IMP1	Our company's main competitors, who adopted green IS, have benefited greatly financially
IMP2	Our company's supply chain members, who adopted green IS, are perceived favourably by their customers
IMP3	Our company's supply chain members, who adopted green IS, have benefited greatly financially
IEI	Internal Environment Impact
IEI1	The management of our company would like to implement green IS
IEI2	Employees in our company have proposed the implementation of green IS
IEI3	Green IS are a frequent topic of conversation in our company

combination of people, software and IT) has an additional functionality that enables a more sustainable performance of business process. Some of often used Green IS are information systems that enable energy consumption management, optimization of production processes, consolidation of data centres and operations, reuse and care for appropriate disposal of IT, micro and macro economical aspects, system performance, efficient usage of a system, as well as social and ethical aspects aligned with purchase. The Green IS research has mainly been focused to energy efficiency (Watson, Boudreau and Chen, 2010) while other forms of Green IS have mainly been neglected in the literature (e.g. information systems for waste reduction management). For example, Energy informatics, a special research field presented by Watson and Boudreau (2011), discusses the importance of IS for the reduction of energy consumption.

According to several academic discussions (Melville, 2010; Watson, Boudreau & Chen, 2010, vom Brocke, Watson, Dwyer, Elliot & Melville, 2013), the research and development in the area of Green IS should be encouraged. Zheng (2014) presents organizational, technological and environmental mechanisms as Green IT/IS adoption motivators. Wati and Koo (2012) researched the motivational perspective of Green IS behaviour intention and actual use of Green IS and concluded that several self-determined motivational factors influence the behaviour intention to use Green IS, while there is no significant influence of behaviour intention on actual use. The actual use of Green IS is according to Wati and Koo (2012) influenced by external pressure, not only by motivational factors.

Since all the aspects of sustainability have not been equally researched, and the focus is mainly on environmental aspect of sustainability (Farzad and Junker, 2015), there is a lack of literature on general awareness of social and economic aspect of sustainability related to IS. Therefore, we decided to follow the research on senior managers' attitude to Green IS in Malaysian companies presented by Gholami, Sulaiman, Ramayah and Molla (2013) and divide the concept of Green IS into three basic forms: pollution prevention, product stewardship and sustainable development. Accordingly, the aim of our research was to evaluate the general awareness and the attitude towards Green IS in Slovenian enterprises.

2 Methods

A survey was developed based on the previous study presented by Gholami et al. (2013) and Mishra, Akman & Mishra (2014). Several items were withdrawn based on the issues of translation and importance in regional circumstances, while several items were added based on previous research (Baggia and Brezavšček, 2015).

Items describing the Green IS adoption were obtained from Gholami et al. (2013). Two additional items (Envi-

ronmentally friendly product/service development and Planning of production/service processes) were added for the description of Green IS adoption regarding the enterprise's attitude toward the software product lifecycle management, while one item (Measuring and monitoring of organizational environmental performance) was added for the description of enterprise's attitude towards sustainable development. Items discussing the institutional pressure were all adopted from Gholami et al. (2013), while items discussing the internal environment impact were adopted from Mishra, Akman & Mishra (2014). Items discussed in this paper are presented in Table 1. Five point Likert type scale was used to measure the items.

2.1 Sampling, data and statistical methods used

The presented survey was performed as a web survey used to collect data about attitude toward Green IS among managers of Slovenian enterprises. Invitations to the web survey were sent via email to 3623 randomly chosen enterprises in Slovenia, where the sample matched the demographical structure of Slovenian companies according to region and main activity of the enterprise, representing 2% of all Slovenian enterprises. Companies with less than two employees were excluded from the sample, based on the assumption that their usage of IS in general is limited. In the period from 25th of May 2015 to 25th of August 2015 we received 222 responses in total. The survey was addressed to the director of the enterprise or to the director of the informatics sector.

For the analysis of research questions, different statistical methods were used: one sided independent samples *t*-test, ANOVAs or Robust test of equality of means and multiple linear regression.

2.2 Characteristics of the enterprises in the sample

On the question about the main activity of the enterprise (classified according to Statistical Classification of Economic Activities in the European Community, NACE Rev 2, 2008) 185 enterprises provided their response. The largest proportion marked Other Service Activities (13.5%), Information and Communication (13.0%), and Manufacturing (10.3%) (Figure 1). The sample consists of 23% micro enterprises (up to 9 employees), almost half of the enterprises were small sized (46%), one quarter of enterprises were medium sized (50 to 249 employees), while 6% were large enterprises with at least 250 employees.

The questionnaire was fulfilled by 58.2% of men and 41.8% of women. The age of the respondents varies from 23 to 65 years, with mean age 43.5 years ($s=9.58$ years).

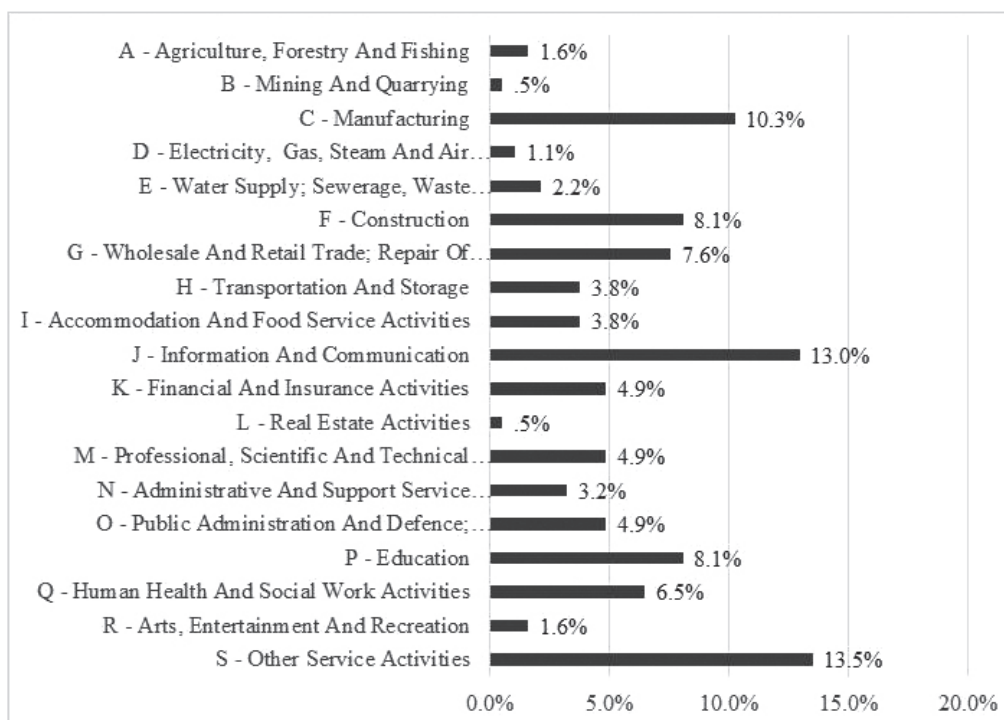


Figure 1: Structure of enterprises in the sample according to their main economic activity

3 Results

According to the topic of items in particular subsection, we first discuss the organizational circumstances leading the enterprise to shift their viewpoint to sustainability, second we discuss the promotion of Green IS usage in enterprises. In the last subsection, we discuss the correlations between different circumstances and the promotion for Green IS adoption.

3.1 Descriptive statistics

There are several external and internal issues leading the enterprise to shift their viewpoint to a more sustainable and further to use Green IS. Descriptive statistics for measured items and constructs are presented in Table 2. Enterprises receive the highest coercive pressure by regulations (3.16), while suppliers (2.64) and important customers (2.62) have lower impact on usage of Green IS. Among three items of mimetic pressure, the highest average grade received the statement that company's main competitors, who adopted Green IS, have benefited greatly financially (3.04). The highest internal environmental impact on implementation of Green IS have managers (3.19), while the implementation of Green IS is not a frequent topic in the conversations (2.91).

Regarding the adoption of Green IS, all three measured items of Pollution Prevention due to use of software were on average estimated high; 3.89 for software for reduction of waste, 3.87 for software for reduction of hazardous and toxic materials, and 3.80 for software for reduction of emissions. Among four items of Green IS Adoption for Product lifecycle, the companies encourage the most the usage of software that enables planning of production/service processes (3.74) and product/service development (3.73). Encouragement for adoption of Green IS for Sustainable development is the highest for online collaboration (3.96), followed by paperless business processes (3.67), while the least sympathy received measuring and monitoring of organizational environmental performance (2.90) and teleworking (2.93).

In the questionnaire 10 green certificates were listed, and the enterprises marked if they already had it or not and if they are in the process of implementation: ISO 14001 – Environmental Management System, ISO 22000 – Food safety management, ISO 26000 – Social responsibility, ISO 50001 – Energy management, EMAS – Eco-Management and Audit Scheme, EcoLabel - label promoting environmental excellence, FSC – Forest Stewardship Council, Family friendly certificate - European work and family audit, SA8000 – Social Accountability International, OHSAS 18001 – Occupational Health and Safety Management

Table 2: Descriptive statistics of the measured items and constructs

Item	N	Mean	SD
GPP	210	3.86	0.760
GPP1	211	3.80	0.893
GPP2	211	3.89	0.874
GPP3	211	3.87	0.863
GPL	200	3.72	0.756
GPL1	205	3.70	0.844
GPL2	204	3.73	0.813
GPL3	203	3.74	0.875
GPL4	204	3.69	0.836
GSD	202	3.37	0.771
GSD1	203	3.96	0.872
GSD2	205	2.93	1.165
GSD3	205	3.67	0.942
GSD4	204	2.90	1.036
ICP	205	2.80	0.782
ICP1	205	3.16	0.952
ICP2	205	2.64	0.916
ICP3	205	2.62	0.892
IMP	101	2.98	0.805
IMP1	113	3.04	0.999
IMP2	130	2.99	0.858
IMP3	109	2.97	0.855
IEI	196	3.04	0.816
IEI1	197	3.19	0.869
IEI2	198	3.01	0.934
IEI3	198	2.91	0.965

Systems. Respondents were also allowed to input additional certificates.

There are 136 enterprises that have no sustainability related certificates (60.7% out of 224) and 88 enterprises that have from 1 to 10 green certificates, with mean value equal to 2.7 ($s=2.1$). More precisely, 20% of enterprises have ISO 14001 - Environmental management, 6% have ISO 22000 - Food safety management, 7 % have ISO 26000 - Social responsibility, 8 % have ISO 50001 – Energy management, 4% EMAS – Eco-Management and Audit Scheme, 7% EcoLabel, 11% have Certificate Family Friendly Enterprise, 5% have SA 8000 - Social Accountability International, 17% have OHSAS 18001 - Occupational Health and Safety Management.

The certificates which are in the process of implementation in 9 % of enterprises are ISO 14001 and ISO 50001.

3.2 Analysis of the research questions

RQ1: *Do the enterprises with at least one implemented sustainability related certificate have on average higher estimates of importance of Green IS adoption than the enterprises who do not have any of sustainability related certificates?*

The first research question was analysed with one sided independent samples *t*-tests. Since we assumed that the enterprises with at least one sustainability related certificate will have higher Green IS awareness, one sided *t*-test was performed on all of 11 items expressing the enterprise's attitude towards the implementation of Green IS and other sustainability issues (2-sided *p*-values obtained in SPSS were recalculated as *p*/2). For four out of eleven items the research question was answered positively. Detailed results are presented in Table 3 and Figure 2.

For two out of three items regarding Pollution Prevention due to Green IS Adoption the research question was answered positively. The statement »Our company encourages the usage of software for reduction of emissions.« was evaluated statistically significantly higher by enterprises who implemented at least one sustainability related certificate (3.94) than by enterprises where they do not have any of sustainability related certificates (3.73) at 5% significance level ($t=-1.753$, $p=.042$). The statement that company encourages the usage of software for reduction of hazardous and toxic materials was on average evaluated higher by the enterprises with at least one sustainability related certificate (4.06) compared to the other enterprises (3.77) at 5% significance level ($t=-2.305$, $p=.011$). None of four items of Product lifecycle due to Green IS Adoption was evaluated statistically significantly higher by the enterprises with implemented sustainability related certificates, while half of the items in Sustainable development were evaluated statistically significantly higher by the enterprises with implemented sustainability related certificates as assumed. The enterprises with implemented sustainability related certificates encourage paperless business processes (3.85) more than the others (3.58) at 5% significance level ($t=-1.960$, $p=.026$). The same goes for measuring and monitoring the organizational environmental performance, since the average estimate for enterprises with sustainability related certificates is equal to 3.18 and statistically significantly lower (2.75) for the enterprises with no green certificates ($t=-2.886$, $p=.002$).

RQ2: *Do the enterprises with at least one implemented sustainability related certificate have on average higher estimates of importance of Institutional coercive pressure, Institutional mimetic pressure and Internal environment impact than the enterprises who do not have any of sustainability related certificates?*

Table 3: Descriptive statistics and results of *t*-test for all 20 items according to enterprises who have implemented sustainability related certificate or not

Item	Number of implemented environmental certificates						<i>t</i> -test for equality of means			
	None			At least one						
	<i>N</i>	Mean	SD	<i>N</i>	Mean	SD	<i>t</i>	<i>df</i>	<i>p</i> (2-sided)	<i>p</i> (1-sided)
GPP1	139	3.73	.915	72	3.94	.837	-1.735	155.5	.085	.043
GPP2	139	3.83	.884	72	4.01	.847	-1.474	209	.142	.071
GPP3	139	3.77	.854	72	4.06	.854	-2.305	209	.022	.011
GPL1	134	3.68	.855	71	3.73	.827	-.429	203	.668	.334
GPL2	134	3.67	.839	70	3.84	.754	-1.432	202	.154	.077
GPL3	134	3.69	.869	69	3.84	.885	-1.131	201	.259	.130
GPL4	134	3.68	.800	70	3.70	.906	-.169	202	.866	.433
GSD1	131	3.90	.867	72	4.07	.877	-1.321	201	.188	.094
GSD2	133	2.87	1.202	72	3.04	1.093	-.994	203	.321	.161
GSD3	133	3.58	.955	72	3.85	.899	-1.960	203	.051	.026
GSD4	132	2.75	.984	72	3.18	1.079	-2.886	202	.004	.002
ICP1	133	3.05	.976	72	3.36	.877	-2.291	203	.023	.011
ICP2	133	2.56	.941	72	2.79	.855	-1.764	203	.079	.040
ICP3	133	2.50	.858	72	2.83	.919	-2.559	203	.011	.006
IMP1	66	3.11	.963	47	2.94	1.051	.890	111	.375	.812 ^a
IMP2	79	2.92	.844	51	3.10	.878	-1.130	128	.261	.130
IMP3	68	2.90	.794	41	3.10	.944	-1.189	107	.237	.119
IEI1	125	3.07	.863	72	3.39	.848	-2.497	195	.013	.007
IEI2	126	2.90	.902	72	3.21	.963	-2.281	196	.024	.012
IEI3	126	2.78	.954	72	3.15	.944	-2.670	196	.008	.004

^a One-sided *p*-value of the item IMP1 was recalculated as $1-p(2\text{-sided})/2$, since averages in the sample are just the opposite according to assumption in the second research question.

The second research question was analysed with the one sided independent samples *t*-tests. Since we assumed that the enterprises with at least one sustainability related certificate will have higher estimate of influence from institutional pressure, one sided *t*-test was performed on all of 9 items expressing the enterprise's institutional pressure on sustainability issues (2-sided *p*-values obtained in SPSS were recalculated as $p/2$). For six out of nine items the research question was answered positively. Detailed results are presented in Table 3 and Figure 2.

All three items in Institutional coercive pressure were on average evaluated lower in the enterprises without sustainability related certificate. The enterprises that implemented at least one sustainability related certificate evaluated force of regulations to use Green IS higher (3.36) than the others (3.05) at 5% significance level ($t=-2.291$, $p=.011$). Similarly, the impact of suppliers to use Green IS was on

average evaluated higher in the enterprises who already have sustainability related certificates (2.29) than in the enterprises with no sustainability related certificates (2.56) at 5% significance level ($t=-0.1764$, $p=.040$). Higher impact of important customers on use of Green IS is detected by the enterprises who already have sustainability related certificates (2.83) than by the others (2.50) at 5% significance level ($t=-2.559$, $p=.006$).

None of three items in Institutional Mimetic pressures were evaluated statistically significantly lower by the enterprises with no sustainability related certificate, while the contrary is true for three items of Internal environmental impact. Regarding the Internal Environment Impact, in the enterprises with implemented sustainability related certificates managers have higher desires to implement Green IS (3.39) than in the other enterprises (3.07) at 5% significance level ($t=-2.281$, $p=.007$). Similarly, the initiative of employ-

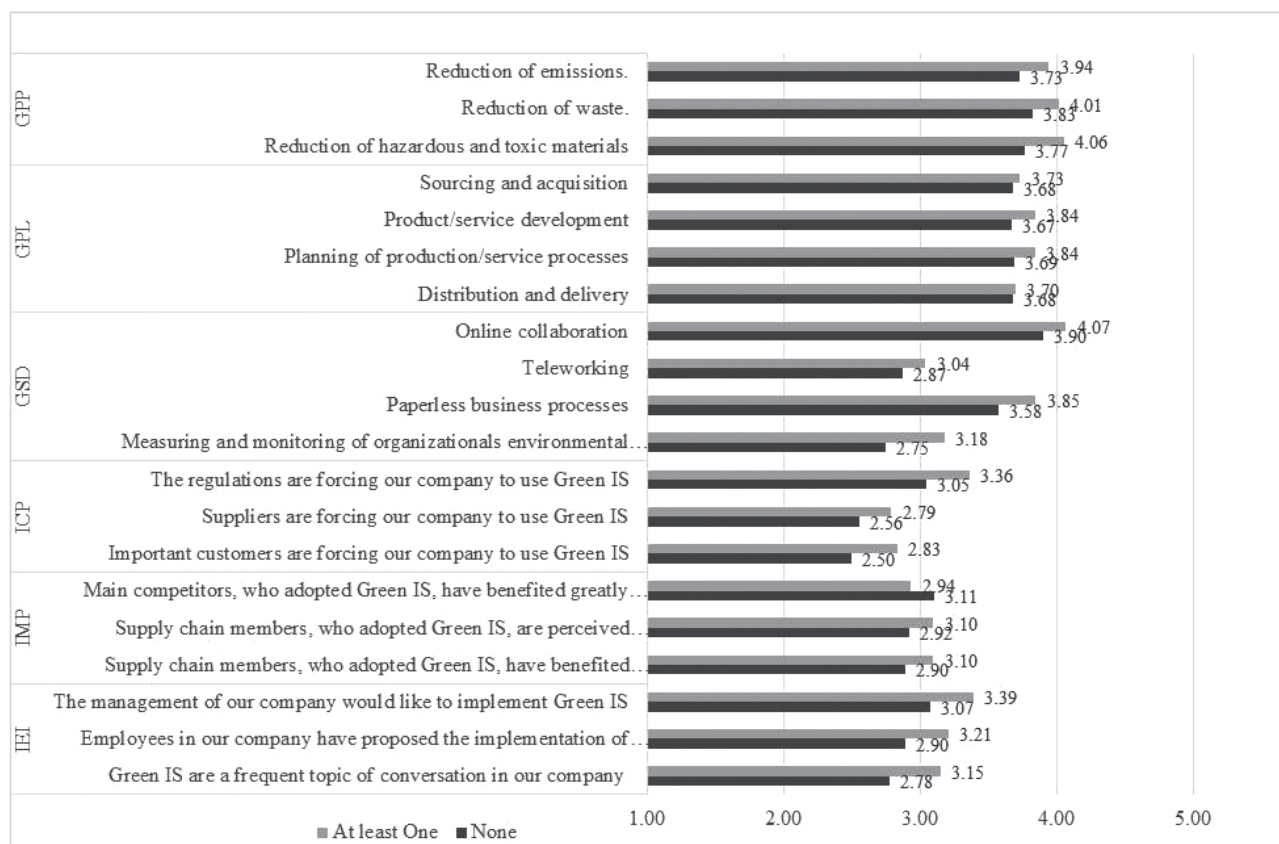


Figure 2: Mean values of 20 items according to enterprises who have implemented sustainability related certificate or not

ees for implementation of Green IS is higher in the employees where they already have any of sustainability related certificates (3.21) than in the others (2.91) at 5% significance level ($t=-2.281, p=.012$). In the enterprises where they already have implemented at least one sustainability related certificate Green IS are more frequent topic (3.15) than in the others (2.78) at 5% significance level ($t=-2.670, p=.008$).

According to the number of employees, the enterprises are divided into four categories: micro, small, medium, and large. Analyses of variance (ANOVAs) or Robust test of Equality of means in case on unequal variances were used to test whether there exist statistically significant differences in average estimates between enterprises of different sizes of the items. In addition, to investigate groups where the differences exist post hoc tests were used.

RQ3: *Are there any differences in the estimates of importance of Green IS adoption among categories according to the size of enterprise?*

Statistically significant differences at 5% significance level were revealed only for one measured item (Table 4 and Figure 3): GSD3 - enterprise encourages use of Green IS for paperless business processes ($F=3.766, p=.012$).

Games-Howell post hoc test reveals that mean values of GSD3 differentiate significantly among micro (3.47) and large enterprises (4.25) ($p=.003$) and small (3.63) and large enterprises ($p=.004$) at 5% significance level.

RQ4: *Are there any differences in the estimates of importance of Institutional coercive pressure, Institutional mimetic pressure and Internal environment impact among categories according to the size of enterprise?*

Statistically significant differences at 5% significance level were revealed only for two measured items (Table 4 and Figure 3): ICP1 - the regulations are forcing the enterprise to use green IS; ($F=4.032, p=.09$) and IEI2 - employees in our company have proposed the implementation of Green IS ($F=2.747, p=.044$). Games-Howell post hoc test reveals that mean values of ICP1 show statistically significant differences only between small (2.99) and large enterprises (3.83) at 5% significance level ($p=.024$). Gabriel post hoc test reveals that for IEI2 significant differences in average estimates exist between small (2.89) and large (3.19) enterprises at 5% significance level ($p=.046$).

^RRobust test (more precisely, Brown-Forsythe test) in the case of unequal variances among groups.

Table 4: Descriptive statistics and results of ANOVAs for 20 items according to the size of enterprises

Item	Number of employees												ANOVA / Robust test	
	1-9			10-49			50-249			More than 500			F	p
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD		
GPP1	45	3.82	.984	88	3.72	.909	48	3.83	.859	12	4.08	.900	.658	.579
GPP2	45	4.00	.905	88	3.83	.874	48	3.92	.846	12	4.08	.900	.562	.640
GPP3	45	3.84	.999	88	3.84	.786	48	3.88	.914	12	4.00	.953	.124	.946
GPL1	44	3.77	.912	87	3.56	.872	48	3.85	.772	12	3.67	.651	1.398	.245
GPL2	43	3.65	.948	87	3.71	.761	48	3.85	.799	12	3.92	.669	.706	.550
GPL3	44	3.59	.996	86	3.76	.825	48	3.90	.905	11	3.82	.603	.943	.421
GPL4	44	3.64	.892	86	3.71	.795	48	3.69	.926	12	3.67	.651	.074	.974
GSD1	45	3.93	.751	87	3.87	.950	48	4.06	.885	12	4.42	.515	1.620	.186
GSD2	45	2.96	1.127	88	2.84	1.202	48	3.02	1.158	12	3.58	.900	1.513	.213
GSD3	45	3.47	1.079	88	3.63	.963	48	3.85	.772	12	4.25	.452	3.766	.012 ^R
GSD4	45	2.87	1.140	87	2.84	.987	48	2.94	.998	12	3.50	1.000	1.493	.218
ICP1	45	3.11	.910	88	2.99	.851	48	3.38	1.084	12	3.83	.835	4.032	.009 ^R
ICP2	45	2.62	.912	88	2.57	.868	48	2.79	1.010	12	2.83	1.115	.765	.515
ICP3	45	2.49	.869	88	2.63	.835	48	2.79	1.031	12	2.67	.985	.880	.452
IMP1	26	3.12	.993	45	2.91	1.125	29	2.97	.823	9	3.67	.707	1.556	.205
IMP2	30	3.10	.885	55	2.93	.879	31	2.90	.831	9	3.11	.782	.412	.744
IMP3	24	3.04	.955	43	2.91	.895	28	2.89	.786	8	3.25	.463	.490	.690
IEI1	44	3.09	.884	88	3.11	.903	47	3.32	.810	12	3.58	.793	1.578	.196
IEI2	45	2.93	.939	88	2.89	.915	47	3.19	.947	12	3.58	.900	2.747	.044
IEI3	45	2.89	1.027	87	2.84	1.010	48	3.00	.875	12	3.17	.835	.577	.631

In the questionnaire, each enterprise has selected one of 19 activities from NACE Rev 2 classification. We reorganized this classification into 7 enterprise categories, as follows:

- Energy: B, D, E
- Industry: C, F
- Wholesale, retail, hotels & restaurants: G, I
- Information and communication: J
- Education, science and entertainment: M, P, R
- Public administration, health and social work: O, Q
- Other: A, H, K, L, N, S

RQ5: Are there any differences in estimates of importance of Green IS adoption among seven groups of enterprises according to their main activity?

Among 11 items ANOVAs revealed that only two items from Sustainable development have statistically significant estimates among seven groups of enterprises according to their activity (Table 5, Figure 4). The first one is online

collaboration ($F=2.470$, $p=.027$), where Games-Howell post hoc test revealed that statistically significant differences exist between Information and communication sector (4.33) and Wholesale, retail, hotels and restaurants (3.48) ($p=.022$) at 5% significance level. Second item is teleworking ($F=4.667$, $p=.000$), where statistically significant differences at 5% significance level exist between Information and communication (3.92) and one of the following sectors: Wholesale, retail, hotels and restaurants (2.43) ($p=.000$), Public administration, health and social work (2.67) ($p=.004$) and Other activities (2.71) ($p=.000$).

RQ6: Are there any differences in estimates of importance of Institutional coercive pressure, Institutional mimetic pressure and Internal environment impact among seven groups of enterprises according to their main activity?

ANOVAs revealed (Table 5), that none of the items from the group of organizational circumstances differ statistically significant.

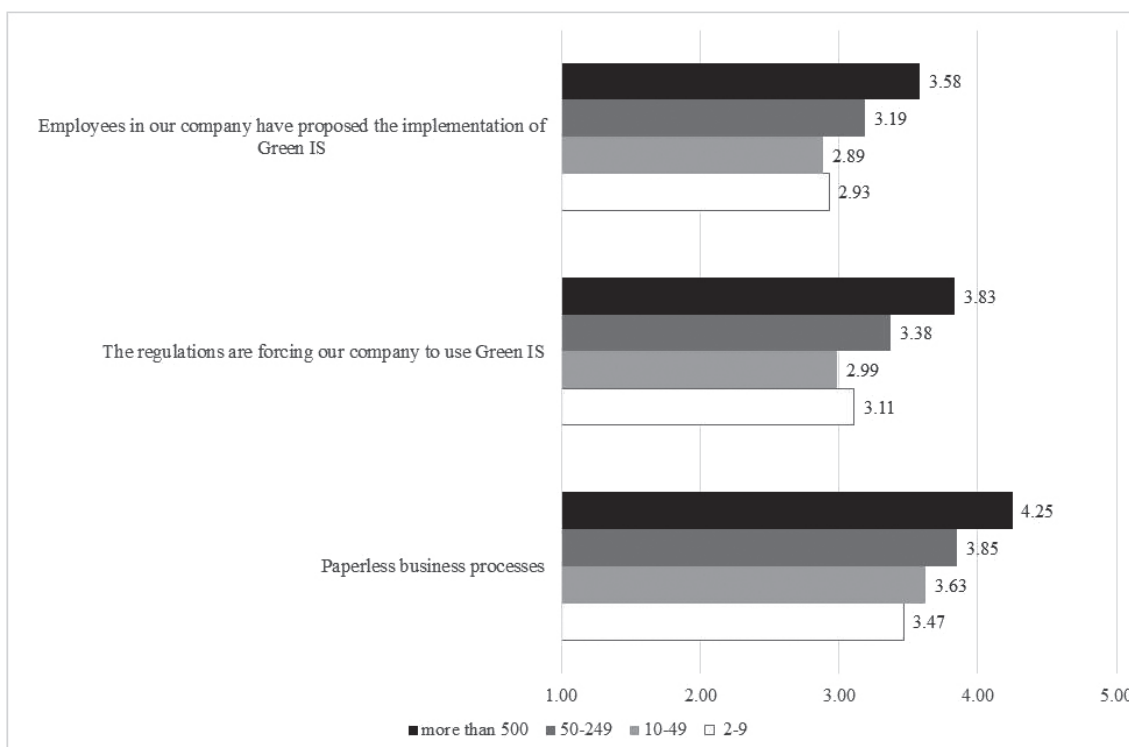


Figure 3: Mean values of three items showing statistically significant differences according to four groups of enterprises according to size

RQ7: *What impact have Institutional coercive pressure (ICP), Institutional mimetic pressure (IMP) and Internal environment impact (IEI) on Green IS adoption?*

The seventh research question was analysed by multiple linear regression. Three independent variables were calculated as the mean value of measured items in the corresponding construct, while Green IS adoption was calculated as mean value of eleven items included in Pollution Prevention, Sustainable development, and Product lifecycle.

Before examining the regression model itself, correlations among included variables were investigated to rule out the possible problem of multicollinearity. All correlation coefficients among variables are statistically significant at 1% significance level. More precisely, correlations among dependent variable and predictors are as follows: the highest positive correlation is between IEI and Green IS adoption ($r=0.549$), followed by correlation coefficient between IMP and Green IS adoption ($r=0.461$), and correlation between ICP and Green IS adoption ($r=0.412$). The highest correlation among predictors is between IEI and ICP ($r=0.420$), followed by correlation between IEI and IMP ($r=0.376$), and ICM and ICP ($r=0.365$). Since none of the correlation coefficients is above 0.8, the multicollinearity is not the problem in our data. Another indicator to rule out the multicollinearity problem are variance inflation factors (VIFs) or the tolerance statistics. The VIFs statistics are for all three predictors

in range from 1.227 and 1.493 and therefore relatively close to 1, while the lowest tolerance statistic for ICP is 0.668 which is highly above 0.2.

The overall model fit was assessed. R^2 is equal to 0.41, indicating that 41% of variance of the Green IS adoption could be explained with three predictors. Durbin-Watson statistic is 1.368 indicating that errors of the model are independent. Results of ANOVA suggests that the proposed model fits well ($F=21.305$, $p=.000$).

Based on unstandardized regression coefficients, the regression model is as follows:

$$\text{Green IS adoption} = 1.743 + 0.047 \cdot \text{ICP} + 0.226 \cdot \text{IMP} + 0.365 \cdot \text{IEI}$$

Coefficients for IMP and IEI differ statistically significantly from zero ($p=.003$ and $p=.000$, respectively) at 5% significance level. Therefore, we can conclude that both Institutional mimetic pressure (IMP) and Internal Environment Impact (IEI) have a positive impact on Green IS adoption.

4 Conclusions

According to Melville (2010), information systems are one of the inadequately understood enablers of sustainable business practices. It was therefore not expected that only 15.3%

Table 5: Descriptive statistics and results of ANOVAs for 20 items according to enterprise's main activity

	Main activity of the enterprise																							ANOVA/ <i>R</i> Robust test	
	Energetics			Industry			Wholesale, retail, hotels and res- taurants			Information and communication			Education, scien- tific and enter- tainment			Public adminis- tration, health and social work			Other						
	<i>N</i>	Mean	SD	<i>N</i>	Mean	SD	<i>N</i>	Mean	SD	<i>N</i>	Mean	SD	<i>N</i>	Mean	SD	<i>N</i>	Mean	SD	<i>N</i>	Mean	SD	<i>F</i>	<i>p</i>		
	Item																								
	GPP1	7	3.57	.79	34	4.03	.94	21	3.76	.89	24	3.46	.98	27	3.89	.89	21	3.57	.98	51	3.84	.88	1.263	.277	
	GPP2	7	4.14	.69	34	3.94	.81	21	3.95	.97	24	3.63	.97	27	4.04	.81	21	3.67	.91	51	3.96	.89	.893	.501	
	GPP3	7	4.00	.58	34	3.79	.88	21	4.10	.89	24	3.67	1.01	27	4.04	.85	21	3.86	.79	51	3.78	.90	.744	.615	
	GPL1	7	3.86	.38	34	3.76	.82	21	3.65	.81	24	3.39	1.03	27	3.89	.85	21	3.67	.86	51	3.65	.84	.833	.546	
	GPL2	7	3.86	.38	34	3.85	.71	21	3.65	.88	24	3.52	.95	27	3.89	.85	21	3.67	.73	51	3.76	.86	.681	.666 ^R	
	GPL3	7	4.17	.41	34	3.82	.77	21	3.55	1.00	24	3.71	1.00	27	3.96	.85	21	3.65	.75	51	3.67	.97	.798	.572	
	GPL4	7	3.86	.38	34	3.67	.74	21	3.60	.94	24	3.65	1.03	27	3.74	.86	21	3.57	.81	51	3.71	.88	.169	.985	
	GSD1	7	3.71	.49	34	3.97	.88	21	3.48	1.17	24	4.33	.82	27	3.89	.93	21	3.86	.57	51	4.12	.82	2.470	.027 ^R	
	GSD2	7	2.86	1.07	34	3.06	1.18	21	2.43	1.08	24	3.92	.97	27	3.15	1.20	21	2.67	1.06	51	2.71	1.10	4.667	.000	
	GSD3	7	3.57	.79	34	3.71	.76	21	3.19	.98	24	3.96	1.04	27	3.85	.72	21	3.95	.92	51	3.61	1.06	1.848	.092	
	GSD4	7	3.29	.49	34	3.26	1.19	21	2.43	.98	24	2.96	.95	27	2.81	.92	21	2.76	.89	51	2.84	1.05	1.815	.098	
	ICP1	7	3.14	.69	34	3.26	.86	21	2.86	.85	24	2.92	.83	27	3.04	.94	21	3.52	1.08	51	3.18	1.05	1.275	.271	
	ICP2	7	2.86	.38	34	2.88	.91	21	2.52	.98	24	2.50	1.06	27	2.52	.98	21	2.43	.81	51	2.71	.90	.905	.493	
	ICP3	7	3.14	.38	34	2.82	.83	21	2.48	.75	24	2.67	1.09	27	2.41	.97	21	2.38	.74	51	2.63	.92	1.319	.251	
	IMP1	7	3.50	.58	34	3.19	1.17	21	3.00	1.22	24	3.21	1.05	27	2.64	.93	21	2.91	.70	51	3.06	.93	.677	.668	
	IMP2	7	3.25	.50	34	3.04	.84	21	2.87	.92	24	2.87	.99	27	2.87	.92	21	2.89	.60	51	2.97	.86	.207	.974	
	IMP3	7	3.25	.50	34	2.81	.91	21	3.10	.99	24	2.79	.70	27	2.75	.87	21	3.18	.75	51	2.97	.89	.536	.780	
	IEI1	7	3.43	.53	34	3.29	.76	21	2.81	.75	24	3.38	.88	27	3.27	.92	21	3.33	.97	51	2.98	.88	1.695	.125	
	IEI2	7	3.14	.69	34	3.09	.93	21	2.52	.98	24	3.13	.90	27	3.12	.91	21	3.29	1.01	51	2.90	.94	1.541	.167	
	IEI3	7	3.00	.89	34	3.03	1.03	21	2.38	.86	24	3.04	1.00	27	2.93	.96	21	3.00	.77	51	2.84	1.01	1.286	.266	

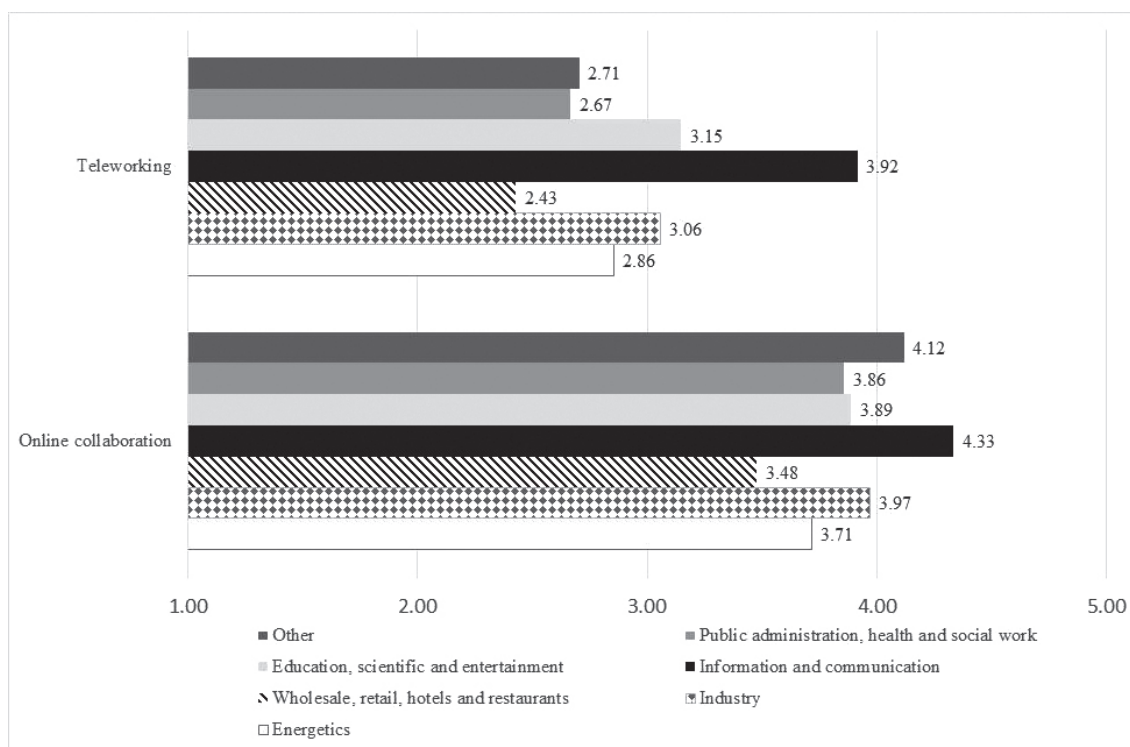


Figure 4: Mean values of two items showing statistically significant differences among seven categories according to enterprise's main activity

of enterprises in the sample do not encourage the use of any Green IS (it was assumed that an enterprise does not encourage the use of any Green IS if the average estimate of Green IS adoption is 3 or less).

Even though, it would be expected that enterprises with sustainability related certificates would promote all listed forms of Green IS, it is evident, that enterprises who already possess at least one of the sustainability related certificates, are more prone only to promote diverse software solutions to lower the GHG emissions, reduce the level of hazardous and toxic materials, paperless business processes and measurements and monitoring of organizational environmental performance. One could also expect that enterprises who measure the organization's environmental performance would put more effort to reduce the environmental impact in the entire life cycle of the product. However, the results show the opposite: the product life cycle is the least used form of Green IS.

Although one could assume, that attitudes and impact on Green IS adoption differ according to the size of the enterprise, only three items showed statistically significant differences:

- the impact of employees on the implementation of Green IS is higher in larger enterprises
- regulations on usage of Green IS have more influence on bigger enterprises

- bigger enterprises are more prone to paperless business process

In general, there are no statistically significant differences among enterprises according to their main activity. Statistically significant difference was found in the adoption of Green IS for sustainable development, where enterprises working in the field of Information and communication had a higher share of online collaboration as wholesale retail, hotels and restaurants as well as a higher share of teleworking as wholesale retail, hotels and restaurants, public administration, health and social work and other activities.

Enterprises who do not feel any pressure from their internal or external environment, do not possess sustainability certificates and do not use Green IS as often as the other enterprises. The results of the survey show that the legislation and suppliers have forced some of the companies to involve sustainability concepts in their business.

It is evident that enterprises who already have implemented the sustainability related certificates, had experienced coercive institutional pressure and internal environment impact in a higher level than the ones without any certificate. The enterprises, who possess sustainability related certificates have a slightly higher attitude towards Green IS adoption. Nevertheless, only 40% of claims on Green IS adoption is evaluated statistically significantly higher.

In contrast to Gholami et al. (2013), where results showed that Coercive pressure and Mimetic pressure does not influence the attitude toward Green IS adoption, our results show: Mimetic pressure and Internal Environmental Impact influence the attitude toward Green IS adoption.

Obviously enterprises do not feel the pressure from regulations, suppliers or customers to change their viewpoint to Green IS. Furthermore, the substantial influence was also detected in the case of external environment with Mimetic pressure, which could be aligned with a special national culture of »begrudging the neighbour«, where an enterprise wants to counterpart their competitors or supply chain members in benefits gained from the adoption of Green IS.

In line with Wati and Koo (2012), who found several self-determination factors in influencing Green IS adoption variables, we conclude that the Internal Environmental Impact is the most influential factor of the attitude toward Green IS adoption. The culture or individual perception of managers and employees play an important role in the Green IS adoption.

As with all of the studies, there is a number of limitations and directions for future research. First, as with any study, there is a potential risk of biased results due to subjective interpretations. These potential drawbacks were considered during both the research instrument development phase as well as during the data collection phase. However, we acknowledge that regardless of our efforts, it may not be possible to mitigate this problem. Second, enterprises from one country were addressed. As such, the increase in a sample size could be seen as an opportunity to improve the generalizability and robustness of the research. Third, we acknowledge that there are possible sources of bias concerning the sample distribution. For instance, some smaller enterprises do not have a special IT department and could therefore not be aware of all the possibilities of Green IS and enabling software products. With this limitation in mind, we did exclude the enterprises with only one employee from the sample, but some biased answers are still not excluded. Finally, we recognize that further research is needed to investigate the aspects of Green IS to determine at what level it is institutionalized and why differences occur in deploying sustainability practices related to IS.

Our further investigation of the readiness to adopt Green IS, and the use of information systems as an enabler of sustainable development, will be focused at individual's characteristics and perception impact on the Green IS adoption in enterprises.

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Ozaveščenost in odnos do zelenih informacijskih sistemov v slovenskih podjetjih

Izhodišča: Raziskava se osredotoča na uporabo informacijskih sistemov za podporo doseganja trajnostnih načel, poznanih kot »zeleni IS«. Zeleni IS predstavljajo priložnost, da podjetja delujejo proaktivno v smislu ohranjanja okolja ter nudijo pomoč pri obvladovanju globalnih klimatskih sprememb ter reševanju ostalih okoljskih problemov.

Namen: Z raziskavo želimo oceniti stopnjo ozaveščenosti o uporabi in sprejetju zelenih IS med managerji v slovenskih podjetjih.

Metode: Empirične podatke smo pridobili s pomočjo obsežne raziskave med vodilnimi managerji slovenskih podjetij. Za analizo raziskovalnih vprašanj je bilo uporabljenih več statističnih metod (kot na primer t-test, analiza variance in multipla linearna regresija).

Rezultati: Ugotovitve kažejo, da na razlike v odnosu do uporabe zelenih IS v podjetjih vplivajo institucionalni mehanizmi. Tako na primer podjetja, ki se ponašajo z najmanj enim trajnostno naravnanim certifikatom, kažejo večjo pripravljenost, da bi svojo trajnostno naravnost nadgradili z uporabo zelenih IS. Rezultati regresijske analize kažejo, da imajo institucionalni mimetični dejavniki in notranji okoljski dejavniki pozitiven vpliv na pripravljenost za uporabo zelenih IS v podjetju.

Zaključki: Glavna ugotovitev raziskave je, da imajo notranji okoljski dejavniki največji vpliv na pripravljenost za uporabo in uvedbo zelenih IS. Prav tako ima pomemben vpliv pri pripravljenosti za uporabo zelenih IS kultura in odnos managerjev in zaposlenih. Dejansko podjetja, ki nimajo dejanskega namena izboljšati svojega okoljskega vpliva, ter zelene IS uvedejo v svoje poslovanje samo za pridobitev priznanja s strani zunanjih deležnikov, ne morejo zagotoviti trajnostno naravnanih izboljšav na področju ravnanja z okoljem.

Ključne besede: zeleni informacijski sistem, trajnostna naravnost, okolje, informacijski sistem

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Factors Influencing Attitudes Towards the Use of CRM's Analytical Tools in Organizations

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Background and Purpose: Information solutions for analytical customer relationship management CRM (aCRM IS) that include the use of analytical tools are becoming increasingly important, due organizations' need for knowledge of their customers and the ability to manage big data. The objective of the research is, therefore, to determine how the organizations' orientations (process, innovation, and technology) as critical organizational factors affect the attitude towards the use of the analytical tools of aCRM IS.

Design/Methodology/Approach: To measure the orientation of the organization (process, innovation, and technology), we redesigned the existing scale, which was validated using exploratory factor analysis. In the next phase, we created a model by which we examined the impact of the organization's stance in relation to the use of the analytical tools of aCRM IS, where we used multiple regression analysis. The model was verified on a sample of Slovenian Organizations (n=105), which use the analytical tools of aCRM IS for analyzing the data they have on their customers and business partners.

Results: In the study we found that all critical factors of the organization, specifically process, technology, and innovation orientation, have a positive impact on the attitudes towards using the analytical tools of aCRM IS. Innovation orientation is particularly important and has the strongest influence on the attitude towards using the analytical tools of aCRM IS. We found that innovation orientation on new ideas, methods, and approaches has the strongest effect, followed by the impact of innovation orientation on acceptance of novelty.

Conclusion: The more innovation-, technology-, and process-oriented organizations are, the more positive their attitude towards using the analytical tools of aCRM IS. The study is particularly important for organizations that are introducing an aCRM IS into their business system.

Keywords: critical organizational factors, analytical customer relationship management (aCRM), analytical tools, attitudes towards use of aCRM

1 Introduction

Organizations nowadays are forced into the use of different information solutions (IS) to deal with severe market competition, which leads to changes in customers' loyalty (Almotairi, 2009), as well as technical development in global networks, convergence, and interactivity (Peppard,

2000). The main phenomena leading to these circumstances are globalization, internationalization, deregulation, the progress of information technology, shorter products' life-cycles, and development of awareness of the connection between client retention and profitability (Chandra and Kumar, 2000; Zineldin and Jonsson, 2000; Sahay, 2003; Stefanou et al., 2003).

However, it is not unusual that even enhanced efforts in organizations to use differentiated IS often do not bring satisfactory results. Literature review reveals several reasons, such as complexity regarding technical and organizational issues (Goodhue et al., 2002), organizational change, policy organizations, poor understanding of information solutions and poor skills using those solutions (Almotairi, 2009), lack of focus on human/social factors (King and Burgess, 2008; McCalla et al., 2003), thinking that technology becomes the solution, the lack of management support, lack of vision and strategy, poor quality of data and consequently of information, inadequate change management, development of IS that do not include the end user (Finnegan and Currie, 2010), etc.

Organizations are constantly trying to discover how to obtain the highest quality of information about their customers, which can help them make key business decisions as well as establish long-term and profitable relationships with customers, indirectly boosting the chances of business success (Gneiser, 2010). As a result, many organizations have decided to implement Customer Relationship Management as an information solution (CRM IS) and have very positive attitudes towards use of analytical solutions and possibilities that CRM IS enables (Rigby and Bilodeau, 2013). In 2013, CRM IS was the first most commonly used management tool worldwide (Rigby and Bilodeau, 2013). A survey in 2010 showed that in Slovenia, CRM IS was not the most commonly used tool by management, however, and it was used only as the seventh most frequently used tool (Potočan et al., 2012). With the development of technology, new forms of CRM IS (e.g., e-CRM, m-CRM, s-CRM) have been developed that facilitate the collection of customer data with the widest possible perspective, with the creation of large-scale data warehousing and data mining as an important infrastructure of analytical customer relationship management as an information solution (aCRM IS) (Srivastava et al., 2002). When looking at the actual context of the economy, the analytical functions within the CRM IS (aCRM IS) become more important. A database with customers and the analytical functions overlaying that database could make the difference between a winner and a loser in the economic game (Furtuna and Barbulescu, 2012). It is expected that aCRM IS, which can discover knowledge from huge amounts of data, plays a crucial role in decision support (Xie et al., 2008).

Our research addresses the following key research question: How do the organizational factors within organizations affect the attitude towards using the aCRM IS? With the purpose to answer this key research question, the three main objectives of this research are: (i) identification of critical organizational factors, (ii) reliability and validity analysis of the measurement scales that were developed and used to measure different aspects of organizational orientation, and (iii) formation of a regression model of critical organizational factors affecting the attitudes towards using the aCRM IS within organizations.

2 Literature review and hypothesis

2.1 Analytical tools of aCRM IS

There are not many research results available regarding the in-depth use of an aCRM IS and the use of tools, techniques, and quantitative methods of an aCRM IS. On the other hand, the existing researches about the aCRM IS focus mainly on managing knowledge, on-line analytical mining, web mining, technologies, applications needed to implement aCRM IS (Ranjan and Bhatnagar, 2011; Feng et al., 2005; Tuzhilin, 2012; Srivastava et al., 2002; Chen et al., 2012), business intelligence, and data mining techniques of CRM solutions (Ngai et al., 2009; Zeng et al., 2012; Olson, 2006; D'Haena et al., 2013; Ranjan and Bhatnagar, 2010; Huang et al., 2012, 2013). They have also explore more general views of aCRM IS (Ranjan et al., 2011) rather than focusing on exploration of the application and usefulness of tools, techniques, and quantitative methods in aCRM IS in an organization. Therefore, this field remains a deficient area of research.

The researchers have so far investigated critical factors of use of CRM IS on the individual level, but not the organizational level. Through literature review, we have detected a heterogeneous terminology, which is reflected in the interpretation of quantitative methods and techniques of data mining. Only in recent years the most commonly used terminology refers to aCRM as the quantitative research methods used to process and analyze data and the use of software support for data mining (Zhang and Segall, 2010; Nonyelum Ogwueleka et al., 2012). Therefore, aCRM IS refers to the obtaining, storage, retrieval, integration, processing, interpretation, transmission, use, and reporting of the data related to customers in order to maximize the value of the data, not only for the customer but also for the organization (Buttle, 2009). It allows the organization to create in-depth summaries of the customer's purchase history, their preferences, and profitable information from the data warehouse and other organizations' databases. At the same time, aCRM IS facilitates analysis, forecasting, customer value creation, customer purchase behavior analysis, and also demand forecasting (O'Brien and Marakas, 2011). Additionally, aCRM IS creates statistical models of customers' behavior and the value of the relationship with customers through time, as well as forecasting the gain, retaining, and loss of customers (Rainer and Cegielski, 2012).

With the help of acquired customer data from the data warehouse organizations, the organization can create in-depth analyses, whereby they can use a number of quantitative methods or so-called techniques of data mining, from simple to more sophisticated ones, such as student's t-test, Chi-square, analysis of variance (ANOVA), Mann-Whitney U, regression analysis, correlation, Fisher's least significant difference test (such as Pearson product-moment correlation coefficient and Spearman's rank correlation coefficient),

time series, cluster analysis, and neural network (Baran et al., 2008; Turban and Volonino, 2010; Kroenke, 2011).

2.2 Organizational factors and attitudes towards the use of aCRM IS within organizations

To date, researchers have particularly studied the organizational factors of successful application of a CRM IS in general (Kavosh et al., 2012; Bavarsad and Hosseinipour, 2013; Sarmaniotis et al., 2013), but they were less focused on factors that affect the application of the analytical tools of the aCRM IS. Reicher and Szeghegyi (2015) explored the factors affecting implementation of a CRM system in organizations. They defined three important factors of implementing a CRM system as strategic, technology, and human factors. Researchers have not studied the orientation of the organization in the field of application of analytical tools of the aCRM IS, and therefore findings in this area represent a significant scientific contribution.

Iriana and Buttle (2006) created a survey instrument to assess an organization's CRM IS orientation in terms of strategic, operational, and analytical perspectives. In development of a survey instrument, they have focused on CRM IS as a whole, but in the strategic CRM the innovative process and technological aspects were not included. These aspects are very important. Namely, important processes exist within and between the individual levels of CRM IS (collaborative, analytical, and operational CRM); an aCRM IS includes collecting and analyzing customers' information (Tufféry, 2011), which is why organizations require appropriate innovative analytical tools that are technologically supported and implemented into other processes within the organization. Analytical CRM also supports internalization processes, to some extent. For instance, employees can gain knowledge about customers by reading reports and analyses prepared using analytical systems (Khodakarami and Chan, 2014). According to Nazari-Shirkouhi et al. (2015), analytical CRM is able to determine customers' needs and predict their future needs along the path to the development of new products and services.

CRM is defined as a core business strategy wherein inside CRM organizations use a number of applications that present CRM solutions (Rajola, 2013, pp. 29; Buttle and Maklan, 2015). CRM solutions usually include a relational database for storing persistent information and software applications for handling business logic, and essentially becomes a database that contains key information about current and prospective customers (Peri and Pakroo, 2014, p. 220; Vaman, 2007, p. 47). These reasons may be reflected in the process orientation as well as in the technological and innovative stance of organizations. All three organizational orientations are the strategic components of the organization (Gatignon and Xuereb, 1997).

The innovative orientation

»An organization's ability to create, store and transfer knowledge about technologies, customer needs, and the innovation process itself may well determine success in bringing new products or services to the market« (Lee and Chang, 2007, pp. 145). This is also an important reason why organizations need information about customer needs, market changes, and competitor actions, as well as development of new technologies, more specifically to create new products that are superior to those of competitors. Many successful organizations have developed customer information files from data that are routinely collected in an organization's various production systems to improve their segmentation and targeting efforts (Slater and Narver, 1998). From the organization's point of view, the aCRM IS offers the prospect of more powerful cross-selling and up-selling programs, and more effective customer retention and customer acquisition programs (Buttle and Maklan, 2015). Therefore, organizations need innovative approaches in the use of analytical tools. Organizations with a strong innovation orientation are more likely to implement policies, procedures, practices, and incentives specifically devoted to gathering and disseminating information about customer and competitor markets to stimulate and sustain innovation (Siguaw et al., 2006). Researchers found that having innovative management and an innovation culture in the organization has a significant impact on the perception of the use of CRM IS, technology of CRM IS, and the probability of accepting a CRM IS in organizations (Hung et al., 2010; Nguyen and Waring, 2013; Newby et al., 2014). The findings on CRM systems applications are reported, and an innovative aCRM system is proposed for customer knowledge acquisition (Xu and Walton, 2005). Nguyen and Waring (2013) found that the innovative management of an organization has significant influence and they recognized that innovation orientation has a positive impact on the adoption of CRM IS. Until now, researchers have found that innovation at an individual level has an impact on the perceived usefulness of CRM IS (Avlonitis et al., 2005). Therefore, it is important to study the innovative orientation of the organization.

Literature review supports the relevance of this research's objectives; namely, that development of measurement scales for organizations' technology, process, and innovation orientations affects the use of analytical tools of the aCRM IS, which would be sufficiently reliable and of sufficient quality for further use and research. Based on theoretical principles, the following hypothesis is offered:

H1: *The higher the innovation orientation of organizations, the more positive in general the attitudes to use an aCRM IS within organizations will be.*

The process orientation

Researchers involved in the study of the performance of different IS within organizations emphasize the role of business processes (Sternad Zabukovšek et al., 2007;

Žabjek et al., 2009). Sternad Zabukovšek and coauthors (2011) also found that there is a positive correlation between organizational process characteristics of IS and the perceived usefulness of it. CRM IS focuses on the automation and improvement of processes within organizations (Xin et al., 2002). Business processes determine the nature of the entity's ability and its key competences for CRM IS (Liu, 2012). Efficient use of aCRM IS therefore depends on how the aCRM IS is integrated with existing processes and structures (Boulding et al., 2005). Chen and Popovich (2003) argue that CRM IS is the integrated approach, taking into account, inter alia, the process, so it is important that if the organization wants to use an aCRM IS, they should be process-oriented. This is particularly true in the implementation phase of CRM IS, because the transition from a vertically oriented organization to a process-oriented organization is an exceptionally complex and demanding process (Gentle, 2008). The researchers note that the lack of business process orientation leads to considerable delay in the process of implementing CRM IS (Raman et al., 2006; Owolabi et al., 2013). Therefore, we have designed the following hypothesis:

H2: *The higher the process orientation of organizations, the more positive in general the attitudes to use an aCRM IS within organizations will be.*

The technological orientation

Technology oriented organizations encourage research and development activities, acquisition of new technology solutions, and using the latest technologies, and thereby they accumulate rich technology knowledge with the help of past experiences and processes, such as investment in research and development and the rapid acquisition of new technologies (Gatignon and Xuereb, 1997; Zheng Zhou and Li, 2010). Technological orientation should be seen as an incentive for the realization of CRM IS (Ryals and Knox, 2001; Bose, 2002). CRM IS requires the use of information technologies (IT) to capture, store, modify, and distribute large amounts of data to interested groups (Piccoli et al., 2003). Organizations that are planning to adopt the aCRM IS must be customer orientated, and attention must be paid to the data aspect of aCRM IS, its initial costs, and if significant change in the organization's processes is needed. Technology that enables data mining and data warehousing requires sufficient organizational buy in because the parts of the organization that will benefit the most from an aCRM IS are the business units, i.e., marketing, sales, etc., rather than the IT department (Cheng et al., 2002). With aCRM technologies, data stored in organizational databases are analyzed to help identify customer behavioral patterns, determine satisfaction levels, support customer segmentation, etc. (Xu and Walton, 2005). Chen and Popovich (2003) also designate the technology as an important factor of CRM IS and several studies show the positive relationship between the perceived usefulness of the new information solutions and

attitude towards technology (Vijayasathay, 2004; Plewa et al., 2012). Within aCRM IS the technology is used to accumulate, store, organize, interpret, distribute, and exploit customer data (Iriana and Buttle, 2006), which is also reflected in the technological orientation of the organization. Based on the presented theoretical basis, we designed a third and final hypothesis:

H3: *The higher the technology orientation of organizations, the more positive in general the attitudes to use an aCRM IS within organizations will be.*

2.3 Attitudes towards the use of aCRM IS within organizations

Empirical studies in different contexts and fields establish a connection between the perceived possibility of increased job performance with the use of IS and a positive attitude towards the use of IS technology within organization (Vijayasathay, 2004; Chen et al., 2009; Plewa et al., 2012). Davis (1989) notes that it can be expected that the user who perceives an increased work performance using IS and IS applications without much effort has a positive attitude towards the use of IS. Employees in organizations therefore have different attitudes and beliefs about the use of IS (Chris and Chang, 2011), which are certainly linked to the characteristics of the previously described process, technological, and innovative orientation of their organizations. Also, Robinson and others (2005) have found that employees are more likely to use the offered CRM IS in an organization if they have a positive attitude towards the CRM IS. If employees believe that by using CRM IS the work will be performed efficiently (i.e., fast access and retrieval of information, targeting, etc.), then they will have a positive attitude towards the use of CRM IS (Beth et al., 2008).

Attitudes towards the use of IS in the organization is a component within the well-known Technology Acceptance Model (TAM), which covers the areas of perceived use, attitudes towards the use, and future intention to use the IS in a wide range of IS users (Davis, 1989, 1993). However, comprehensive treatment of TAM exceeds objectives set for the present research. Nevertheless, it certainly represents a possibility for future research, which we also discuss at the conclusion chapter of this paper.

3 Methodology

This research utilizes the quantitative research approach. It was conducted in the following stages. In the first phase, we reviewed the relevant scientific literature and resources. In the next phase, the survey questionnaire was developed. With the help of the questionnaire, we measured organizational factors of an aCRM IS, where we derived which orientations were of strategic importance to the organiza-

tion, such as innovation, technology, and process orientation. In designing the measuring scales we considered the already established scales, which measure the innovation, technology, and process orientation of organizations, and we changed them respecting the use of analytical tools. For this process, we started from the already developed measuring scales: process orientation (Chen et al., 2009; Tang et al., 2013) and innovative orientation (Zheng Zhou et al., 2005a; Narver et al., 2004; Theodosiou et al., 2012) were measured with nine statements, and technological orientation (Gatignon and Xuereb, 1997; Zheng Zhou and Li, 2010; Zheng Zhou et al., 2005b; Kim et al., 2013) was measured with six statements. Agreement with the statements was assessed using the Likert scale (1 – completely disagree to 7 – completely agree). In the next phase, we submitted the e-questionnaire to the three organizations that will review the questionnaire to avoid any ambiguity in understanding and completing the questionnaire. For transformation of the scale orientation of the organization, we re-examined their measurement reliability, which represents our scientific contribution. The structure of the measurement scale is presented in Table 1.

In the next phase, we formed a model based on the literature review. The model was used to examine the effect of the organization's orientation on the attitude towards the use of analytical tools of the aCRM IS. So far researchers have not studied how the organization's orientation influences the attitude towards the use of analytical tools of an aCRM IS; therefore, our research makes an important contribution to

the clarification of the use of analytical tools of an aCRM IS. The research model is presented in Figure 1.

Attitudes towards the use of aCRM IS were measured with a single item scale from 1 – strongly disagree to 7 – strongly agree with the statement, »We have positive attitudes towards the use of analytical tools of an aCRM IS.«

3.1 Data collection

A random sample of $n=833$ organizations was collected using the e-questionnaire (with two reminders), during the period from December 4, 2014 until March 27, 2015. The e-questionnaire was distributed using the web addresses of organizations with the help of the Slovenian Chamber of Commerce and companies who are dealing with the development of information technology business solutions. The mentioned organizations helped us in transmitting e-questionnaires to companies. The e-questionnaire was completed by managers or by persons who are responsible for CRM IS and analysis of customer data, suppliers, and business partners. Besides respondents, 18 organizations returned the questionnaire without participating in the survey. Specifically, they didn't want to participate because they believed that their use of comprehensive analytic tools for analyzing business areas was not at a sufficient level. The response to the survey was 12.6%, which means that the final sample of $n=105$ organizations was formed. The structure of the sample of $n=105$ organizations is as follows:

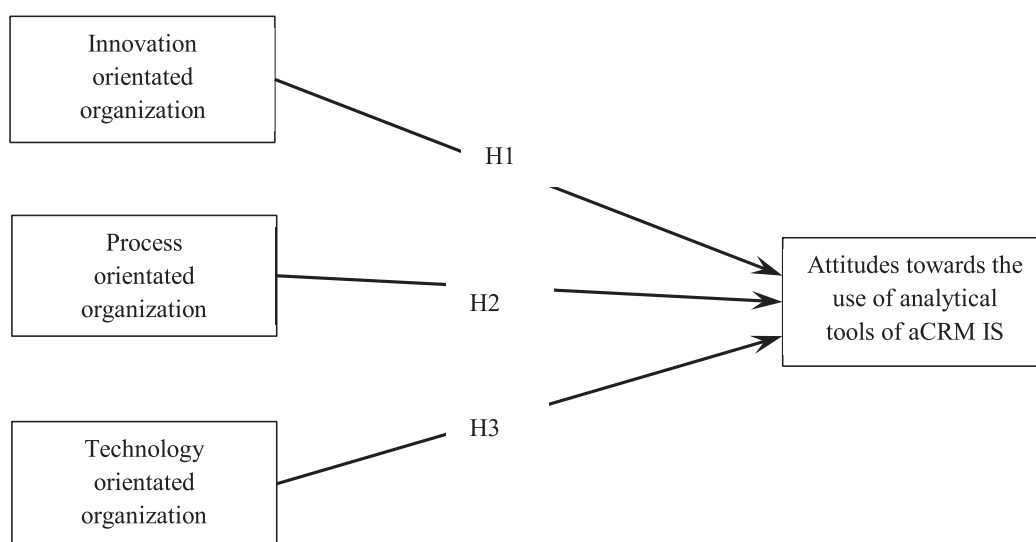


Figure 1: Research model.

(Source: Authors)

Table 1: Measurement scale – process, technology, and innovation orientation of organizations.

Different aspects of organizational orientation (process, technological and innovative):
Q1. Usage of the tools for processing and analyzing of data about customers and business partners is a set of related processes.
Q2. When using tools for processing and analyzing of data about customers and business partners we are using the concepts of process (inputs, outputs, processes and process owners) in peer conversations.
Q3. Processes in the use of tools for processing and analyzing of data about customers and business partners have defined and documented using inputs and outputs to and from our customers / business partners.
Q4. Business processes in the application of tools for processing and analyzing of data about customers and business partners are sufficiently defined so people know what their jobs are.
Q5. The tasks using the tools for processing and analyzing of data about customers and business partners are usually multidimensional and not just simple tasks.
Q6. In the process of using tools for processing and analyzing of data about customers and business partners we are constantly learning new things.
Q7. The process for using the devices for processing and analyzing of data about customers and business partners (quality analysis, preparation time and analysis, cost analysis, preparation ...) is defined.
Q8. The objectives of the performance of devices for processing and analyzing of data about customers and business partners (target quality analysis, target cost, target time, target variability) are set.
Q9. The results of the application of tools for processing and analyzing of data about customers and business partners (real quality of analysis, the real target cost, real time, real variability) were measured.
Q10. In general, we believe that our employees in the use of tools for processing and analyzing of data about customers and business partners are creative and inclined to news.
Q11. We are trying to look for new methods, findings and innovative approaches in the use of tools for processing and analyzing of data about customers and business partners.
Q12. When using tools for processing and analyzing of data about customers and business partners we are trying to generate ideas and proposals for the effective and efficient implementation of analytical activities.
Q13. The organization we are trying to ensure that adequate resources (human, financial, organizational ...) to improve activities in the use of tools for processing and analyzing of data about customers and business partners.
Q14. In the organization we ensure an adequate plan for the development of new ideas and innovations in the use of tools for processing and analyzing of data about customers and business partners.
Q15. Much attention was paid to improving the use of tools for processing and analyzing of data about customers and business partners.
Q16. Advances in the use of tools for processing and analyzing of data about customers and business partners are readily accepted in our organization.
Q17. In organization we see the need to encourage the development and exploitation of resources in the use of tools for processing and analyzing of data about customers and business partners.
Q18. The organization's management encourages employees to suggest ideas for improving the efficiency of the use of tools for processing and analyzing of data about customers and business partners.
Q19. We are quick in inclusion of new technology to use tools for processing and analyzing of data about customers and business partners.
Q20. In organization we strive to connect with each other the various technologies that support the devices to process and analyze data about customers and business partners.
Q21. To a large extent we use technology that allow us to use tools to perform complex analyzes under cultivation and analysis of information about clients and business partners.
Q22. Our organization is very active in developing new technologies that support utilities for manipulating and analyzing data about customers and business partners.
Q23. Compared with the competition, we have more technical knowledge that supports devices to process and analyze data about customers and business partners.
Q24. Our aim is to develop technology that would respond to the changing needs of devices for processing and analyzing the information about clients and business partners.

(Source: Authors)

- The majority of companies were large organizations with more than 250 employees (59.0%), followed by medium-sized organizations (26.7%), small organizations (10.5%), and micro organizations (3.8%). The size breakdown of participating organizations was expected, as large organizations in general have the most advanced customer relationship management, have extensive databases of customers, and apply statistical and analytical software for analyzing complex databases (Phillips-Wren and Hoskisson, 2015).
- Almost two thirds of the companies in the sample were from the service sector (62.9%), while 37.1% of organizations were from the manufacturing sector. The majority of respondent organizations were engaged in commercial activity and sales; followed by financial institutions (banks and insurance companies); manufacturing organizations, which are engaged with energy and logistics; information technology organizations; pharmacy organizations; and food processing organizations.
- More than half of the observed organizations have made a significant proportion of revenue in international markets (54.3%), while 45.7% of organizations have made a significant proportion of their revenue in the domestic market, namely in Slovenia.
- Regarding the analytical tools that organizations use in the context of relations with customers and business partners, 49.5% of organizations most frequently analyze and manage relations with individuals or end customers, while 50.5% of the organizations most often analyze and manage relations with other legal entities, such as business partners, suppliers, and other organizations.

Table 2: Results of EFA – factors of organizational orientation regarding processes, technology, and innovations.

Items	Communality	Factors				Cronbach α	Mean	$a \pm SD$	95% Confidence Interval for Mean	
		1	2	3	4				Lower	Upper
Q18	0.798	0.844				0.926	5.02	1.56	4.71	5.32
Q17	0.802	0.809					4.95	1.40	4.68	5.22
Q20	0.702	0.729					5.23	1.29	4.98	5.48
Q14	0.774	0.692					4.55	1.59	4.25	4.86
Q15	0.759	0.683					4.71	1.47	4.43	5.00
Q21	0.751	0.626					4.69	1.64	4.37	5.00
Q20	0.831		0.889			0.841	5.62	1.16	5.40	5.84
Q21	0.733		0.756				5.60	1.11	5.39	5.81
Q10	0.779		0.748				5.20	1.40	4.93	5.47
Q8	0.796			0.759		0.857	4.98	1.49	4.69	5.27
Q7	0.698			0.745			4.70	1.43	4.42	4.97
Q3	0.677			0.740			5.06	1.52	4.76	5.35
Q9	0.733			0.703			4.77	1.63	4.46	5.09
Q2	0.485			0.653			4.56	1.68	4.24	4.89
Q1	0.525			0.629			5.90	1.21	5.67	6.14
Q23	0.808				0.857	0.875	4.62	1.46	4.34	4.90
Q24	0.745				0.772		4.76	1.57	4.46	5.06
Q22	0.817				0.712		4.11	1.72	3.78	4.45

Bartlett test of sphericity (BTS)=1362.950; **Kaiser-Meyer-Olkin** statistics (KMO)=0.886; Statistically significant (Sig.) $p < 0.001$; Explain total variance=73.43%

Note: $a \pm SD$ -standard deviations.

(Source: Authors)

3.2 Methodological tools

For testing the research hypotheses, regression analysis was used. An f-test was used to test the regression model, while the statistical significances of regression coefficients were tested using the t-test (Janssens et al., 2008), at a 5% significance level.

To establish the structure of influencing factors representing explanatory variables in the regression model, exploratory factor analysis (EFA) was used. Bartlett's Test of Sphericity (BTS) and Kaiser-Meyer-Olkin statistics (KMO) were calculated (Janssens et al., 2008). The independency of factors and a more simple factor structure were obtained using the principal component analysis (PCA) and the Varimax rotation. The criteria that factor loadings of each item and item-total correlation coefficients (CITC) for each item must exceed 0.5 were used to guarantee the reliability and validity of the questionnaire scale (Nunnally, 1978). EFA was also used to establish a scale dimensionality by checking the factorial structure of items (indicators).

4 Results

As already described, the questionnaire used included statements (items) about the three aspects of organizational orientation: process, technological, and innovative orientation, as well as the assessment of attitudes towards the use of analytical tools of an aCRM IS.

With the purpose to test hypotheses H1, H2, and H3, we firstly present the results of the factor analysis. The results of the factor analysis indicate that it is meaningful to use EFA (KMO > 0.5; BTS significance $p < 0.001$) and the results lead to the four-dimensional factor solution. The varimax factor rotation led to the structure of factors as presented in Table 2. EFA shows that variables (items)

Q4, Q5, Q6, Q13, Q16, and Q19 have factor loadings lower than 0.5; therefore, they have been excluded from further analysis.

According to the factor loadings, factor 1 describes »Innovation orientation – technologies and tools,« while factor 2 describes »Innovation orientation – new ideas and approaches.« Factor 3 was named »Technological orientation« and factor 4 »Process orientation.« All four obtained measurement scales proved high reliability (Cronbach Alpha > 0.7). A total 73.43% of total variance is explained by the four factors formed.

Regression analysis results are presented in Table 3. The value of the adjusted coefficient of determination indicates that 46.7% of the variation in the attitudes towards the use of an aCRM IS may be explained by the variation in the four independent variables (factors) included into the analysis. The model as a whole is significant ($F_{4,100} = 23.811$, $p < 0.001$), the model is meaningful, and a good fit is present between the model and the data. The regression model with standardized coefficients is presented in Figure 2.

All four factors are significant – partial regression coefficients are all statistically significant ($p < 0.01$) and all have the expected sign; all regression coefficients are positive, as expected. The higher each component of organizational orientation is, the greater the positive attitudes towards the use of analytical tools of an aCRM IS. Therefore, all three hypotheses are confirmed.

5 Discussion

We tested the hypothesis that the process orientation, technological orientation, and innovation orientation of organizations have a positive impact on the attitudes towards the use of the analytical tools of an aCRM IS within organizations. All of these hypotheses were confirmed.

Table 3: Multiple regression analysis results (dependent variable: attitude towards the use of analytical tools of aCRM IS)

Structural relationship	B ^a	β^b	Std. error	t-value	95% Confidence Interval for B	
					Lower	Upper
1. IO1 → AT	0.398***	0.393	0.072	5.489	0.254	0.541
2. IO2 → AT	0.464***	0.459	0.072	6.413	0.321	0.608
3. PO → AT	0.243**	0.240	0.072	3.351	0.099	0.386
4. TO → AT	0.259**	0.256	0.072	3.573	0.115	0.402
$F_{4,100} = 23.811^{***}$; $R = 0.698$; $\text{Adj.-}R^2 = 0.467$						

Notes: ^aUnstandardized coefficients, ^bStandardized coefficients; AT - Attitudes towards the use analytical tools of an aCRM IS (dependent variable); IO1 – Innovation orientation – technology, tools; IO2 – Innovation orientation – new ideas, approaches; PO-process orientated organization, TO-technology orientated organization. *** $p < 0.001$; ** $p < 0.01$.
(Source: Authors)

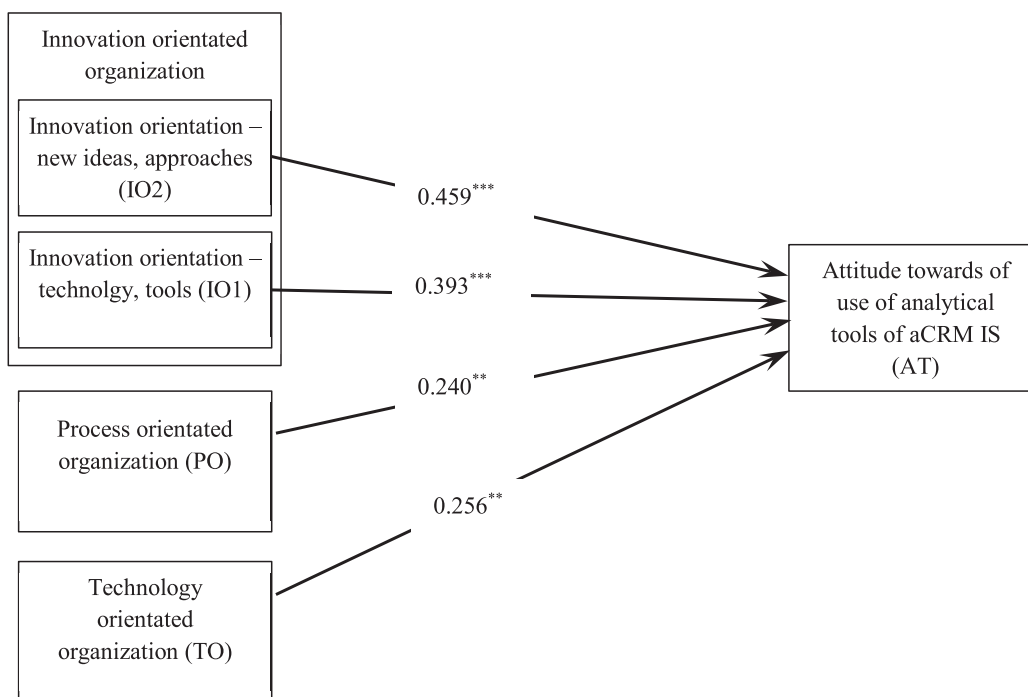


Figure 2: Regression model with standardized coefficients.

(Source: Authors)

One important result that we found is that innovation orientation has the highest positive impact on positive attitudes towards organizations' use of the analytical tools of an aCRM IS, which accounts for innovations regarding new technologies and tools, as well as new ideas and approaches. In our study, we found that even an innovative stance of the organizations is reflected in the perceived attitudes towards the use of the analytical tools of an aCRM IS. The analytical tools of aCRM IS should not be seen as a routine accessory (it is constantly adapting as technology evolves). However, the analytical tools of an aCRM IS, which offer organizations new insights into innovative approaches, are reflected in the market through new products and approaches to clients. In organizations, knowing how to meet customer needs is a constant question. In turn, this means finding new ways of mining data, which requires the use of analytical tools like an aCRM IS.

We also found that, as more organizations are process and technology oriented, there are more positive attitudes towards the use of the analytical tools of an aCRM IS. Such correlations were expected, as the analytical tools of an aCRM IS are incorporated in the process of work within each level of management. Furthermore, such analytical tools are incorporated all the way to the point where organizations face their customers, which is reflected through

the collaboration of an aCRM IS. The analytical tools of an aCRM IS can be very useful for establishing customer relationships, which are then built upon. For an organization to be able to successfully pursue its relationship with its customers, it must clearly define the processes within the organization, as well as to its customers, which is part of process orientation. The second most important factor in our model is the technology orientation. These results are also expected, since technologically oriented organizations advocate research and development activities, the acquisition of new technological solutions and the use of the latest technologies. They accumulate rich technological knowledge through previous experience and processes, and quickly adopt new technologies (Zheng Zhou and Li, 2010). The results of our study are also supported by the findings in literature that state that the adoption of an aCRM IS in organizations depends on the technology that is used for data analyses (Ranjan and Bhatnagar, 2011). The analytical tools of an aCRM IS are already used with hardware and software support, which means that an organization must provide relevant technology and software support that support analytical tools and utilities. If an organization sufficiently invests in new technologies and software to manage customers, then wider support and positive attitude of employees in using the analytical tools of an aCRM IS can also be expected.

Organizations' primary focus should be on investing in applied technology solutions and software support that will enable the effective use of analytical tools and utilities. Until now, researchers have not studied the attitudes of organizations towards the use of CRM IS as a whole nor the attitudes towards the use of the analytical tools of an aCRM IS. The primary focus of previous research was on the critical factors for organizations to use CRM IS as a whole, but not aCRM IS and the analytical tools of the aCRM IS.

In our study, we limited ourselves to three types of organization orientation: process, technological, and innovative attitude. This is because these factors in aCRM IS have not yet been studied. In designing the research model, we restricted ourselves to the attitude towards the use of the analytical tools of the aCRM IS, which derives from TAM. There are theoretical studies on the critical factors of the use of aCRM IS, but not many on the impact that they have. Researchers have commonly associated organizational factors with the constructs of TAM as perceived use and perceived ease of use, but not in relation to the use of technology and IT solutions. There are studies that mainly focus on the technologies and solutions at the level of individuals, but not at the level of the whole organization (Šumak et al., 2011; Son et al., 2012; Sternad Zabukovšek and Bobek, 2013). In our study, we restricted ourselves to the study of the attitudes and use of analytical tools on the individual level, which arise from TAM and the critical factors at the organization level. Our study is important for organizations that would like to implement or introduce an aCRM IS in their business system. Through the scientific method, we proved how important the relationship is between the organizational factors and attitudes towards the use of analytical tools of an aCRM IS on the individual level.

There are also several possible extensions of our research that could enrich the discussion. As already mentioned, the attitudes towards the use of analytical tools of an aCRM IS within organizations may be represented as a multidimensional variable in the Technology Acceptance Model (TAM). In further research, we believe that it would be reasonable to extend TAM with the influential factors of organizational orientation, specifically with the multidimensional variables that we have formed in the present study. Since aCRM IS uses extensive databases of statistical data on customers, the increasing need for the knowledge of statistical tools and methods is expected (Raeside and Walker, 2001). We believe that when analysing the analytical tools of an aCRM IS, the knowledge and skills of the statistical tools should be considered and TAM should be expanded to also include this aspect.

6 Conclusions

The use of analytical tools of an aCRM IS is an extremely promising area for research, yet it has not been the focus of

many studies. It is a particularly promising area for research because organizations are being increasingly faced with »big data,« the need for information about customers, market demands, and new products. In turn, these require the use of analytical tools of an aCRM IS. The use of new analytical instruments and tools of an aCRM IS also encourages the development of new technologies and software support. Our study has found that, in order to give an organization a positive attitude towards the use of the analytical tools of an aCRM IS, organizations must be innovative, process, and technology oriented. It is particularly important to be innovative oriented, as new ideas and approaches have the most significant impact on the attitude towards the use of the tools of aCRM IS. In relation to the use of analytical tools, aCRM IS also has an influence on the attitudes towards the use of new technologies and other tools. Out of the three orientations, innovative and technological orientation have the strongest impact. The use of the analytical tools of an aCRM IS requires the use of appropriate technology and software support, new ideas and approaches, and knowledge on how to use them to obtain new and interesting information about customers. This is important for strategic decision making in the management of organizations. In considering the organizations' stance, we must also take into account the orientation process, which has a significant impact on the attitude towards the use of the analytical tools of an aCRM IS. Analytical tools are an integral part of the customer management process and at the management level, depending on what kind of information is needed and what decisions are accepted. The use of analytical tools is not only helpful for strategic management support, but also throughout the organization in general. Thus, we researched the orientation of the organizations in relation to their use of the analytical tools of an aCRM IS.

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Vpliv organizacijskih dejavnikov na odnos do uporabe analitičnih orodij informacijske rešitve CRM

Ozadje in namen: Informacijska rešitev analitičnega upravljanja s strankami (aCRM IR) zajema med drugim uporabo analitičnih orodij, ki zaradi potrebe organizacij po znanju strank in upravljanju masivnih podatkov, pridobivajo na vse večji veljavi. Zato je bil cilj raziskave ugotoviti, kako naravnost organizacije (procesna, inovativna in tehnološka) kot kritični organizacijski dejavnik vpliva na odnos do uporabe analitičnih orodij aCRM IR.

Zasnova/metodologija/pristop: Za merjenje naravnosti organizacije (procesna, inovativna in tehnološka) smo preoblikovali obstoječe merilne lestvice, ki smo jih validirali s pomočjo eksploratorne faktorske analize. V naslednji fazi smo oblikovali model, s katerim smo preverjali vpliv naravnosti organizacije na odnos do uporabe a analitičnih orodij aCRM IR, pri čemer smo uporabili multiplo regresijsko analizo. Model smo preverjali na vzorcu slovenskih organizacij (n=105), ki za analiziranje podatkov o strankah in poslovnih partnerjih uporabljajo analitična orodja.

Rezultati: V študiji smo ugotovili, da imajo vsi trije vidiki naravnosti organizacije, procesna, tehnološka in inovativna naravnost, pozitiven vpliv na odnos do uporabe analitičnih orodij aCRM IR v organizaciji. Še zlasti je pomembna inovativna naravnost organizacije, ki ima najmočnejši vpliv na odnos do uporabe analitičnih orodij aCRM IR. Inovativno naravnost je dvodimenzionalni konstrukt. Ugotovili smo, da ima inovativna naravnost na nove ideje, metode in pristope največji vpliv na odnos do uporabe analitičnih orodij aCRM IR, sledi pa inovativna naravnost na sprejem novosti v organizaciji.

Zaključek: Bolj kot so organizacije inovativno, tehnološko in procesno naravnane, bolj pozitiven odnos imajo v povprečju do uporabe analitičnih orodij aCRM IR. Študija je še posebej pomembna za organizacije, ki vpeljujejo aCRM IR v poslovni sistem.

Ključne besede: *kritični organizacijski dejavniki, analitično upravljanje odnosov s strankami (aCRM), analitična orodja, odnos do uporabe orodij aCRM*

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Hybridization of Stochastic Local Search and Genetic Algorithm for Human Resource Planning Management

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Background and Purpose: The restructuring of human resources in an organization is addressed in this paper, because human resource planning is a crucial process in every organization. Here, a strict hierarchical structure of the organization is of concern here, for which a change in a particular class of the structure influences classes that follow it. Furthermore, a quick adaptation of the structure to the desired state is required, where oscillations in transitions between classes are not desired, because they slow down the process of adaptation. Therefore, optimization of such a structure is highly complex, and heuristic methods are needed to approach such problems to address them properly.

Design/Methodology/Approach: The hierarchical human resources structure is modeled according to the principles of System Dynamics. Optimization of the structure is performed with an algorithm that combines stochastic local search and genetic algorithms.

Results: The developed algorithm was tested on three scenarios; each scenario exhibits a different dynamic in achieving the desired state of the human resource structure. The results show that the developed algorithm has successfully optimized the model parameters to achieve the desired structure of human resources quickly.

Conclusion: We have presented the mathematical model and optimization algorithm to tackle the restructuring of human resources for strict hierarchical organizations. With the developed algorithm, we have successfully achieved the desired organizational structure in all three cases, without the undesired oscillations in the transitions between classes and in the shortest possible time.

Keywords: *stochastic local search, system dynamics, human resources, manpower, simulation*

1 Introduction

Human resource planning is one of the main activities in every organization that has a long-term mission plan. In our previous research (Škraba et al., 2011; Škraba et al., 2015a; Škraba et al., 2015b; Škraba et al., 2015c; Kofjač et al., 2015), we have examined human resources planning in strict hierarchical organizational structures, such as the army, or other organizations, in which promotions to higher

classes are possible only by one step at a time. The problem of the hierarchical manpower control is challenging due to the variability of the constraints on the recruitment, transitions, wastage, and retirements. Furthermore, the dynamics of the system should be considered, usually in a longer period, i.e. ten years or more. In order to provide proper strategies to restructure human resources, several techniques have been applied. For the prevention of oscillations, the finite automaton was developed (Škraba et al., 2011) combined

with genetic algorithms and pattern search. In optimization methods, the self-configuring algorithms were developed (Škraba et al., 2015b) providing promising results. In addition to the problem of the oscillations, the variable parameter boundaries were considered (Škraba et al. 2015c).

Human resource planning affects the entire organization. In the research of Majd et al. (2015), the combination of human resource planning and production-inventory control is considered. The problem was addressed by the modelling and simulation methods providing promising results in comparison to other approaches. The importance of a hybrid simulation model tackling management problems was indicated in Kljajić et al. (2000). In this work, System Dynamics Methodology has been used (Škraba et al., 2003; Škraba et al., 2007; Borštnar et al., 2011; Rozman et al., 2013). A resource assignment language was developed in the research of Cabanillas et al., (2015), which provided the automatic answers to tackle the problem of the management of resources in business process at the design phase. In the study of Lin et al. (2015), the mixed integer programming model was used to solve the problem of workforce scheduling for retail stores, taking into account employee's preferences and the equality of scheduling. Here the goal was to achieve an optimal balance among employee's satisfaction, customer service level, and labor costs. Unsurprisingly, the human resource planning requires advanced quantitative methods to provide proper results. Gupta and Ghosal (2014) applied stochastic modelling for determination of the appropriate time of promotion considering the survival rates in different classes. They have considered varying size classes and indicated, that the main goal of an employee in an organization is to get a promotion to the next grade. Nevertheless, the main obstacles to the organizational restructuring regarding human resources management are in organizational barriers (Babaei et al., 2015). Technological factors should, therefore, be considered to be less important than the organizational obstacles.

Our goal is to provide the proper mathematical model of the strict hierarchical human resources model and an appropriate optimization algorithm, that would provide the transition strategies for particular classes, which would enable us to restructure the organization in the shortest possible time without undesired oscillations in the strategy.

2 Methodology

The structure of the organizational human resources system could be best described by the application of the Causal Loop Diagram (CLD). Figure 0 shows the structure of the system, in which n classes are considered. Starting with Class 1 at the left, recruitment is increasing the number of employees in Class 1. If the number of members of Class 1 increases, the Promotions from Class 1 to Class 2 increases above the number that it would have otherwise been. In contrast the other hand, if the Number of Promotions from Class 1 to Class 2 increases, the number in Class 1 is lower than it would have otherwise been. This forms the stabilizing, negative feedback loop, which is cascading throughout our structure. The amount of waste decreases the number of people in each particular class. The promotion factor determines the rate of promotions from lower classes to the higher classes. More promotions from Class 1 to Class 2 increase the number of people in Class 2, etc. At the end of the structure, retirement is considered to be the exit from the system. The structure consists of the cascaded structure of decay determining the dynamics of the system.

The system was modelled using the System Dynamics methodology (Sterman, 2000). In a compact form, the dynamics are described in the state space:

$$\begin{aligned}\dot{\mathbf{x}} &= \mathbf{A}\mathbf{x} + \mathbf{B}\mathbf{u} \\ \mathbf{y} &= \mathbf{C}\mathbf{x} + \mathbf{D}\mathbf{u}\end{aligned}$$

where \mathbf{x} represents the state vector, \mathbf{y} the output of the system, \mathbf{A} is the matrix of coefficients, \mathbf{B} is input matrix, \mathbf{u} ,

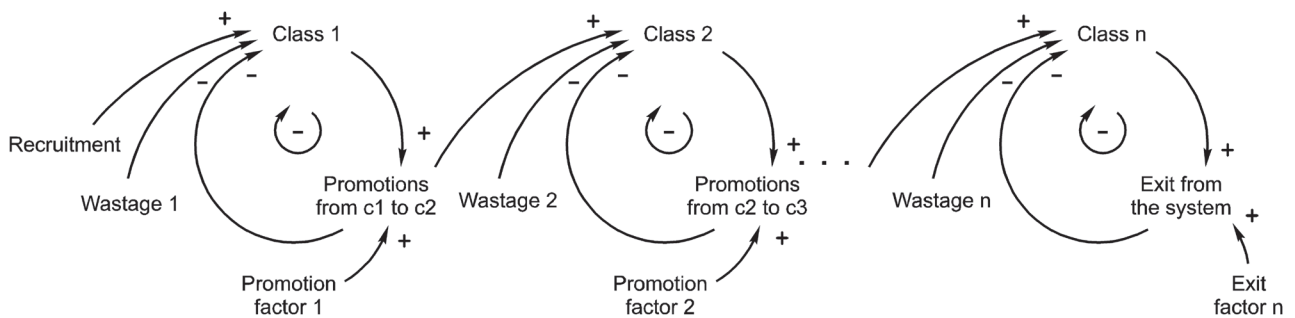


Figure 0: CLD of Organizational Human Resources

vector of inputs, **C** output matrix and **D** translation matrix providing the input values to the desired output. Therefore, the system has been described as the set of the differential equations in the state space. A more detailed description could be found in the reference Škraba et al., 2015a.

The developed model provides us with the dynamic response. In order to obtain the appropriate strategies, that would enable achieving proper numbers of people in a particular class, the optimization algorithm was developed, which is applied to the model. In order to achieve the

desired number of people in a particular rank, the goal is to determine how to define recruitment, transitions between ranks and fluctuations to reach a new, i.e. the desired, organizational structure.

The pseudocode of the optimization algorithm for finding transition values for one iteration is provided in the next section. The code should be launched several times until two last iterations are equal (i.e. the system is in equilibrium). The parameter r represents promotions, f factor of wastage, min and max represent parameter boundaries.

For all r and f set:

$$r = (r_{min} + r_{max})/2$$

$$f = (f_{min} + f_{max})/2$$

$$recruitment = max_recruitment/2$$

For all classes calculate next iteration X

Repeat the following algorithm for N steps:

For classes from 1 to *NumberOfClasses*:

If class number is 0:

If current X value is lower than desired:

Choose one of three actions randomly:

- 1) Decrease outflow by 1 by changing f value, if possible
- 2) Decrease promotion by 1 to the next class by changing r , if possible
- 3) Increase recruitment by 1 if possible

Else if current X value is higher than desired:

Choose one of three actions randomly:

- 1) Increase outflow by 1 by changing f value, if possible
- 2) Increase promotion by 1 to the next class by changing r , if possible
- 3) Decrease recruitment by 1 if possible

For all classes recalculate next iteration X

If class number is larger than 0 but lower than *NumberOfClasses*:

If current X value is lower than desired:

Choose one of three actions randomly:

- 1) Decrease outflow by 1 by changing f value, if possible
- 2) Decrease promotion by 1 to the next class by changing r , if possible
- 3) Increase promotion by 1 from previous class by changing r , if possible

Else if current X value is higher than desired:

Choose one of three actions randomly:

- 1) Increase outflow by 1 by changing f value, if possible
- 2) Increase promotion by 1 to the next class by changing r , if possible
- 3) Decrease promotion by 1 from previous class by changing r , if possible

For all classes recalculate next iteration X

If class number is equal to *NumberOfClasses*:

If current X value is lower than desired:

Choose one of three actions randomly:

- 1) Decrease outflow by 1 by changing f value, if possible
- 2) Decrease output from the system by 1 by changing r , if possible
- 3) Increase promotion by 1 from previous class by changing r , if possible

Else if current X value is higher than desired:

Choose one of three actions randomly:

- 1) Increase outflow by 1 by changing f value, if possible
- 2) Increase output from the system by 1 by changing r , if possible
- 3) Decrease promotion by 1 from previous class by changing r , if possible

For all classes recalculate next iteration X

Copy current r , f and recruitment values to the next iteration.

This algorithm allows finding the solution for the class problem using an iterative approach. The random choice of one of three different actions in each of the possible situations is because these actions influence not only the previous and next class nodes, but also all the nodes after the next. Because of the complexity of such dependencies, and the fact that a case with integer values is under consideration, the random choice of the next step was used.

Although this algorithm is capable of finding a solution, this solution depends on the initial values of the transitions, fluctuations, and recruitment. Because the numbers of transitions, fluctuations, and recruitment are quite large even for several classes, we used the genetic algorithm as an optimizing technique for this problem. The optimized values were the initial positions of the transition and fluctuation coefficients. Therefore, the proposed algorithm for finding the optimal strategy given the initial values can be considered to be the local search method. The fitness values for GA were calculated as the average number of steps required to achieve the goal position plus the penalty values.

The goal position was achieved only if all the class values were equal to the desired ones, and transition and fluctuation values are the same for two last time steps, as well as the number of people (this means that the system is stable/in the equilibrium point).

For every goal function calculation in GA, 100 runs of the proposed strategy search algorithm were used, and then used the minimal number of steps required to achieve the basic fitness value. Every time, we received a better solution, we saved it separately.

Together with the number of time steps, two more criteria were included into the goal function: the average recruitment level needed to achieve the goal and stabilize the system (normalized to the maximum recruitment number) with a weight of 0.001 as well as the penalty value, depending on the oscillations. The penalty values were calculated using a derivative-based approach (Škraba et al., 2015b). The initialization of the population of GA was performed randomly; the size of the population was 100, and the number of generations was 1000.

3 Results

A large organization restructuring problem with a strict hierarchical structure has been under consideration (Škraba et al., 2011). The developed algorithm was used to consider the three experiments that were made for the initial values presented in Table 1.

Table 1. Initial numbers of class members

Class	State variable	[people]
C1	x_1	256
C2	x_2	258
C3	x_3	447
C4	x_4	189
C5	x_5	119
C6	x_6	42
C7	x_7	11
C8	x_8	3

Since the goal is to obtain the optimal transition and recruitment coefficients between particular classes, their lower and upper boundaries have to be considered; these are shown in Table 2. Here \bar{r} represents the average value of the promotion parameters, σ_r is standard deviation, min and max represent maximum values for particular parameters; similar for wastages f .

Table 2: Transition coefficients and corresponding statistics

Class	\bar{r}	σ_r	r_{\min}	r_{\max}	\bar{f}	σ_f	f_{\min}	f_{\max}
C1	0.16	0.13	0.06	0.43	0.13	0.09	0.04	0.30
C2	0.12	0.09	0.04	0.32	0.11	0.06	0.06	0.24
C3	0.07	0.06	0.03	0.20	0.07	0.04	0.03	0.15
C4	0.10	0.10	0.03	0.33	0.09	0.06	0.02	0.20
C5	0.07	0.05	0.02	0.18	0.08	0.06	0.02	0.16
C6	0.05	0.04	0.01	0.11	0.15	0.10	0.05	0.37
C7	0.01	0.04	0.00	0.11	0.15	0.10	0.00	0.28
C8	0.01	0.05	0.00	0.10	0.15	0.10	0.00	0.30

In Table 3, the three different goal positions are shown. The differences in these scenarios are the rate of reduction/increase of people in particular classes. SC2 and SC3 are therefore scenarios with more demanding restructuring regarding the change in particular rank.

Table 3: Three scenarios used

Class	SC1	SC2	SC3
C1	148	110	110
C2	289	304	304
C3	339	221	151
C4	224	165	109
C5	121	83	53
C6	45	32	13
C7	16	7	6
C8	6	5	3

For the first scenario, the following solution was found, having three time steps. The fourth time step is needed to ensure that the system is stable. In Figure 1, the recruitment level into the first class is shown.

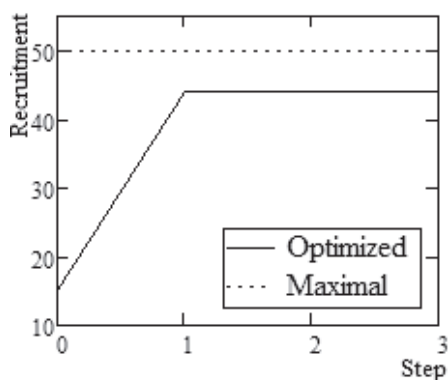


Figure 1. Recruitment level

In Figures 2 and 3, the change of the number of people in each class is shown. At time step 0, the initial values are shown. At timestep 1, for most of the classes, the goal values are achieved.

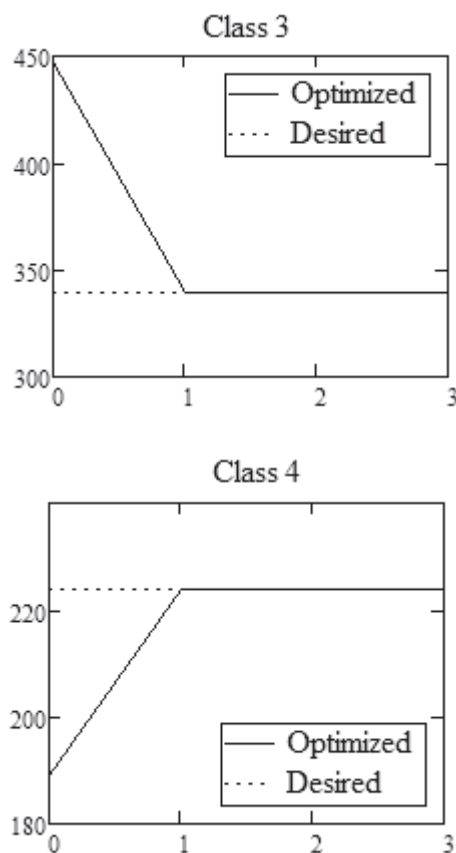
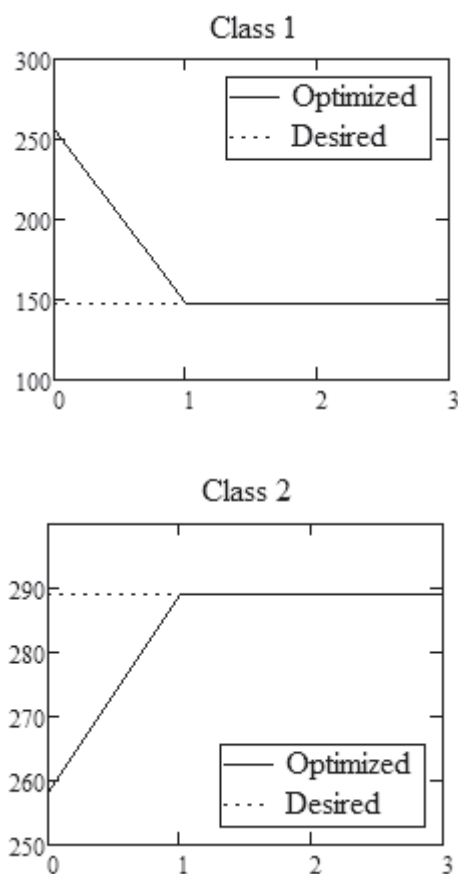
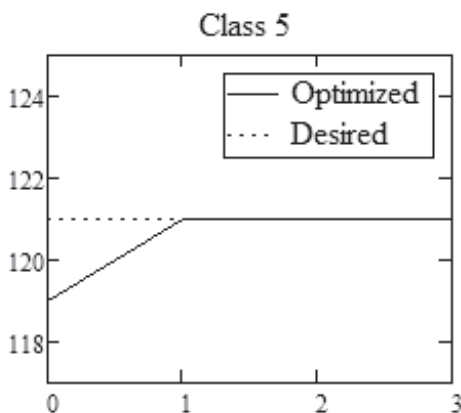


Figure 2. Classes 1-4

For classes 7 and 8, it is not possible to achieve the goal in one step due to the transition coefficient boundaries so that the algorithm finds the best possible solution in two steps.



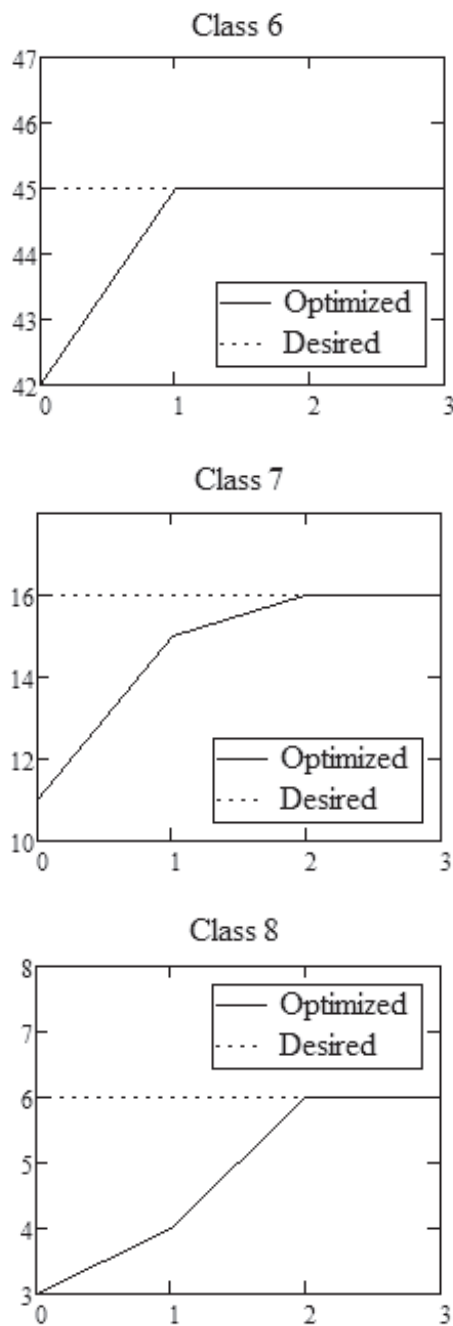


Figure 3. Classes 5-8

Figure 4 shows the transition and fluctuation coefficients achieved by the algorithm. Different colors represent transitions and fluctuations from particular classes.

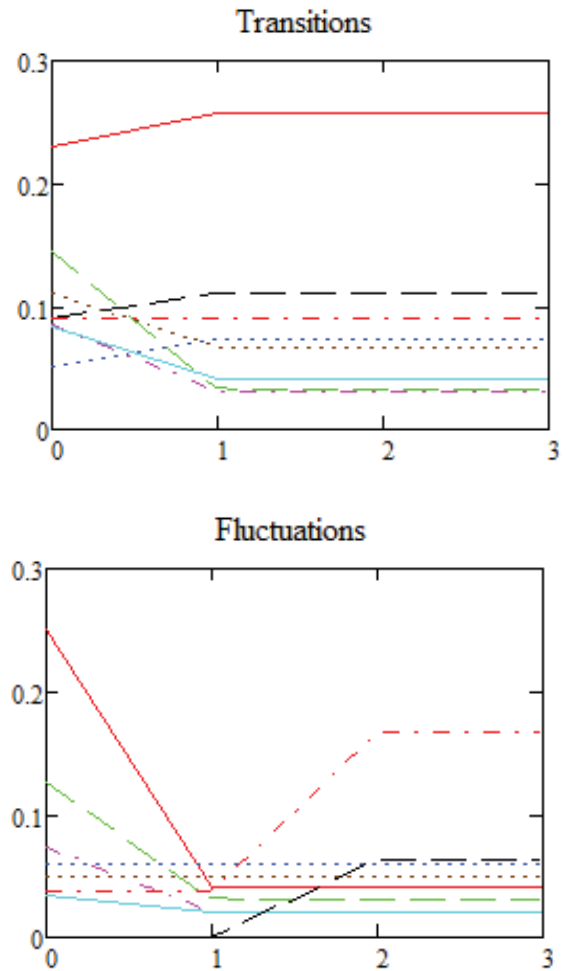
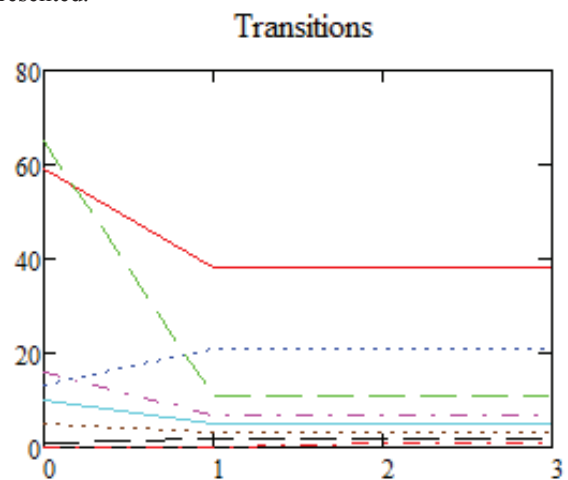


Figure 4. Transition and fluctuation coefficients

The last step shows that the transition and fluctuation values are stable, as are the number of people in each class. In Figure 5, the values of transitions and fluctuations are presented.



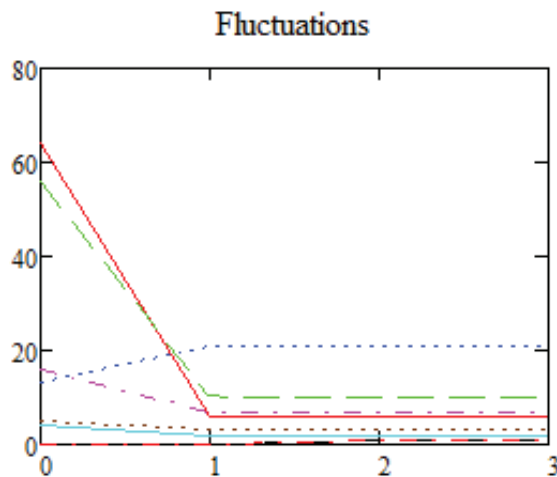


Figure 5. Transition and fluctuation values

From the presented figures, for this scenario, it may be concluded that the proposed approach enabled finding the solution without oscillations and in the least possible number of steps. This solution is not the only possible one, as the transition and fluctuation coefficients can be changed in each class while maintaining the system in a state of equilibrium.

For the second scenario, the following results were achieved. The recruitment level into the first class change is shown in Figure 6. For this case, the algorithm requires six steps to achieving the goal.

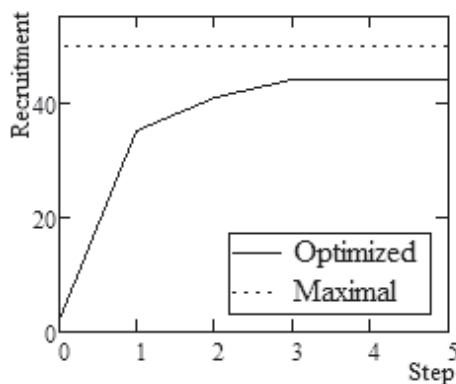
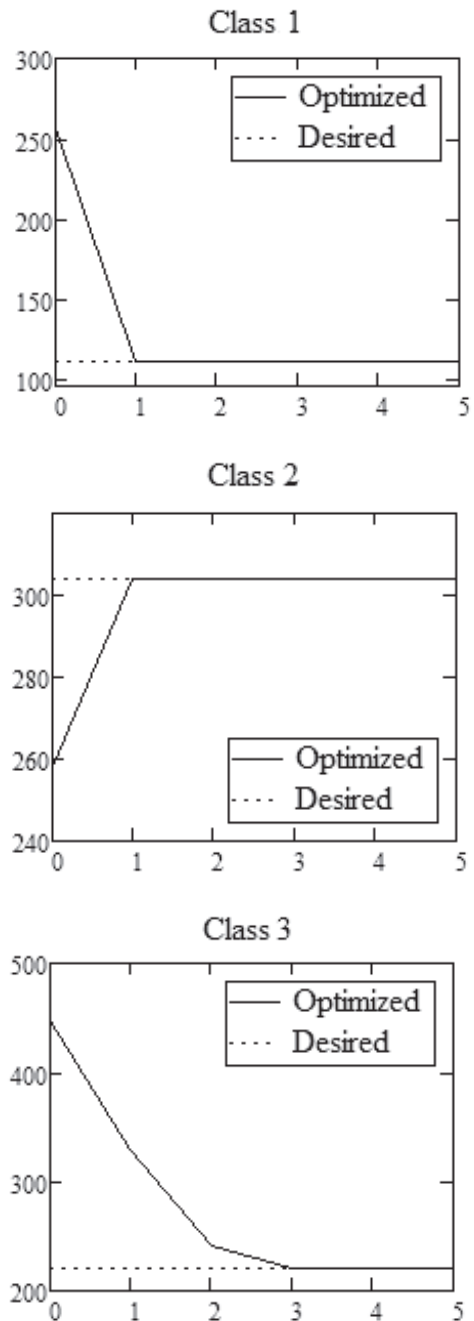


Figure 6. Recruitment level, second scenario

The recruitment level gradually rises but does not achieve the maximum possible level. In Figures 7 and 8, the change of the number of people in each class is shown. At time step 0, the initial values are shown. For classes 1 and 2, the goal is achieved in one step, while the other classes require more steps. For most classes the goal is not achievable in one step because of the constraints. In this case, the algorithm moves the current values of classes towards the goal and proceeds to the next step.



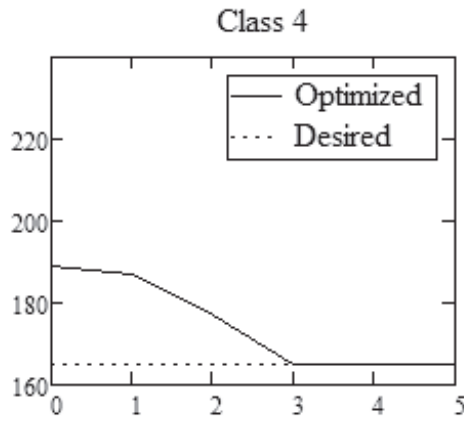


Figure 7. Classes 1-4, second scenario

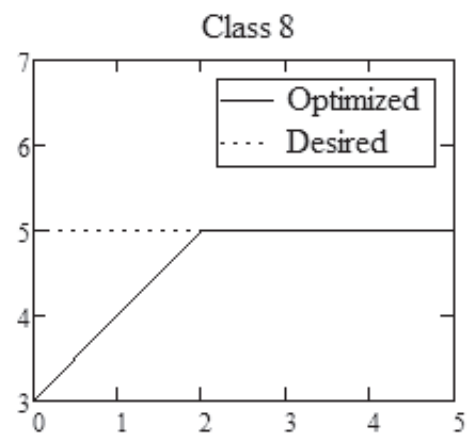
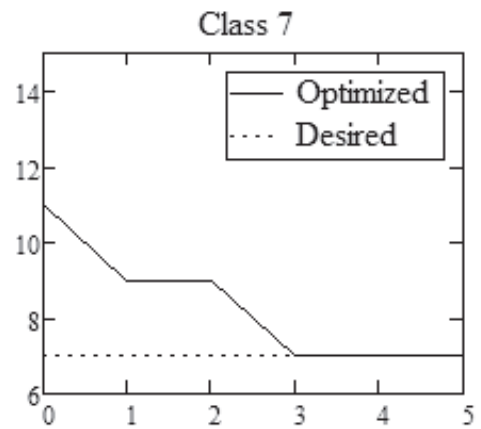
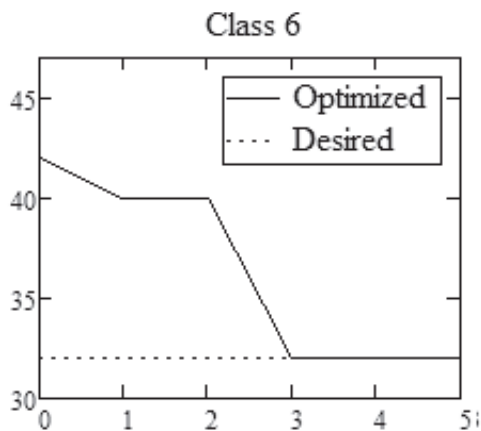
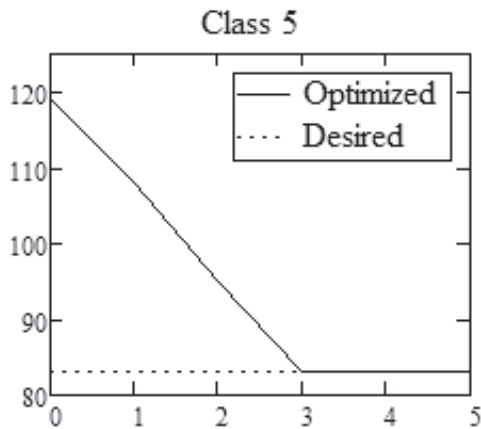
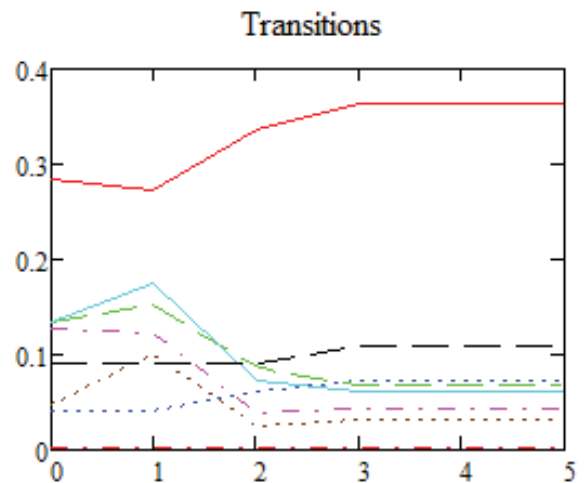


Figure 8. Classes 5-8, second scenario

Figure 9 shows the transition and fluctuation coefficients achieved by the algorithm.



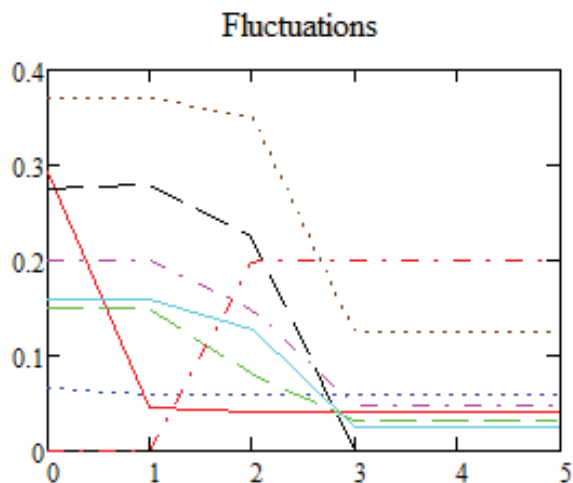


Figure 9. Transition and fluctuation coefficients, second scenario

The last step shows that the transition and fluctuation values are stable, as is the number of people in each rank. In Figure 10, the values of transitions and fluctuations are presented.

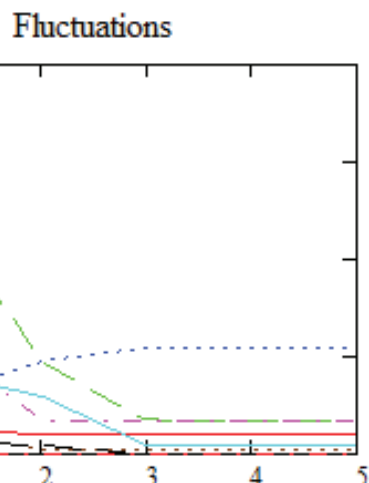
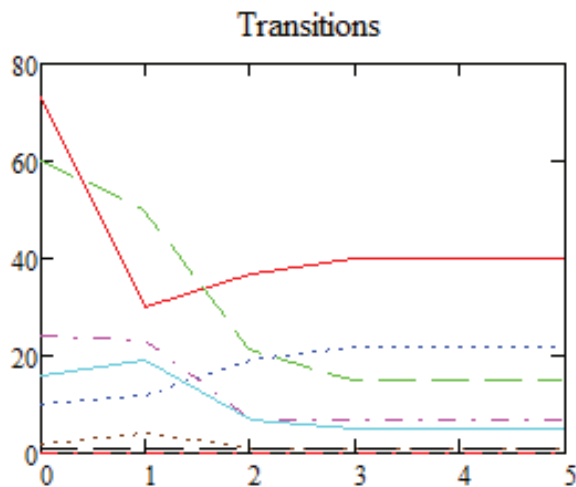


Figure 10. Transition and fluctuation values, second scenario

Although the transition coefficients have peaks, they cannot be considered as oscillations. Moreover, oscillations in the transition and fluctuation coefficients do not always result in non-monotonic transition values.

For the third scenario, the following results were achieved. The recruitment level change for the first class is shown in Figure 11. For this case, the algorithm requires eight steps to achieve the goal.

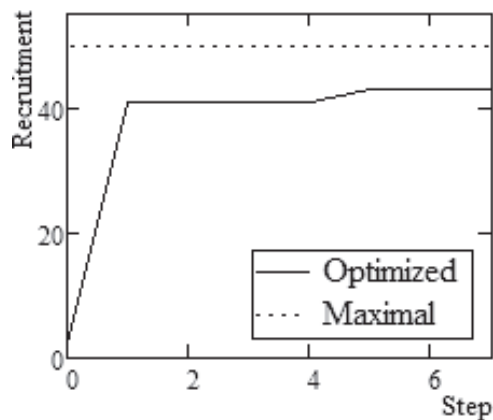


Figure 11. Recruitment level, third scenario

The recruitment level gradually rises but does not achieve the maximal possible level. In Figures 12 and 13, the change of the number of people in each class is shown. At time step 0, the initial values are shown. For classes 1 and 2, the goal is achieved in one step, while the other classes require more steps. For class 8, the initial value is equal to the desired one, and the algorithm keeps it unchanged.

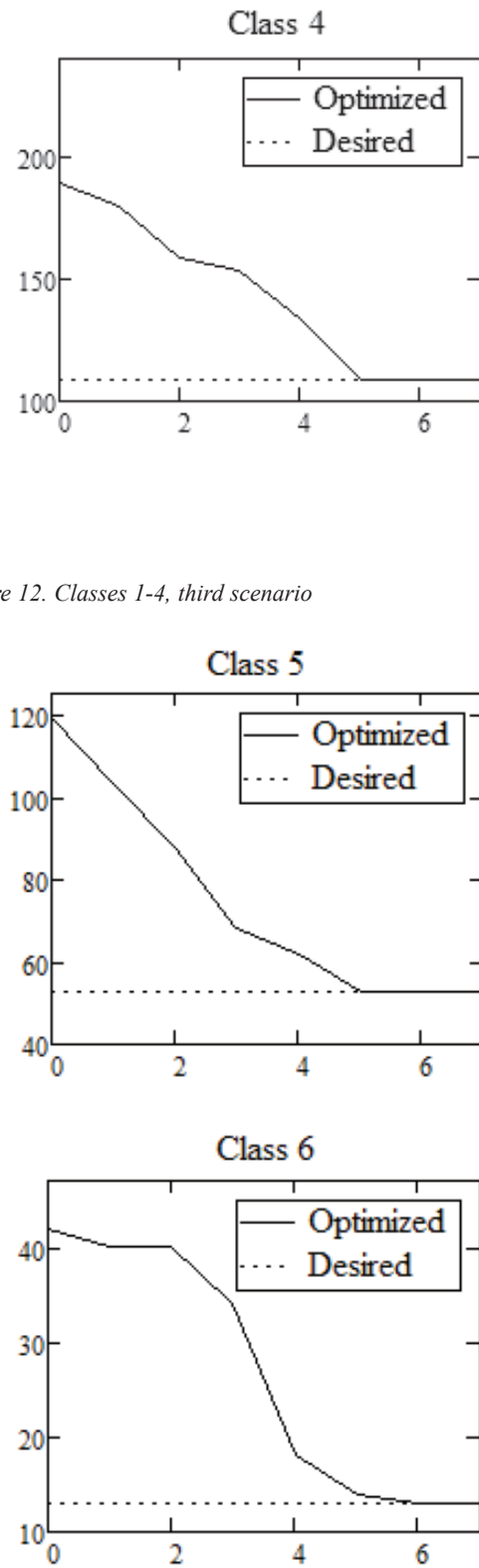
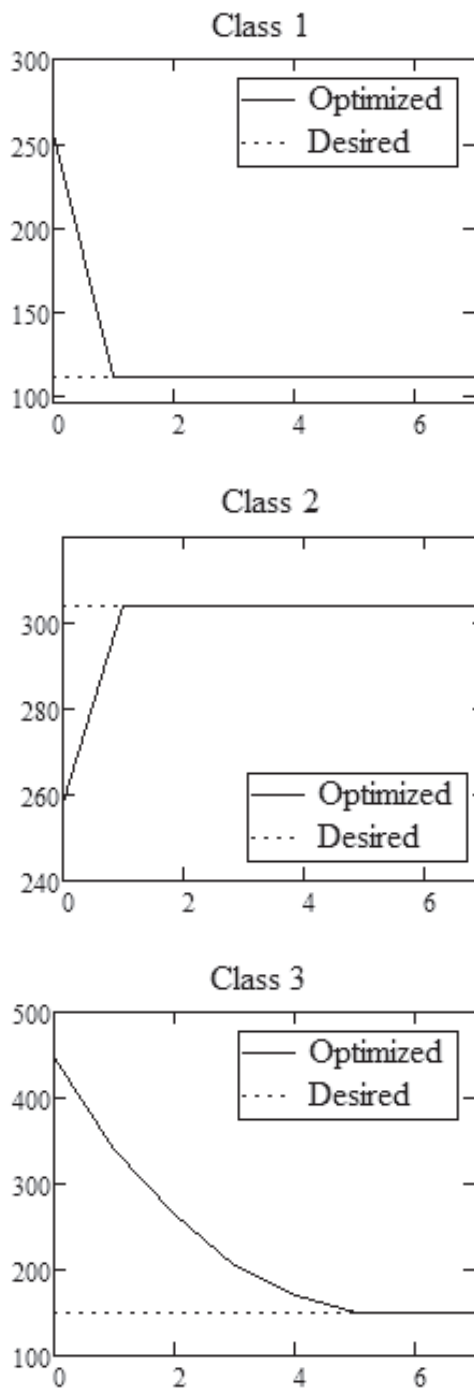


Figure 12. Classes 1-4, third scenario

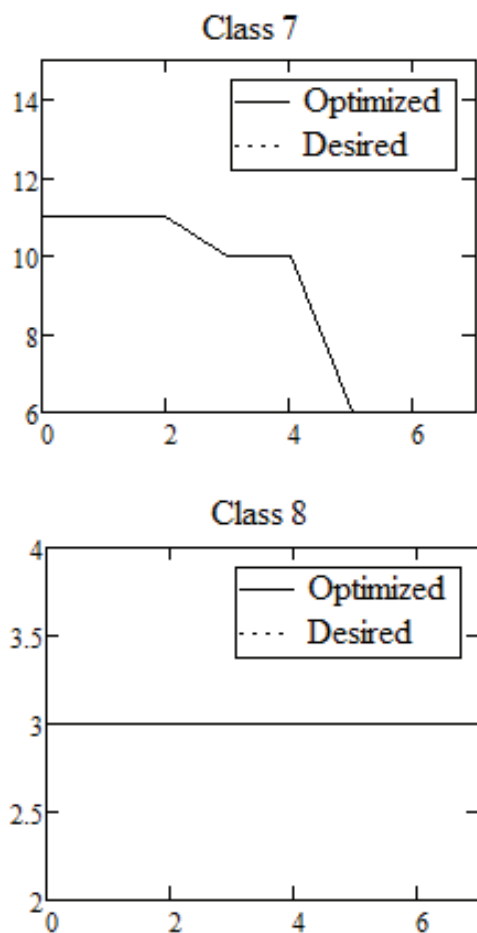


Figure 13. Classes 5-8, third scenario

Figure 14 shows the transition and fluctuation coefficients achieved by the algorithm.

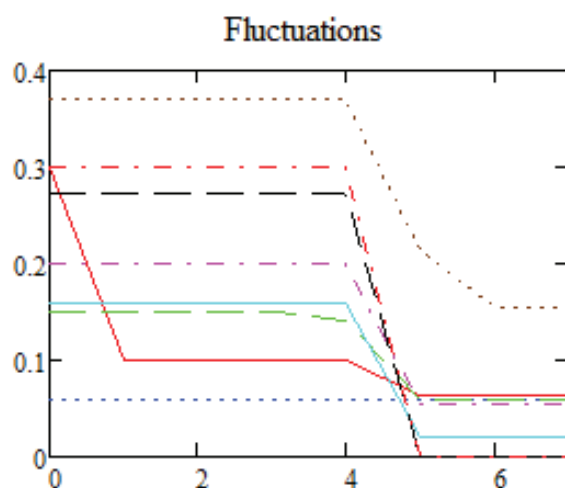
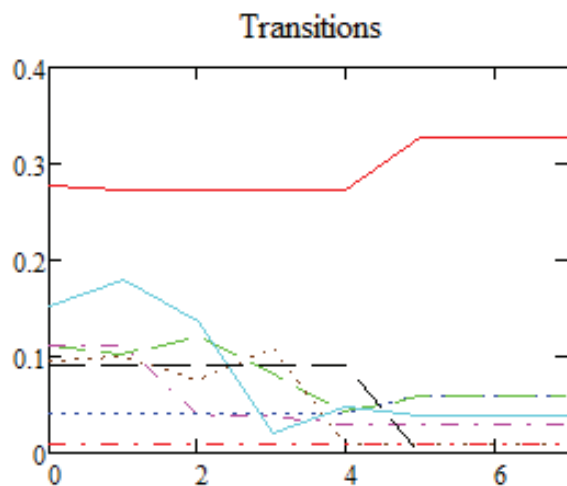
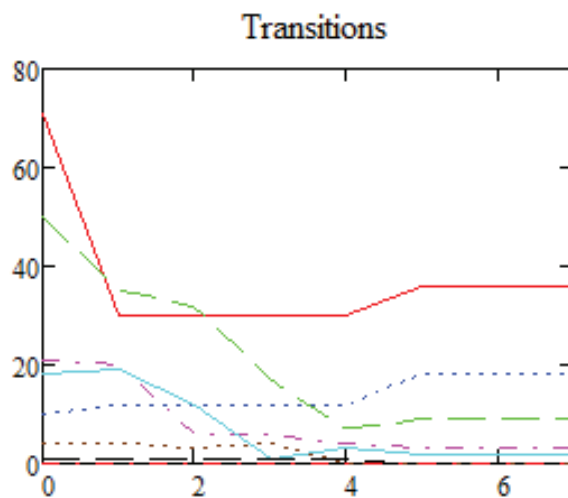


Figure 14. Transition and fluctuation coefficients, third scenario

The last step shows that the transition and fluctuation values are stable, as are the number of people in each class. In Figure 15 the values of transitions and fluctuations are presented.



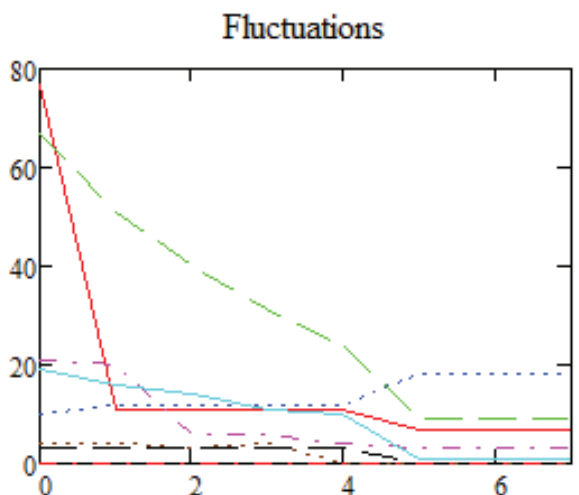


Figure 15. Transition and fluctuation values, third scenario

As with the previous scenario, the peaks in transition coefficients may be observed; however, these peaks are allowable as they are not oscillations.

The presented results show that the proposed method allows finding optimal solutions for different scenarios of human resource planning problems. Testing the algorithm on a set of 25 other scenarios with randomly generated parameters has shown similar results, proving the algorithm's efficiency.

4 Conclusion

The applied mathematical model and developed optimization algorithm provided the solutions to the problem of finding proper transition strategies in the strict hierarchical human resources management system. With the proper strategy, a short time is needed to achieve new numbers in particular classes without oscillations in transition and wastages. The task of providing the proper strategies is demanding, since the problem is dynamic, meaning that each parameter of the model could be changed in time. This generates a large search space, which is challenging for the optimization algorithm. Another challenge is the possibility to provide two equally good strategies with different control vectors. This means that the optimum criterion is not fully defined. Nevertheless, the developed, advanced local stochastic search algorithm provided proper solutions, eliminating the oscillations, achieving the target values in the shortest possible time.

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Hibridizacija stohastičnega lokalnega iskanja in genetskih algoritmov za planiranje človeških virov

Ozadje in cilj. V prispevku je obravnavana reorganizacija na področju človeških virov kot najpomembnejšega dejavnika v vsaki organizaciji. Obravnavali smo striktno hierarhično strukturo organizacije, kjer spremembe v posameznem nižjem razredu vplivajo na višje razrede. Pri reorganizaciji želimo, da se struktura čim prej prilagodi novim, želenim vrednostim. Pri tem so nihanja v številu prehodov nezaželena, saj neugodno vplivajo na proces reorganizacije. Optimizacija tovrstne strukture je kompleksna in zahteva ustrezen pristop s heurističnimi metodami.

Metodologija in pristop. Hierarhična struktura človeških virov v organizaciji je modelirana s pomočjo principov sistemske dinamike. Optimizacija dinamike obravnavane strukture je izvedena z algoritmom, ki kombinira stohastično lokalno iskanje in genetske algoritme.

Rezultati. Razviti algoritem je bil testiran na treh različnih scenarijih; vsak od scenarijev je izkazoval drugačno dinamiko pri doseganju želenih stanj v strukturi človeških virov. Rezultati so potrdili uspešnost razvitega algoritma za optimizacijo parametrov modela, ki omogoča hitro doseganje ciljnih stanj.

Zaključek. Predstavili smo matematični model in optimizacijski algoritem, ki omogoča prestrukturiranje na področju človeških virov v organizacijah. S pomočjo razvitega algoritma smo uspešno dosegli želeno organizacijsko strukturo v treh različnih podanih scenarijih brez nezaželenih oscilacij v številu prehodov.

Ključne besede: stohastično lokalno iskanje, sistemska dinamika, človeški viri, delovna sila, simulacija

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Attitudes of Social Gerontology and Physiotherapy Students Towards the Elderly

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Background/Goal. Attitudes towards older persons are particularly important for healthcare students and practitioners. The aim of our work is to analyse the attitudes of social gerontology and physiotherapy students towards elderly persons.

Method. A structured questionnaire using the Kogan Attitudes towards Older People scale (KAOP) was used to collect data. Statistical methods were applied to evaluate the data: reliability test, t-test for independent samples and bivariate correlational analysis.

Results. Social gerontology and physiotherapy students accept the elderly with awareness and respect. Few age-related prejudices and stereotypes were found among them, and they do not problematise the elderly. Social gerontology students have more positive attitudes towards the elderly than physiotherapy students do. Male students and students who live in the same household with elderly persons are more appreciative towards them, but they have more prejudices; the same applies to a lesser extent to students who do not live in the same household with an elderly person.

Conclusion. Although minor deviations from a positive attitude were found, probably resulting from different experiences with elderly people, the results of this study raise hopes that respectful relations and cooperation across age groups will continue.

Key Words: attitude, elderly, student, social gerontology, physiotherapy, KAOP.

1 Introduction

The population is ageing globally. In recent years, the older adult population (age 65 and older) has been increasing. Research into aging has developed rapidly over the past decade, including research on attitudes towards older adults. This applies in particular to countries with a good publicly funded health care system that guarantees universal coverage for health care services based on need, rather than the ability to pay, such as Canada (Sheets and Gallagher, 2012).

Gerontology is the study of the social, psychological, cognitive, and biological aspects of aging. *Gerontologists* include researchers and practitioners in a very wide range of fields, from biology, nursing, public health, and medicine, to economics, architecture, housing, and anthropology. Gerontology is distinguished from **geriatrics**, which is the branch of medicine that specialises in the treatment of existing disease in older adults.¹ **Social gerontology** is a multidisciplinary sub-field that specialises in studying or working with older adults. *Social gerontologists* may have degrees

¹ Wikipedia, <https://en.wikipedia.org/wiki/Gerontology>

or training in social work, nursing, psychology, sociology, demography, or other social science disciplines. They are responsible for educating, researching, and advancing the broader causes of older people.² Social gerontology deals with advanced age and old people, who should be (regardless of age) active and productive, integrated into the life of the society, not as a supported group.

Demographic changes in the direction of a rapidly increasing contingent of elderly people often result in prejudices and deviating behaviour, which can influence mutual relations between different age groups (Ule, 2004). Often they result in discriminatory perceptions of age groups and idealising the group to which we belong. In particular, in relation to elderly people, stereotypes and stigmas are often encountered. Most frequently, they appear in the relations between the generation of retirees and generation Z.³ Because of our perceptions of someone's traits, which we transfer onto entire groups, such perceptions mostly negatively influence our relations. This is also a possible explanation of why medical students do not choose a career in geriatrics (Meiboom et al., 2015). Negative attitudes towards older people and myths about ageing are ubiquitous. Older adults are sometimes viewed as a health care worker's burden and an obstacle to the more important work of caring for younger adults (Liu et al., 2012).

Common beliefs about the aging process are often a consequence of negative stereotypes: simplified and biased opinions about the elderly. A »typical« elderly person is often seen as a senile individual, tired, passive, without energy, and dependent on others. Children experience an elderly person as an individual with positive personal characteristics but as someone with poor physical performance. However, if the physical abilities are more important to children than the personal characteristics of the elderly, they will consequently experience them less positively than younger people will (Schaie & Willis, 2011).

The attitude towards the elderly is particularly relevant for students and practitioners in healthcare professions, such as physicians, nurses, physiotherapists, geriatric specialists, and, specifically, for social gerontologists. Although many studies have been published focusing on rather different aspects of the attitudes of health care professionals and of students of health sciences towards the elderly, conclusions are many times incomplete and inconsistent (see chapter Literature review). In our study, we focused on the attitude of physiotherapy and social gerontology students. The goal of our work is to investigate the attitude of the two student groups towards older persons and possible deviations in their attitudes.

2 Literature review

Numerous studies have been carried out among healthcare workers and healthcare-related students; they were conducted in different countries, among different professional and student groups. In addition, the focus of these studies is rather diverse. Even recently published systematic literature reviews, such as that of Liu et al. (2012) and Wang and Chonody (2013), have found that results of the studies on attitudes towards older people were inconsistent, with positive, negative and neutral attitudes being noted across various groups of health care professionals.

Bergman et al. (2014) investigated factors associated with interest in aging-related topics and careers and knowledge about the opportunities that exist in the field of gerontology. Their study includes a survey of 300 college students representing a wide range of disciplines. Most of the studies focus on health care professionals and/or students. For example, Doherty et al. (2011) report that health care workers in Ireland held generally positive attitudes towards older people; no significant differences in attitude scores measured across gender, job title, the length of service in the current role, and workplace setting were found. The study did detect a significant difference in scores between university graduates (associated with more positive attitudes) when compared to those who had not attained a university qualification. In contrast, a study carried out in the United Arab Emirates showed that education had minimal impact on the attitude of students toward old people (Sheikh et al., 2013). Moreover, medical students in Singapore have a positive attitude towards the elderly (Cheong et al., 2009). It is important to note that their medical curriculum continues to have an increasing geriatric component while the curriculum in the United Arab Emirates entailed no comprehensive module for geriatric health or ageing. Ayoğlu et al. (2014) report that »[...] medical students showed more positive attitudes toward older people than nursing students. Students who were females, whose economic income was less than expenditure, and who were not interested in working with older people after graduation showed less positive attitudes«. Liu (2014) found that the majority of Chinese undergraduate medical students surveyed had positive attitudes towards the elderly, and students with an interest in problems of the elderly and were more willing to consider careers in gerontology.

Others, for example, Turan et al. (2015), studied the attitude of a specific group (in their case, physiotherapy students) towards older people and found that they were more positive than students in other health disciplines. However, they found no differences in the attitudes of health science

² Wikipedia, https://en.wikipedia.org/wiki/Gerontology#Social_gerontology

³ Wikipedia, https://en.wikipedia.org/wiki/Generation_Z

students towards older persons throughout Turkey. Wang et al. (2009) concluded that female students who were younger and studying nursing were more likely to have more positive attitudes than older males studying medicine.

While most of the studies report a mostly positive attitude towards the elderly, an investigation by Kearney et al. (2000) among a specific group of medical staff (oncology healthcare professionals) found that regardless of gender, profession, clinical experience, and specialist education, persistently negative attitudes were displayed towards elderly people.

Previous relations and contact with the elderly may have a significant impact on someone's attitude towards them. For example, Khan (2011) states that students who had cared for an older adult reported a more positive attitude toward older adults than other students who had not had such an experience. Preferences to work with older people and knowledge of ageing appeared to be associated with positive attitudes towards older people (Liu et al., 2012).

Eaton et al. (2015) presented a mixed method study in which 12 nursing students and 12 older adult long-term care residents collaborated in a transformational learning experience. Although positive overall, student attitudes varied in the initial status and rate of change. Students who interacted most frequently with older adults had attitudes that were more neutral.

Intercultural studies of the attitude towards the elderly revealed some differences between eastern and western countries. For example, a survey among four countries (Japan, China, Taiwan, and Vietnam) in Eastern cultures and in two countries (USA and UK) in the West showed that the level of knowledge about aging in Western countries is significantly higher than that in Eastern countries, and attitudes toward aging are more positive in the western countries compared to the eastern countries (Huang, 2013). This suggests that the tradition of respecting older adults in Eastern cultures may have weakened gradually, and it appears industrialisation devalues aging populations in Eastern countries but not in Western countries.

While many studies address the attitude of healthcare professionals and students of different specialisations towards the elderly, our literature research identified no investigations about the attitude of social gerontology students. Therefore, we carried out a survey among social gerontology and physiotherapy students in Slovenia, with the aim to investigate their attitudes towards the elderly. Based on the literature survey, we posed the following research questions:

- To what extent do students appreciate (positive attitude) or reject (negative attitude) the elderly?
- Are there any significant differences in the attitude of physiotherapy students and social gerontology students?
- Does the attitude towards the elderly depend on the student's gender?

- Does the attitude towards the elderly depend on the students' age?
- Are there any significant differences in the attitude towards the elderly between students who live in the same household with an elderly person and other students?

The last research question is based on the assumption that the home environment impact students' attitude. The influence of environment on attitudes was also found in some previous studies, for example Khan (2011) and Eaton et al. (2015).

3 Methods

Survey data was collected from students of physiotherapy and social gerontology (N=107) at Alma Mater Europaea, a higher education institution in Maribor, Slovenia, via close-ended structured questionnaire. Questionnaires were distributed to students during the lectures; they were asked to return the completed questionnaire within one week.

Instruments. We used a Slovenian translation of Kogan's Attitudes toward Old People Scale (KAOP), using matched pair items. The same instrument, first presented in (Kogan 1961), has been used in many studies, including most of the investigations summarised in the Literature review (Section 2). In non-English speaking countries, the questionnaire was usually somewhat adapted to the language and to the surveyed sample, for example to Italian (Matarese et al., 2012) or to Turkish (Kiliç & Adibelli, 2011).

KAOP consists of two main latent constructs. Seventeen items are negatively worded (KAOP-) statements while the others sixteen items (KAOP+) are presented positively worded, both in random order. The scale is designed in the form of a summed Likert scale of agreement with seven-point response categories that range from »strongly disagree« (1) to »strongly agree« (7). Negatively-worded statements form the construct »prejudice«, for which a higher total score indicates a more negative or prejudicial attitude towards older persons. Positively-worded statements form the construct »appreciation«, for which a higher total score indicates a more positive or appreciative attitude towards older persons. The higher the gap between prejudice and appreciation, the more positive or negative the attitude towards older people is; the smaller the gap between prejudice and appreciation, the more neutral the attitude towards older people is. The matched items do not have perfectly identical meanings, despite the attempts by Kogan to build logical opposites. The feelings and the experiences described by the matched statements are logical but not necessarily psychological opposites (Matarese et al., 2012).

Reliability. Kogan (1961) used odd-even Spearman-Brown reliability coefficients for the negative scale, ranging from 0.73 to 0.83 for his sample of 168 respondents (Khan, 2011). Cronbach's alpha coefficient as a measure of internal

consistency of the constructs was used in order to confirm scale reliability. Both scales turned out to be reliable, as Cronbach's alpha coefficient for the construct »prejudice« is 0.81 and for »appreciation« 0.77.

Data analysis. Data collected via questionnaire was analysed using the statistical program IBM SPSS 22.0. Different statistical methods were used: descriptive statistics, reliability test, t-test for independent samples and bivariate statistical analysis. We considered relations and differences to be significant if the statistical parameter p was less than 0.05 ($p < 0.05$). The degree of positive or negative attitude was determined on the basis of average values.

4 Results

In November and December 2015, 120 questionnaires were distributed among students of physiotherapy and social gerontology. A total of 107 questionnaires were returned, yielding an 89% response rate. Socio-demographic characteristics of the respondents are presented in Table 1.

Table 2 presents descriptive statistics for items that indicate negative attitudes towards the elderly. The lower the average value of an item is, the less negative the attitude of the respondents is towards elderly people. The higher the average value is, the more negative the attitude is. The item »... have a negative influence on a neighbourhood« was rated the lowest ($M=1.78$; $SD=1.320$), indicating the lowest level of prejudices related to this item. The next three lowest rated items are »... make others feel ill at ease« ($M=2.41$; $SD=1.659$) »... have shabby homes« ($M=2.44$; $SD=1.480$), »... have irritating faults« ($M=2.46$; $SD=1.449$) and »... bore others with their stories« ($M=2.49$; $SD=1.519$).

The strongest prejudice related to elderly people was the diversity of the elderly compared to younger (item »...are different« ($M=5.22$; $SD=2.0$), »... have excessive demands for love« ($M=4.28$; $SD=1.99$), the inability of the elderly to change (»... are unable to change«) with ($M=3.76$; $SD=2.041$) and »... complain about the young« ($M=3.71$; $SD=1.682$).

Table 3 presents descriptive statistics for items that indicate positive attitudes towards the elderly. The higher the average score of an item, the more positive the attitude towards the elderly is, and vice versa. The items for which appreciation of students is the strongest are »...are different from one another« ($M=5.42$; $SD=1.778$), »... prefer to work as long as they can« ($M=5.27$; $SD=1.418$) and believing that elderly »...are no different from anyone else« ($M=5.03$; $SD=1.861$).

The average level of appreciation among students is 4.56 ($SD=0.840$), and the average level of prejudice is 2.78 ($SD=0.992$), which indicates that the students are more likely to have an appreciative attitude towards the elderly than prejudicial, negative attitudes. We must be aware that appreciation and prejudices do not exclude each other. The measurement was carried out so that an individual can have prejudices, but simultaneously be appreciative towards the elderly.

The fact that the level of appreciation and the level of prejudices are not necessarily correlated (interconnected) is also evident from the correlation matrix in Table 4: most of the items of positive and negative attitudes towards elderly are not correlated. There are some statistically significant correlations, but they are weak. Positive and negative correlations can be observed.

Table 1: Survey sample

	f (%)		f (%)
Gender		Specialisation	
Male	38 (35.5)	Physiotherapy	61 (57)
Female	69 (64.5)	Social Gerontology	46 (43)
Current education		Elderly members among household members	
Undergraduate	99(92.5)	No	55 (51.4)
Graduate	6 (5.6)	Yes	52 (48.6)
Doctoral study	2 (1.9)		
Age			
to 20 years	36 (33.6)		
21–23 years	38 (35.5)		
above 23 years	33 (30.8)		

Table 2: Descriptive statistics for items, which indicate negative attitude towards the elderly

Item number	The elderly ...	N	Min	Max	Mean	Std. deviation
1	... are irritable, grouchy and unpleasant	107	1	7	2.83	1.533
2	... have a negative influence on a neighbourhood	107	1	7	1.78	1.320
3	... are always prying into the affairs of others	107	1	7	2.95	1.488
4	... are untidy	107	1	7	2.63	1.593
5	... complain about the young	107	1	7	3.71	1.682
6	... bore others with their stories	107	1	7	2.49	1.519
7	... have shabby homes	105	1	7	2.44	1.480
8	... have irritating faults	107	1	7	2.46	1.449
9	... make others feel ill at ease	107	1	7	2.41	1.659
10	... are much alike	107	1	7	3.03	1.729
11	... are unable to change	107	1	7	3.76	2.041
12	... have excessive demands for love	107	1	7	4.28	1.990
13	... have too much influence in society	106	1	7	2.95	1.641
14	... quit work when they become pensioners	106	1	7	2.81	1.913
15	Wisdom does not come with advancing age	107	1	7	3.40	2.009
16	... should live in special residences	107	1	7	2.71	1.976
17	... are different	106	1	7	5.22	2.000

Table 3: Descriptive statistics for items that indicates positive attitude towards elderly

Item number	The elderly...	N	Min	Max	Mean	Std. deviation
1	... mind their own business	107	1	7	3.99	1.622
2	... have clean, attractive homes	107	1	7	4.24	1.547
3	... should have more power in society	107	1	7	4.02	1.721
4	... are relaxing to be with	107	1	7	4.95	1.383
5	... are cheerful, agreeable and good humoured	107	1	7	4.79	1.358
6	... grow wiser with advancing age	107	1	7	4.39	1.664
7	... are clean and neat	107	2	7	4.56	1.290
8	... prefer to work as long as they can	107	1	7	5.27	1.418
9	It is nice when they speak about their past	107	1	7	4.95	1.645
10	... seldom complain about the young	107	1	7	3.80	1.645
11	... are capable of new adjustment	107	1	7	3.93	1.647
12	Neighbourhoods are nice when integrated with them	107	1	7	4.76	1.619
13	... need no more love than others	107	1	7	4.04	2.032
14	... are different from one another	106	1	7	5.42	1.778
15	... have the same faults as the young	107	1	7	4.62	1.902
16	... are no different from anyone else	107	1	7	5.03	1.861

Table 4: Correlation matrix: relations between positive and negative attitude towards elderly

		Indicators of positive attitude towards elderly															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Indicators of negative attitude towards elderly	1	-.03	.15	-.12	-.16	-.11	-.16	-.04	-.06	-.39**	-.09	-.04	-.10	.17	-.18	-.16	-.17
	2	-.01	-.05	-.17	-.26**	-.16	-.23*	-.09	-.15	-.24*	.08	-.04	.01	.09	-.20*	-.15	-.31**
	3	-.18	-.09	-.35**	-.29*	-.27**	-.24*	-.12	.01	-.24*	-.07	-.29**	-.02	.16	-.10	-.06	-.05
	4	-.15	.05	.06	.00	-.09	-.06	-.12	.10	-.10	-.04	-.05	-.08	-.02	-.02	-.04	.05
	5	-.05	-.07	-.22*	-.21*	-.28**	-.49**	-.19*	-.11	-.29**	-.15	-.27**	-.11	.22*	-.01	-.18	-.17
	6	-.05	.27**	-.09	-.15	-.11	-.06	-.02	-.16	-.23*	.05	-.16	-.04	.12	-.03	-.17	-.19
	7	.05	.08	.04	-.03	-.09	-.02	.00	.02	-.22*	.04	-.06	-.06	.05	-.07	-.06	-.08
	8	-.15	-.02	-.24*	-.20*	-.27**	-.26**	-.09	.00	-.25**	-.11	-.18	.04	.13	-.10	-.20*	-.19*
	9	-.09	.12	.05	-.05	-.02	-.01	.04	.09	-.16	.00	.04	-.04	.13	-.18	-.08	-.09
	10	-.08	-.07	-.07	-.07	-.14	-.08	-.21*	.02	-.11	.09	-.11	-.06	.01	-.13	-.06	-.08
	11	-.17	.13	-.19*	-.03	-.10	-.06	-.20*	-.06	-.08	-.16	-.28**	-.08	.01	.04	-.08	.07
	12	.12	-.14	-.04	.07	.03	.23*	-.09	.04	.16	-.09	-.27**	.10	-.04	.14	.11	.07
	13	.02	.17	-.12	-.10	.01	.06	.09	-.01	-.07	.07	-.02	.06	.05	-.07	-.08	.00
	14	.08	-.05	.08	-.10	-.15	-.04	.13	-.08	-.04	.17	.16	-.03	.12	-.20*	-.02	-.07
	15	-.08	-.12	-.32**	-.36**	-.31**	-.23*	-.10	-.21*	-.11	.04	-.27**	.02	.12	-.02	-.07	-.19
	16	.19*	.10	.23*	.11	.04	.12	.13	.08	-.21*	.14	.29**	-.11	.10	-.21*	-.04	-.09
	17	.03	.08	-.21*	.04	-.04	-.04	-.18	.03	.31**	-.15	-.17	.10	.02	.30**	.00	-.09

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

We tested the relation between students' age and their attitudes towards the elderly using bivariate correlation analysis, using Pearson's correlation coefficient for interpretation (Table 5). We tested correlations on the level of individual items. The values of Pearson's correlations coefficient were between -0.207 and 0.090, which indicates only a weak relation. Age is statistically significantly correlated only with the item »... seldom complain about the young« ($p=-0.207$; $p<0.05$). This is a weakly negative correlation that means that the older the students are, the more they think that the elderly »... seldom complain about the young«, while younger students more frequently recognise complaining of the elderly about the young. The remaining relations are not statistically significant.

If we observe the attitude towards the elderly on the level of a construct, we can conclude that the students' attitudes are related to neither age, nor to prejudice, nor to positive attitudes toward the elderly. Relations between age and individual items of the attitude toward elderly also are not statistically significant if considered separately by specialisation (physiotherapists, social gerontologists).

We tested the differences in the relation to the elderly using an independent samples t-test. Table 6 presents the results of the t-test for testing the differences in prejudices towards the elderly depending on gender. Table 7 presents the results of the t-test of differences in the appreciation depending on the student's gender. There are minor differences among the students related to gender, which are mostly not statistically significant, except the differences in the perception of the elderly that complain about the young ($t=2.201$; $p<0.05$). This is more present among male students ($M=4.18$; $SD=1.642$) than female ones ($M=3.45$; $SD=1.659$), which indicates that male students have significantly more negative attitudes towards the elderly than female students do regarding this item.

In contrast, female students have significantly ($t=2.289$; $p<0.05$) less positive attitudes towards the elderly than male students do ($M=4.63$; $SD=1.837$) regarding the item »... need no more love than others«.

Male students have, in general, somewhat more rejecting (negative) attitudes toward the elderly than female students do, while they are also more appreciative. This appears to be a conflicting finding, but it makes sense if

Table 5: Pearson's correlation coefficients for correlations between attitudes towards the elderly indicators and student's age, and segmented regarding specialisation

The Elderly ...	AGE	AGE (physiotherapy)	AGE (social gerontology)
... are irritable, grouchy and unpleasant	.027	.171	-.101
... have a negative influence on a neighbourhood	-.074	-.074	.027
... are always prying into the affairs of others	-.131	-.112	-.057
... are untidy	.063	.010	.121
... complain about the young	-.025	-.006	-.020
... bore others with their stories	-.099	.091	-.270
... have shabby homes	.052	.079	.033
... have irritating faults	-.034	.006	-.001
... make others feel ill at ease	-.011	.092	-.129
... are much alike	-.134	-.179	-.095
... are unable to change	-.008	-.032	.029
... have excessive demands for love	.002	-.169	.226
... have too much influence in society	.036	.251	-.145
... quit work when they become pensioners	.007	-.071	.144
Wisdom does not come with advancing age	-.107	-.033	-.140
... should live in special residences	.002	-.003	-.015
... are different	.090	.136	.060
... mind their own business	-.056	-.036	-.061
... have clean, attractive homes	.004	.063	-.142
... should have more power in society	.010	-.092	.041
... are relaxing to be with	.050	-.021	.024
... are cheerful, agreeable and good humoured	-.042	-.021	-.149
... grow wiser with advancing age	-.133	-.084	-.215
... are clean and neat	.024	.124	-.147
... prefer to work as long as they can	.044	-.006	.088
It is nice when they speak about their past	-.091	-.178	-.024
... seldom complain about the young	-.207*	-.201	-.197
... are capable of new adjustment	-.013	-.163	.123
Neighbourhoods are nice when integrated with them	-.095	-.225	.018
... need no more love than others	-.139	-.028	-.253
... are different from one another	-.054	-.025	-.074
... have the same faults as the young	-.143	-.094	-.200
... are no different from anyone else	-.089	-.091	-.107
PREJUDICE	-.037	.017	-.060
APPRECIATION	-.079	-.116	-.106

*. Correlation is significant at the 0.05 level (2-tailed).

Table 6: Results of *t*-test - testing differences in prejudices depending on the gender

	Male (n=38)	Female (n=69)	
The Elderly ...	M (SD)	M (SD)	t (p)
... are irritable, grouchy and unpleasant	2.66 (1.279)	2.93 (1.657)	-0.87 (0.39)
... have a negative influence on a neighbourhood	1.82 (1.249)	1.75 (1.366)	0.232 (0.82)
... are always prying into the affairs of others	2.76 (1.24)	3.06 (1.608)	-0.98 (0.33)
... are untidy	2.87 (1.492)	2.49 (1.642)	1.169 (0.24)
... complain about the young	4.18 (1.642)	3.45 (1.659)	2.201 (0.03)
... bore others with their stories	2.68 (1.435)	2.38 (1.563)	1.001 (0.32)
... have shabby homes	2.38 (1.299)	2.47 (1.578)	-0.304 (0.76)
... have irritating faults	2.37 (1.261)	2.51 (1.549)	-0.473 (0.64)
... make others feel ill at ease	2.58 (1.518)	2.32 (1.736)	0.774 (0.44)
... are much alike	3.29 (1.659)	2.88 (1.762)	1.163 (0.25)
... are unable to change	3.68 (1.933)	3.8 (2.111)	-0.273 (0.79)
... have excessive demands for love	3.84 (1.853)	4.52 (2.034)	-1.706 (0.09)
... have too much influence in society	2.95 (1.541)	2.96 (1.705)	-0.025 (0.98)
... quit work when they become pensioners	3.05 (1.692)	2.68 (2.026)	0.971 (0.33)
Wisdom does not come with advancing age	3.47 (2.023)	3.36 (2.014)	0.273 (0.79)
... should live in special residences	2.61 (1.911)	2.77 (2.023)	-0.406 (0.69)
... are different	4.81 (2.106)	5.43 (1.921)	-1.541 (0.13)
PREJUDICE	2.85 (0.777)	2.75 (1.096)	0.557 (0.58)

Table 7: Results of *t*-test - testing differences in appreciation depending on the gender

	Male (n=38)	Female (n=69)	
The Elderly ...	M (SD)	M (SD)	t (p)
... mind their own business	3.95 (1.754)	4.01 (1.558)	-0.204 (0.84)
... have clean, attractive homes	4.47 (1.484)	4.12 (1.577)	1.146 (0.25)
... should have more power in society	3.97 (1.684)	4.04 (1.753)	-0.200 (0.84)
... are relaxing to be with	4.92 (1.124)	4.97 (1.514)	-0.178 (0.86)
... are cheerful, agreeable and good humoured	5.00 (1.162)	4.68 (1.450)	1.164 (0.25)
... grow wiser with advancing age	4.16 (1.586)	4.52 (1.703)	-1.083 (0.28)
... are clean and neat	4.63 (1.101)	4.52 (1.389)	0.420 (0.68)
... prefer to work as long as they can	5.29 (1.206)	5.26 (1.531)	0.106 (0.92)
It is nice when they speak about their past	5.32 (1.397)	4.75 (1.744)	1.820 (0.07)
... seldom complain about the young	3.79 (1.63)	3.81 (1.665)	-0.066 (0.95)
... are capable of new adjustment	4.11 (1.539)	3.83 (1.706)	0.838 (0.40)
Neighbourhoods are nice when integrated with them	5.00 (1.185)	4.62 (1.808)	1.297 (0.20)
... need no more love than others	4.63 (1.837)	3.71 (2.073)	2.289 (0.02)
... are different from one another	5.39 (1.636)	5.44 (1.864)	-0.128 (0.90)
... have the same faults as the young	4.50 (1.797)	4.68 (1.967)	-0.470 (0.64)
... are no different from anyone else	4.95 (1.643)	5.07 (1.980)	-0.331 (0.74)
APPRECIATION	4.61 (0.715)	4.54 (0.905)	0.391 (0.7)

we consider the logics of the measurement instrument, which not only measures the attitude toward the elderly as a uniform dimension; an individual can have to some extent positive as well as negative attitudes toward the elderly. If we reduced the two dimensions into one, we would lose the variability in the attitudes toward the elderly, which (according to the existing definition) spans from strongly negative to strongly positive.

An independent t-test was also used to test the attitudes towards the elderly depending on the specialisation of the students. Table 8 presents the results of the t-test for the differences in prejudices toward the elderly; in Table 9 the results of the t-test for the differences in appreciation depending on specialisation are given. Students demonstrated some statistically significant differences related to their specialisation: social gerontology students have less negative attitudes in the item »The elderly have a negative influence on a neighbourhood« ($t=2.370$; $p<0.05$), »... the elderly are always prying into the affairs of others« ($t=3.119$; $p<0.001$), »... the elderly have irritating faults« ($t=2.494$; $p<0.01$) and »wisdom does not come with advancing age« ($t=2.288$; $p<0.05$). On average, the attitude of

social gerontology students is less negative than the attitude of physiotherapy students.

On average, social gerontology students also have a more positive attitude towards the elderly than students of physiotherapy do. Statistically significant is the more positive attitude of social gerontology students regarding the items »... the elderly should have more power in society« ($t=-2.455$; $p<0.05$), »... the elderly are relaxing to be with« ($t=-3.430$; $p<0.001$) and »... the elderly are cheerful, agreeable and good humoured« ($t=-2.113$, $p<0.05$).

Differences in the attitudes toward the elderly depending on the presence of an elderly person in the students' households were tested using an independent samples t-test. Table 10 presents the results of the t-test of the differences in prejudices toward the elderly, and Table 11 the results of the t-test of the differences in appreciation. The results indicate that students who live in the same household with an elderly person demonstrate statistically significant differences in their attitude toward the elderly: they have significantly less negative (rejecting) attitudes in the items »... are untidy« ($t=2.299$; $p<0.05$), »... are much alike« ($t=2.336$; $p<0.05$).

Table 8: Results of t-test - testing differences in prejudices depending on study specialisation

	physiotherapy (n=61)	Social gerontology (n=46)	
The Elderly ...	M (SD)	M (SD)	t (p)
... are irritable, grouchy and unpleasant	3.07 (1.601)	2.52 (1.394)	1.837 (0.07)
... have a negative influence on a neighbourhood	2.03 (1.516)	1.43 (0.910)	2.370 (0.02)
... are always prying into the affairs of others	3.33 (1.535)	2.46 (1.277)	3.119 (<0.01)
... are untidy	2.59 (1.616)	2.67 (1.578)	-0.268 (0.79)
... complain about the young	3.84 (1.753)	3.54 (1.588)	0.890 (0.38)
... bore others with their stories	2.62 (1.428)	2.30 (1.631)	1.075 (0.29)
... have shabby homes	2.48 (1.479)	2.39 (1.498)	0.303 (0.76)
... have irritating faults	2.75 (1.578)	2.07 (1.162)	2.494 (0.01)
... make others feel ill at ease	2.44 (1.669)	2.37 (1.665)	0.224 (0.82)
... are much alike	2.98 (1.727)	3.09 (1.749)	-0.305 (0.76)
... are unable to change	3.80 (2.015)	3.70 (2.096)	0.269 (0.79)
... have excessive demands for love	4.34 (2.007)	4.20 (1.985)	0.381 (0.70)
... have too much influence in society	3.10 (1.504)	2.76 (1.804)	1.055 (0.29)
... quit work when they become pensioners	2.88 (2.108)	2.72 (1.642)	0.441 (0.66)
Wisdom does not come with advancing age	3.77 (2.124)	2.91 (1.749)	2.288 (0.02)
... should live in special residences	2.61 (2.002)	2.85 (1.955)	-0.623 (0.53)
... are different	5.33 (2.072)	5.07 (1.914)	0.682 (0.50)
PREJUDICE	2.89 (1.004)	2.64 (0.967)	1.347 (0.18)

Table 9: Results of *t*-test - testing differences in appreciation depending on study specialisation

	Physiotherapy (n=61)	Social Gerontology (n=46)	
The Elderly ...	M (SD)	M (SD)	t (p)
... mind their own business	4.08 (1.686)	3.87 (1.544)	0.669 (0.51)
... have clean, attractive homes	4.08 (1.706)	4.46 (1.295)	-1.291 (0.20)
... should have more power in society	3.67 (1.589)	4.48 (1.798)	-2.455 (0.02)
... are relaxing to be with	4.57 (1.335)	5.46 (1.295)	-3.430 (<0.001)
... are cheerful, agreeable and good humoured	4.56 (1.373)	5.11 (1.286)	-2.113 (0.04)
... grow wiser with advancing age	4.34 (1.721)	4.46 (1.601)	-0.344 (0.73)
... are clean and neat	4.43 (1.310)	4.74 (1.255)	-1.246 (0.22)
... prefer to work as long as they can	5.21 (1.416)	5.35 (1.433)	-0.485 (0.63)
It is nice when they speak about their past	4.79 (1.724)	5.17 (1.525)	-1.208 (0.23)
... seldom complain about the young	3.90 (1.535)	3.67 (1.790)	0.707 (0.48)
... are capable of new adjustment	3.79 (1.593)	4.11 (1.716)	-1.001 (0.32)
Neighbourhoods are nice when integrated with them	4.57 (1.658)	5.00 (1.549)	-1.354 (0.18)
... need no more love than others	4.15 (2.015)	3.89 (2.068)	0.644 (0.52)
... are different from one another	5.52 (1.882)	5.30 (1.645)	0.608 (0.54)
... have the same faults as the young	4.69 (1.996)	4.52 (1.786)	0.447 (0.66)
... are no different from anyone else	4.95 (1.944)	5.13 (1.759)	-0.493 (0.62)
APPRECIATION	4.43 (0.774)	4.74 (0.898)	-1.895 (0.06)

Table 10: Results of the *t*-test testing differences in prejudices related to presence of an elderly in the household where the student is living.

	No elderly person in household (n=55)	Elderly person in household (n=52)	
The Elderly ...	M (SD)	M (SD)	t (p)
... are irritable, grouchy and unpleasant	2.98 (1.394)	2.67 (1.665)	1.042 (0.30)
... have a negative influence on a neighbourhood	1.75 (1.022)	1.81 (1.585)	-0.243 (0.81)
... are always prying into the affairs of others	3.13 (1.441)	2.77 (1.529)	1.247 (0.22)
... are untidy	2.96 (1.598)	2.27 (1.523)	2.299 (0.02)
... complain about the young	3.87 (1.611)	3.54 (1.754)	1.027 (0.31)
... bore others with their stories	2.60 (1.559)	2.37 (1.482)	0.797 (0.43)
... have shabby homes	2.54 (1.397)	2.33 (1.571)	0.703 (0.48)
... have irritating faults	2.49 (1.332)	2.42 (1.576)	0.241 (0.81)
... make others feel ill at ease	2.40 (1.486)	2.42 (1.840)	-0.072 (0.94)
... are much alike	3.40 (1.628)	2.63 (1.760)	2.336 (0.02)
... are unable to change	4.16 (1.782)	3.33 (2.220)	2.142 (0.03)
... have excessive demands for love	4.09 (1.818)	4.48 (2.156)	-1.008 (0.32)
... have too much influence in society	2.91 (1.651)	3.00 (1.645)	-0.289 (0.77)
... quit work when they become pensioners	3.00 (2.028)	2.62 (1.784)	1.035 (0.30)
Wisdom does not come with advancing age	3.25 (1.878)	3.56 (2.146)	-0.779 (0.44)
... should live in special residences	2.69 (1.698)	2.73 (2.250)	-0.103 (0.92)
... are different	5.41 (1.732)	5.02 (2.245)	0.994 (0.32)
PREJUDICE	2.92 (0.861)	2.64 (1.104)	1.481 (0.14)

Table 11: Results of t-test testing the differences in appreciation related to the presence of an elderly person in the household where the student is living.

The Elderly ...	No elderly person in household (n=55)	Elderly person in household (n=52)	t (p)
	M (SD)	M (SD)	
... mind their own business	3.98 (1.509)	4.00 (1.749)	-0.058 (0.95)
... have clean, attractive homes	4.16 (1.525)	4.33 (1.581)	-0.544 (0.59)
... should have more power in society	3.95 (1.615)	4.10 (1.839)	-0.451 (0.65)
... are relaxing to be with	4.84 (1.344)	5.08 (1.426)	-0.898 (0.37)
... are cheerful, agreeable and good humoured	4.62 (1.367)	4.98 (1.336)	-1.386 (0.17)
... grow wiser with advancing age	4.35 (1.613)	4.44 (1.731)	-0.300 (0.77)
... are clean and neat	4.40 (1.314)	4.73 (1.254)	-1.331 (0.19)
... prefer to work as long as they can	5.02 (1.472)	5.54 (1.320)	-1.921 (0.06)
It is nice when they speak about their past	5.00 (1.711)	4.90 (1.587)	0.301 (0.76)
... seldom complain about the young	3.87 (1.678)	3.73 (1.622)	0.444 (0.66)
... are capable of new adjustment	3.76 (1.710)	4.10 (1.575)	-1.044 (0.30)
Neighbourhoods are nice when integrated with them	4.58 (1.536)	4.94 (1.697)	-1.153 (0.25)
... need no more love than others	3.85 (1.890)	4.23 (2.175)	-0.957 (0.34)
... are different from one another	5.75 (1.404)	5.08 (2.067)	1.928 (0.06)
... have the same faults as the young	4.49 (1.894)	4.75 (1.919)	-0.703 (0.48)
... are no different from anyone else	5.24 (1.753)	4.81 (1.961)	1.194 (0.24)
APPRECIATION	4.48 (0.778)	4.65 (0.900)	-1.001 (0.32)

and »... are unable to change« ($t=2.142$, $p<0.05$). In addition, the general attitude of students who live in the same household with an elderly person is less negative than the attitude of students who live in a household without one.

Students who live in the same household with an elderly person have on average a more positive attitude to the elderly than students who do not live with one, but the differences are not statistically significant ($p>0.05$).

We can observe that a student's specialisation as well as the fact that he or she lives in the same household with an elderly person, appeared as key external factors influencing the attitude towards the elderly. Therefore, we will also check the differences in attitude towards the elderly depending on their specialisation and on the fact that they live in the same household with an elderly person.

The results presented separately for the two groups of students (physiotherapy and social gerontology), depending on whether they live in the same household with an elderly person or not, highlight the statistical characteristics of the two groups. Table 12 presents differences in average values for individual negative attitude items and the result of the t-test for independent samples. Table 13 shows differences in arithmetic means for each item of appreciation attitude towards the elderly and the results of the t-test.

Where »mean difference« and test statistics are positive, students of social gerontology have fewer prejudices towards the elderly than students of physiotherapy do. We found that differences between students of the two specialisations in negative attitudes towards the elderly is larger in the group that does not live in the same household with an elderly person, with a »mean difference« ($MD=0.37$) than in the group of students who live with an elderly person ($MD=0.15$). There are no statistically significant differences between students who live in the same household with an elderly person, regardless of specialisation. Students of social gerontology who do not live with an elderly had statistically significantly fewer prejudices than students of physiotherapy who also do not live with an elderly person in the same household, regarding the items »... are irritable, grouchy and unpleasant« ($t=2.126$; $p<0.05$), »... have a negative influence on a neighbourhood« ($t=3.122$; $p<0.01$), »... are always prying into the affairs of others« ($t=2.817$; $p<0.01$) and »... have irritating faults« ($t=2.766$, $p<0.01$).

If the values in the column »Mean difference« and test statistics column of an item are positive, then social gerontology students have less positive attitudes towards the elderly than physiotherapy students do. Negative values under »Mean difference« and test statistics mean that stu-

Table 12: Results of the *t*-test testing differences in prejudices related to the presence of an elderly person in the household where the student is living and to student's specialisation.

The Elderly ...	No elderly person in household		Elderly person in household	
	Mean difference	t (p)	Mean difference	t (p)
... are irritable, grouchy and unpleasant	0.78	2.126 (0.04)	0.30	0.638 (0.53)
... have a negative influence on a neighbourhood	0.81	3.122 (<0.01)	0.38	0.842 (0.40)
... are always prying into the affairs of others	1.04	2.817 (0.01)	0.70	1.666 (0.10)
... are untidy	0.23	0.528 (0.60)	-0.40	-0.935 (0.35)
... complain about the young	0.74	1.708 (0.09)	-0.17	-0.342 (0.73)
... bore others with their stories	0.10	0.242 (0.81)	0.55	1.343 (0.19)
... have shabby homes	0.33	0.855 (0.40)	-0.16	-0.359 (0.72)
... have irritating faults	0.94	2.766 (0.01)	0.42	0.944 (0.35)
... make others feel ill at ease	0.04	0.109 (0.91)	0.10	0.198 (0.84)
... are much alike	-0.33	-0.731 (0.47)	0.15	0.310 (0.76)
... are unable to change	-0.08	-0.162 (0.87)	0.33	0.526 (0.60)
... have excessive demands for love	-0.43	-0.868 (0.39)	0.75	1.254 (0.22)
... have too much influence in society	0.28	0.623 (0.54)	0.39	0.851 (0.40)
... quit work when they become pensioners	0.15	0.268 (0.79)	0.20	0.396 (0.69)
Wisdom does not come with advancing age	0.67	1.328 (0.19)	1.05	1.843 (0.07)
... should live in special residences	0.19	0.410 (0.68)	-0.70	-1.116 (0.27)
... are different	0.66	1.400 (0.17)	-0.12	-0.195 (0.85)
PREJUDICE	0.37	1.621 (0.11)	0.15	0.469 (0.64)

dents of social gerontology have more positive, appreciative attitudes towards the elderly than physiotherapy students do. Differences in appreciative attitudes among students of both specialisations are higher in the group of students who live with an elderly person (MD=0.37) than in the group which does not (MD=0.25)

Social gerontology students who do not live with an elderly person in a common household have a significantly more appreciative attitude towards elderly than physiotherapy students who do not live with an elderly person do. The differences appeared in the following items: »... should have more power in society« ($t=-2.140$; $p<0.05$), »... are relaxing to be with« ($t=-2.531$, $p<0.05$) and »... neighbourhoods are nice when integrated with them« ($t=-2.408$, $p<0.05$). In contrast, students of social gerontology who live in the same household with an elderly person are statistically significantly more appreciative than students of physiotherapy who live with an elderly person. The statistically significant items are »... relaxing to be with« ($t=-2.320$, $p<0.05$) and »... are cheerful, agreeable and good humoured« ($t=-2.041$; $p<0.05$). Students of social gerontology are also significantly more in favour of older people, expressing the opinion that the elderly are relaxing to be with, regardless of whether they live with the elderly or not.

5 Discussion

The research offered insights into the attitudes of students of social gerontology and physiotherapy towards the elderly population.

Our first research question was: to what extent do students appreciate (positive attitude) or reject (negative attitude) the elderly? The results show that on average the appreciation (measured with a KAOP questionnaire) of older people among students is 4.56, while the average dismissive attitude (prejudices) is 2.78. This indicates that students are on average more appreciative towards the elderly than they have prejudices against them. The degree of positive attitude goes beyond negative attitude. The level of dismissive attitude, which is 2.78 measured on a seven-point Likert scale, can be described as very low, and we can say that students are appreciative of the elderly.

Our study shows that students of social gerontology, on average, are more appreciative of older people and at the same time have fewer prejudices about older people than students of physiotherapy do. Students of social gerontology have significantly less negative attitudes towards older people than students of physiotherapy do, regarding the statements that »older people have a negative impact

Table 13: Results of a t-test testing differences in appreciation related to presence of an elderly in the household where the student is living, and to specialisation

The Elderly ...	No elderly person in household		Elderly person in household	
	Mean difference	t (p)	Mean difference	t (p)
... mind their own business	0.63	1.563 (0.12)	-0.24	-0.478 (0.63)
... have clean, attractive homes	-0.15	-0.367 (0.72)	-0.62	-1.528 (0.13)
... should have more power in society	-0.91	-2.140 (0.04)	-0.70	-1.367 (0.18)
... are relaxing to be with	-0.88	-2.531 (0.01)	-0.89	-2.320 (0.02)
... are cheerful, agreeable and good humoured	-0.38	-1.027 (0.31)	-0.74	-2.041 (0.05)
... grow wiser with advancing age	-0.50	-1.134 (0.26)	0.29	0.601 (0.55)
... are clean and neat	-0.10	-0.287 (0.78)	-0.55	-1.571 (0.12)
... prefer to work as long as they can	-0.34	-0.841 (0.40)	0.07	0.178 (0.86)
It is nice when they speak about their past	-0.37	-0.792 (0.43)	-0.40	-0.903 (0.37)
... seldom complain about the young	0.07	0.152 (0.88)	0.40	0.833 (0.41)
... are capable of new adjustment	-0.27	-0.580 (0.56)	-0.38	-0.868 (0.39)
Neighbourhoods are nice when integrated with them	-0.96	-2.408 (0.02)	0.14	0.284 (0.78)
... need no more love than others	0.70	1.380 (0.17)	-0.23	-0.374 (0.71)
... are different from one another	0.14	0.363 (0.72)	0.30	0.506 (0.62)
... have the same faults as the young	0.50	0.973 (0.33)	-0.20	-0.377 (0.71)
... are no different from anyone else	-0.25	-0.513 (0.61)	-0.10	-0.175 (0.86)
APPRECIATION	-0.25	-1.193 (0.24)	-0.37	-1.485 (0.14)

on society«, »interfering in the affairs of others«, that they »have annoying habits« and that »wisdom comes with age«. At the same time, students of social gerontology are significantly more appreciative towards the elderly than students of physiotherapy are regarding the statements that the elderly »should have more influence in society«, »it is nice to be in their company« and »the elderly are cheerful, good humoured and agreeable«. Students of social gerontology are appreciative and have fewer prejudices and against the elderly than students of physiotherapy do, regardless of whether they live in the same household with elderly people or not. This answers our second research question (Are there any significant differences in the attitude of social gerontology students and physiotherapy students?).

The third research question relates to student's ages. Our results showed that neither the appreciation of the elderly nor prejudices against them depend on the age of students. The only age-related difference in the attitude was that younger students are more often convinced that that elderly »complain about the young« than their older colleagues are. This may be associated with even greater attachment of older students on the family, in the third generation, or can be associated with higher awareness.

The next research question was about the attitude towards the elderly depending on student's gender. In their

general attitude towards older people, students are not significantly different according to gender, although some differences between students were found: male students are, on average, slightly more appreciative towards the elderly but also have more prejudices against them. Male students more frequently perceive the elderly to be those who »complain about young people«, but the differences are not significant. Nevertheless, males are significantly more in favour of older people regarding the statement that »older people do not need any more love than most people« in comparison with female students who think the opposite.

The final research question was whether students significantly differ in the attitude towards older people, depending on whether they live in the same household with an elderly person. Students who do live in the same household with an elderly person are generally more appreciative towards the elderly; they have fewer prejudices than students who do not live with the elderly. These students have significantly less bias in and prejudices against the elderly in the items »...are untidy«, »... they are all the same« and »... cannot be changed« than students who do not live with the elderly. Therefore, living with older people has a positive impact on intergenerational understanding and respect.

Our investigation has several limitations. Results were obtained from a limited sample of physiotherapy and

social gerontology students; the investigated population was limited to students of one higher education institution. Therefore, our results cannot be generalised to a wider student population. Our suggestion for further work on the topic investigated in this article is that the attitude towards elderly in different groups dealing with the elderly should be studied, not only among health care professionals and among students. The possibility of building a comprehensive model of factors that influence attitudes towards the elderly could be considered.

6 Conclusion

Changes affect the dynamics of responses and cause dilemmas, both in society and on the individual level. This dynamic affects the attitude towards the elderly. Therefore, we focused our research attention on the issue of the attitude and awareness of attitudes towards the elderly.

As we separately studied two student groups, which are both preparing for work with older people, the results raise hopes that the attitudes of the two groups towards the elderly will be fair and respectful. The two groups perceive this marginal group predominantly positively. Since the survival of civilisation depends on the creation of space and opportunity for all, it seems important that the two groups of participants in our study perceive such a space as granted. Although minor deviations from positive attitudes were found, probably resulting from different experiences with elderly people, the results of our study raise hope that we will be able to keep a respectful relation and cooperation across age groups, despite the current deepening economic crisis.

Civilisational progress based on the link between nature and the culture of generations forces us to create a new culture of awareness and new spiritual dynamics (Ovsenik, 2015). Our research indicates that we are on this path, at least in the groups who participated in our study, and have already made the first step towards understanding and respect for older people. Despite the positive attitudes toward older people revealed in our study, more efforts are required to enhance these attitudes. Improved and new curricula are needed that may better emphasise the attitudes of students toward older people and to better prepare students for their roles as caregivers for elderly citizens.

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Odnos študentov fizioterapije in socialne gerontologije do starejših

Ozadje in cilj. Odnos študentov do starejših ki je še posebej pomemben pri študentih in zaposlenih v socialnih in zdravstvenih poklicih. Cilj našega članka je analizirati odnos študentov socialne gerontologije in fizioterapije do starejših.

Metode. Za zbiranje podatkov smo uporabili Koganov strukturirani vprašalnik za merjenje odnosa do starejših (KAOP). Zbrane podatke smo obdelali s statističnimi metodami: test zanesljivosti, t-test za neodvisne vzorce in bivariatno korelacijsko analizo.

Rezultati. Študenti socialne gerontologije in fizioterapije sprejemajo starost ozaveščeno in s spoštovanjem. Med njimi ni zaznani s starostjo pogojenih predsodkov in stereotipov, ne problematizirajo starejših. Študenti socialne gerontologije imajo bolj pozitiven odnos do starejših kot študenti fizioterapije. Študenti moškega spola in tisti, ki živijo v skupnem gospodinjstvu s starejšim, bolje sprejemajo starejše, hkrati imajo moški študenti več predsodkov do starejših. Podobno velja za študente, ki ne živijo v skupnem gospodinjstvu s starejšim.

Zaključek. Čeprav smo ugotovili manjša odstopanja od pozitivnega odnosa do starejši, ki verjetno izhajajo iz različnih izkušenj s starejšimi, ugotovitve naše študije vzbujajo upanje, da bo mogoče tudi v prihodnje vzpostavljati spoštljiv odnos do starejših in sodelovanje med različnimi starostnimi skupinami.

Ključne besede: odnos, starejši, študent, socialna gerontologija, fizioterapija, KAOP.



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