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Perceived alternative job opportunities and turnover intention as preliminary steps in employee withdrawal

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Abstract

Background: Employee turnover represents permanent withdrawal from the organization, which brings long-term unfavorable consequences, especially when it comes to the voluntary early departure of quality employees. Turnover intention is a preliminary step that can predict the employee's intention to leave and is very often the main precursor to the final decision to leave or stay. In addition to internal organizational influences, a strong influencing factor on such a decision is represented by perceived alternative job opportunities.

Purpose: The goal of the paper is, therefore, to examine the employee's perception of the possibilities of alternative employment and their turnover intention to determine that the main factor of the environment strongly shapes thinking in the context of leaving.

Study design/methodology/approach: The primary research was conducted on a convenience sample of 423 in 15 medium and large enterprises in Croatia (Slavonia and Baranja region) and in various economic sectors: Agriculture, Industry, Energy, Construction, Services, Trade, Transport, Education, and Tourism and Hospitality. The data were subjected to univariate and bivariate analysis. The influence of sociodemographic variables was also tested to identify possible differences between different groups of employees.

Findings/conclusions: The results of the research indicate fairly low rates of turnover intention, with a simultaneous perception of very few or weak possibilities for alternative employment. There are no statistically significant differences between the sociodemographic groups, so all employees, for the most part, do not intend to leave the organization in which they are currently employed, but they also do not think that they could easily be employed elsewhere.

Limitations/future research: The biggest limitation is the examination of only these two variables without studying cause-effect relationships, which is also a recommendation for future research. It could be helpful to analyze competitiveness on the labor market, because the situation of the market can also affect the perception of employability, which would determine whether the perceptions are close to the real picture.

Keywords

Croatia; employee turnover; organizational behavior; perceived alternative job opportunities; turnover intention

Introduction

Within organizational behavior, employee turnover is one of the forms of behavior that represents employee withdrawal and it is a dependent variable that depends on several independent variables. The simplest definition of employee turnover is given by Robbins and Judge (2017) as a permanent abandonment of the organization. Mobley, Griffeth, Hand and Meglino (1979) divided the construct of knowledge about voluntary turnover into three levels: the first is the thought of leaving the organization, the second is the intention to look for a new job, and the third is the intention to leave the current work organization. Although it is considered that most of the causes of employee turnover are in the organizational domain, the very intention of turnover, which precedes the final decision and behavior, still shapes several different variables.

1. Background

Traditional attitudes primarily include job satisfaction, expectations, organizational commitment, and organizational involvement, and new approaches to researching attitudes that shape turnover include workplace stress and strain, exhaustion, personal well-being, psychological insecurity, acceptance of change, perception, and stressors, challenges, and opportunities. If all organizational aspects are excluded, and the external environment is considered, the dominant variable that is repeated among many researchers is perceived alternative job opportunities (PAJO) (Bee, Mak, Jak & Ching, 2014; Dardar, Jusoh & Rasli, 2012; Gerhart, 1990; Griffeth, Steel, Allen & Bryan, 2005; Hausknecht & Trevor, 2011; Holtom, Mitchell, Lee & Eberly, 2008; Hulin, Roznowski & Hachiya, 1985; Ing-San & Jyh-Huei, 2006; Mobley et al., 1979; Pepra-Mensah, Adjei & Yeboah-Appiagyeyi, 2015; Saleem & Gul, 2013; Saridakis & Cooper 2016; Steel & Griffeth, 1989; Steel, 2002; Treuren, 2013; Umar, Shamsudin, Chandrakantan & Johanim, 2013).

This variable should by no means be viewed in isolation from the underlying context because it is mediated by organizational commitment and perceived organizational support (Albalawi Naughton, Elayan & Sleimi, 2019). Also, together with the quality of work-life and hardiness, perceived alternative job opportunities influence turnover intentions by 57.8% (Setyawati, 2021).

When employees in the environment notice alternative employment opportunities and perceive

them as more favorable than the current job and the organization in which they work, there is an increase in the intention to leave the current organization. On this assumption is based the basic premise of the work that the intention to leave the organization is accompanied by the perception of easier employability in other organizations. Malik, Danish and Munir (2012) therefore say that in developing countries, where unemployment is high and the economy is destabilized, people do not think from the head, but from the stomach. Carsten and Spector found (1987) that the local unemployment rate is a moderator between job satisfaction and turnover, proving that external factors are indispensable in the study of employee turnover and turnover intention.

Ramlawatia, Trisnawati, Yasinc, and Kurniawaty (2021) found that external alternatives have a significant effect on job satisfaction and turnover intention, while job satisfaction has a significant effect on turnover intention. They suggest that to reduce turnover intention, it is better to reduce employees' access to information about external market opportunities, because external labour market conditions have a strong influence on turnover intention. Rasheed, Okumus, Weng, Hameed and Nawaz (2020) also emphasized the importance of external opportunities and influences. They found that happiness orientation has a strong influence on TI, but that perceived career opportunities play a moderating role between TI and happiness orientation, such that the relationship between happiness orientation and TI weakens when perceived career opportunities are low.

Like all other intentions, the turnover intention (TI) is very changeable and subject to environmental conditions, primarily information. When new information becomes available after a person has expressed some of his or her intentions, the new information may influence his or her prominent behavioral beliefs and thus lead to changes in attitudes, subjective norms, and intentions; eventually, this person is no longer interested in carrying out his original intention (Ajzen, 1985). This means that a person who does not originally intend to leave their work organization can very quickly change their intention if a better offer for a new job in another organization arises. In fact, employees very rarely leave the organization without considering alternative jobs (Griffeth et al., 2005). The perceived possibility of employment in another organization is one of the most important factors

related to the turnover intention and in some cases the main one (Rahman, Raza Naqui, & Ismail Ramay, 2008). The main goal of this paper is to determine whether turnover intentions are consistent with perceived alternative job opportunities.

Another aim of this paper is to investigate whether there are differences in intention to leave an organization among different groups of employees, depending on sociodemographic variables. For example, highly educated employees and over-qualifiers display greater intentions to leave the current job and, in turn, engage in more external job search behaviors (Wu & Chi, 2020).

The differences between groups are very important to study because collective perception often encourages collective intentions and behaviors. Namely, it is interesting to note that, in a situation where co-workers are actively seeking alternative employment, an individual during such a mass exodus may also follow the behavior of a group suggesting that “the grass is always greener on the other side” (Lee, Yang & Li, 2017). Thus, some research has shown that cohorts of employees (groups of employees who share some common characteristics), often go in search of an alternative job because they monitor the behavior of their colleagues (Lee et al., 2017).

1.1. Review of recent studies

More recent studies in the field of organizational behavior agree that job satisfaction, organizational commitment, organizational embeddedness, and organizational identification have the greatest intraorganizational impact on TI, while PAJO has the greatest external impact. Organizational embeddedness, as stated by Shah, Yadav, Afzal, Shah, Junaid, Aza, Jonkman, De Boer, Ahammad, and Shanmugam (2020), with a high level of CWP (creative work performance), leads to lower TI. Higher job satisfaction and higher job embeddedness contribute to lower levels of TI (Skelton, Nattress, & Dwyer, 2019) while job satisfaction seems to be the main predictor of turnover intention (Ladelsky & Lee, 2022).

Ningsih, Susetyo, and Kananlua (2020) confirm that job satisfaction and PAJO have the greatest influence on TI, with PAJO being the moderator between job satisfaction and TI. Job alternatives play an important role in turnover intentions (Alpar, 2020) so perceived external employability predicts high risk of turnover (Zhang, Deng, Xia, Lan, 2021). The relationship between TI and PAJO is positive, while the relationship between PAJO

and organizational identification is negative. Organizational identification is also a mediator in the negative relationship between perceived external prestige and organizational career growth with TI (Zhu, Flores, Weng, & Li, 2020). In a study conducted among nurses, perceived job alternatives were found to moderate the relationship between job engagement and turnover intention (Zhou, et al., 2022).

Ozkan, Elci, Karabay, Kitapci and Garip (2020) found that organizational commitment and job satisfaction have the strongest influence on the TI and almost equally strongly, and that the influence of empowerment on the TI is small, so they consider organizational commitment and job satisfaction to be the strongest predictors of the TI. Furthermore, organizational commitment is a mediator between perceived organizational support and TI, as well as between PAJO and TI (Albalawi, et al., 2019). Perceived organizational support has a significant negative impact on TI in the way that it improves work performance and reduces burnout at work (Wang & Wang, 2020). Burnout in the workplace occurs due to being overwhelmed with work and obligations. Therefore, it is not surprising that overtime, work stress and workload significantly affect TI (Junaidi, Sasono, Wanuri, & Emiyati, 2020).

Except for organizational commitment, TI is also influenced by psychological commitment. It reduces the employee's desire to leave his organization and reduces the need to consider alternative options (Murray & Holmes, 2021). TI is also influenced by employee engagement (Sandhya & Sulphrey, 2020). Work engagement has a negative effect on TI (Memon, et al., 2020).

Subjective career success negatively influences organizational and occupational turnover intentions (Talluri & Uppal, 2022). Quality and capable employees usually have more employment opportunities and are more competitive on the labor market. It would be logical that such employees, considering that they have a high PAJO, and PAJO is in a positive relationship with TI, have more intentions to leave the organization. But it doesn't have to be like that, and research proves exactly the opposite. Namely, more talented employees who possess protean career orientation (PCO), are more capable employees, choose the organization in which they will work, and therefore have a higher level of organizational commitment and higher job satisfaction (Redondo, Sparrow, & Hernández-Lechuga, 2019). Precisely because they have a higher level of commitment, a higher PAJO

does not strongly affect their TI. This is also confirmed by the research conducted by Aburumman, Salleh, Omar, and Abadi (2020), who found that career satisfaction and HRM practices have a significant negative impact on TI, with career satisfaction mediating the relationship between HRM practices and TI.

Employees' perceived employability mediates the relationship between coworkers' upward mobility and employees' turnover intention (Huang, Wang, Pi & Hewlin, 2020). Perceived employability it is an equal concept to PAJO and it should be taken into account that when workers think about their coworkers, they first consider the perception of organizational justice

Perceived distributive justice often has a strong negative impact on TI (Mengstie, 2020; Huffman, Albritton, Matthews, Muse, & Howes, 2021) because the feeling of inequality encourages thoughts of leaving. It is necessary to consider that both active and passive job seekers assess their PAJO constantly. Namely, according to Hosain and Liu (2020), passive job seekers are those who already have a job but are thinking about better alternatives, so they are not in a hurry to make a decision about actual turnover. Sometimes, even when an employee is neither a passive nor an active job seeker, he/she subconsciously evaluates his/her possibilities and compares himself with others and his/her possibilities in other organizations. Better opportunities may inadvertently arouse in an employee the desire to leave.

Sender, Morf, and Feierabend (2020) conducted a study that brought interesting results: employees with higher levels of TI are actually more prone to more or less serious deviant organizational behavior, depending on whether they can find better job opportunities more easily. Specifically, employees who have a high PAJO and high levels of TI at the same time are those who report higher levels of deviant behavior.

The relationship between TI and organizational citizenship behavior is usually negative, but this is not necessarily always the case. Given that the employee turnover and TI is more pronounced in some industries than in others, one study showed that in the construction sector, when employees believe that they have limited employment opportunities, they are more likely to engage in citizenship behavior because they see it as an opportunity to stay with the organization (De Clercq, Suhail, Azeem, & Haq, 2019). On the other hand, excessive pressures for organizational citizenship behavior drive people out of the

organization, especially if they have higher levels of PAJO. In the same industry, but in a different study, it was discovered that TI is influenced by employees' perceptions of organizational prestige, and that organizational identification serves as a partial mediator between self-construal and the TI (Uğural, Giritli, & Urbański, 2020).

Salleh, Omar, Aburumman, Mat, and Almhairat (2020) believe that TI can be shaped by an employee's career planning, employees then achieve high levels of satisfaction with their careers because they see their future clearly and feel a sense of control over their career path. Organizational culture plays an important role in TI in the way that a positive and friendly culture reduces TI (Ryu, Hyun, Jeung, Kim, & Chang, 2020). Management and leadership can undoubtedly influence TI, so it turns out that transformational leaders actually reduce TI by encouraging employee performance (Yücel, 2021).

2. Methodology

For this research, a convenience sampling was used, consisting of employees from 15 different organizations that have an annual average of more than 50 employees and operate in the Slavonia and Baranja region. The dispersion of the sample is limited due to the lack of financial and time resources. Regarding the number of employees, small and micro enterprises (with an annual average of less than 50 employees) were excluded from the survey because the turnover rate in smaller enterprises is drastically different (lower) than in medium and large enterprises. The organizations in which the survey was conducted belong to different economic sectors: Agriculture, Industry, Energy, Construction, Services, Trade, Transportation, Education, and Tourism and Hospitality. Due to the sensitivity of the issues addressed in this research and for privacy reasons, the names of the organizations that participated in this research are not mentioned anywhere in the paper, which was one of the basic conditions for most of the organizations to obtain permission to conduct the research.

Depending on the total number of employees, 30-40% of employees were studied in each organization, randomly selected with the consent and support of the organization's owner, the organization's governing body, human resources staff, or one of the authorized managers. A total of 593 questionnaires were collected, but after removing incomplete questionnaires and

questionnaires with missing values, the final sample consists of 423 respondents.

The method used is the test method by batch testing. The interviews were conducted on the premises of the working organizations of the respondents. In most organizations, a separate research room was provided (conference room, separate office or meeting office, or any other available room such as a social room, kitchen, or dining room), and in some, depending on the type of workplace, the survey was conducted on the workplace itself at a time and in a manner that did not interfere with regular working hours and the business process. Due to the group type of survey, participants were not allowed to communicate with each other before completing the questionnaire to avoid bias errors.

Adult employees of both genders, all age groups, all educational levels, and from all levels of the organizational structure participated in the research, including the so-called "white collars", "blue collars" and "pink collars". White collar employees are managers, professionals, and office and administrative employees; employees with pink collars include service clerks and salespeople; while employees with blue collars refer to technicians and device and machine operators.

The created questionnaire is anonymous, and it was filled in independently on paper by the respondents, in the presence and with explanations of one examiner. The particles related to the observed variables include the responses of the subjects along the Likert-5 scale.

The Turnover Intention does not have a universally accepted valid and reliable scale, so in this paper, two different ones are applied, which consist of a total of five particles. The intention to leave the organization is measured by a combination of several scales taken directly from Schwepker Jr. (2001), and it is indirectly about: (1) Bluedorn's (1982) "staying-leaving" index which measures the intention to leave the organization in the future through different periods, and; (2) a scale developed by Wayne, Shore and Liden (1997) and taken from Yamazaki and Petchdee (2015) that measures the degree of thinking about a new job and the level of activity in search of a new job. Perceived Alternative Job Opportunities are measured by two scales: the first scale originates from Treuren, (2013), and the second is a scale created by Mowday, Porter and Steels (1982) found in Mushtaq Amjad and Saeed, (2014).

In addition to TI and PAJO, the sociodemographic characteristics of the

respondents were also examined. These characteristics include gender, age, level of education, place of residence, work status, work experience, number of work organizations changed so far, size and form of ownership of the current work organization, position in the organization, and forms of work according to working hours and type work.

Primary data analysis includes univariate analysis (frequencies and arithmetic means), and bivariate analysis (correlation analysis, ANOVA, and T-test). The used software package is Statistical Package for the Social Science (SPSS) ver. 21.0 for Windows.

3. Results

In the sample there are equally represented men (50.7%) and women (49.3), as well as all age groups: 18-26 years (4.2%); 27-35 years (28.7%); 34-44 years (27.7%); 45-53 years (21.8%); and 54 and older (17.6%). There are the fewest youngest respondents under 26 because they are objectively the least in the labor market, and employees who perform student work, employees who have less than one year of work experience, and who are employed in the current work organization for less than a year are excluded from the survey. Regarding the level of education, 3.6% of respondents have completed primary school, 55% secondary education, 11.7% higher education, 25.5% higher education, 4% scientific master's degree and, 0.2% doctorate. This shows that the largest number of respondents have secondary education (55%) followed by higher education (47.7%).

The majority of respondents represent the urban population (59.9%), while the rest of the respondents live in the countryside (25.6%) and suburbs (14.9%). The majority of respondents are employed full-time (98.6), in medium-sized (64.2%) and large organizations (35.3%). Employees with different durations of total work experience are equally represented: for up to 8.5 years of work experience (34.7%); 8.6-16.25 years of work experience (18.4%); 16.3-23.9 years of work experience (20%); 24-31.5 years of work experience (13.7%); 31.6-39 years of work experience (13.2%). Considering the work experience in the current organization, the largest number of respondents is employed up to 8.4 years (54.6%), and only 4.7% of employees in the current organization are longer than 31.5 years. 51% of respondents have changed 2-3 work organizations so far, 26.3% have only one organization in their

work experience, and 22% of respondents have worked in 4 or more organizations.

56.7% of respondents are employed in the public/state sector, while a slightly lower percentage of 43.1% is employed in the private sector. 99.1% of respondents cite work in an organization as a spatial workplace, while only 10% of respondents have the opportunity to work from home. 80.6% of respondents work based on

fixed working hours, and only 22.2% of respondents have the option of flexible working hours.

The results of the univariate analysis for turnover intention are shown in Table 1, where it is clear that the intention to leave the current work organization is generally low. Table 1 shows descriptive values for turnover intention

Table 1 Turnover intention

Turnover intention (N=423)	Arithmetic mean	Standard error of the arithmetic mean	Standard deviation
As soon as I find a better job, I will leave the current organization.	2,21	0,071	1,456
I am actively looking for a new job outside the current organization.	1,57	0,051	1,050
I am seriously considering the possibility of resigning.	1,63	0,055	1,124
I intend to leave the current organization in the next year.	1,54	0,052	1,061
I intend to leave the current organization in the next two years.	1,76	0,061	1,258

Source: the authors

22.5% of employees said they were very likely or extremely likely to leave the current organization as soon as they find a better job, only 8% of respondents are actively looking for a new job, and 9.6% of respondents are seriously considering resigning. Furthermore, 7.4% of respondents intend to leave the current organization in the next year, and 12.7% of respondents intend to do so in the next two years.

When it comes to perceived employment

opportunities in another organization, respondents generally rate them at lower levels. This means that they do not believe in the possibility of employment in other organizations, which is shown by the arithmetic mean of the collected answers, that is, they do not believe that they could easily find other jobs, similar jobs or better jobs than those they currently do. Table 2 shows descriptive values for PAJO.

Table 2 Perceived Alternative Job Opportunities

Perceived Alternative Job Opportunities (N=423)	Arithmetic mean	Standard error of the arithmetic mean	Standard deviation
I could easily find another job.	2.86	0.064	1.323
I could easily find another job that is better than the current one I have.	2.49	0.059	1.212
I could easily find a similar job in another organization.	2.72	0.066	1.348
I am familiar with several alternative employment opportunities that I could apply for.	2.50	0.069	1.419
I have job offers available in other organizations.	2.14	0.068	1.397
There are many more jobs available similar to my current job.	2.59	0.066	1.355
I can find another job doing exactly what I do now.	2.57	0.069	1.410

Source: the authors

Only a quarter of all respondents have a positive perception of their employment opportunities in another organization, with 19.6% of respondents stating that they already have job offers in other organizations.

To further investigate the turnover intention, a bivariate analysis was conducted to try to determine the differences in the turnover intention concerning different sociodemographic characteristics. A t-test was performed to determine differences in intent to leave between

men and women. Leven's test and t-test on the equality of arithmetic means were performed. Since the Leven test shows a significance of less than 0.05 (0.013), and the significance of the two-way t-test is greater than 0.05 (0.145), that means that there is no statistically significant difference in the turnover intention concerning gender.

The same analysis was conducted to examine the differences between organizations concerning the form of ownership, where the respondents were divided into two categories: employees in

public/state organizations and employees in private organizations. There were no significant differences in the turnover intention in the form of ownership of the organization either. The arithmetic mean shows that there are no discrepancies in the results between the respondents of public/state organizations concerning the respondents employed in privately-owned organizations. Leven's test determined that these were assumed to be equal variances (significance greater than 0.05 (0.343)), and the two-way test of equal assumed variances also showed no statistically significant difference (significance greater than 0.05 (0.275)).

Further, the turnover intention concerning employees who have an open opportunity to work at home and work in an organization was tested. Leven test results (significance less than 0.05 (0.000)) show that equal variances are not assumed. Although the arithmetic mean shows that there are deviations of respondents who have the opportunity to work from home compared to those

who do not, the t-test found that these deviations are not statistically significant because the results of the two-way test are not statistically significant (significance greater than 0.05 (0.148)).

Among the represented forms of work, the turnover intention concerning flexible working hours was also tested. Analysis has shown that there is no difference in the turnover intention between respondents who apply flexible working hours and those who do not. This is evidenced by both the Leven test (assumed equal variances: significance greater than 0.05 (0.328)) and the t-test (two-way significance test: significance greater than 0.05 (0.702)).

After the t-test applicable to the nominal variables, the ANOVA test was used to test the turnover intention relative to the ordinal variables to compare the differences between the different groups. The turnover intention concerning age was examined first and the results are presented in Table 3 and Table 4.

Table 3 Descriptive analysis of turnover intention concerning age

Age	N	Arithmetic mean	Standard deviation	Arithmetic mean error	Arithmetic mean interval (95% reliability)	
					Low value	High value
18-26	17	2.0471	1.10120	0.26708	1.4809	2.6132
27-35	116	1.7966	1.06876	0.09923	1.6000	1.9931
36-44	111	1.7820	1.02285	0.09708	1.5896	1.9744
45-53	88	1.7647	1.02906	0.10970	1.5467	1.9827
54+	70	1.3886	0.79264	0.09474	1.1996	1.5766
Total	402	1.7251	1.01375	0.05056	1.6257	1.8245

Source: the authors

Table 4 Analysis of age variance

	The sum of squares	df	The square of the arithmetic mean	F	Sig.
Between groups	10.779	4	2.695	2.666	0.032
Within the group	401.325	397	1.011		
Total	412.104	401			

Source: the authors

In the analysis of the smallest and largest variance, the F-ratio is observed, which in this case is statistically significant (0.032), which means that there are differences between the groups in the

turnover intention. The post hoc test can determine which groups there are differences, so the Bonferroni test was applied.

Table 5 Bonferroni test: turnover intention concerning age

Age (I)	Age (J)	Arithmetic mean difference (I-J)	Standard error	Sig.
18-26	27-35	0.25051	0.26111	1.000
	36-44	0.26508	0.26186	1.000
	45-53	0.28236	0.26637	1.000
	54+	0.65849	0.27186	0.159
27-35	18-26	-0.25051	0.26111	1.000
	36-44	0.01457	0.13350	1.000
	45-53	0.03185	0.14213	1.000

36-44	54+	0.40798	0.15217	0.076
	18-26	-0.26508	0.26186	1.000
	27-35	-0.01457	0.13350	1.000
	45-53	0.01728	0.14351	1.000
45-53	54+	0.39341	0.15346	0.107
	18-26	-0.28236	0.26637	1.000
	27-35	-0.03185	0.14213	1.000
	36-44	-0.01728	0.14351	1.000
54+	54+	0.37613	0.16102	0.200
	18-26	-0.65849	0.27186	0.159
	27-35	-0.40798	0.15217	0.076
	36-44	-0.39341	0.15346	0.107
	45-53	-0.37613	0,16102	0.200

Source: the authors

Table 5 shows that despite previous analyses, there are no significant differences between groups (statistical significance is greater than 0.05 everywhere). Such results sometimes occur when sample sizes in groups are not uniform (Pallant, 2005). Therefore, it cannot be interpreted that there

are differences between the groups, which means that the turnover intention does not differ depending on the age of the respondents. After age testing, the turnover intention concerning the level of education was examined (results in Table 6 and Table 7).

Table 6 Descriptive analysis of turnover intention concerning the level of education (6 groups)

Level of education	N	Arithmetic mean	Standard deviation	Arithmetic mean error	Arithmetic mean interval (95% reliability)	
					Low value	High value
Primary school	15	1.6667	0.86740	0.22396	1.1863	2.1470
Secondary school	231	1.6519	1.00697	0.06625	1.5214	1.7825
Undergraduate studies	49	1.7429	1.02144	0.14592	1.4495	2.0362
Graduate studies	107	1.8168	0.98675	0.09539	1.6277	2.0059
M.S.	17	2.2706	1.36554	0.33119	1.5685	2.9727
Ph.D.	1	4.6000	-	-	-	-
Total	420	1.7371	1.02748	0.0510	1.6386	1.8357

Source: the authors

Table 7 Analysis of variance in education levels

	The sum of squares	df	The square of the arithmetic mean	F	Sig.
Between groups	15.466	5	9.093	3.000	0.011
Within the group	426.875	414	1.031		
Total	442.341	419			

Source: the authors

Table 7 shows that there are differences between groups defined by different levels of education because the F-ratio shows statistical significance (0.011). Therefore, the Bonferroni post hoc test should be carried out further, but this is not possible because at least one group has a sample of less than 2 (specifically, only one subject has a doctoral level of education). In the next step,

all levels of education that include university education, from an undergraduate level to M.S., are grouped into one common group to determine the differences between respondents in primary, secondary, and higher education. The ANOVA test and analysis of variance in education levels are being conducted again.

Table 8 Descriptive analysis of the turnover intention concerning the level of education (3 groups)

Level of education	N	Arithmetic mean	Standard deviation	Arithmetic mean error	Arithmetic mean interval (95% reliability)	
					Low value	High value
Primary	15	1.6667	0.86740	0.22396	1.1863	2.1470
Secondary	231	1.6519	1.00697	0.06625	1.5214	1.7825
High	174	1.8563	1.05996	0.08036	1.6977	2.0149
Total	420	1.7371	1.02748	0.05014	1.6386	1.8357

Source: the authors

Table 9 Analysis of variance in education levels (3 groups)

	The sum of squares	df	The square of the arithmetic mean	F	Sig.
Between groups	4.223	2	2.111	2.010	0.135
Within the group	438.118	417	1.051		
Total	442.341	419			

Source: the authors

After classifying all highly educated respondents into one group, however, it was found that there is no difference between the groups (0.135) which means that the intention to leave the organization does not vary depending on the level of education.

In order to explore the strength and direction of the linear relationship between TI and PAJO, a correlation analysis was made by calculating the Pearson product-moment correlation. The results of the aforementioned are shown in the following tables.

Table 10 Descriptive statistics for correlation analysis

	Mean	Std. Deviation	N
TI	8.7139	5.15136	423
PAJO	17.8747	8.00568	423

Source: the authors

Table 11 Correlation analysis

		TI	PAJO
TI	Pearson Correlation	1	.309**
	Sig. (2-tailed)		.000
	Sum of Squares and Cross-products	11198.388	5383.839
	Covariance	26.536	12.758
	N	423	423
PAJO	Pearson Correlation	.309**	1
	Sig. (2-tailed)	.000	
	Sum of Squares and Cross-products	5383.839	27046.359
	Covariance	12.758	64.091
	N	423	423

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

Source: the authors

After the analysis, a positive correlation was established between the two observed variables, which means that people who have higher PAJO levels also have higher TI. The size of the "r" value shows medium strength of the relationship (.309). Continuing with the previous, the calculation of the coefficient of determination shows 0,09, which means that two observed variables share 9% of the variance, so PAJO explains only 9% of the variance in TI. Although the previously mentioned strength between variables is medium, this strength

can really be significant because the sample is large.

Also, large sample allows further analysis. Regression analysis was performed to determine whether PAJO has any predictive power on TI. The dependent variable in this case is TI, and the independent variable is PAJO. The results of the regression analysis are shown in the following tables.

Table 12 Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.309 ^a	.096	.094	4.90448	.096	44.554	1	421	.000

a. Predictors: (Constant), PAJO

Source: the authors

Table 13 ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1071.705	1	1071.705	44.554	.000 ^b
	Residual	10126.682	421	24.054		
	Total	11198.388	422			

a. Dependent Variable: TI

b. Predictors: (Constant), PAJO

Source: the authors

Table 14 Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.156	.584		8.829	.000
	PAJO	.199	.030	.309	6.675	.000

a. Dependent Variable: TI

Source: the authors

As mentioned earlier, this model explains 9,6% of the variance in the dependent variable. The ANOVA table reveals statistical significance (Sig = .000, $p < .0005$). The Beta coefficient in the last table shows PAJO’s fine contribution to explaining TI, which is why it can be considered as its suitable predictor.

4. Discussion

Low rates of turnover intention indicate a misperception of the public that Croatian employees are mostly dissatisfied with their jobs and want to leave the organizations in which they work. It is worth mentioning that the public is often misled about the labor market in Croatia, so the society is presented with inaccurate statements about excessive turnover rates of domestic employees, although statistics indicate that these rates are completely acceptable. Of course, there are economic activities in which employee turnover is always a problem, but generally speaking, organizations in Croatia have on average acceptable turnover rates of up to 15% per year.

Low rates of turnover intention are not a guarantee of satisfied employees, but it should be borne in mind that, no matter how traditional the attitude, job satisfaction should not be excluded from the study of turnover intentions. This research, of course, says nothing about this variable, but it certainly suggests that Croatian

employees have fewer intentions to leave the organization than expected.

Furthermore, this low level of TI is consistent with PAJO because respondents have very low levels of PAJO, implying that employees believe they have few better or no better opportunities in the environment, and thus their intentions to leave the organization are lower. In order to prove this presumption, the statistical analysis in this paper showed a direct, positive, medium-strong connection between TI and PAJO. Furthermore, by this simple model, it is established that PAJO can be a valid predictor of TI, and if a model were developed with more independent variables, it would be interesting to study how strong its influence would then be.

However, this paper confirmed the relationship between TI and PAJO, just as other studies have confirmed that external circumstances have a significant influence on TI (Alpar, 2020; Ramlawatia, et al., 2021; Zhou, et al., 2022). It is obvious that PAJO must be included in the model in correlation with other variables and even individual variables, as it can change the strength of the influence of other factors, as has already been confirmed (Rasheed, Okumus, Weng, Hameed & Nawaz, 2020).

In contrast to the studies presented previously, the results of the bivariate analysis did not show significant differences between any of the observed groups, which can be interpreted positively

because it indicates that the observed sample does not tend to collective behavior, which is a conclusion that is always desirable when it comes to undesirable organizational behaviors. However, these results also may indicate a group perception and mindset, such that overall, the surveyed employees believe that they have very few alternative employment opportunities.

Usually, the process of leaving the organization takes place in such a way that the perpetrators realize the withdrawal from the organization which is manifested by the expected benefits of withdrawal, intention to withdraw (turnover intention, TI), turnover costs, creating a plan to leave the organization and potential discomfort.

Alternatives that appear include the perceived possibility of employment in another organization, i.e. perceived alternative jobs, general availability of jobs, and the unemployment rate, as well as the employability index. After all, the initial behavior that indicates withdrawal, and that is the search for a new job and a new work organization, and the behavior of the withdrawal itself begins with absenteeism, delay in work to extreme withdrawal – voluntary turnover. All the influential variables on the intention to leave and actual turnover need to be studied together and the emphasis should be put on “the functional relationship between employer offerings as an input and employee attitudes as an output, with more emphasis on the organizational equilibrium” (Ahmad, 2018).

Lower turnover intention rates are not necessarily an indicator of the success of an organization and its socially responsible business towards employees, nor an indicator of quality Human Resources Management. Sometimes it is simply a matter of contingency variables, i.e. environmental factors that help employers in conditions of the high unemployment rate, which in turn results in lower turnover rates. Whether or not an employee leaves the organization also depends on his or her employability. When society and the labor market are more competitive, more choices will result in higher turnover rates. Labor markets, as well as the general economic situation in Croatia, are not at an enviable level, so the perception of employees about their jobs and organizations is similar to that of the economic situation, which is that mostly the “glass is half empty”.

Conclusion

Monitoring turnover intentions is sometimes not so easy because current employees cannot be

expected to explicitly state their intentions, especially in situations where employees are calculating and are not sure if they will work in another organization. Greater opportunities encourage people to think about leaving, and since employees in the study conducted rate alternative opportunities low, it is reasonable to expect that their turnover intentions are also lower. The implications of this work certainly do not go in the direction of relaxation, because it is only a matter of time before the situation in the labor market becomes more favorable and more accessible and attractive opportunities arise. Before competitors recognize talent, organizations should strive to retain quality employees which is certainly one of the most difficult tasks of HRM.

Regardless, no company can change the conditions of the labor market, but by investing internally in its employees, it can change their perceptions of the benefits of their work and their jobs. Of course, market competition creates a lot of pressure, but under these circumstances, investing in desirable employees is the only sure way to maintain their loyalty. Few will “flee” to other companies because of unsatisfactory salary levels if they feel happy, relaxed and unencumbered in their current company. Going to work without “stomach cramps” means an incredible amount to employees, and even if the company can afford to raise salary levels, this may not be a long-term solution.

The practical implications of this work suggest that other organizational behaviors and attitudes can also be indicators of turnover intentions and actual turnover, so managers need to keep their eyes open and carefully and systematically monitor the competition and trends in the labor market when taking preventive measures and solving this problem.

This research is a valid basis for more complex future research of causal relationships among the observed variables. Recent studies, some of which are presented in this paper, point to the immediate influences of key organizational aspects that moderate or mediate the relationship between TI and PAJO. It is these influences and key variables such as organizational commitment that should be the focus of future research, not only in scientific but also in practical terms. However, arguing about the importance of turnover intention, Cohen, Blake and Goodman (2016) suggest that managers should focus on unique demographic characteristics and specific management practices, rather than on their employees’ self-reported aggregated turnover

intention rate. This only points to the fact that sociodemographic variables must by no means be neglected in the study of organizational behaviors because very often they speak much more than their perception of some attitudes, which are of course subject to change. Also, considering that many previous studies have shown that people leave when they are treated unkindly, it is necessary to include this variable in future studies of turnover intention. One possible reason for intention to leave is the incivility and discourtesy experienced by employee's experience in the workplace, which was found to be a particularly dominant factor for leaving in the academic community (Namin, Øgaard & Røislien, 2022).

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Business process automation – new challenges to increasing the efficiency and competitiveness of companies¹

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Abstract

Background: Scientific and technical progress are unstoppable. Nowadays, information technology affects every sphere of social and economic life. The automation of business processes is a common part of business and accounting practice. Moreover, the COVID-19 pandemic has accelerated the automation in companies. Regularly occurring transactions, which were performed manually before, are gradually being replaced by information technology and automatic robotic systems. The companies fully use cloud storages, artificial intelligence, or blockchain technologies.

Purpose: The purpose of the paper is to identify areas and possibilities for improvement of business and accounting processes with use of information technologies, digitalization, and automation.

Methodology: For the purpose of the paper, a standard methodology review of literature sources was performed. Then we conducted a brief questionnaire survey in order to find out the level of automation and digitization of business processes in companies in the Slovak Republic.

Findings and conclusions: It is expected that, as a result of robotization and automation of business processes, some professions will gradually disappear within a few decades. Even the crisis related to COVID-19 pandemic had an impact on the acceleration of using information technologies in business processes related to their digitalization and automation. The paper describes possibilities of automation with focus on e-shop, which make the processes safer, faster, more effective, eco-friendly, with fewer errors. On the other hand, there are some challenges and threats the accounting entities have to consider when implementing artificial intelligence, information technology in their business processes, such as cyber security, the Internet and electricity outages. We have observed that companies in Slovakia have their business processes more or less automated. However, the automation is the domain of bigger and multinational companies. The higher initial costs related to automation are limitation for smaller companies that need to consider benefits and costs the automation requires.

Limitations and future research: Our paper is based on the theoretical background with a brief research in the area of implementing information technologies in companies in the Slovak Republic. The number of returned questionnaire surveys that were the base for our brief and initial research was very low. More detailed analysis of level of automation in the Slovak companies in comparison with companies abroad, their readiness for changes related to automation, as well as threats, challenges, pros and cons of automation may be the topic for the future research.

Keywords

Accounting, automation, digitalization, e-invoicing, DMS, ERP, COVID-19 pandemic

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Introduction

In the recent period, the use of information technology in business processes as a part of Industry 4.0 has been growing. Industry 4.0 is a shortened title for Fourth Industrial Revolution that is also known as the Digital Revolution. According to Blahušiaková, Mateášová and Meluchová (2022), Industry 4.0 is characterized by creation of industrial networks, introduction of smart technologies, establishment of smart factories, and building the so-called intelligent industry. The basic condition for Industry 4.0 is widely accessible Internet that allows a very easy connection of a large number of people around the world. According to Majstorovic and Mitrovic (2019), Industry 4.0 is a Program initiated by German Government and industry as a new model of automatization of manufacturing technologies.

Information technologies affect all spheres of human life, social, and business environment. Especially in the business area, we can see the growing use of information technologies connected with automation and digitization of business processes. According to Budnik, Macaulay and O'Donnell (2017), the impact of advanced information technologies touches virtually every sector and company on various levels, from strategic planning and marketing to supply chain management and customer services. Digital technologies offer new opportunities for establishment of new infrastructures, products, and business models and, thus, can change the ways in which companies organize for innovation (Drechsler, Gregory, Wagner & Tumbas, 2020).

If companies want to remain competitive, they should focus on more efficient business process solutions, with accent on digitalization and automation. This is supported by Erceg and Zoranović (2022), who state that if companies want to gain or rise market share in the digital era, they must act quickly when a new business opportunity appears. Kontić and Vidicki, (2018) state that the key factors, which determine the company's potential to become a digital organization are proactive leadership and investment.

Digitalization relates to all business processes, such as acquiring new customers, taking care of existing ones, developing new products, automatic tracking orders, mobile warehousing, online invoicing, intelligent store management, or remote document approval. Information technologies help to optimize and automate these processes. Nowadays, it is obvious to issue an invoice right

from the smart phone, or to pay invoice just by one click. Electronic banking belongs to areas where we can see a huge development in digitalization and increasing usage of artificial intelligence. Payments realized just using smart phone or smart watch, payment of invoice by QR code scanning, or creating an account using smart phone with an Internet connection belong to a several examples of information technologies application in business.

Numerous challenges in the area of digitalization (Gulin, Hladika & Valenta, 2019; Gotthardt et al., 2020; Marshall & Lambert, 2018), such as the use of big data in accounting, cloud computing, artificial intelligence and blockchain technology affect the future of business processes. Traditional methods are replaced by Internet based accounting systems (Mancini, Lamboglia, Castellano & Corsi, 2017). This is supported by Dečman, Mališ and Sačer (2019), who state that earlier the focus of accounting staff was on recording historical business transactions, while advanced accounting information systems are now being used as a main support when it comes to making important business decisions. The accountants play significant role in automation of business processes. The clients expect them to provide more complex services, because they themselves do not have time, professional capacity or financial sources to be spent to analyze their problems and search for optimal solution. Thus, the accountant is not only the person who takes responsibility for recording accounting documents, but also the person who is required to provide the ready-made comprehensive solutions for their current problems that should be implemented in a short time.

Implementing information technologies in business processes may contribute to increasing of competitiveness of economy, as well as of competitiveness of micro-entities (Domazet, Zubović & Lazić, 2018). Due to massive digitalization it is expected that many professions will disappear altogether (Jylhä & Syyrimaa, 2019; Pajarinen, Rouvinen & Ekeland, 2015). According to Grace, Salvatier, Dafoe, Zhang and Evans (2018), artificial intelligence is expected to beat the human beings' performance within 45 years and completely replace the human workforce within 120 years. Concerning this, Frey and Osborne (2017) have realized a research to find out, how susceptible are jobs to computerization.

COVID-19 outbreak has affected many common stereotypes. The shift of work

performance into the online environment, meeting restrictions, or a curfew have had a great impact on the change of standardized ways of work performance of several professions. Not only information technologies, but technologies in general have strong impact on work and organization. This is supported by Mičić, Khamooshi, Raković and Matković (2022), who state that social and technological changes have the impact on the ways of communication, cooperation and collaboration.

Nowadays, still more and more companies are using the e-commerce. Business in e-commerce has thrived in recent years, and this growth has also been significantly affected by the COVID-19 pandemic. In the first and second wave of COVID-19 pandemic, switch to e-commerce, or just establishment of e-shops for companies that did not use it before, was the only way to survive during those times.

Legislation has to reflect these rapid changes in business processes connected to growing usage of information technologies. The increasing number of electronic documents, use of electronic signature, using cloud storages, or online communication between business partners need to be regulated by legislation.

What are the possibilities of automation in companies? How to automate and optimize business processes in e-commerce conditions? How to interconnect these processes with accounting system? We have tried to answer these questions in the paper.

1. Methods

The purpose of the paper is to identify areas and possibilities for improvement of business and accounting processes with the use of information technologies, digitalization and automation.

For the purposes of the paper, the systematic review of the relevant printed and electronic sources of literature was performed. The literature review started by defining the research purposes, followed by identification of the key databases and papers in these databases based on defined keywords. The basic databases were Web of Science and Scopus database, as well as professional papers from websites of biggest accounting and auditing companies, and professional bodies. The first selection was performed based on keywords, then according to the title of the papers, abstract and finally based on conclusion of the papers. The basic keywords were: automation, digitization, Document

Management System (DMS), Enterprise Resource Planning (ERP), Robotic Process Automation (RPA), Industry 4.0, e-shop, e-commerce, automation in human resources. We focused on articles not older than 5 years. The literature review continued with the analysis, selection and quality assessment of papers. The final step was data extractions and synthesis.

Based on the keywords we extracted more than 100 records from which we removed those that are not relevant to our work. The basis was the papers included in the Web of Science and Scopus databases, as we consider these papers to be of higher quality. After qualitative evaluation of the papers we chose those sources that are stated in references, which have related to the subject of our research and have contributed to our research the most.

Due to the fact that the subject of our paper is to analyse the possibilities of automation, digitalization and robotization of business processes in companies comprehensively, the resources that we selected in the literature review were the basis for the analysis of all areas of business processes that can be automated and which we discuss in the Results section. Specifically, it is an analysis of procedures related to the digitization of documents, the possibilities of automation in the electronic shop (such as Enterprise Resource Planning, automation of invoicing and processing documents, automation of warehousing and the logistics processes), and automation in the HR field.

Automation of business processes cannot work without a legislative framework. That is why we also focus on legislative changes in the field of automation in the Slovak Republic, which have resulted from the increasing degree of automation of business processes, especially the growing number of electronic documents, in our paper.

In order to investigate the level of automation of business processes in Slovak companies we have realized the brief questionnaire survey among accounting entities in the Slovak Republic in the period from February 4, 2022 to February 18, 2022. The questionnaire survey was distributed to e-mail addresses of companies' representatives (managers, heads of accounting departments, or other responsible persons). We approached 2,358 accounting entities from all Slovak Regions, but only 132 respondents have responded to our survey. The data obtained by this survey were analysed and interpreted.

The main scientific methods that we used when writing this paper were analysis, comparison, selection, deduction and generalization.

2. Results and discussion

2.1. Document management systems (DMS)

The shift of businesses into the online environment due to restrictions related to COVID-19 outbreak has the technology industry growing faster more than ever. New challenges regarding digitizing accounting records caused by movement and meetings restriction, have forced companies to digitize paper documents into the electronic format. The very popular form of processing accounting documents was just scanning them and sending them in .pdf format to responsible persons, or just using the electronic format with the electronic signature.

The increasing number of electronic documents and accounting records put new requirements and challenges on accounting documentation, issuing accounting records, their circulation in the company, and their storage (archiving). Many accounting entities, or companies fully use the cloud storage in their processes for these purposes, with possibility of electronic storage of accounting ledger, automatic recording and e-storage of invoices, as well as e-invoicing. According to Avokaado (2021), almost up to 48.00% of companies choose to store their confidential and important data in the cloud, as the cloud-based documentation enables flexibility and security. In spite of massive digitalization, there are still documents which accounting entities are obliged to issue and store in the paper form (such as documents related to employment relations, or labour law documents). These documents can be stored in the paper form, but also in the electronic form. Avokaado (2021) states some statistics that prove the inefficiency of on-premise paper documentation:

- Companies spend an average of \$25,000 to fill their file cabinets plus \$2,100 a year to maintain them.
- Managers miss important info daily because they cannot find it because it is on paper.
- Almost up to 80% of the information in paper documents is never used again.
- Using paper can cost anywhere from 13 to 31 times more than the paper itself.

- 70% of today's businesses would go down in 3 weeks if they lost their paper records in a fire or flood.
- Each lost document takes about 25 hours to recreate.
- Redoing documents has cost US companies \$1.5 trillion.
- A copy-paste error cost a company 10% of its annual profits.
- Workers waste 20-30% of their time managing documents. and
- Businesses lose \$600 billion every year because of inaccurate or missing data.

To avoid the inefficiency, the integrated cloud-based document management systems (DMS) has been established. The document management system could be defined as a computer-based system used to receive, track, manage and store documents, as well as reduce paper, which offers many benefits (Figure 1).

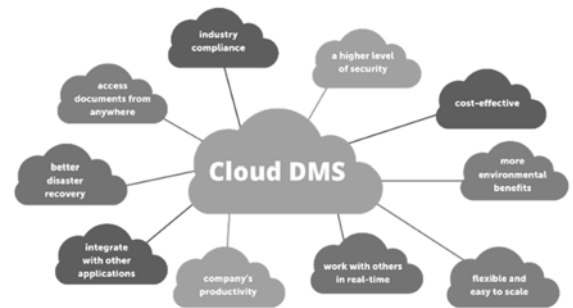


Figure 1 Cloud Document Management System

Source: Avokaado, 2021

The process of storing documents in digital form may in practice look as follows: the incoming invoice is scanned and meta-data are extracted from it. Afterwards, the electronic invoice is circulating in the company instead of the paper form. The electronic form of document is being approved in DMS. After approval, the invoice is being recorded in accounting. Thus, based on digital data stored in the document management system, it is much easier for companies to prepare tax returns.

According to Filipe, Martins and Rocha (2019), implementation of DMS dematerializes, optimizes and simplifies the internal processes. Thanks to document management system, documents stored in the cloud can be accessed remotely, the only condition is an Internet connection. Documents can be retrieved, sorted by defined criteria. DMS regulates company's compliance with legislation, which mandates the accounting entity to organize

documents in a reliable host. Cloud DMS provides a higher level of security through cloud providers, who take security very seriously. Fees for cloud-based DMS are lower in comparison with maintenance expenses, expenses for new computers, disk space, paper, or ink. This leads to reduction of overall expenses for electronic document processing. Cloud document management system, which is based on digital documents, has environmental benefits due to less paper, less energy. Collaboration and documents sharing within the company are easier with cloud-based DMS. The company can control who to give access to, so negotiating with other team members becomes easily. Thanks to DMS, the management can concentrate on decision-heavy tasks that directly impact company's growth. DMS could be integrated with other company's applications, systems, and software. It speeds up and streamlines the work. A cloud-based disaster recovery solution provides continued operations despite disruptions. This is more efficient in comparison with paper-based systems, because if unforeseen or unexpected circumstances, such as lockdowns, fires, or system failures occur, the company still can have access to its data, or can recover data much faster.

The advantage of documents digitization and electronic archives is mainly (Filipe, et al., 2019; Smith, 2018) their accessibility for every employee of the company with an access. The documents do not need to circulate physically in the company. It saves costs, time, increases transparency and reliability, and on the other hand, reduces errors. An integral part of building an information system is backup and security. The basic requirement is the possibility to control an access to the system by name and password, the authorization of the user to work only with certain documents, and to use only allowed functionalities.

If the company wants to be able to operate as much as possible without paper and fully use the potential of digitalization, the electronic signature plays a significant role. In the Slovak Republic, the *Act No. 215/2002 Coll. on Electronic Signature as amended* was issued in 2002. It was replaced by the *Act. No. 272/2016 Coll. on Trusted Services for Electronic Transactions in the Internal Market and Amending Certain Laws (Trust Services Act)* as amended in 2016. Both acts defined basic terms, such as electronic document, electronic signature, electronic seal, public key, private key, certified authority, and so on. They also specified the rights and obligations of entities using the electronic

signature and electronic seals, the authenticity and protection of electronic documents signed electronically. There can be three different types of signatures (Podnikajte, 2021a):

- the simple electronic signature without exactly defined format criteria or security level criteria, such as scanned handwritten signature at the end of the e-mail;
- the improved electronic signature that guarantees higher security, as it must meet certain criteria, e. g. allows to identify the signatory, for example signing of documents in internet banking, where it is possible to sign by entering a password from two-factor authentication;
- the qualified electronic signature that represents the form of improved electronic signature with additional requirement for security and identification of the signatory (through identity card with an electronic chip). Using this type, the business partners can check and sign the documents using web application from any place in the world with Internet connection.

The qualified electronic signature is legally equal to the handwritten signature. It ensures the authenticity and integrity of the electronic document. The signatories no longer need to own a hardware cryptographic facility to obtain a qualified electronic signature. The secure signature creation facility may be managed by the issuing certification authority, in particular by a trust service provider. In the Slovak Republic, the D. Trust Certified Authority a. s. (DTCA) is the exclusive service provider of an accredited certification authority.

The safer way of signing business contracts and agreements is creation of secure electronic signature with application of biometric-based cryptographic techniques. The techniques combine password and biometric authentication factors into the Biometric Authenticated Key Exchange protocol, which provides mutual authentication and multi-factor authentication of users, as well as preventing phishing and man-in-the-middle attacks (Griffin, 2019).

Introduction of e-signature requires the change of processes and habits in the company. The experts argue that introduction of electronic signature brings many benefits, such as improvement of documents storage, time savings, elimination of manual errors, reducing the need for printing and scanning signed documents, or

ecological aspect – paper savings. On the other hand, there are many threats related to electronic signature, to which belongs mainly the cybercrime. The users of electronic signature become aware that the electronic signature methods they use are adequate and the two or three-degree authentication process will not be broken by criminals.

2.2. Automation in electronic shop

Another area of automation of business processes is an electronic shop (e-shop). The popularity of purchasing goods is growing, and due to several lockdowns during the COVID-19 pandemic, when most stores had been closed, e-shops were the solution for many entrepreneurs. In a fast-growing e-commerce business, the e-shopper must respond flexibly to new market trends, not to lag behind the competition, constantly innovate, look for new sales channels, and improve existing ones. However, the process of ordering goods, payment and registration of payment, until goods are delivered to the customer, consists of many steps. This process can be significantly facilitated by automation using the Enterprise Resource Planning (ERP) information system.

2.2.1. Enterprise resource planning (ERP)

The enterprise resource planning (ERP) system can be defined (Moon, 2007; Ruivo, Johansson, Sarker & Oliveira, 2020) as an enterprise information system designed with the purpose of integrating and optimising the business processes and transactions in a company. It is the internal integrated information system used for management and coordination of all sources, workplaces and functions of business sphere through shared data storage. It is a category of business management software, usually a suite of integrated applications that a company can use to collect, store, manage, and interpret data from many business activities.

According to Nikitović and Mahmutović (2019) the acronym ERP can be explained like: E represents Enterprise with emphasis on the integrity of business system, R means Resources representing all resources of a company (human, material, financial, information, organizational), respectively all resources at disposal in a company, while P is Planning, whereby the focus is on providing all resources and their best allocation for the achievement of objectives. The ERP is something like the central brain for all company's activities that helps companies with enterprise

resource planning and management (Král, 2019).

Due to globalization, it is necessary to look for any tools that will give the company a competitive advantage. Many companies achieve this advantage by using the ERP system. The ERP system combines customer management, human resources, enterprise intelligence, financial management, inventory and supply chain capabilities into one system (Figure 2).

The ERP stores all entered data in one database, which allows all departments to work with the same information. The advantages of the ERP are (Midasto, 2021):

- increasing profit using the ERP system,
- streamlining internal processes,
- better analysis and data evaluation,
- higher productivity,
- customer satisfaction,
- easier compliance and risk management,
- easier warehouse management, and
- more accurate production planning and resource management.



Figure 2 Enterprise resource planning
Source: Král, 2019

When integrating enterprise resource planning with the online store (e-shop), the list of products and the data update are done only in one system, in that of ERP, and the e-shop gets this information automatically. This integration brings many advantages, such as reducing of personnel costs, minimizing errors or the number of complaints, and increasing the e-shop credibility for its customers. Thus, the company can eliminate human errors and make the work of their employees more efficient. At the same time, the company has all the data needed for accounting for in the economic system. Due to this integration and adaptation, many processes run without the need for human intervention. The operation of the company is faster, more accurate and more efficient. Anyone in the company can check the

order status, the number of issued invoices, or how the sales are rising or falling. The biggest benefit of the ERP system is the centralization of all the e-shop agendas in one place (Podnikajte, 2021b) – from order registration, requirements for the purchase of goods or materials (if the e-shop does not have it in warehouse), through issuing inventories from the warehouse, invoicing, accounting for, up to payment matching. Thanks to the ERP system, it is possible to have an immediate overview of the company as a whole, including related analyzes. The manager can evaluate the consumption of individual customers, the best-selling products, or product categories. All outputs from the ERP, to which e-shop also belongs, contain up to date data about prices, or stock in warehouse. The efficiency in order processing and in other automated processes is maximized. The human factor is eliminated, and the error rate during data transmission is minimized. The costs related to order processing are also minimized and the profitability of the whole e-shop increases.

The most frequent ways of ERP and e-shop interconnection are either regular data transfers using files in .csv format or .xml format through FTP (File Transport Protocol) folder, or “online” transfers of data through API (Application Programming Interface). An API is a software intermediary that enables two applications to communicate with each other. It is an interface with various pre-programmed features, which provide a third party or an internal programmer with the possibility of exchanging data with the e-shop.

Despite many advantages of ERP, Mahmood, Khan and Bokhari (2019) state 31 challenges, or issues that are faced by small and large organizations during ERP implementation. The topmost ten challenges include especially top management approach, change management, training and development, effective communication, system integration, business process reengineering, consultant/vendor selection, project management, project team formation, team empowerment / skilled people, and data conversing / migration. They also state other issues, such as data security, cloud awareness, functionality limitations, or subscription expenses. This is supported by Janssens, Kusters and Martin (2021) who state that ERP implementation is complex, risky, time-consuming, and very expensive. ERP implementations often exceed budget and time, and fall short of stakeholders’ expectations.

Nikitović and Mahmutović (2019) agree with this opinion, as they state that ERP implementation is a cost demanding for every organization.

When thinking about integration the ERP system with the e-shop, the company should define functions, which will be provided by the e-shop and those which will be provided by the ERP system itself. If the entrepreneur handles a couple of orders a day, the interconnection between e-shop and the ERP system is not necessary.

2.2.2. Automation of invoicing and processing of documents

Choosing the right invoicing application is a very important step. The e-shop company should answer questions, how to automate the invoicing and how to import these data into accounting (Podnikajte, 2022c). E-shops with only a few orders a day can issue invoices manually, using invoicing application or accounting software. If the number of orders exceeds the certain level, this manually provided activity becomes an unnecessary burden, unbearable for the entrepreneur, as well as for the accountant, and as the number of cases increases, so does the error rate. According to the Slovak legislation, the seller is obliged to confirm the order immediately. If the confirmation of orders is automated, the automation of invoicing can be the next step.

The invoicing depends on the time the payment is realized and, on the time, when the goods or services are actually delivered. The settings of invoice’s content, or mode of VAT, especially when a company delivers goods or provides services to customers abroad, are among other issues that should be considered, when setting up invoicing processes.

Automated invoicing has many advantages:

- reduction of administrative and time burden on this agenda,
- real-time overview of company’s income, profit, expected tax liability for VAT, unpaid receivables,
- integration with warehouse,
- integration with payment gateways, and
- integration with transport companies.

This is supported by Bellon, Dabla-Norris, Khalid, and Lima (2022) who argue that e-invoicing increases reported company’s sales, purchases and VAT liabilities by more than 5% in the first year after adoption.

Invoices are generated automatically without the need for manual intervention and are imported

into the accounting software, which also reduces the cost for the accountant's work. Furthermore, the interconnection between the e-shop and the warehouse enables to monitor the amount of stocks and to predict the need of purchasing goods or materials for production. The e-shop operator can plan the purchase of inputs before he needs them, which provides a competitive advantage.

Narayanamm, et al., (2020) suggest to organizations to implement blockchain-based e-invoicing systems to reduce invoice disputes, reduce dispute resolution time, and provide real-time auditing.

2.2.3. Automation of warehousing and the logistics processes

Having enough inventory in the warehouse is one of the key factors for companies, especially for e-shops. If the goods are missing, the processing of the order is postponed, and the customer's dissatisfaction grows. On the other hand, it is not appropriate to have a warehouse full of products, for which there is no demand. Therefore, the effective warehouse management, quantity optimization and automation of the purchasing process are important. According to Anđelković and Radosavljević (2018), the functioning of order-picking process, which is very significant in terms of contribution to the competitiveness of company, depends on information technology, such as warehouse managements system.

Thus, the solution can be the investment into new technologies, such as semi-automated stackers with guidance, robotic registration sorting - packing line, automated table workstations, or the autonomous mobile robots (AMRs). Autonomous mobile robots are (Fragapane, de Koster, Sgarbossa & Strandgagen, 2021) currently being introduced in many intralogistics operations, like manufacturing, warehousing, cross-docks, terminals, and hospitals. AMRs can communicate and negotiate independently with other resources like machines and systems and thus decentralize the decision-making process. Despite many advantages, Liaqat, et al., (2019) state that a dynamic and flexible manufacturing environment presents many challenges in moving of autonomous mobile robots, leading to delays due to the complexity of operations while negotiating even a simple route.

Investing in technology should be based on economic base and quick return. The key indicator is turnover. The entrepreneur should be informed about how fast the inventories are selling. The

purpose is the highest turnover at the lowest number of inventories in the warehouse. Many companies use inventory mirroring, cluster picking or dynamic slotting (Podnikajte, 2022b). Inventory mirroring means that the bestsellers are not only in one place in a warehouse, but in several zones. The cluster generation method, which groups orders with the same priority and their individual items close to each other, helps to process orders more efficiently. Dynamic slotting helps to determine where the optimal place for storing a particular item is. The storage of inventory items is not static, but varies according to season, the development of orders and their items. The virtual copy of the whole warehouse belongs to often used technology in e-shop.

The entrepreneur is thus able to automate purchase and sale of goods, and set up online campaign for low-turnover goods he needs to get rid of. Systems based on artificial intelligence can automatically select missing items with the necessity to re-order them. Sometimes these systems are able to send the order directly to supplier.

Intelligent technologies, modern systems and complex solutions help companies to save time, costs and even "feet" of their employees. Orders are processed faster, customers are more satisfied and the error rate is lower. As from the future perspective and the expansion of operations to more warehouses, the necessary capacities can be relocated and the technologies can be used exactly, where they are most needed at the moment. This will have a positive impact on sustainability and the environment, too.

Many companies use mathematical models to optimize the purchase and the quantity of inventories (Podnikajte, 2022a). It helps to improve the stock records, to settle automatic reminders, when inventories decrease under the minimum level, or to predict the inventory consumption. The automatic generation of online invoices, their export into the accounting software and their automatic accounting for, as well as the payment matching, are other examples of automated business processes.

Another step in the order processing is issuing of goods from the stock. Artificial intelligence, such as automated control system, is most often used in warehouses in order to reduce errors caused by humans. Companies use all available technical means, such as code readers, Radio Frequency Identification (RFID) tags, calibrated proportional scales connected via a network to their ERP

system, or PDA devices. Radio frequency identification tags are a type of tracking system that uses smart barcodes in order to identify items (Pontius, 2022).

The automated control system may look like this: The first level of control is being carried out in the individual sectors of the warehouse. The employee can verify the position of the item in the warehouse via the PDA at any time. Number of items are checked via a special scale. The system shows the storekeeper the corresponding number of pieces. The second level of control is being carried out at the output control, where the system, after reading the barcode, also displays an image of the component on the monitor for check in. The whole process of the output control can be recorded by cameras.

2.3. Automation in the human resources sphere

Digitalization and technological progress have been applied in the human resources (HR) sphere, too. This is supported by Kholod, et al., (2021) who argue that the use of digital technology significantly affects the entire cycle of personnel in an organization, including hiring, onboarding, and firing. Automatic recording of employees' attendance, using virtual reality system for trainings of pilots or doctors, using a cloud solution (data storage) for storing of employees' data are only some of the examples of implementation of information technologies in human resources sphere. The cloud data storage is a safer solution for employees' registration in comparison with the paper form. Moreover, the external cloud companies invest more money to secure the systems they are providing for these purposes than the company itself.

Owing to the information technologies, HR activities, such as monitoring and recording attendance, absences, sick leave, annual leave, payments of wages, benefits, training, and employee contract are faster, more accurate, and easier than before (Berber, Đorđević & Milanović, 2018). According to Slavić, Bjekić and Berber (2017), the use of social networking sites, such as LinkedIn, Facebook and Twitter, in recruitment process is becoming increasingly popular. Artificial intelligence, such as chatbots are a good help in onboarding (the adaptive process) of new employees. The chatbot answers frequent questions from newcomers and replaces HR staff. Deploying Robotic Process Automation (RPA) can according to Balasundaram and Venkatagiri (2020)

help to offer better service to employees and managers, ensure compliance of HR processes with standards and regulations, facilitate rapid start-up and completion of human resource processes, increase efficiency by digitizing data and auditing process data, increase and improve HR productivity, and save costs by automating manual and repetitive tasks. Robotic process automation is a new technology which automates tasks by interacting with other software through appropriate user interfaces (Herm, Janiesch, Reijers & Seubert, 2021). Results of the RPA are (Johansson, Engberg, Lindgren & Sordal, 2020) upskilling, job satisfaction, and that the employees perceive an increased level of job enlargement. RPA has also been adopted in many industries (Huang & Vasarhelyi, 2019), including the accounting and auditing industry, to automate well-defined and repetitive tasks.

The common example of automation in human resources is interconnection of the attendance system with the payroll software, and with the accounting software, where the salaries are subsequently being accounted for.

According to Berber et al. (2018), the key advantages of electronic human resource management are faster, more accurate and simpler processing of information about employees, cost savings, freeing human resources managers from administrative tasks, better access to human resources data, standardization of human resources processes within the company, more consistent and up-to-date data about employees and their performance, and the like. Thanks to digitalization of human resources processes (Kholod et al., 2021), as well as the use of such elements in personnel management as cloud technology, remote working, big data, social media and artificial intelligence, companies can increase their lead over their competitors.

2.4. Legislative changes related to automated processing of accounting documents in the Slovak Republic

Accounting practice has been impacted by digitalization and automation since the first computers and accounting software started to be used by processing accounting documentation. Thus, accounting books in the paper form have been gradually replaced by the electronic format because accounting documents started to be processed automatically. In the Slovak Republic, according to the *Act No. 431/2002 Coll. on Accounting as amended* (hereafter referred to as

“Act on Accounting”), the accounting documentation shall include all accounting records. Till the end of the 2021, the accounting record could have either the written form or the technical form. *The Act No. 456/2021 amending Act on Accounting*, which entered into force on January 1, 2022, responded mainly to the growing number of electronic accounting records in accounting practice. The amendment specifies conditions the companies are required to follow when processing accounting records and states information the accounting documents must contain. The paper accounting record and the electronic accounting record are the new terms that have replaced previously used terms – the written form of the accounting record and the technical form of the accounting record. In the amendment of *Act on Accounting*, the electronic accounting record has been specified as the accounting record made:

- in the electronic format, and received or made available in the electronic format, whereby the electronic format is determined by the issuer of the accounting record or is determined on the basis of agreements with the recipient of the accounting record;
- in accordance with *Act on Accounting* and sent electronically, for example as an attachment of an e-mail;
- in the electronic format for internal purposes of the accounting entity.

The accounting entity is required to ensure the credibility of the origin, the integrity of the content, and the legibility of the accounting record from the moment the accounting record is made (received, made available) until the end of the archiving period of 10 years. The credibility of the origin and the integrity of the content of the accounting record can be ensured (Blahušiaková, et al., 2022) by the signature of the responsible person, by electronic data exchange, or by the internal control system of the accounting records. The electronic data exchange can be understood as the computer-to-computer exchange of business documents in a standard electronic format among business partners, which goes through the processes of verification, coordination, approval, and recording in accounting books, without human intervention in the content of the accounting record. The signature can be either a handwritten signature, a qualified electronic signature or a similar verifiable signature replacing a handwritten signature in electronic form, which allows unambiguously

verifiable identification of the person who made the signature. The signature is accepted only if the person uses a personal access code (name, password, key) to enter the information system.

The transformation of the accounting record from the paper form into the electronic form, or vice versa, can be performed by a guaranteed conversion or by scanning into a file format in raster graphic form, saved in .pdf, .png, or .jpg format. The electronic accounting records can be stored on data storage device, such as optical drive, flash drive, memory stick, hard drive, cloud storage, and so on.

The amendment of *Act on Accounting* effective from January 1, 2022 requires companies to deliver all the required accounting documentation, such as the financial statements, the annual reports, the Announcement on the approval of the financial statements, auditor’s report and so on, only in the electronic form to the Register of Financial Statements (hereafter referred to as “Register”). The Register represents the information system of public administration that is administered by the Ministry of Finance of the Slovak Republic, which is responsible for establishment, maintaining, and operating the Register and for other duties arising from the *Act on Accounting*. The Register is divided into the public part and the non-public part. The public part of the Register consists of documents of almost all companies in the Slovak Republic if financial statements of these companies shall be publicly accessible besides those stated in the *Act on Accounting*. As of the January 1, 2022, all the accounting entities are required to deliver all the accounting documentation only in the electronic form into the Register. The process of filing the documentation is simplified and the errors are eliminated. The required documents are delivered via the electronic mailroom. The Financial Directorate of the Slovak Republic passes documents delivered in the electronic form on to the Register administrator. The Register administrator subsequently makes documents of accounting entities accessible in the public part of the Register to all persons through the website in the electronic form. The public part of the Register enables companies to have an access to financial statements of other accounting entities, so they can work with datasets including information from financial statements and compare their economic results, financial position, and financial performance with other companies.

As of the January 1, 2022, the communication between the Financial Administration Authority of the Slovak Republic (hereinafter referred to as “FAA”) and taxpayers is carried out only electronically through the Central Government Portal, Slovensko.sk. It reduces operating financial costs, decreases the number of printed paper documents and makes the communication between FAA and clients more effective. On the other hand, the outages of Internet or electricity, failure of the system may cause many problems, such as delays when delivering the documents electronically.

The issuers whose securities are admitted to trading on a regulated market in the European Union are required to publish a European Single Electronic Format for accounting periods beginning on or after January 1, 2020. It is a new uniform electronic reporting format for issuing annual financial reports. The provisions on a European Single Electronic Format included in the Transparency Directive are based on the premise that a harmonised electronic format for reporting would be highly beneficial for issuers, investors and competent authorities, as it would facilitate reporting and make annual financial reports easier to access, analyse and compare. This regulation does not relate with COVID-19 pandemic but it is a new issue that auditors had to deal with during the difficult times of the pandemic, and as well, it increases the level of automation in accountancy and auditor profession.

2.5. The level of automation in Slovak companies

Digitalization and automation are and will be connected with additional costs the accounting entities will have to bear, either for the technical and software equipment, or trainings of employees in the area of digital skills. Are the accounting entities ready for changes related with automation and digitalization? To what level are their business processes automated? The answers to these questions we have observed through the questionnaire survey.

The structure of respondents consisted of 37.1% of micro accounting entities, 28.0% of small accounting entities, 24.2% of large accounting entities, 5.3% of accounting entities under IFRS and 5.3% of other accounting entities. The respondents have their headquarters in all Slovak Regions. The most respondents have their headquarters in the Bratislava Region (39.4%), Žilina Region (16.7%), Prešov Region (9.8%), Trenčín Region (7.6%), Banská Bystrica Region

(7.6%), Nitra Region (7.6%), Trnava Region (6.1%), Košice Region (5.3%). Regarding the number of employees, almost 50% of respondents have been smaller accounting entities employing less than 10 employees (49.2%). Up to 22.7% of respondents employed more than 100 employees. Based on the legal form of accounting entities, most respondents were limited liability companies (77.3%), joint stock companies (15.9%), self-employed persons (5.3%). Two respondents were the organizational unit of a foreign accounting entity. The most respondents were accounting entities providing the services (63.6%), the accounting entities operating in the wholesale and retail (18.9%), and the accounting entities operating in the manufacture (17.4%).

Based on the results of our research, up to 29.5% of respondents have all business processes in the company fully automated (from orders, through purchasing of goods, invoicing, payments, up to accounting for, including automation of payrolls and warehouse). Other respondents have stated partial automation of only several processes. For example, up to 38.6% of respondents have integrated invoicing with accounting system; up to 37.9% of respondents have only communication with the Financial Administration Authority automated; up to 33.3% of respondents have interconnected payroll and accounting; up to 30.3% of respondents is using the electronic invoicing and electronic signature; and up to 17.4% respondents have reported the warehouse management automation. Some respondents have stated that they have most of the software and databases interconnected, which enables any employee to log in to the system from anywhere via the Internet. One respondent from the retail sector has stated that they have several processes within the company automated, they are still working on automation, but the physical presence of the employees is still necessary. One respondent (a joint-stock company operating in the engineering sector, with more than 100 employees) has reported that despite the full automation of all business processes, including electronic invoicing, the archiving of documents in their company is still carried out in the paper form.

The level of automation in accounting entities participating in our questionnaire survey based on the size of the accounting entity and legal form is stated in Table 1 and Table 2. As Table 1 shows, full automation of business processes we can see in 19 of 32 large accounting entities (59.4%). Only six small accounting entities (16.2%), and ten

micro accounting entities (20.4%) have business processes fully automated. The results of our research also proved that six of seven accounting entities under IFRS have their business processes fully automated. Self-Employed persons automate their business processes at the lowest level. As the results of our research proved, one self-employed person has warehouse management automation, one is using electronic invoicing and signature, but on the other hand six self-employed persons have automated communication with FAA. Based on these results, we assume that bigger accounting entities automate business processes to a much greater extent than smaller ones. The questionnaire survey has also proved that most accounting entities have automated invoicing with accounting system (51 respondents), electronic communication with FAA (50 respondents), and integrated payroll with accounting system (44 respondents), as well as electronic invoicing and signature (40 respondents).

Table 1 The level of automation based on the size of accounting entity

Automated Processes	Large AE	Small AE	Micro AE
Fully automated processes	19	6	10
Warehouse management automation	7	7	7
Automated payroll tool integrated with accounting system	11	13	19
Automated invoicing integrated with accounting system	14	19	18
Electronic invoicing and signature	6	10	23
Communication with FAA	6	14	24
Total sum of individual types of accounting entities	32	37	49

Source: Own research based on questionnaire survey
Legend: AE – accounting entity

Based on results shown in Table 2, we can see that more than a half of joint stock companies (57.1%) have fully automated business processes. From nine joint-stock companies, which do not have fully automated business processes, up to eight companies have warehouse management automation, automated payroll, invoicing and also the communication with FAA. Only 28 from 102 limited liability companies have their business processes fully automated. Up to six limited liability companies have automated payroll, invoicing, as well as warehouse management automation. Up to fifteen limited liability companies have reported automation in payrolls and invoicing synchronously; up to thirty respondents have stated interconnection between

payroll system and accounting software; and up to 38 respondents have automated only invoicing that is interconnected with accounting software.

Table 2 The level of automation based on the legal form

Automated Processes	Joint-stock company	Limited Liability Company
Fully automated processes	12	28
Warehouse management automation	8	13
Automated payroll tool integrated with accounting system	9	34
Automated invoicing integrated with accounting system	8	42
Electronic invoicing and signature	5	33
Communication with FAA	9	35
Total sum of individual types of accounting entities	21	102

Source: Own research based on questionnaire survey

The results of our research also proved that one of two organizational unit of foreign accounting entity has fully automated business processes.

Up to 65.2% of all respondents have reported that they had implemented automation and digitalization on their own, up to 44.7% of respondents had used services of external company for these purposes. Based on this, we can state that up to 9.9% of respondents combines these two variants – some processes they have implemented by themselves, some processes through external supplier.

Up to 52.3% of respondents have reported additional costs related to automation of businesses processes, while 47.7% of respondents have not reported any additional costs related to automation. Up to 19.7% of respondents have stated no or minimal automation costs. Up to 21.2% of respondents have stated automation costs up to 10% of the total costs. Automation costs in the amount of 11 – 50% of the total costs have been reported by 4.5% of respondents. According to respondents, the costs are related mainly to the purchase of technology, software, payments for external data storage, payments for electronic communication, and electronic signature.

Conclusion

The paper focuses on digitalization and automation of business processes which, nowadays, create an integral part of business practice. Activities surrounding order processing, order tracking, invoicing, accounting, payroll processing, or inventory management are the main candidates for automation.

Digitizing of accounting records requires to store these data in cloud storage so that anyone in the company had the access to them. Cloud based documentation enables flexibility and security. We agree with Avokaado (2021) who recommend establishing the integral cloud-based document management system in order to avoid the inefficiency of on-premise paper documentation. This computer-based system is defined as system that receives, tracks, manages, and stores documents, and which offers many benefits at the same time. The main benefits are reducing expenses, optimizing and simplifying the internal processes, increasing of security, and social sustainability. The DMS could be integrated with other company's applications, systems, and software.

Another system designed to integrate and optimize the business processes and transactions in companies is the enterprise resource planning system, which is according to Moon (2007), Ruivo et al. (2020) used for management and coordination of all sources, workplaces and functions of business sphere through shared data storage. The ERP can be interconnected with e-shop, which leads to centralization of all the e-shop agendas in one place. Many companies use automated invoicing, automation of warehousing, electronic signature, or e-invoicing in their practice. As the practice showed, automation and digitization save costs, time, increase security, transparency, reliability, and company's credibility for its customers, as well as reduce errors or the number of complaints. On the other hand, there are some challenges that are faced by both, small and large organizations during ERP implementation (Mahmood et al., 2019; Janssens et al., 2021; Nikitović & Mahmutović, 2019), such as data security, cloud awareness, functionality limitations, or subscription expenses. The ERP implementation is a cost demanding for every organization.

Nowadays, autonomous mobile robots are still more often used to make processes in warehouses, manufacturing, terminals, or hospitals, more effective. Despite many advantages the AMRs bring, there are some authors who mention the limitations in moving of AMRs.

HR processes are also the area where we can see the growing trend of automation and technological progress. As several researchers (Balasundaram & Venkatagiri, 2020; Slavić, et al., 2017; Herm, et al., 2021) state, monitoring and recording attendance, absences, sick leave,

trainings, employee contracts are due to the information technology faster and easier. The use of chatbots or RPA leads to an increase in skills, job satisfaction and an increase in the level of job enhancement as perceived by employees. Still more and more companies use social network sites in recruitment processes.

As our research, as well as previous research and practice, shows, information technology plays an important role in all spheres of business processes, making them faster, simpler, safer, more reliable, and less error-prone.

As the practice proved, the legislation has to reflect changes in business processes resulting from automation, digitalization, and increasing number of electronic documents. Amendment of *Act on Accounting* effective from January 1, 2022 brought some changes related to automation, to which belong amendments in the area of Register of financial statements, electronic signature, as well as the definition of the electronic accounting record and its equality with the paper accounting record.

Regarding the growing level of automation in business processes resulting partially from the COVID-19 pandemic, we have performed a brief research among companies in the Slovak Republic. The aim of the research was to investigate the level of automation in the Slovak companies. We found out that companies in the Slovak Republic have their business processes more or less automated. The COVID-19 pandemic with its meeting and moving restrictions has also affected the level of automation in the Slovak accounting entities. The paper form of documents has been gradually replaced by their electronic form, which has contributed to increasing level of automation in the Slovak companies.

The bigger companies, especially those presenting their financial statements in accordance with IFRS and joint-stock companies, are usually on higher level of automation in comparison with smaller accounting entities, which are not able to spend so much money on purchasing and implementing of these automated systems. The bigger companies dealing with large number of documents usually benefit from automation. Accounting, payroll processing, internet banking, communication with FAA are the main areas, where we can see the highest level of automation in almost all responded accounting entities. Up to 40.9% of respondents have reported automation costs in the amount up to 10% of the total costs.

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processes require high level of cyber security, which belongs to the main challenges the companies have to face. Internet and electricity outages can also be a complication, when a company automates its business processes, because the employees would not have the access to the company's data. When thinking about automation and digitalization of their business processes, companies should compare the costs for technical and software support for automation with benefits the automation brings to them.

Automation and digitization are linked with many challenges the companies have to consider. Only their implementation will show the companies' readiness for that. Our research of the level of automation among the Slovak companies was based on a very low number of returned questionnaire surveys. Moreover, the questionnaire survey was very brief and aimed only to find out the basic information about the level of automation. More detailed analysis of level of automation in Slovak companies, their readiness for that, challenges, limitations, pros and cons of automation are issues that could be the topic for the future research.

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The effects of R&D performance on the profitability of highly innovative companies

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Abstract

Background: In modern business conditions, intangible assets have a dominant impact on the business performance of the company. R&D activities, the level of R&D investments and the efficiency of R&D investments affect company profitability. There are various performance indicators of R&D activities that have an impact on profitability.

Purpose: Bearing in mind that R&D is the precondition of growth and development of the company, as well as the efficiency of R&D investments, is the key determinant of economic corporate responsibility, the purpose of this paper is to investigate the effects of various performance indicators of R&D activities on companies' profitability. The aim of this paper is to investigate the effects of R&D investments, R&D intensity and return on R&D capital on the profitability of highly innovative companies.

Study design/methodology/approach: Correlation, regression and cluster analyses were performed to provide an empirical investigation of the impact of key R&D performance indicators on the return on assets (ROA) of highly innovative companies, which are on the list of the top R&D spenders in the world. The data for the analysis comprises 24 R&D-intensive companies for the period 2013-2021.

Findings/conclusions: The regression analysis results conducted on the determined clusters show that all three analyzed indicators of R&D activities have a positive and statistically significant impact on ROA in highly R&D-intensive companies. It is confirmed that the effects of various indicators of R&D activities are bigger in companies with higher RDII.

Limitations/future research: The sample encompasses the 24 companies listed among the top 50 R&D spenders worldwide, which is considered insufficient for extensive analysis. The other limitation is related to the short research period. As the R&D activities produce yields after several years, the possible direction for future research is to investigate the impact of accumulated R&D investment over several years on ROA.

Keywords

R&D investments; R&D intensity; return on R&D capital; profitability; efficiency; innovation; top R&D spenders

Introduction

In science and technology-based companies, R&D is a crucial input in creating new knowledge and products, generating future returns, as well as gaining and maintaining higher profitability in comparison to market rivals. To gain a competitive advantage in a rapidly changing, uncertain and competitive environment, a company needs to improve its business performance through efficient use of R&D investment with the aim of better R&D outputs and outcomes. Consequently, they will positively contribute to the enhancement of various financial and non-financial performances. Nowadays, every company strives to improve the efficiency of R&D investments in order to boost revenues, profits, labor productivity, profitability, technological innovation and competitiveness (Veselinović & Veselinović, 2019). Innovation activities or R&D activities affect business performance. According to Jin and Choi (2019), improvements in product innovation, as well as R&D investment and research resources, have a favorable impact on business performance (i.e., revenue and labor productivity).

Many companies choose to invest their revenue in R&D activity, as a valuable instrument of competitive struggle, in order to achieve expected returns in the future. In the technology era, those firms which allocate a higher level of investment in those activities are expected to earn more and generate higher levels of business performance than other companies which invest less (Chao, 2011). R&D-intensive companies will gain higher returns, and the positive relationship between R&D investment and returns is primarily due to risk compensation (Amoroso, Moncada-Paterno-Castello & Vezzani, 2017).

Considering all these facts, the aim of the paper is to empirically verify the importance of growing R&D investments, R&D intensity and efficiency of R&D investments for increased return on assets (ROA), as a vital indicator of the company's profitability. The structure of this paper is organized as follows. After the introduction, the next section provides a literature review of the main determinants of R&D activity and investments, as well as the existing literature on the relationship between R&D expenditures, R&D intensity indicator, the return on R&D investments and ROA. The following section focuses on the research methodology and is followed by the empirical data analysis. The last section provides

the research results and discussions of empirical findings.

1. Literature review

1.1. R&D investments

During the last thirty years, the knowledge economy has achieved dominance based on the fact that the value of tangible assets has been decreased and replaced by the value of intangible assets (Petković, Krstić, & Radenočić, 2020; Paula & Silva Rocha, 2021). The business success or competitiveness of an enterprise increasingly depends on R&D as an element of structural intangible (intellectual) assets, which "includes employees, structural intellectual capital and employee relations with the enterprise stakeholders" (Jovanović, Petrović & Janjić, 2021). The survival and success of the company in the marketplace depend on the introduction of innovative changes in the company and the undertaking of R&D activities. In the conditions of rapid technological changes and highly competitive markets, R&D plays a critical role in establishing a competitive advantage, labor productivity, sales and profit growth. R&D activities are seen as a key stimulus to the innovative activities of companies and national economies. Innovation has been acknowledged as a very important factor influencing development (Cicea, Lefteris, Marinescu, Popa & Albu, 2021). Without effective R&D activities, innovation development in companies and national economies cannot be expected. Therefore, it is necessary to examine the performance of R&D activities at various levels (Janjić, Jovanović, & Simonović, 2021).

In the era of knowledge-based economies, R&D investments are essential for the success and survival of companies and national economies (Li, Nosheen, Haq & Gao, 2021; Dai, Fan, Wang & Xie, 2022). The most significant feature of R&D investment is its cumulative nature, which can lead to overall higher returns. Both the high level of uncertainty and risk and the specificity of the business model distinguish R&D investments from other types of investments, by their nature and other particular features. R&D activities are recognized as a major source of visible potential returns, reflected in growing sales revenue, profitability, market capitalization, business competitiveness, employment, and socio-economic welfare (Hall, Mairesse & Mohnen, 2010).

R&D investments are one of the most crucial elements in scientific and technological progress and present a significant source and basis of innovation (Wang, Lu, Huang & Lee, 2013). It is considered a dominant factor in the development and sustainability of the company (Dimitropoulos, 2020). R&D activities of companies are the main factor in enhancing their future financial performance and development. Some empirical studies have proved that the growth in R&D investments is positively correlated with future returns (profits) (Chan, Lakonishok & Sougiannis, 2002; Eberhart, Maxwell & Siddique, 2004; Tung & Binh, 2021). R&D investments do not generate immediate results and returns. Reasons leading to a gap between R&D investments and the return on those investments are related to the fact that some R&D outputs appear slowly and are short-lived, while others are long-lasting or used in future R&D.

1.2. Significance of R&D investments for profitability

Many researchers have used Return on Assets (ROA) and Return on Equity (ROE) indicators to determine the effects of R&D expenditures on profitability. Conducted studies at the beginning of the 21st century found a positive and consistent impact of R&D investment on business profitability (Roberts, 2001; Chen, Cheng & Hwang, 2005; Shah, Stark & Akbar, 2008; Ehie & Olibe, 2010; Pindado, De Queiroz & Torre, 2010; Ayaydin & Karaaslan, 2014; VanderPal, 2015; Freihaat & Kanakriyah, 2017; Pan, Guo & Chu, 2021; Boiko, 2022). Serrasqueiro (2009) used dynamic panel estimators to research the sample of the 500 largest Portuguese companies for the period 1999-2003. The research's empirical results showed a positive and statistically significant association between growth and profitability in Portuguese companies. For example, Shin, Kraemer and Dedrick (2009) analyzed a data set of 200 firms in the electronic industry for the period 2000-2005, and the results revealed a positive and statistically significant relationship between R&D spending and gross profit, while the relationship between R&D expenditures, ROA and ROE was not statistically significant. Similarly, a sample of the world's top 20 pharmaceutical companies in 2010 showed that R&D expenditures had an important impact on sales and profitability, according to the regression analysis (Hajiheydari, Dastgir & Soltani, 2011) The study that included 187 firms in Portugal for the period 2002-2009,

detected a significant and positive effect of R&D expenditures on profitability (Nunes & Serrasqueiro, 2015). If the period of observation in the analysis differs, the study (Kiraci, Celikay & Celikay, 2016), which was based on a sample of 46 publicly traded manufacturing firms listed on the Borsa Istanbul for the period 1998-2012, proved that R&D expenditure does not have a statistically significant impact on short-term profitability, while on the other hand exist a significant, positive and strong impact on long-term profitability.

The company's profitability may also be affected by the turnover of its assets (Pervan & Mlikota, 2013). Erdogan and Yamaltdona (2019) also revealed a positive association between R&D and profitability performance (ROA and ROE), in the sample of 62 production firms for the period 2008-2017, as well as Hazarika (2021) in the sample of 24 energy companies for the period 2007-2016. The regression analysis results showed a negative and linear impact of R&D intensity on ROA, while the effect of R&D intensity on ROE was statistically insignificant. Some recent research (Tung & Binh, 2021; Pham, Nguyen & Hoang, 2021) proved that R&D investments (spending) have a positive influence on revenues, profits, ROA, and ROE. Furthermore, the regression results imply that companies with high R&D outperform those with low R&D in terms of profit, revenue and ROA.

It is also useful to look at these relations in crisis conditions. Dimitropoulos (2020) used a sample of Greek firms for the period 2003-2016, to investigate the impact of R&D investments on profitability. Based on regression results, he stated that before the crisis R&D expenses had a negative impact on profitability, but during the crisis (2011-2016) the level of R&D investments improved profitability. Interestingly, there is evidence to the contrary. Namely, some studies (Kounnou & Kyrkilis, 2020) proved that the influence of R&D on profitability has no statistical significance.

1.3. Significance of R&D intensity for profitability

In the last 20 years, the impact of R&D intensity on firm performance has attracted the attention of many researchers, policymakers, and practitioners. R&D intensity (measured by Research intensity or R&D intensity) is crucial for assessing technical efficiency and innovative activity (Chao & Kavadias, 2013; Leung & Sharma, 2021). Based on the literature, R&D intensity is recognized as an

important indicator for determining the firm's strategic use of R&D (Lin, Lee & Hung, 2006).

When it comes to the relationship between R&D intensity and business performance, Zhaohui and Xiaokangs (2011) conducted research in China on a sample of medical and biochemical manufacturers and proved a weak, but significant correlation between R&D intensity and business performance in the same year, as well as a strong and considerable association between R&D intensity and business performance in the following year. Similarly, Dave, Wadhwa, Aggarwal and Seetharman (2013) detected a powerful connection between R&D intensity and gross profit. Other studies (Chao & Kavadias, 2013) proved that a balance between R&D intensity and the portfolio strategy of new product development facilitated company profitability. In accordance with that, Jaisinghani (2016) analyzed the business performances of 55 Indian pharmaceutical companies for the period 2005-2014. The dynamic panel data and generalized method of moments showed that R&D intensity and business performance are positively correlated.

Most previous studies have reported a positive link between R&D intensity and firm performance, but some findings indicate negative relations or no relations at all (Chandler and Hanks 1994). Kim and Kim (2018) proved that the negative impact of environmental costs on a company's profitability as measured by its Return on Assets (ROA) is reduced (decreased), as the firm's R&D intensity increases. According to Chen, Guo, Chen and Wei, (2019), R&D intensity does not always correlate with a company's performance. In their research, ROA is negatively correlated with R&D intensity during the first period when R&D investment is made, while R&D has a negative impact on ROA. There are also opposite findings. Bloemendaal (2020) discovered a negative correlation between R&D intensity and profitability indicators (ROE and ROA), as well as a negative impact of R&D on financial performance. Other authors (Rasvelj & Aristovnik, 2020; Leung & Sharma, 2021) also revealed the same. Ravšelj and Aristovnik (2020) found that R&D intensity is negatively correlated with ROA, ROE and ROS (return on sales). Leung and Sharma (2021) researched a sample of 385 private companies listed on the Shanghai and Shenzhen stock markets. According to their findings, R&D intensity has a negative influence on profitability (short-term financial performance), but a positive impact on business value (long-term financial performance).

1.4. Significance of return on R&D capital for profitability

The efficiency of used R&D capital (which may be treated as investments in R&D) could be calculated by a valuable indicator - Return on R&D capital (RORDC). Companies can expect future returns on R&D investments (capital) if they can transform the results of their innovative projects into true sales growth (Cohen, Diether & Mally, 2013). Foster, Linden, Whiteley and Kantrow (1985) explained this indicator as a measure of the contribution of R&D investments (capital) to profits. In other words, these authors defined the return on R&D capital as the quotient of profits and the value of R&D investments (capital). According to Foster et al. (1985), RORDC depends on two indicators: R&D productivity and R&D yield.

Chesbrough and Liang (2008) state that the firms in the globally-oriented segment have larger returns on R&D investment (i.e., the RORDC indicator) in comparison with the firms in the domestically-oriented segment. From theoretical and empirical aspects, the return on R&D investments (or R&D capital) has been the subject of extensive literature (Lev & Sougiannis 1996; Kothari, Laguerre & Leone, 2002; Anagnostopoulou & Levis 2008).

Hsieh et al. (2003) compared the rates of return on R&D investment and fixed asset investment in the pharmaceutical and chemical industries. Also, they found that an investment in R&D earns an operating profit return much higher than the industry cost of capital. Cincera & Veugelers (2014) explained the differences in the Return on R&D rates for European and US young leading R&D firms. However, in the scientific literature, the absence of studies which analyze the connection and impact of return on R&D capital and profitability indicators (ROA and ROE) is evident.

2. Methodology

Considering all the previously mentioned facts and the literature review, the analysis in the study was performed in two phases. Firstly, the panel data analysis was conducted to estimate the impact of various performance indicators of R&D activities (R&D investments, R&D intensity and return on R&D capital) on the company profitability (ROA) of R&D intensive companies. Secondly, cluster analysis was used to explore the homogeneity of the 24 innovative companies in the research sample. The list of variables is shown in Table 1. The independent variables used in this study are

R&D expenditures (RDI), R&D Intensity Indicator (RDII), and Return on R&D or Return on R&D Capital (RORDC).

Table 1 List of used variables

Variable	Variable Type
R&D expenditures in million \$ (RDI)	Predictor
R&D Intensity Indicator (RDII)	Predictor
Return on R&D Capital (RORDC)	Predictor
Return on Assets (ROA)	Dependent

Source: the authors' calculation based on SPSS software

RDII differs across various industries and achieves the highest value in high-technology companies. For period *t*, it is calculated according to the following formula (Savrul & Incekara 2015):

Table 2 Sample of companies that are listed in the top 50 R&D spenders list by industries and countries

Company	Country	Industry
Airbus	Netherlands	Aerospace & Defense
Amgen	US	Health Industries
AstraZeneca	UK	Health Industries
Bayer	Germany	Health Industries
BMW	Germany	Automobiles & other transport
Bristol	US	Health industries
Daimler	Germany	Automobiles & other transport
Ericsson	Sweden	ICT producers
Ford Motor	US	Automobiles & other transport
General Motors	US	Automobiles & other transport
GlaxoSmith Kline	UK	Health Industries
Huawei	China	ICT producers
Johnson & Johnson	US	Health Industries
Merck Us	US	Health Industries
Novartis	Switzerland	Health Industries
Panasonic	Japan	Others
Pfizer	US	Health Industries
Qualcomm	US	ICT producers
Robert Bosch	Germany	Automobiles & other transport
Roche	Switzerland	Health Industries
Sanofi	France	Health Industries
Siemens	Germany	ICT producers
Sony	Japan	Others
Volkswagen	Germany	Automobiles & other transport

Source: Authors' calculation according to annual financial reports of analyzed companies that are publicly available (official company websites)

$$RDII_t = R\&D\ expenditures_t : Sales\ revenue_t \quad (1)$$

RORDC shows how much of the company's gross profit in the current year comes from the R&D expenditures from the previous period. It is calculated according to the following formula (Christensen & Van Bever 2014):

$$RORDC_t = Gross\ profit_t : R\&D\ expenditure_{t-1} \quad (2)$$

ROA is calculated according to the following formula:

$$ROA_t = EBIT_t : A_{s_t} \quad (3)$$

where: EBIT – Earnings before Interest and Tax, As – Assets. The use of EBIT, as a category of profit, allows us to eliminate the impact of different tax systems that exist in different countries, as well as the impact of financial decisions made by managers in different companies.

The initial sample was divided into two separate clusters, and regression analysis was carried out on each of these clusters. The clusters were formed based on the R&D intensity (RDII) and efficiency of R&D investments (Return on R&D capital - RORDC).

In order to analyze the effects of R&D investments on profitability and to test the defined hypothesis, the sample of EU and non-EU companies presented in the EU Industrial R&D Investment Scoreboard was employed. The EU Industrial R&D Investment Scoreboard provides the R&D investment database for benchmarking the performances of individual R&D intensive companies against the best global competitors in their sectors.

The data used in this study were taken from the financial statements of 24 R&D intensive companies covering the period 2013-2020. The sample contains 24 companies that are listed on the top 50 R&D spenders list in each year during the analyzed period. Other companies that dropped out of this list in some years during the analyzed period were excluded from the sample. Among the group of top 24 R&D investors, there are 9 companies based in the EU and 15 non-EU companies.

Table 3 Sample of companies that are listed on the top 50 R&D spenders list

Company	Average RDI	Average RDII	Average RORDC
Airbus	3,681.9	0.05	2.45
Amgen	3,932.3	0.18	4.58
AstraZeneca	5,662.6	0.23	3.50

Bayer	4,850.1	0.10	6.15
BMW	5,240.6	0.05	4.10
Bristol	4,060.5	0.21	4.17
Daimler	8,318.6	0.05	4.61
Ericsson	4,503.1	0.16	1.95
Ford Motors	7,183.3	0.05	3.67
General Motors	7,050.0	0.05	2.43
GlaxoSmith Kline	5,437.6	0.14	4.53
Huawei	10,180.1	0.14	3.46
Johnson & Johnson	9,369.1	0.13	5.78
Merck Us	8,623.1	0.21	3.23
Novartis	9,001.6	0.18	3.68
Panasonic	4,289.4	0.06	4.56
Pfizer	7,753.6	0.15	5.36
Qualcomm	5,365.8	0.23	4.34
Robert Bosch	6,894.9	0.09	3.85
Roche	10,858.2	0.21	3.49
Sanofi	5,977.7	0.15	4.57
Siemens	8,122.0	0.09	4.02
Sony	4,310.8	0.06	5.46
Volkswagen	15,285.1	0.06	3.14

Source: the authors' calculation according to annual financial reports of analyzed companies that are publicly available (official company websites)

The following hypotheses are tested in this study:

H1: A positive correlation exists between R&D investments, R&D intensity indicator, the return on R&D capital and return on assets;

H2: R&D investments, R&D intensity indicator, and return on R&D capital positively influence the profitability;

H3: There is heterogeneity between companies based on R&D intensity indicator and return on R&D capital;

H4: The impact of R&D investments, R&D intensity indicator and return on R&D capital on profitability is bigger in companies with higher R&D intensity indicator.

Correlation, regression, and cluster analyses are employed to test the validity of the defined hypotheses.

3. Research results and discussion

3.1. Descriptive statistics analysis

The descriptive statistics are presented in Table 4. The average R&D expenditures (RDI) in the analyzed companies are 7.4 billion \$. The minimum value of 2.08 billion \$ was recorded in Bristol in 2015, while the maximum value of 22.38 billion \$ was recorded in Huawei in 2021. The

average RDII in the analyzed companies is 0.1308, while the minimum value of 0.0381 was recorded in Daimler in 2019, and the maximum value of 0.3227 was recorded in Merck US in 2020. The average value of RORDC in the analyzed companies is 3.9812, while the minimum value of 1.5432 was recorded in Airbus in 2016, and a maximum value of 8.1069 is recorded in Sony in 2019. The average value of ROA in the analyzed companies is 0.0746, while the minimum value of 0.0017 was recorded in Sony in 2014, and the maximum value of 0.2634 in Roche in 2013.

Table 4 Descriptive Statistics

Variable	Min	Max	Mean	Std. Dev.
RDI	2.077	22.3843	7.4135	3.5831
RDII	0.0381	0.3227	0.1308	0.0704
RORDC	1.5432	8.1069	3.9812	1.2296
ROA	0.0017	0.2634	0.0746	0.0516

Source: the authors' calculation based on SPSS software

3.2. Correlation and regression analysis

In order to perform the correlation and regression analyses all variables are transformed into log values. The correlation analysis was performed in order to test the validity of the first hypothesis (H1), and the results are presented in Table 5.

Table 5 Correlations

	RDI	RDII	RORDC	ROA
RDI	1			
RDII	0.1861*	1		
RORDC	-0.0939	0.0346	1	
ROA	0.1851*	0.5358*	0.2490*	1

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

Source: the authors' calculation based on SPSS software

According to the results, there is a positive correlation between ROA and all three R&D performance indicators (RDI, RDII, RORDC). Results show that the positive correlation between R&D investments and ROA is weak and statistically significant (0.1851), whereas the correlation between RORDC and ROA is moderate and statistically significant (0.2490). These results are in line with the results of Daldavi and Mansuri (2018), who found a linear correlation between R&D investments and profitability indicators. The strongest positive correlation is between the RDII and ROA (0.5358). These results partially correspond to the results of Morbey (1988) and Shaikh, O'Brien and Peters (2018), who also revealed a correlation between R&D intensity

indicator (RDII) and profitability indicators, but in a weak form. These results confirm the first hypothesis (H1) and are interesting from the managerial perspective, as they indicate that there is a linear association between R&D investments, R&D intensity, the efficiency of R&D investments and company profitability measured by ROA.

The conducted study reveals a strong and positive correlation between RDII and ROA. Furthermore, the correlation between R&D investments and ROA is low and statistically significant, whereas the correlation between RORDC and ROA is moderate and statistically significant. These results confirm our first hypothesis (H1).

After the diagnostic checking was performed to determine the appropriate panel data model (Table 6), the random effect model (REM) was chosen for fitting the data, and the results are presented in Table 7. Namely, the results of the F-test point towards the FEM model, while the results of the Breusch-Pagan LM test point towards the REM model. The final decision was made based on the results of the Hausman test, according to which the REM model is appropriate at a 5% significance level ($p=0.0691$).

Table 6 Diagnostic tests

Model	F-test	reusch-Pagan LM	Hausman
	H_0 : Pooled, H_1 : FEM	H_0 : Pooled, H_1 : REM	H_0 : REM, H_1 : FEM
Model	4.12 (0.0000)	40.56 (0.0000)	7.09 (0.0691)

Note: p values are given in ()

Source: the authors' calculation based on SPSS software

The model analyses the impact of RDI, RDII and RORDC on ROA in 24 companies covering the period 2013-2021. After performing the REM model, the Pasaran CD (cross-sectional dependence) test was used to test whether the residuals are correlated across companies. The results of the Pasaran CD test revealed the presence of the cross-sectional dependence (3.095, $p=0.0020$), and hence the REM model with Driscoll and Kraay standard errors was used and is presented in Table 6.

The obtained results show that R&D investments (RDI) are not statistically significant, whereas R&D intensity indicator (RDII) and return on R&D capital (RORDC) have a positive and statistically significant impact on the company's profitability. The estimated model explains a

33.97% change in ROA and this model is statistically significant as confirmed by the Wald statistics. Individual specific errors can explain 25.71% of the entire composite error variance.

The conducted study confirms that R&D investments, R&D intensity and efficiency of R&D investments (RORDC) have a positive impact on the company's profitability (ROA). The efficiency of R&D investments has the strongest influence on company profitability. These results confirm our second hypothesis (H2).

The positive, but statistically insignificant impact of R&D investments on profitability, is in line with the study conducted by Kiraci, Celikay and Celikay, (2016) and Kounnou and Kyrkilis (2020). Namely, the results of the previously mentioned research proved that R&D expenditure did not have a statistically significant impact on profitability, as in this study.

The increase in the RDII by 1% leads to an increase in ROA by 0.6361%, and this is very important for managers. These results are in line with the results obtained by Ayaydin and Karaaslan (2014), who found a positive effect of R&D intensity (RDII) on ROA.

In addition, it is not only important the share of R&D investments in sales revenue, but also the economic efficiency of those investments. The regression results confirm that the increase in the RORDC by 1% leads to an increase in ROA by 0.8263%, thus confirming that the management of companies in the research sample has made good business, investment, and financial decisions aiming to increase the efficiency of R&D investments, and this is especially important for creating positive contributions of those decisions in the increase of ROA. Hence, managers should increase RORDC through their business decisions, and then they can expect to increase ROA as the indicator of company profitability. The obtained results confirm the second hypothesis (H2), as all indicators positively influence ROA, whereas the RDII and RORDC are statistically significant, and R&D investments are not.

Table 7 Regression results

	Const	RDI	RDII	RORDC	R ²	ρ
ROA	2.6877 [-9.25] (0.000)	0.0613 [1.09] (0.306)	0.636 1 [6.70] (0.000)	0.8263 [4.26] (0.003)	0.3397	0.2 571
					Wald statistics	51. 82 (0.0 000)

Note: t values are given in [], p values are given in ()

Source: the authors' calculation based on SPSS software

3.3. Cluster analysis

Cluster analysis is performed to investigate whether there are differences among companies regarding R&D investment intensity (RDII) and R&D investment efficiency (RORDC). The squared Euclidean distance measure was used to calculate the distance between the data points, while Ward’s method was used to calculate the similarity of the data. The results of the cluster analysis displayed two clusters (C1 and C2) in the dendrogram in Fig. 1.

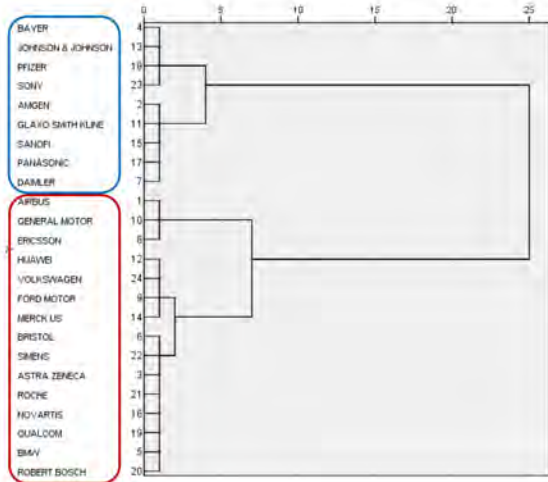


Figure 1 Dendrogram

Source: the authors’ calculation based on SPSS software

These results confirm hypothesis H3 that there is heterogeneity between companies based on the R&D intensity indicator and return on R&D capital.

The characteristics and basic descriptive statistics of clusters are presented in Table 8. Cluster 1 shows better R&D investment intensity (RDII), whereas the efficiency of R&D investment (RORDC) is smaller compared to cluster 2. This means that those companies investing more in R&D do not necessarily have the higher value of RORDC, i.e., higher R&D investment intensity does not lead to an increase in the efficiency of R&D investments. This efficiency depends on successfully marketed created value, but also on the revenue to R&D expenditures ratio and the revenue to cost ratio.

Table 8 Results of hierarchical clustering

Cluster (C)	RDII	RORDC
C1 (n=15)	0.1380±0.07756	3.3590±0.62682
C2 (n=9)	0.1189±0.05101	5.0183±0.62327
Total (n=24)	0.1308±0.06824	3.9812±1.02355

Source: the authors’ calculation based on SPSS software

To investigate the differences among analyzed firms regarding RDII, a regression analysis was performed on the determined clusters, and the results are presented in Table 9. The Pasaran CD test was conducted on both models, and the results showed no presence of cross-sectional dependence for Cluster 1 (-0.677, p= 0.4984), while the results of the Pasaran CD test revealed the presence of cross-sectional dependence for Cluster 2 (2.982, p=0.0029), and hence the REM model with Driscoll and Kraay standard errors was used.

For the first cluster - C1 - R&D investments (RDI), R&D intensity (RDII) and efficiency of R&D investments (RORDC) have positive and statistically significant impact on the company’s profitability (ROA). RORDC has the strongest impact and this impact is statistically significant at a 1% level of significance, whereas the impact of R&D investments and R&D intensity is not statistically significant. If RORDC increases by 1%, ROA will increase by 1.46%, ceteris paribus. The estimated model explains 57.94% of the change in ROA and this model is statistically significant as confirmed by the F statistics.

Table 9 Regression results for clusters

ROA	Const	RDI	RDII	RORDC
Cluster 1	-5.2177	0.4148	0.2917	1.4641
	[-2.13]	[0.71]	[0.39]	[3.19]
	(0.037)	(0.482)	(0.700)	(0.002)
	R2	Adjusted R2	F statistics	
	0.5794	0.5123	3.68	
			(0.0161)	
ROA	Const	RDI	RDII	RORDC
Cluster 2	-2.6089	0.0029	0.6097	0.8631
	[-7.21]	[0.03]	[4.37]	[5.68]
	(0.000)	(0.975)	(0.002)	(0.000)
	R2	ρ	Wald statistics	
	0.3860	0.2453	44.68	
			(0.0000)	

Note: for cluster 1, t values are given in [], p values are given in () for cluster 2, z values are given in [], p values are given in ()

Source: the authors’ calculation based on SPSS software

For the second cluster - C2, R&D intensity and RORDC have a positive and statistically significant impact on company profitability – ROA, while RDI has a positive, but statistically insignificant impact. If RDII increases by 1%, ROA will increase by 0.6097%, ceteris paribus. If RORDC increases by 1%, ROA will increase by

0.8631%, *ceteris paribus*. The estimated model explains a 38.6% change in ROA and this model is statistically significant as confirmed by the Wald statistics ($p < 0.01$).

The conducted cluster analysis revealed two clusters – one of the highly R&D intensive companies with lower efficiency of R&D investments and another of less R&D intensive companies with higher efficiency of R&D investments. The regression analysis results within the first cluster demonstrate that only the efficiency of R&D investments has a positive and statistically significant impact on company profitability (ROA). Findings for the second cluster confirm that R&D intensity and efficiency of R&D investments have a positive and statistically significant influence on company profitability (ROA), while the impact of R&D investments, although positive, is statistically insignificant. It is in line with the result of Wu et al. (2020). Hence, these results confirm our hypothesis (H4) that the effects of various indicators of R&D activities are bigger in companies with higher RDII.

Conclusion

The paper contributes to the existing literature and provides new empirical evidence on this topic by highlighting the importance of R&D investments in improving return on assets. The originality of the work is reflected in the comprehensive analysis of the impact of 3 key indicators of R&D activity on the profitability of top R&D spenders in the world. The analysis especially contributes to the existing literature, bearing in mind that there is no comprehensive analysis of various research and development indicators on the company's profitability. In particular, there is a lack of evidence in the academic literature about the connection and impact of return on R&D capital and profitability indicators. This specific indicator of R&D performance (RORDC) has not yet been analyzed in terms of contributing to the profitability of the company. Further, the study contributes to the current literature as the existing studies do not consider the importance of the efficiency of R&D investments from the aspect of profitability. Finally, the originality is also reflected in the chosen sample – these are the companies that are the biggest R&D spenders. The originality of the work from the aspect of practice is reflected in the fact that it highlights the importance of not only the amount of allocation for R&D but also the efficiency of these activities in the company. It is indicated that experts in R&D

functions must monitor various indicators of R&D activities.

Certain practical implications and benefits for modern managers can also be highlighted. Namely, such evidence points to the importance of the research and development department in companies if the company wants to operate profitably in the long term. The research indicates the direct influence of allocations for investments in the company's intangible assets on profitability indicators. Additionally, this paper contributes to the raising awareness of the importance of investing in R&D, as well as the impact of the intensity and efficiency of R&D investments on profitability. It is useful for top managers of companies, especially those responsible for R&D in companies, because it indicates the importance of research and development activities to boost profitability. The research is beneficial and gives recommendations for corporate managers as well as policymakers and implementers of R&D strategies. Namely, it can provide practical implications, giving guidelines for decision-making to potential R&D investors. It is pointed out to them that apart from the level of investment in R&D, they must take into account the efficiency of those investments. Decision makers are thus suggested to specifically provide R&D investment support to the most efficient companies in this area and to formulate policies to encourage their R&D efficiency, in order to ultimately improve their profitability (from which public policymakers benefit directly). Employees, especially qualified and talented ones, are motivated to work in companies that invest more in R&D and are more efficient in this area, which indicates the security of their job and because it supports the success of the company (through superior profitability). The positive correlation between R&D investments and the profitability of the company as well as the positive impact of the efficiency of investment in R&D on the profitability of the company emphasizes the importance of investment in R&D activity and indicates the justification of the hypotheses.

There are certain limitations in any scientific-research study that serve the purpose of critical re-examination, rather than dismissing the study findings. The first limitation is related to the research sample. Namely, the sample encompasses 24 companies listed among the top 50 R&D spenders worldwide according to EU Industrial R&D Investment Scoreboard and which were on this list in all analyzed years (which is why the

sample was reduced from 50 to 24 companies) which is considered insufficient for extensive analysis. The other limitation is related to the short research period (2013-2020), which makes it difficult to apply complex econometric methodologies. Hence, the extension of the research period is one direction for future studies. This could provide more empirical background for this issue. Finally, the limitation of this study stems from the fact that it investigates the impact of R&D indicators on short-term company profitability. As the R&D activities produce yields after several years, the possible direction for future research is to investigate the impact of accumulated R&D investment over several years on ROA. These limitations point to future research directions, especially in the context of comparing the analyzed industries with other industries as well as the effects of COVID-19 in this segment.

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Consumer ethnocentrism under the circumstances of the COVID 19 virus pandemic¹

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Abstract

Background: The new circumstances of life due to the proclamation of the COVID 19 virus pandemic have caused numerous changes both in general people's lives and in consumption.

Purpose: The aim of this paper is to identify changes in the degree of consumer ethnocentrism when choosing products during the COVID 19 virus pandemic, compared to the period before its occurrence. In addition, differences in consumer preferences for certain domestic products and services before and during the pandemic were analyzed. The paper also deals with differences in ethnocentric tendencies during the pandemic between different socio-demographic consumer segments.

Study design/methodology/approach: The primary data were collected from 176 respondents by using the survey method. A paired samples t test is used for hypotheses testing. Independent samples t test and Anova, post hoc Scheffe test, were conducted for analysing differences in ethnocentric tendencies between observed consumer segments during the pandemic.

Findings/conclusions: Higher level of consumer ethnocentrism is confirmed in period during the pandemic, especially when it comes to choice of domestic medical products. On the other hand, lower level of consumer ethnocentrism is observed for fashion products and insurance during the pandemic. Older consumers and pensioners exhibit stronger ethnocentric tendencies during the pandemic.

Limitations/future research: The main limitation of the paper relates to the use of only a few of the 17 statements within the CET scale for measuring ethnocentric tendencies before and during the pandemic. Also, the research did not cover all categories of domestic products and services. According to the limitations, future studies are recommended to fully apply the CET scale for measuring consumer ethnocentrism. Also, the recommendation is to observe higher number of categories of products and services, and to break down the categories into several subcategories. Finally, future studies can also include some of the determinants of consumer ethnocentrism in the research model.

Keywords

consumer ethnocentrism, CET scale, pandemic, COVID 19, Serbia

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Introduction

The concept of ethnocentrism has been the subject of interest of a large number of authors from various fields for several decades now. Ethnocentrism relates to the evaluation of others' cultures based on one's own cultural values and norms (Chaudhry, ali Mughal, Chaudhry & Bhatti, 2021). Ethnocentrism is both a sociological concept and a psychological construct according to which individuals see their group as more important than others. In other words, ethnocentrism is an attitude that makes people believe that their group is the centre of everything, while all other groups, both past and present, are not as good as theirs (Bizumic, 2019). Accordingly, ethnocentrism is based on the attitude that one's group is dominant compared to others, and behavior that implies strengthening ties with one's own and the absence of ties with other groups (Veljković, 2006). Hence, ethnocentric individuals favor members of their own group while members of other group held in contempt (Prince, Yaprak & Palihawadana, 2019). Consequently, ethnocentrism is based on group boundaries and can have negative implications such as ethnic conflicts, instability of democratic institutions, discriminatory behaviors, or even war (Smyczek & Glowik, 2011).

A somewhat newer term "consumer ethnocentrism" was derived from the term "ethnocentrism". Consumer ethnocentrism is often confused with country-of-origin bias, although the two terms are different. Precisely, consumer ethnocentrism represents a general tendency to avoid buying foreign products due to nationalistic reasons, while country-of-origin bias is related to the specific image of the country of origin of the product (Shankarmahesh, 2006). Consumer ethnocentrism is associated with the patriotic feeling that it is necessary and moral to buy domestic products (Kostić, Stanišić & Marinković, 2021); hence, it goes beyond economic and functional features of products. In other words, ethnocentric consumers feel the need to support their own country by buying domestic products and rejecting foreign products due to the notion that it may harm their nation's economy (Vuong & Giao, 2020). Accordingly, consumer ethnocentrism links to the preferences for domestic products, i.e. it implies the belief that buying foreign products is immoral and unpatriotic, harms the domestic economy and increases unemployment (Shimp & Sharma, 1987). Hence, Siamagka & Balabanis

(2015) describe consumer ethnocentrism as a means to understand the moral concerns related to the consumption of foreign and domestic products. In general, consumer ethnocentrism implies the tendency of consumers to avoid foreign products, regardless of their price and quality, due to nationalistic reasons (Shankarmahesh, 2006). According to Marinković (2017), encouraging consumers to buy domestic products positively influences domestic production and employment, especially when country is facing an economic crisis.

Even though the concept of consumer ethnocentrism derives from the concept of ethnocentrism, it is important to point out that it encompasses not only the sociological but also the economic dimension. Consequently, consumer ethnocentrism is the subject of study not only by sociologists but also by macroeconomists and marketers. The assessment of ethnocentric tendencies can help marketers to understand consumers' inclination towards accepting or rejecting foreign and domestic products and brands (Das & Mukherjee, 2020). Consumer ethnocentrism is an important construct to be taken into account since the origin of the product may not be significant to all consumers as a sector the brand does business in (Furman & Maison, 2020). Consumer ethnocentrism assessment is important not only for the formulation and implementation of proper marketing strategies, but also for the investment in domestic economy (Kostić et al., 2021). Following previous studies in the Republic of Serbia, the highest level of consumer ethnocentrism was manifested in Central Serbia, followed by Belgrade, while the lowest level of ethnocentrism was recorded in Vojvodina (Marinković, 2017).

Consumers exhibit different levels of ethnocentrism due to many factors that may be related to the characteristics of the country in which consumers live, but also to their demographic and socio-economic characteristics and lifestyle. Also, consumer ethnocentrism level is highly associated with the characteristics of the product's country of origin and category of the product which consumers evaluate and purchase (Veljković, 2006). However, neither countries nor consumers are isolated from the changes at the global level, which can best be seen through the consequences of the current COVID 19 virus pandemic. Thus, in the period of the previous economic crisis, Smyczek & Glowik (2011) pointed to a change in consumer behavior in the

form of strengthening ethnocentric tendencies, especially among those who perceived the impact of the crisis extremely negatively. A similar interpretation gives Gómez-Díaz (2021). Namely, the author points out that since ethnocentric consumers are guided by economic motives when choosing domestic products, during the economic crisis it is quite logical to expect a strengthening of the influence of ethnocentrism on their purchasing behavior. According to Siamagka & Balabanis (2015), consumer ethnocentrism during crisis serves as a self-defence reflex of domestic economy, organizations and individuals against foreign competition and imports. Consequently, it can be concluded that there was an increase in ethnocentric tendencies during the current COVID 19 virus pandemic (Boulouta & Manika, 2022).

Based on the above findings, the paper aims to analyse the degree of consumer ethnocentrism during and before the COVID 19 virus pandemic. Also, the paper investigates differences in consumer preferences for different domestic products and services in the observed periods. Additionally, the paper deals with differences in ethnocentric tendencies during the pandemic between different socio-demographic consumer segments. For these purposes, primary data were collected from 176 respondents with different demographic and socio-economic characteristics, as well as the status of infection with the virus. Regarding the paper structure, the first part considers the most important theoretical knowledge about consumer ethnocentrism and how to measure it. The following section presents the results of previous studies by foreign authors who analyzed consumer ethnocentrism during the current pandemic. The third part of the paper gives the most important elements of empirical research. The research was conducted starting from the observed research gap in the domestic literature which lacks studies regarding the level of consumer ethnocentrism at the time of the pandemic. At the end of the paper, the concluding part summarizes the knowledge acquired by the study, then points out the most significant contributions and limitations of the work and provides guidelines for future research.

1. Consumer ethnocentrism

Consumer ethnocentrism is an important concept for studying in the field of international marketing and consumer behavior. It represents a normative factor of consumer purchasing attitudes and intentions. More precisely, consumer

ethnocentrism affects decisions of whether to buy foreign or domestic products. The concept itself and its measures were conceived in developed countries, where research showed that consumers have more positive attitudes towards domestic products (Kibret & Shukla, 2021). On the other hand, consumers in developing countries prefer foreign products because they are attracted by foreign countries and tend to identify with global consumers (Verma & Naveen, 2021). Consequently, Karoui & Khemakhem (2019) state that domestic consumption in developing countries should be more encouraged due to the fact that the economy of the developing countries is vulnerable in the face of the foreign competition from the developed countries. Similar, Gómez-Díaz (2021) points out that not only the survival of developing countries is important for the global market, but it is also important to strengthen domestic capacities and promote domestic production and consumption.

Consumer ethnocentrism is based on the fact that consumer ethnocentric tendencies influence the choice and purchase of domestic and foreign products and brands. Namely, consumer ethnocentrism is negatively correlated with the purchase of foreign products; higher degree of consumer ethnocentrism implies less favorable attitudes toward foreign products and their purchase (Karoui & Khemakhem, 2019). This attitude of ethnocentric consumers is based on the belief that the purchase of foreign products endangers the domestic economy and leads to rising unemployment in the country. In addition to the above, consumer ethnocentrism provides an individual with a sense of belonging and identity, as well as a guide to which purchases are accepted within the group and which are not (Shimp & Sharma, 1987). In other words, consumer ethnocentrism transfers the superior feeling of one's group into economic actions related to the purchase of domestic products and boycott foreign ones (Ma, Yang & Yoo, 2020). Fernández-Ferrín, Bande, Martín-Consuegra, Díaz & Kastenholz (2020) state that highly ethnocentric consumers even contempt foreign products.

Unlike non-ethnocentric, ethnocentric consumers are more conservative and guided by tradition, which is why the use of domestic products fits into their view of life and gives them a sense of pride and moral obligation to support the domestic economy (adapted from Fernández-Ferrín, Calvo-Turrientes, Bande, Artaraz-Miñón & Galán-Ladero, 2018). Ethnocentric consumers

perceive higher quality and have a stronger emotional attachment to domestic products, which is why they prefer local products over imported ones, often without a rational reason (Casado-Aranda, Sánchez-Fernández, Ibáñez-Zapata & Liébana-Cabanillas, 2020). In other words, ethnocentric consumers buy certain products mainly due to emotional or moral reasons, while economic or rational motives are less important (Smyczek & Glowik, 2011). Also, highly ethnocentric consumers can even make wrong judgments and overestimate domestic products. Consequently, Zeren, Kara & Gil (2020) state that domestic products of lower quality or higher price may be preferred over foreign ones, even though such action is against consumers' economic interests. Hence, Marinković (2017) indicated that it should be considered whether it is justified to encourage consumers to buy domestic products with lower quality. According to Marinković, Stanišić & Kostić (2011), ethnocentric consumers blame buyers of foreign products for the problems of the domestic economy, especially unemployment, while non-ethnocentric consumers tend to meet their needs in the best way, regardless of the geographical origin of the product. In other words, non-ethnocentric consumers evaluate foreign products by using their own merits related to price, quality or other product features (Watson & Wright, 2000). They simply compare domestic and foreign products by quality, price, or performance and select the best one (Camacho, Ramírez-Correa & Salazar-Concha, 2022), or even have more favorable attitudes towards foreign products precisely because they are manufactured outside of the country (Shimp & Sharma, 1987). However, it is important to note that the positive attitude of ethnocentric consumers toward domestic products does not automatically imply the negative attitude towards foreign products, especially in times of globalization that encourages international cooperation, which makes it increasingly difficult for consumers to distinguish between domestic and foreign brands (Siemieniako, Kubacki, Glińska & Krot, 2011). In other words, globalization has enabled consumers, especially those in the lower classes, easier access to foreign companies and the purchase of products without the need to travel (Aljukhadar, Boeuf & Senecal, 2021), which in turn affects their ethnocentric tendencies. The level of ethnocentrism that consumers manifest within a country depends on many factors such as the history and culture of a nation, economic

development, openness to the world (Veljković, 2006), patriotism, conservatism, animosity, consumer demographic characteristics (Shankarmahesh, 2006), and before mentioned globalization and global consumer culture (Bizumic, 2019). Also, it is important to mention that the level of ethnocentrism can be different in different countries or cultures, or even for different population segments within one country.

Given the interest that consumer ethnocentrism has aroused in marketers and other researchers, a large number of authors have devoted themselves to measuring it. As a result of these attempts, several different scales for measuring consumer ethnocentrism have been developed. The most commonly used scale is Shimp & Sharma's (1987) scale in the literature known as the CET scale (*Consumer Ethnocentric Tendency Scale - CET*). This scale proved to have good psychometric properties when used to measure ethnocentric tendencies (Fernández-Ferrín et al., 2020). The scale was developed as the result of the authors' tendency to provide a unique scale for measuring ethnocentrism, which is relevant to the study of consumer behavior and marketing. The CET scale consists of 17 statements measured on a seven-point Likert scale. To determine the level of consumer ethnocentrism, the CET scale allows calculating the score ranging from 17 to 119. A score of 17 implies the lowest level of consumer ethnocentrism while a score of 119 indicates the absolute orientation of consumers to buy domestic products (Marinkovic, 2017). Yet, it is important to mention that ethnocentric tendencies can also be measured outside of the 17-119 range, on the five-point or nine-point scale. The statements of the CETSCALE measure the consumers' tendency, which may precede attitudes, to act consistently towards foreign and domestic products (Watson & Wright, 2000). By using the CETSCALE on the American consumers' sample, Shimp and Sharma (1987) proved several propositions: (1) that scores on the CETSCALE are negatively correlated with consumers' beliefs, attitudes and purchase intentions toward foreign products; (2) that scores on the CETSCALE are negatively correlated with consumers' foreign-product behavior; and (3) that consumers' ethnocentric tendencies are especially noticeable among individuals whose quality of life and economic situation are threatened by foreign competition. The importance of this scale is confirmed by a large number of studies that have used it to measure consumer ethnocentrism with original or modified statements, all or only a few

(Akbarov, 2021; Evanschitzky, Wangenheim, Woisetschläger & Blut, 2008; Fernández-Ferrín et al., 2018; Javalgi, Khare, Gross & Scherer, 2005; Karoui & Khemakhem, 2019; Lee, Chen, Chen, Lo & Hsu, 2020; Siamagka & Balabanis, 2015; Sun, Gonzalez-Jimenez & Wang, 2021; Watson & Wright, 2000). In addition to the CET scale, other known for measuring consumer ethnocentrism is NATID (Keillor & Hult, 1999) and GENE scale (Neuliep & McCroskey, 1997), and more recently the new SCONET scale (Maison, Ardi, Yulianto & Rembulan, 2018).

2. COVID 19 virus pandemic effects on consumer ethnocentrism

The COVID 19 virus pandemic has caused many negative consequences for people's lives on a global level. The most visible health consequences of the virus are presence of stress, fear of exploitation, frustration, anxiety and even panic (Mezzina, Sashidharan, Rosen, Killaspy & Saraceno, 2020). Apart from health problems related to the population, the consequences of the pandemic are reflected in the decline of economic activities, the crisis of the global economy, restrictions on movement, the closing of economies, quarantine, the collapse of a large number of companies or bankruptcy for many well-known brands, losing jobs for large number of people, etc. (Donthu & Gustafsson, 2020). These circumstances, along with concern for the personal and health of loved ones, have significantly changed consumer behavior in the market. Sheth (2020) states that COVID 19 virus pandemic resulted in new and modified consumer habits related to work, study, relax or shopping. Similarly, Zwanka & Buff (2021) reported consumer behavioral shifts during a pandemic such as stuck-up mentality, online ordering, work from home, shift to cooking at home, increased focus on environmental stewardship or return to experience and hedonism. Ethnocentric tendencies of consumers were also affected by the pandemic. Starting from the stated fact, the growing interest of the authors in the analysis of the changes in the consumer ethnocentrism during the pandemic is noticeable in the literature. Thus, a study by Verma & Naveen (2021) showed that during the pandemic, consumers avoid foreign products, which has a positive effect on their ethnocentric tendencies, i.e. greater purchases of domestic products. Authors Camacho et al. (2022) examined and confirmed the presence of a negative but insignificant impact of consumer ethnocentrism on

consumer intention to shop online during a pandemic. Related to food preferences, Ben Hassen, El Bilali & Allahyari (2020) observed through their research a significant increase in food consumption of domestic producers during the pandemic due to consumer concerns about food safety. Similar results were obtained in a study by Migliore et al. (2021) which indicates the strengthening of consumer ethnocentric preferences towards domestic food, which they predict will continue after the end of the pandemic. Goddard (2021) reports that during a pandemic there was an increased interest in buying local food due to the temporary shortages in grocery stores of specific items and tendency of consumers to reduce the number of transactions between farm and final consumer. Additionally, Hobbs (2020) indicates that the interest in buying local food will grow at least in the short to medium term post-COVID-19 as the result of the consumers' desire for food security and support for local businesses. Regarding the purchase of wine, Miftari, Cerjak, Tomić-Maksan, Imami & Prenaj (2021) concluded that consumers during the pandemic show stronger preferences for the purchase of domestic wine brands. Similar, Wolf, Wolf & Lecat (2022) concluded that significant attribute consumers observe when buying wine during a pandemic is, among others, that the wine is made by the local producer.

During a pandemic, consumers were prone to stockpile medical and sanitation products. As for many other product categories, the need for product security and the disruption of the supply chains encouraged consumers to buy medical products manufactured by domestic companies. Related to the above mentioned, Mhatre & Singh (2021) in the research concluded that during the pandemic period, consumer interest for the purchase of domestic alternative medicine products in India increased, to which the Indian population otherwise has low preferences. The same result is achieved by Chakraborty, Siddiqui, Siddiqui & Alatawi (2022), with the results of their study showing that consumer concerns about health are influenced by ethnocentrism, which encourages them to buy more domestic alternative medicine products during the pandemic.

One of the most affected sectors by the pandemic is tourism. Due to the fear of getting infected with the virus and restrictions imposed by governments, consumers' preferences for travelling abroad decreased. For example, Vaishar & Štátná (2022) observed that during the

pandemic the occupancy of accommodation in domestic rural tourism destinations in the Czech Republic increased. Further, Kock, Nørfelt, Josiassen, Assaf & Tsionas (2020) concluded that the pandemic has had a positive impact on the level of ethnocentrism among American consumers in terms of strengthening their preferences for tourist destinations in America. Huang, Shao, Zeng, Liu & Li (2021) saw a reduction in the preferences of Chinese consumers to travel far from their country, especially to destinations that have a large number of infected people. Calderón, Esquivel, García & Lozano (2021) concluded that consumers' preferences for domestic tourism in Costa Rica increased due to the higher sense of security in terms of the probability of contagion in domestic destinations.

According to He & Harris (2020), purchase of domestic or foreign products during the COVID 19 pandemic has become an important ethical dilemma. Consequently, it is necessary to research trends in nationalism, animosity and ethnocentrism to see its effects on ethical purchasing decisions by consumers during a pandemic. Similarly, Abdul-Latif & Abdul-Talib (2022) believe that there should be new studies that examine changes in the effects of consumer ethnocentrism on consumer purchasing behavior during a pandemic. Concerning specific product categories, a study by Fernández-Ferrín et al. (2018) showed that the level of consumer ethnocentrism does not have to be the same for different product categories. Additionally, Watson & Wright (2000) indicate that the loyalty of consumers to domestic products cannot be related to all products categories because some products are not produced in domestic industry. In other words, there are certain categories of foreign products that do not have domestic alternatives. Based on the above, the paper will test the following research hypothesis:

H1: The COVID 19 virus pandemic has led to an increase in consumer ethnocentrism.

The creators of the CET scale, Shimp & Sharma (1987), have observed differences in the degree of consumer ethnocentrism based on different demographic and socio-economic characteristics of the consumers. Namely, the authors concluded that older, working-class consumers manifest stronger ethnocentric tendencies. Similarly, Sharma, Shimp & Shin (1995) proved that women are more ethnocentric than men. Also, authors observed negative correlation between consumer

ethnocentrism and education and income; in other words, consumer ethnocentric tendencies decrease with higher educational level and income. Further, Josiassen, Assaf & Karpen (2011) proved that women and older ones are more ethnocentric than man and younger ones, while Hsu & Nien (2008) concluded that ethnocentric consumers are relatively older with lower educational levels. Starting from the previously mentioned research, it is logical to assume that significant differences in ethnocentric tendencies also exist in the observed socio-demographic segments during the pandemic. Hence, Čvirik, Nađová Krošlákova, Milić Beran, Capor Hrosik & Drábik (2022) concluded that women and the elderly have stronger ethnocentric tendencies during the pandemic than men and younger consumers. On the other hand, Wang, Wong & Zhang (2021) observed higher level of consumer ethnocentrism among males than females during the pandemic. In line with previous research, the paper additionally examines the differences in consumer ethnocentrism level during the pandemic for the observed segments of consumers.

3. Research methodology

Empirical research in the paper was conducted based on the analysis of primary data collected from 176 respondents of different demographic and socioeconomic characteristics and status of infection with the COVID 19 virus. The survey method, personal interview technique was used to collect primary data. The research is based on the convenience sampling technique. Namely, the questionnaire was distributed to respondents in shopping malls and at university premises at the surveying moment. The surveying was performed during the pandemic period, precisely at the end of 2021 and the beginning of 2022. It is important to emphasize that respondents were surveyed in a single moment about their ethnocentric tendencies before and during the pandemic. The above mentioned is following the approach used by Khan, Ateeq, Ali & Butt (2021) or Youn, Rana & Kopot (2022) to estimate changes in consumer attitudes and behavior under pandemic circumstances. A questionnaire was used for data collection. The first part of the questionnaire includes 10 modified statements taken from the CET scale (Shimp & Sharma, 1987) to measure consumer ethnocentrism before and during the COVID 19 virus pandemic (the same statements: 5 before and 5 during the pandemic). The statements were measured on a seven-point Likert scale (1-absolutely disagree; 7-

absolutely agree). Also, the questionnaire includes statements used to determine the purchase frequency of certain categories of domestic products and services before and during the pandemic, following a survey conducted by Deloitte (2020). In the mentioned group of questions, the respondents expressed the degree of purchase frequency on the seven-point Likert scale, starting from the grade 1 - I never buy, to the grade 7 - I always buy. The last part of the questionnaire refers to the respondent's characteristics. The sample structure is presented in Table.

Table 1 Sample structure

Criteria		Number	Percent
Gender	Female	96	54.5
	Male	80	45.5
Age	18 to 25	52	29.6
	26 to 45	71	40.3
	46 to 65	34	19.3
	66 and more	19	10.8
Education	High school	74	42
	Higher educ.	48	27.3
	Master	38	21.6
	PhD	16	9.1
Working status	Employed	77	43.8
	Unemployed	30	17
	Student	43	24.4
	Pensioner	26	14.8
Infection with the COVID 19 virus	Been infected	106	60.2
	Been self-isolated	15	8.5
	Not been infected	55	31.3

Source: the authors

If we look at the sample structure by gender, based on the data shown in Table 1 it can be concluded that the sample is dominated by 96 female respondents (54.5%), compared to 80 male respondents (45.5%). The highest percentage of the sample includes respondents aged 26 to 45 years (71 respondents or 40.3%), followed by respondents aged 18 to 25 years (52 respondents or 29.5%), 34 respondents (19.3%) have between 46 and 55 years, while the least number of respondents is 66 or older (19 respondents, i.e. 10.8%). Related to the education, the sample is dominated by 74 respondents with high school education (42%), followed by those with higher education (48 respondents, i.e. 27.3%), then with master's degree (38 respondents, i.e. 21.6%), while 16 respondents (9.1%) have PhD. The largest percentage of the sample consists of employees (77 respondents or 43.8%), followed by students (43 respondents or 24.4%) and unemployed (30 respondents or 17%), while 26 respondents are pensioners (14.8%).

Regarding the infection with the virus, the largest number of respondents have already been infected with the virus (106 respondents or 60.2%), a significantly smaller number have not been infected with the virus (55 respondents or 31.3%), while the smallest number of respondents have been self-isolated (15 respondents, i.e. 8.5%).

SPSS 26 statistical software was used to process the primary data. In this program, first a descriptive analysis was performed to determine the sample structure (frequency analysis). In the following step, factor analysis was conducted to determine the factors composed of statements from the questionnaire. Reliability analysis for extracted factors was performed to determine the internal consistency of the statements that compose them. A paired samples t test was applied to determine statistically significant differences related to the consumer ethnocentrism during the current pandemic and before declaring it. Also, the presence of differences related to the consumer preferences towards different categories of the domestic products and services in the observed periods was analyzed by performing the paired samples t test. The independent samples t test and one-way ANOVA, post hoc Scheffe test, were conducted to examine the differences in consumer ethnocentrism level during the pandemic between socio-demographic segments of consumers

4. Research results and discussion

The first analysis in the paper refers to the factor analysis to determine the factors composed of statements used in research. The results are given in Table 2.

Table 2 Factor analysis

Variable	Before pandemic (factor loadings)	During pandemic (factor loadings)
It is always best to purchase domestic products.	0.831	0.689
It is not right to purchase foreign products because it hurts the domestic economy and employment.	0.938	0.844
I believe that we should buy only those foreign products that we cannot obtain within our own country.	0.878	0.788
I believe that foreign products should be taxed heavily to reduce their entry into the domestic market.	0.839	0.821

I believe that there should be very little trading or purchasing of products from other countries unless out of necessity.	0.914	0.885
KMO and Bartlett's test	0.833	0.802
% of the total variance explained	77.60	65.33
Cronbach's alpha	0.927	0.866

Source: the authors

Two factor analyses were conducted in the paper, and two factors were extracted. The first analysis refers to 5 statements related to consumer ethnocentrism before the pandemic, while the second one is related to 5 statements used to measure consumer ethnocentrism during the pandemic. According to the results, statements were grouped around one factor in both analyses. The obtained results are logical since statements in both cases measure the same factor, i.e. consumer ethnocentrism. The factor loadings from Table 2 indicate a strong correlation between statements and the factors they belong since all values are above 0.05. The first factor related to consumer ethnocentrism before the pandemic explains 77.60% of the total variance. On the other side, the factor labelled as consumer ethnocentrism during the pandemic explains 65.33% of the total variance. Reliability analysis was performed for both factors. Based on the Cronbach's alpha coefficient values in Table 2, it can be concluded that both factors show an adequate reliability level since the value of the Cronbach's alpha coefficient for both factors is higher than 0,7 (Nunnally, 1978). Consumer ethnocentrism factor had a higher degree of reliability before the pandemic due to the higher value of the Cronbach's alpha coefficient. The reliability analysis results are in line with factor analysis results since statements grouped around extracted factors have an adequate level of internal consistency.

A paired samples t test was applied to determine the changes in the degree of consumer ethnocentrism in the observed periods. The results of the analysis are shown in Table 3.

Table 3 Paired samples t test

Variable (statements)	Before pandemic	During pandemic	p value
	Mean	Mean	
Consumer ethnocentrism	4.25	4.53	0.000
It is always best to purchase domestic products (before/during the pandemic).	4.47	5.00	0.000

It is not right to purchase foreign products because it hurts the domestic economy and employment (before/during the pandemic).	4.16	4.46	0.005
I believe that (before/during the pandemic) we should buy only those foreign products that we cannot obtain within our own country.	4.23	4.26	0.813
I believe that (before/during the pandemic) foreign products should be taxed heavily to reduce their entry into the domestic market.	4.13	4.28	0.068
I believe that (before/during the pandemic) there should be very little trading or purchasing of products from other countries unless out of necessity.	4.25	4.66	0.000

Source: the authors

Table 3 shows the values of the arithmetic mean for the variable consumer ethnocentrism in the observed periods which show a stronger level of consumer ethnocentrism during than in the period before the pandemic. The results confirm a p value lower than 0.1 and a higher value of the arithmetic mean for a given variable in this period. When comparing the statements for measuring ethnocentrism, the results are similar to those for variables. Based on the p value, statistically significant differences in the observed periods occur when it comes to consumer attitudes that it is best to purchase domestic products, that it is not right to purchase foreign products because it hurts the domestic economy and employment, that foreign products should be taxed heavily to reduce their entry into the domestic market and that trading and purchasing foreign products should be very little unless out of necessity. Regarding the strength of the stated attitudes, consumers expressed them more strongly during the pandemic, which confirm higher values of arithmetic means for these statements in the given period. On the other hand, a statistically significant difference was not identified when observing the attitude of consumers that they should buy only

those foreign products that cannot be obtained in our own country, given that the difference in the strength of this attitude in the observed periods is insignificant. Based on the obtained results, it is concluded that hypothesis H1 related to the strengthening of consumer ethnocentrism during the pandemic has been proven.

A paired samples t test was also conducted to determine consumer preferences for the observed domestic products and services before and during the pandemic. The results of the analysis are shown in Table 4.

Table 4 Paired samples t test

Products and services	Before pandemic	During pandemic	p value
	Mean	Mean	
Beauty and care	4.09	4.10	0.948
Drugs/medicine	4.46	4.62	0.083
Fashion	4.10	3.87	0.003
Travel	3.82	3.71	0.379
Insurance	3.44	3.28	0.065

Source: the authors

Based on the results from Table 4, the presence of statistically significant differences in terms of selection and purchase of three categories of domestic products and services in the observed periods can be noticed: medical products (drugs/medicine), fashion and insurance. In particular, when looking at the domestic medical products, consumers use them more during the pandemic than before. As for fashion, consumers preferred to buy domestic brands before the pandemic. Finally, regarding the use of domestic companies insurance services, consumers used them more before the pandemic. When observing the remaining domestic products and services, the differences related to their use in the period before compared to the period during the pandemic were not identified.

In the next step, the independent samples t test was conducted to determine the differences in consumer ethnocentrism level between women and men during the pandemic. The results of the analysis are presented in Table 5.

Table 5 Independent samples t test

Statements	During pandemic		p value
	Women	Men	
	Mean	Mean	
It is always best to purchase domestic products.	5.09	4.90	0.465
It is not right to purchase foreign products because it hurts the domestic economy and employment.	4.34	4.61	0.354

I believe that we should buy only those foreign products that we cannot obtain within our own country.	3.98	4.60	0.037
I believe that foreign products should be taxed heavily to reduce their entry into the domestic market.	3.96	4.67	0.011
I believe that there should be very little trading or purchasing of products from other countries unless out of necessity.	4.45	4.91	0.114

Source: the authors

According to the results from Table 5, statistically significant differences in attitudes between women and men exist for two out of five statements used to measure consumer ethnocentrism during the pandemic. More precisely, men stronger believe that consumers should buy only those foreign products that cannot be obtained within own country, and that foreign products should be taxed heavily to reduce their entry into the domestic market. For other statements, the attitudes of women and men are similar. Generally, obtained results indicate that women and men mostly show similar ethnocentric tendencies during the pandemic.

The following analysis refers to the differences in ethnocentrism level for consumers who belong to different segments based on age (Table 6).

Table 6 Anova, post hoc Scheffe test

Statements	Differences in segments during the pandemic		p value
	Segments	Mean	
It is always best to purchase domestic products.	S2 - S3	4.46 - 5.85	0.002
	S2 - S4	4.46 - 5.63	0.066
It is not right to purchase foreign products because it hurts the domestic economy and employment.	S1 - S3	4.21 - 5.76	0.001
	S1 - S4	4.21 - 5.79	0.009
	S2 - S3	3.68 - 5.76	0.000
	S2 - S4	3.68 - 5.79	0.000
I believe that we should buy only those foreign products that we cannot obtain within our own country.	S1 - S3	3.79 - 6.00	0.000
	S2 - S3	3.63 - 6.00	0.000
	S2 - S4	3.63 - 4.79	0.096
I believe that foreign products should be taxed heavily to reduce their entry into the domestic market.	S1 - S3	4.08 - 5.18	0.050
	S1 - S4	4.08 - 5.37	0.062
	S2 - S3	3.72 - 5.18	0.002
	S2 - S4	3.72 - 5.37	0.005

I believe that there should be very little trading or purchasing of products from other countries unless out of necessity.	S1 - S3	4.48 - 5.82	0.010
	S1 - S4	4.48 - 5.79	0.062
	S2 - S3	3.93 - 5.82	0.000
	S2 - S4	3.93 - 5.79	0.001

S1 – 18 to 25; S2 – 26 to 45; S3 – 46 to 65; S4 – 66 and more

Source: the authors

Results from Table 6 indicate that consumers of different ages mostly had different ethnocentric tendencies during the pandemic. More precisely, differences in attitudes of younger and older consumers exist for all statements used to measure ethnocentric tendencies during the pandemic. According to the results, consumers who are between 46 to 65 years old and those who are 66 or older, stronger agree with all observed statements related to ethnocentric tendencies compared to consumers who have between 18 to 25 or 26 to 45 years. Generally, it can be concluded that older consumers exhibit a stronger degree of consumer ethnocentrism during the pandemic.

The final analysis was performed to determine if there are differences in ethnocentrism level between consumers with different working status (Table 7).

Table 7 Anova, post hoc Scheffe test

Statements	Differences in segments during the pandemic		p value
	Segments	Mean	
It is always best to purchase domestic products.	-	-	0.439
It is not right to purchase foreign products because it hurts the domestic economy and employment.	S3 - S4	3.84 - 5.20	0.006
I believe that we should buy only those foreign products that we cannot obtain within our own country.	-	-	0.177
I believe that foreign products should be taxed heavily to reduce their entry into the domestic market.	S1 - S4 S3 - S4	4.13 - 5.31 3.98 - 5.31	0.048 0.039
I believe that there should be very little trading or purchasing of products from other countries unless out of necessity.	S3 - S4	4.23 - 5.61	0.039

S1 – employed; S2 – unemployed; S3 – student; S4 – pensioner

Source: the authors

Based on the result from Table 7, statistically significant differences in attitudes of consumers with different working status exist for three out of five statements related to ethnocentric tendencies during the pandemic. Compared to employed respondents or students, pensioners agree more strongly that it is not right to purchase foreign products during the pandemic because it hurts the domestic economy and employment, that foreign products should be taxed heavily to reduce their entry into the domestic market, and that there should be very little trading or purchasing of products from other countries during the pandemic, unless out of necessity. According to the results, it can be concluded that consumers with different working status show different ethnocentric tendencies during the pandemic.

Conclusion

The proclamation of the COVID 19 virus pandemic has changed the daily lives of people around the world in just a few months. Since the virus has been present among people for a long time, changes are evident in many aspects of consumption, including consumer ethnocentrism. To identify such changes, an empirical study was conducted based on a comparison of the degree of consumer ethnocentrism during the pandemic with the period before its proclamation. Also, the research aims to identify differences in the purchase of certain domestic products and services in the observed periods. Finally, the paper deals with differences in ethnocentric tendencies during the pandemic between different socio-demographic consumer segments. Following the obtained results, it is first possible to notice that the level of consumer ethnocentrism differs. In other words, consumer ethnocentrism is higher during the pandemic. The obtained result is in line with the assumptions and results of previous research showing that ethnocentric tendencies are much higher during a pandemic (Ben Hassen et al., 2020; Kock et al., 2020; Migliore et al., 2021; Miftari et al., 2021; Mhatre & Singh, 2021; Verma & Naveen, 2021; Chakraborty et al., 2022). The results related to purchasing different domestic products and services gave somewhat different conclusions. Namely, in two of the five observed categories, there is no difference in purchasing the same before and during the pandemic. Differences occur when buying medical products, fashion and insurance services. When it comes to domestic medical products, consumers buy them more during the pandemic, while the situation is reversed

for fashion and insurance. The result related to higher purchases of domestic medical products is in line with the general result of the research, which indicates the strengthening of consumer ethnocentrism during the pandemic. This result is also supported by the fact that during the pandemic, consumers bought more medical products, primarily from domestic pharmaceutical companies. Also, during the pandemic, the Government often emphasized and praised the work, commitment and sacrifice of medical workers, which additionally influenced the strengthening of consumer confidence in domestic medicine in general. The result is consistent with a study conducted by Mhatre & Singh (2021) and Chakraborty et al. (2022). The result for the beauty and care products can be explained by the fact that consumers are most loyal to cosmetic brands they use regardless of their origin. Also, this is the category of products where consumers are not too sensitive to changes in ethnocentric tendencies. Regarding fashion, the obtained result is not in line with the general results related to the strengthening consumer ethnocentrism during the pandemic. However, the result can be explained similarly as for the previous product category. In other words, consumers are most loyal to the brands they wear. Also, during the pandemic, a certain number of foreign brands entered the market, which may also be the cause of the decline in consumer interest in domestic fashion brands. When looking at travel, differences are not identified. The obtained result can be a consequence of consumer desire to travel to foreign destinations after quarantine and closure of countries globally, on the one hand, but also fear of viruses and government incentives in the form of vouchers for visiting domestic destinations on the other hand. The obtained result is opposite to the results of other studies (Kock et al., 2020; Huang et al., 2021; Calderón et al., 2021). As for insurance, it was observed that the services of domestic insurance companies were used more before the pandemic, which contradicts the general result of the research. However, the result can be explained by the fact that fear of the pandemic has affected consumers to use foreign companies' insurance services more due to their better reputation, which encourages a higher degree of trust in the services quality provided by these companies. Generally, the results of the study for product categories are in line with the results of research conducted by Fernández-Ferrín et al. (2018), which indicate that changes in the degree of consumer ethnocentrism depend on the product

category. Accordingly, strengthening ethnocentric tendencies during a pandemic cannot be generalized for all product categories.

Additional analysis related to differences in ethnocentric tendencies for different socio-demographic consumer segments gave interesting results. In general, results show that differences mostly exist when observing ethnocentric tendencies of different consumer segments during the pandemic. First, the results indicate that older consumers exhibit a stronger degree of consumer ethnocentrism during the pandemic compared to younger ones, which is in line with previous studies (Čvirik et al., 2022). In addition to this is the result that pensioners show stronger ethnocentric tendencies during the pandemic compared to employed ones and students. On the other hand, the results indicate that women and men exhibit similar degree of consumer ethnocentrism during the pandemic, which is contrary to previous studies (Čvirik et al., 2022; Wang et al., 2021), but this result can be explained by the fact that research was conducted in different geographical areas and time periods.

The results of the conducted empirical research go beyond the observed gap in the domestic literature, which, according to the authors, lacks studies comparing the degree of consumer ethnocentrism during and before the pandemic. In this way, the current knowledge about the effects of the pandemic on consumer behavior is expanding. The methodological framework of the research can serve as a starting point for future studies based on larger samples related to consumer ethnocentrism today. Also, there is significant knowledge related to the consumer's ethnocentric tendencies regarding the purchase of different domestic products and services. Finally, the paper provides useful knowledge about relations between socio-demographic characteristics of consumers and ethnocentric tendencies during the pandemic. From a managerial perspective, domestic producers can work further to strengthen consumer ethnocentrism on the market. Precisely, they should take into account the identified pandemic effect by providing consumers with safe shopping conditions and safe and high-quality domestic products for use during and after pandemic. In this way, domestic companies would instill a higher degree of trust in consumers when buying domestic products due to the provision of adequate purchasing conditions to protect consumers from the virus. The above mentioned is especially

important for mature consumers and pensioners who exhibit stronger ethnocentric tendencies during the pandemic. In this regard, it is necessary to emphasize the previously mentioned advantages of buying domestic products during the pandemic (safe shopping and products). Also, it is necessary to ensure appropriate sanitary conditions during production and sale of products to consumers (compliance with sanitary regulations and standards, wearing masks, maintaining social distance, regular quality control of raw materials, adequate product packaging, etc.). In addition to producers, the generated knowledge can be used by the Government and the relevant ministry to identify those product categories where consumers manifest a high level of consumer ethnocentrism or categories where it makes sense to encourage the campaign “Buy local!”.

After the contribution, it is important to point out the limitations of the work. First, only a few of the 17 statements within the CET scale were used to measure consumer ethnocentrism. The research sample is not fully representative in terms of size and territorial distribution, which is why the results cannot be generalized for the entire population and must be interpreted with reservations. Also, the study did not cover all categories of products and services that consumers buy and use. It is important to emphasize that the author’s intention was not to include those categories of products in which the domestic economy is competitive, such as agricultural products, but to focus on categories where foreign brands are more dominant. Accordingly, the identified degree of consumer ethnocentrism for given product categories shows whether and where there is a basis for encouraging the campaign “Buy local!”. In line with the observed limitations, the first recommendation is to expand the sample to generate more accurate results. Also, it is desirable to fully apply the CET scale for measuring consumer ethnocentrism. Regarding the categories of products and services, it is desirable to expand their number to analyze consumer attitudes more comprehensively. Also, it is desirable to break down the categories into several subcategories (for example, different food products, household appliances, beauty and care products, etc.). Recommendation for future studies also refers to the possibility of including some of the determinants of consumer ethnocentrism (patriotism, animosity, cultural openness) to generate more accurate results on its effects on consumer preferences during a pandemic.

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Organizational behavior from the perspective of methodological isomorphism

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Abstract

Background: As an interdisciplinary research area at the interface of management theory, psychology, sociology, social anthropology, and cultural studies, organizational behavior (OB) still lacks a clear definition, whereas its status and scope have not been precisely determined. Some experts believe that the knowledge of all possible instances of OB and its constant improvement is the key to the proper calibration of management techniques, organizational dynamics, and more active staff. Others stress that OB has lost its significance and authority as an academic discipline.

Purpose: The goal of the research is to develop an approach that complements and further develops concepts comprising OB theory as regards the identification of micro-, meso-, and macro-organizational behavior actors – individuals, groups, teams, the organization itself, and its external stakeholders.

Study design/methodology/approach: The authors provide a solid framework for the principle of methodological isomorphism and its application to the indicators of OB – measures of organizational actions. Further, a possibility for the methodological integration of tools for managing the OB of all categories of actors is demonstrated.

Findings/conclusions: An original definition of OB management is offered and justified. The focus is on the strategic context of efforts to improve OB. A strategy map used in OB management is provided as an illustration. It is concluded that the sustainable success of an organization heavily depends on how stakeholders (actors) perceive the efforts of the management to enhance working conditions and the organizational culture of the work environment, as well as to strengthen the market leadership of the organization.

Limitations/future research: The research limitations lie in the scope of methodological challenges which need to be solved. New approaches to monitoring, analyzing, and evaluating the measurement results are going to be proposed and researched. The methodology and relevant calculations for perception indicators computation are going to be explored.

Keywords: organisational behaviour, organisational culture, perception, stakeholder, isomorphism

Introduction

As an interdisciplinary research area at the interface of management theory, psychology, sociology, social anthropology, and cultural studies, organisational behaviour (OB) still lacks a clear definition, whereas its status and scope have not been precisely determined.

Some experts believe that the knowledge of all possible instances of OB and its constant improvement are the key to the proper calibration of management techniques, organisational dynamics, and a more active staff (Luthans, Luthans & Luthans, 2021).

Others stress that organisational behaviour has lost its significance and authority as an academic discipline (Singh & Schick, 2007). Schein, Quick, Gavin & Kets de Vries (2000) has even called the phrase 'organisational behaviour' an oxymoron.

The list of open questions goes on:

Is organisational behaviour an, albeit interdisciplinary, independent area of knowledge?

Is organisational behaviour a field of management theory studying organisations and their employees with the tools of psychology, sociology, cultural studies, and other related disciplines?

Is organisational behaviour part of the academic discipline of human resource management, which focuses on the behaviour of the main types of employees (individual and groups) in job-related standard situations?

The proponents of the above approaches have not drawn unequivocal conclusions.

Applied behaviourism has brought forth applied behaviour analysis (ABA), which adjusts socially sensitive behaviour by reinforcement and punishment (Baer, Wolf & Risley, 1968).

The situational approach to management has been advocated by Burns and Stalker (1994), Lawrence and Lorsh (1969), Fiedler (1967), Hersey and Blanchard (1977), and House and Mitchell (1974), who have created numerous leadership models tailored for specific situations.

Another popular approach is Albert Bandura's concept of social learning of complex forms of behaviour in institutional conditions (Bandura, 1977).

Organisational behaviour theory has given rise to the concept of organisational citizenship behaviour (OCB) (Bateman & Organ, 1983), which has both widespread appeal and a solid methodological framework (Đorđević, Ivanović-Đukić, Lepojević & Milanović, 2021;

Thiruvenkadam, Yabesh, & Durairaj, 2017; Karriker & Williams, 2009; Podsakoff, MacKenzie, Paine & Bachrach, 2000; Laxmipriya & Sasmita, 2022). In today's world the concept of organizational citizenship behaviour (OCB) is evolving quite rapidly towards the environment (OCBE) (Anwar et al., 2020; Khan & Khan, 2022; Malik, Mughal et al., 2021), gender studies (Mousa, Massoud & Ayoubi, 2020; Li, Zhou, Shao & Lin, 2022), formation and evaluation of the impact of the employer's brand on OCB (Kaur, Malhotra & Sharma, 2020), organizational morality in relation to corporate social responsibility (Ellemers & Chopova, 2021).

As an independent line of research, the phenomenon of unethical pro-organizational behavior is actively conceptualized (Mishra, Ghosh & Sharma, 2022; Liu, Lu, Zhang & Cai, 2021; Fehr et al., 2019).

The most numerous are the studies where the differentiated approach to modelling personnel organizational behavior of different professional groups, namely public servants, is developed (Mai & Tran, 2022), as well as service industry employees (Lavelle, Rupp, Herda & Lee, 2022), sports employees (Kim, Kim, Newman, Ferris & Perrewé, 2019), management students and future IT specialists (Mudrova & Guzikova, 2022).

In the 1980s, organisational behaviour was divided into separate fields: micro-organisational behaviour (individual behaviour in an organisation), meso-behaviour (the behaviour of people working as a team), and macro-organisational behaviour (an organisational action) (Miner, 2006).

The behavior of an organization (on a macro level) is considered in the categories of compliance control, punishment of the organization for their misconduct, for deviations from the norms and violation of laws (McDonnell & Nurmohamed, 2021).

When it comes to micro- and meso-organisational behaviour, specialists employ concepts, or predictors, such as stress, job satisfaction, creativity and leadership (Kostin, 2019; Budur & Poturak, 2021; Khaola & Rambe, 2020).

When studying meso-organisational behaviour, they focus on organisational structure, organisation design, organisational change, and organisation development (Delich, 2015).

For the purposes of our study it is important to draw the attention of colleagues to the work of Vic

Benuyenah, who discusses the need to include within the boundaries of the theory of organizational behavior of citizenship (OCB), “external” behavior, when some types of work behavior can occur outside the organization (Benuyenah, 2021).

Terence Mitchell’s work that explores the ways to build and measure employees’ organisational commitment was the highest-rated book on organisational behaviour for the year it was published (Mitchell, 1978).

The boundaries of organisational behaviour as a social structure have been discussed with references to semantic models of digital text analysis (Arnulf, Larsen & Martinsen, 2018).

Neuromanagement and organisational neurobiology open exciting prospects for organisational research (Maksimtsev, Kostin & Berezovskaya, 2022). Fascination with neuromanagement techniques as applied to the theory and practice of organisational behaviour may, however, lead to mistakes in establishing the causes of certain behaviour as well as to ‘the fallacy of attempting to reduce human behavior to levels of activity or inactivity’ (Ashkanasy, Becker & Waldman, 2014).

The successes in those areas are evident. We, nevertheless, share the viewpoint of Singh and Schick (2007) that, in order to fit into the concepts of organisational behaviour within the context of today’s management curriculum, it is necessary to hold an open, honest, and direct discussion about the patterns of organisational behaviour and its indicators in the micro-, meso- and macro-fields.

It should be assumed that the boundaries of organizational behavior as a social structure and interdisciplinary scientific direction change with the development of the theories, approaches and concepts that underlie it.

The goal of the research is to develop an approach that complements and further develops concepts comprising organisational behaviour theory as regards the identification of micro-, meso-, and macro-organisational behaviour actors – individuals, groups, teams, the organisation itself, and its external stakeholders. A solid framework for the principle of methodological isomorphism and its application to the indicators of organisational behaviour will be built. The paper is structured as follows: a comprehensive literature review is presented in the introduction section. The methods section defines and explores relevant methodology to complete the goals of this research. The focus is on the strategic context of efforts to

improve organisational behaviour. The methodological integration of tools for managing the organisational behaviour of all categories of actors is presented in the results section. An original definition for the organisational behaviour management is offered and justified. A strategy map used in organisational behaviour management at a research organisation headed by one of the co-authors is provided as an illustration. The discussion section addresses the challenges in organizational behavior and the prospects section which follows investigates relevant methodological challenges. At the end of the article it is concluded that sustainable success of an organisation depends heavily on how stakeholders (actors) perceive the efforts of the management to enhance working conditions and the organisational culture of the work environment, as well as to strengthen the market leadership of the organisation.

Methods

The position according to which organizational isomorphism increases organizational legitimacy is one of the central ones in institutional theory (DiMaggio & Powell, 1983; Amoako, Adam, Arthur & Tackie, 2021). Isomorphism is most often interpreted as the “same device” in the sense of structure, processes or structure. (Zach, Schnitzer & Falk, 2021; Nite & Edwards, 2021). The isomorphism criterion with corresponding metrics is widely used in various branches of mathematics. The principle of methodical isomorphism has great potential to take the study of organizational behavior beyond descriptive accounts.

We have taken the liberty of asserting that the definition of organisational behaviour as a science concerned with reciprocal actions of an organisation’s actors, including its external stakeholders, makes it possible to remove most, if not all, problems associated with the definition crisis and the unclear status of OB as a research area.

Rethinking OB from the perspective of the stakeholder concept in management is closely linked to organisations searching for ways to ensure stakeholder engagement in identifying, exploring and responding to sustainability problems and goals as well as to integrate them into the management process and structure and related decision-making processes (Freeman, 1984; AccountAbility AA1000 Stakeholder Engagement Standard, 2015).

Management theory defines the range of stakeholders and describes their roles in achieving mutual goals and increasing the competitiveness of a contemporary company (Kostin, 2018). Moreover, it investigates the ability of stakeholders to have good or bad influence on an organisation (Clarkson, 1995; Post, Preston & Sachs, 2002a; Post, Preston & Sachs, 2002b; Savage, Nix, Whitehead & Blair, 1995).

From this perspective, organisational behaviour management is the transformations of decisions, plans, and actions, which comprise organisational behaviour, by an organisation when building relations with everyone with an interest (the actors). This definition meets the standards ISO 9001:2015, ISO 14001:2015, OMG Essence, and SEBoK.

If an organisation’s actors, including the organisation itself and its external stakeholders, perform reciprocal actions, the reactions of each to such actions should fall into a certain common category. In organisational behaviour management, this category is perception, i.e. an experience-based way of viewing, systematising, and interpreting objects and events. The way an organisation’s actors perceive each other’s attitudes and actions is the phenomenon the study of which makes organisational behaviour an independent research area. Suffice to say that Paul Spector and Lorenz Meier have described organisational behaviour as a process that begins with within-person factors leading to internal states (perception) and, through a series of actions (behaviour), culminates in the results of behaviour (Spector & Meier, 2014).

Table 1 shows factors that are significant for different categories of stakeholders and determine the nature of possible elements of an organisational behaviour management plan.

Table 1 Factors affecting stakeholders’ perception of an organisation

Customers	Employees	Owners / shareholders
<ul style="list-style-type: none"> ✓ company’s reliability, established relationships, special terms; ✓ product price, discounts, loyalty programs, pricing policy; ✓ product range; ✓ product quality, quality guarantees; ✓ employees’ performance: competency, efficiency, manners; 	<ul style="list-style-type: none"> ✓ working conditions designed to promote the physical and emotional health of employees; ✓ effective production engineering; ✓ employee engagement approach 	<ul style="list-style-type: none"> ✓ strategy implementation; ✓ managerial experience; ✓ employees; ✓ market leadership; ✓ leadership in research; ✓ risks and liabilities; ✓ quality of processes

<ul style="list-style-type: none"> ✓ installation and technical specifications (manuals); ✓ line of credit, grace periods, credit history; ✓ warranty and post-warranty maintenance 		
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Source: prepared by the authors

The excellence model developed by the European Foundation for Quality Management (EFQM, 1991) includes 32 sub-criteria that are worth a total of 1,000 points. The highest-rated are customer perception measures (150 points) followed by performance efficiency (75 points), key performance indicators (75 points), and employee perceptions measures (67.5 points).

The above made us consider the possibility of applying the principle of methodological isomorphism to the key indicators of micro-, meso- and macro-organisational behaviour by building a system of organisational perception measures of all categories of an organisation’s actors.

The indicators of perception of any category of stakeholders measure the latter’s loyalty to, satisfaction and engagement with an organisation (Bezduknaya, Rastova & Sigov, 2019).

Satisfaction is comprised of positive assessments of certain aspects of the company’s performance. As to employees, these are job design, remuneration, career growth, relationships with management, relationships with peers and working conditions. Satisfaction is an indicator of normative commitment and the readiness of employees to do their job properly.

Loyalty, a positive attitude to the company, stands side by side with continuance commitment. The absence of alternatives is not the only reason for that, as the concept of three types of organisational commitment of employees would hold it (Meyer & Allen, 1997).

Along with conscious loyalty, engagement comprises emotional attachment to the company – pride in being part of an organisation and the desire to be identified with it.

The most popular customer satisfaction indices are the Customer Satisfaction Index (CSI) and the American Customer Satisfaction Index (ACSI) from the National Quality Research Center at the University of Michigan.

Employee satisfaction is evaluated using a series of indices:

- Job Descriptive Index (JDI) (Smith, Kendall & Hulin, 1969);
- Brief Index of Affective Job Satisfaction (BIAJS) (Thompson & Phua, 2012);

- Minnesota Satisfaction Questionnaire (MSQ);
- Job Satisfaction Survey (JSS) (Spector, 1997).

There is no special indicator of the satisfaction of shareholders, who expect continuous profits. The factors in Table 1, however, give a comprehensive picture of the situation when shareholders assess a company’s performance positively.

Loyalty is evaluated using established indices, namely the Net Promoter Score (NPS) and the employee Net Promoter Score (eNPS). The loyalty of an owner/shareholder can be measured based on whether they intend to sell the company/its shares in the next 1–2, 5, ten years or not.

Declining loyalty of any stakeholder category – customers, employees, owners, shareholders, contractors, the state, investors, and guarantors – has a direct negative effect on the achievement of an organisation’s strategic and business goals, as well as on its performance efficiency.

Disloyal customers will neither repeat their purchases nor recommend the product or service to potential customers.

Disloyal employees are prone to larceny, negligence, cover-ups, and misuse of corporate resources.

No or insufficient loyalty of a supplier translates into disadvantageous trade-credit conditions and makes postponed payments impossible.

In Russia, the disloyalty of shareholders manifests itself in denying interested party transactions, the absence of quorum during supervisory body elections, and shareholders demanding the company to buy all or any of their shares at not less than the market price. Moreover, there is a risk of reputation losses and litigation fees associated with the restoration of shareholders’ rights, challenging transactions, or contesting general meeting’s resolutions.

Customer and employee engagement is commonly measured using the indices developed by Gallup Inc.: Customer Engagement (CE) and Q12. Other popular indices have been proposed by Aon Hewitt (Hewitt Associates) and Towers Watson.

The shareholder involvement rate (SIR) is also calculated based on an approach used by Gallup Inc. The involvement index comprises 11 questions, eight of which focus on emotional attachment and three on conscious loyalty. Table 2 contains a template of the questionnaire.

Table 2 Owner/shareholder involvement

Factor	Question formulation
Passion	I can't imagine the world without...
	A perfect company to invest in...
Pride	People here respect me as an owner/shareholder...
	I am proud to be an owner/shareholder
Honesty	Any problems arising here are solved in a fair and legal manner
	I am always treated fairly
Confidence	The board is performing its duties and using its powers to generate profits
	The organisation's management is performing its duties and using its powers to generate profits
Conscious loyalty	I am generally satisfied with the performance of the organisation
	I am ready to continue owning this asset
	I am ready to recommend it

Source: prepared by the authors

A fully engaged shareholder answers at least seven attachment-related and all three loyalty-related questions positively. Shareholders that are not actively engaged with the company answer ‘no’ to at least four attachment questions and all three loyalty questions.

Results

When calculating the indicators of organisational action perceptions by any category of stakeholders, i.e. in the micro-, meso-, and macro-fields, a common pattern emerges. We see the principle of methodological isomorphism at work, whereas the problem of methodological integration of tools for organisational behaviour management is solved for all categories of actors.

Meaningful connections between the measures of organisational action perception by different categories of actors made it possible to establish the interrelationship between them (Figure 1).

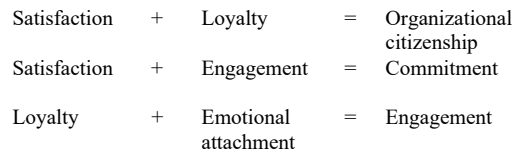


Figure 1 Interrelationships between the measures of stakeholders’ organisational action perception

Source: developed by the authors

Job design, in particular the significance of job tasks, can also affect employee/partner engagement (Organ, Podsakoff & MacKenzie, 2006; Podsakoff et al., 1990). Highly engaged employees are more likely to put work at the heart of their self-assessment. The perception of work-environment attributes by an engaged, responsible and results-driven employee is rational to a degree, research shows. Such an employee is capable of ‘understand[ing] the importance of their work

environment’ and identifying what is necessary and sufficient to ensure satisfaction. Among other things, the study in question demonstrates that the diversity of tasks may decrease employee engagement and have an adverse effect on organisational citizenship (Chen & Chiu, 2009).

An engaged employee pays attention to interdependent relationships between colleagues, can evaluate these relationships, and is ready to demonstrate organisational citizenship behaviour. This argumentation provides a rationale for greater employee autonomy as well as for allowing the staff to work at their own pace, control the quality, and determine what skills are necessary to perform the job. It has been stressed that these processes reinforce the verbal, intellectual, and creative abilities of employees.

The above patterns are especially pronounced in teamwork, which requires participant engagement in setting and reviewing goals, transparency of decision-making, free knowledge exchange, creative competitiveness, etc.

Shanker (2016) analyses how other measures of employee perception affect organisational commitment. She stresses that commitment to an organisation is largely determined by the emotional attachment of employees and how they evaluate their efforts and experience already ‘invested’ in the organisation and colleagues when demonstrating OCB.

Figure 2 shows the measures of perception characteristic of the organisational behaviour of an organisation’s actors and stakeholders as well as factors affecting these measures and connections between them. Solid lines mark functional relationships (the attribute is an argument in the model for evaluating another attribute), whereas dashed lines represent stochastic dependencies.

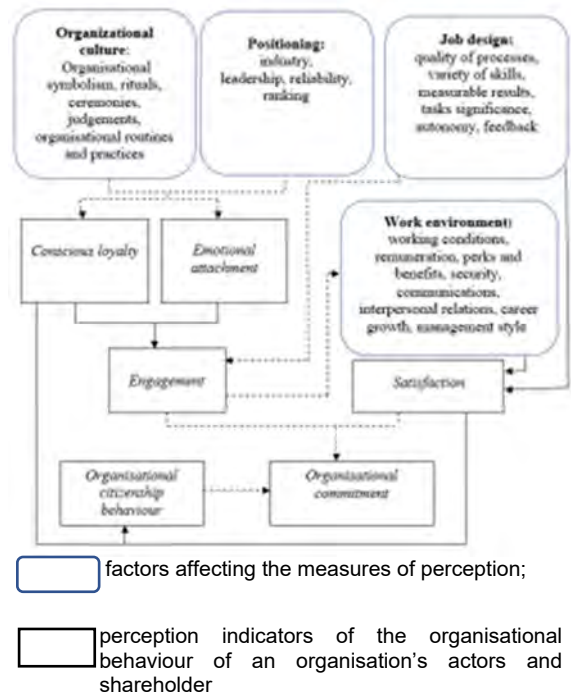


Figure 2 A system of indicators of organisational action perception
 Source: prepared by the authors

An organisational management strategy (Fig. 3) used at the Konstantinov Nuclear Physics Institute in St. Petersburg, a division of the Kurchatov Institute, proves the consistency of the interrelationships between perception indicators of organisational behaviour and the factors affecting them. The map draws on the above system of perception indicators.

The strategic map gives concise and clear information, monitoring which makes it possible to make prompt adjustments. When visualised, the equilibrium and interconnections between all the attributes of the map have a considerable motivational potential: they prove that organisational behaviour management actions can reinforce each other.

Most importantly, the strategic map confirms that improvements to organisational behaviour are a long-term practice, which has to be fitted into the context of strategic management of any organisation.

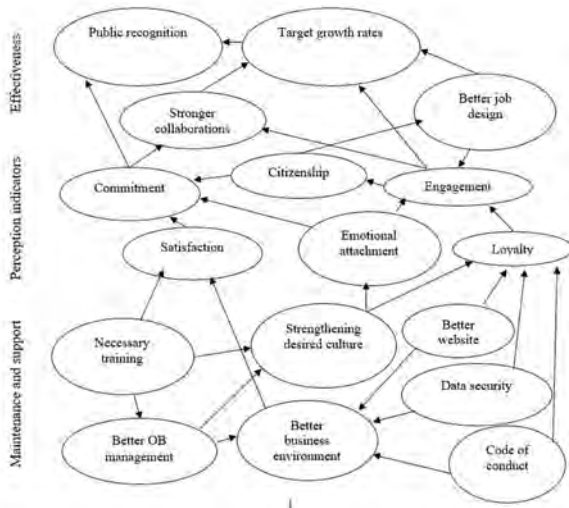


Figure 3 Strategy map for organisational behaviour management at a research organisation
Source: prepared by the authors

Discussion

The subject of discussion today may remain the question of whether the problems of organizational behavior are relevant enough to remain in the focus of public interest and, as a result, research funding. (Aguinis, Jensen & Kraus, 2022).

The next fundamental aspect of the discussion is whether efforts should be directed to the formation of specific models of organizational behavior of personnel of different professional groups, to the development of research tools for organisational citizenship behaviour (OCB), the organisational citizenship behaviour towards the environment (OCBE), unethical pro-organizational behavior, organizational behavior management (OBM), on the search for universal metrics for continuous monitoring, analysis and evaluation of information about organizational behavior and its management. We support the latter approach and intend to continue the search from interdisciplinary positions for common patterns for the study of organisational behavior at macro-, meso- and micro levels exclusively.

Prospects

Studying perception indicators cannot be reduced to devising a working formula. Rather, it is closely linked to ensuring the quality of data, calculations, and result interpretation.

The remaining methodological challenges are:

- selecting sources of reliable evidence to form a judgement about the actors' perceptions of organisational actions, of their nature, and dynamics;

- identifying and sorting out OB improvement priorities.

It is important to explore ways to monitor, analyse, and evaluate the measurement results. Perception indicators should be calculated in real time by organisations themselves to track trends and avoid unrealistic forecasts. The indicators may aid independent consulting companies and universities in calculating threshold values, drawing conclusions about the perception excellence of sector leaders, and comparing the perception performance of different categories of actors.

Conclusions

Examining how organisational behaviour theory fits into the structure of management science and management practices in modern organisations led us to conclude that the interdisciplinary nature of organisational behaviour precludes developing a single methodology and solving the problem of the compatibility and differentiation within the conceptual and methodological frameworks, which derive from social action theory, cognitive and behaviourist approaches, and management theory. Considering current programmes of organisational behaviour studies as well as the logic, method, and tools to measure organisational behaviour suggested as much.

The problem can be solved by treating organisational behaviour as a separate science concerned with the behaviour and reciprocal actions of an organisation's actors, including its key external stakeholders.

Identifying a common pattern for calculating key indicators of organisational behaviour such as the measures of perception (satisfaction, loyalty, and engagement) in the micro-, meso- and macro-fields as well as employing the principle of methodological isomorphism made it possible to describe interrelationships between these measures and the factors affecting them.

Within the proposed approach, practical actions to manage organisational behaviour are guided by strategy maps. The efforts of the management to improve the organisational culture of the work environment, enhance job design, and strengthen the organisation's position in the market – the efforts that affect the perception of the organisations by all categories of stakeholders – ensure the balanced and long-term success of an organisation.

Perspective of future research

The perspective of future research lies in solving the methodological challenges, described in the paper. New approaches to monitoring, analysing, and evaluating the measurement results are going to be proposed and researched. The methodology and relevant calculations for perception indicators computation are going to be explored, as it would aid organizations with tools to track relevant trends in real time and avoid unrealistic forecasts.

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All tables, graphs and diagrams are expected to back your research findings. They should be clearly referred to and numbered consecutively in Arabic numerals. They should be placed in the text at the appropriate paragraph (just after its reference).

Tables should be centered. All tables must have captions. The title of your table should follow the table number. Tables should not be wider than the margins of the paper.

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Ljubojević, T.K. (1998). Ljubojević, T.K. (2000a). Ljubojević, T.K. (2000b).
Ljubojević, T.K., & Dimitrijević, N.N. (1994).

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A. PERIODICALS

Authors must be listed by their last names, followed by initials. Publication year must be written in parentheses, followed by a full stop. Title of the article must be in sentence case: only the first word and proper nouns in the title are capitalized. The periodical title must be in title case, followed by the volume number, which is also italicized:

Author, A. A., Author, B. B., & Author, C. C. (Year). Title of article. *Title of Periodical, volume number* (issue number), pages.

➤ Journal article, one author, paginated by issue

Journals paginated by issue begin with page 1 in every issue, so that the issue number is indicated in parentheses after the volume. The parentheses and issue numbers are not italicized, e.g.

Seliverstova, Y. (2021). Workforce diversity management: A systematic literature review. *Strategic Management, 26*(2), 3–11.
<https://doi.org/10.5937/StraMan2102003S>

➤ Journal article, one author, paginated by volume

Journals paginated by volume begin with page 1 in issue 1, and continue page numbering in issue 2 where issue 1 ended, e.g.

Perić, O. (2006). Bridging the gap: Complex adaptive knowledge management. *Strategic Management, 14*, 654–668.

➔ **Journal article, two authors, paginated by issue**

Dakić, S., & Mijić, K. (2020). Regression analysis of the impact of internal factors on return on assets: A case of meat processing enterprises in Serbia. *Strategic Management*, 25(1), 29–34.
<https://doi.org/10.5937/StraMan2001029D>

➔ **Journal article, two authors, paginated by volume**

Ljubojević, K., & Dimitrijević, M. (2007). Choosing your CRM strategy. *Strategic Management*, 15, 333-349.

➔ **Journal article, three to six authors, paginated by issue**

Marić, S., Uzelac, O., & Strugar-Jelača, M. (2019). Ownership structure as a measure of corporate performance. *Strategic Management*, 24(4), 28–37.
<https://doi.org/10.5937/StraMan1904028M>

➔ **Journal article, three to six authors, paginated by volume**

Boškov, T., Ljubojević, K., & Tanasijević, V. (2005). A new approach to CRM. *Strategic Management*, 13, 300-310.

➔ **Journal article, more than six authors, paginated by issue**

Ljubojević, K., Dimitrijević, M., Mirković, D., Tanasijević, V., Perić, O., Jovanov, N., et al. (2005). Putting the user at the center of software testing activity. *Management Information Systems*, 3(1), 99-106.

➔ **Journal article, more than six authors, paginated by volume**

Strakić, F., Mirković, D., Boškov, T., Ljubojević, K., Tanasijević, V., Dimitrijević, M., et al. (2003). Metadata in data warehouse. *Strategic Management*, 11, 122-132.

➔ **Magazine article**

Strakić, F. (2005, October 15). Remembering users with cookies. *IT Review*, 130, 20-21.

➔ **Newsletter article with author**

Dimitrijević, M. (2009, September). MySQL server, writing library files. *Computing News*, 57, 10-12.

➔ **Newsletter article without author**

VBScript with active server pages. (2009, September). *Computing News*, 57, 21-22.

B. BOOKS, BROCHURES, BOOK CHAPTERS, ENCYCLOPEDIA ENTRIES, AND BOOK REVIEWS

Basic format for books

Author, A. A. (Year of publication). *Title of work: Capital letter also for subtitle*. Location: Publisher.

Note: "Location" always refers to the town/city, but you should also include the state/country if the town/city could be mistaken for one in another country.

➔ Book, one author

Ljubojević, K. (2005). *Prototyping the interface design*. Subotica: Faculty of Economics in Subotica.

➔ Book, one author, new edition

Dimitrijević, M. (2007). *Customer relationship management* (6th ed.). Subotica: Faculty of Economics in Subotica.

➔ Book, two authors

Ljubojević, K., Dimitrijević, M. (2007). *The enterprise knowledge portal and its architecture*. Subotica: Faculty of Economics in Subotica.

➔ Book, three to six authors

Ljubojević, K., Dimitrijević, M., Mirković, D., Tanasijević, V., & Perić, O. (2006). *Importance of software testing*. Subotica: Faculty of Economics in Subotica.

➔ Book, more than six authors

Mirković, D., Tanasijević, V., Perić, O., Jovanov, N., Boškov, T., Strakić, F., et al. (2007). *Supply chain management*. Subotica: Faculty of Economics in Subotica.

➔ Book, no author or editor

Web user interface (10th ed.). (2003). Subotica: Faculty of Economics.

➔ Group, corporate, or government author

Statistical office of the Republic of Serbia. (1978). *Statistical abstract of the Republic of Serbia*. Belgrade: Ministry of community and social services.

➔ Edited book

Dimitrijević, M., & Tanasijević, V. (Eds.). (2004). *Data warehouse architecture*. Subotica: Faculty of Economics.

➔ Chapter in an edited book

Boškov, T., & Strakić, F. (2008). Bridging the gap: Complex adaptive knowledge management. In T. Boškov, & V. Tanasijević (Eds.), *The enterprise knowledge portal and its architecture* (pp. 55-89). Subotica: Faculty of Economics in Subotica.

➔ **Encyclopedia entry**

Mirković, D. (2006). History and the world of mathematicians. In *The new mathematics encyclopedia* (Vol. 56, pp. 23-45).
Subotica: Faculty of Economics.

C. UNPUBLISHED WORKS

➔ **Paper presented at a meeting or a conference**

Ljubojević, K., Tanasijević, V., Dimitrijević, M. (2003). *Designing a web form without tables*. Paper presented at the annual meeting of the Serbian computer alliance, Beograd.

➔ **Paper or manuscript**

Boškov, T., Strakić, F., Ljubojević, K., Dimitrijević, M., & Perić, O. (2007, May). *First steps in visual basic for applications*.
Unpublished paper, Faculty of Economics Subotica, Subotica.

➔ **Doctoral dissertation**

Strakić, F. (2000). *Managing network services: Managing DNS servers*. Unpublished doctoral dissertation, Faculty of Economics Subotica, Subotica.

➔ **Master's thesis**

Dimitrijević, M. (2003). *Structural modeling: Class and object diagrams*. Unpublished master's thesis, Faculty of Economics Subotica, Subotica.

D. ELECTRONIC MEDIA

The same guidelines apply for online articles as for printed articles. All the information that the online host makes available must be listed, including an issue number in parentheses:

Author, A. A., & Author, B. B. (Publication date). Title of article. *Title of Online Periodical, volume number* (issue number if available). Retrieved from <http://www.anyaddress.com/full/url/>

➔ **Article in an internet-only journal**

Tanasijević, V. (2003, March). Putting the user at the center of software testing activity. *Strategic Management*, 8 (4).
Retrieved October 7, 2004, from <http://www.ef.uns.ac.rs/sm2003>

➔ **Document from an organization**

Faculty of Economics. (2008, March 5). *A new approach to CRM*. Retrieved July 25, 2008, from <http://www.ef.uns.ac.rs/papers/acrm.html>

➔ Article from an online periodical with DOI assigned

Jovanov, N., & Boškov, T. A PHP project test-driven end to end. *Management Information Systems*, 2 (2), 45-54.
<https://doi.org/10.5937/StraMan213302003S>

➔ Article from an online periodical without DOI assigned

Online journal articles without a DOI require a URL.

Author, A. A., & Author, B. B. (Publication date). Title of article. *Title of Journal, volume number*.
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Jovanov, N., & Boškov, T. A PHP project test-driven end to end. *Management Information Systems*, 2 (2), 45-54. Retrieved from <http://www.ef.uns.ac.rs/mis/TestDriven.html>.

REFERENCE QUOTATIONS IN THE TEXT

➔ Quotations

If a work is directly quoted from, then the author, year of publication and the page reference (preceded by “p.”) must be included. The quotation is introduced with an introductory phrase including the author’s last name followed by publication date in parentheses.

According to Mirković (2001, p. 201), “The use of data warehouses may be limited, especially if they contain confidential data”.

Mirković (2001, p. 201), found that “the use of data warehouses may be limited”. What unexpected impact does this have on the range of availability?

If the author is not named in the introductory phrase, the author's last name, publication year, and the page number in parentheses must be placed at the end of the quotation, e.g.

He stated, “The use of data warehouses may be limited,” but he did not fully explain the possible impact (Mirković, 2001, p. 201).

➔ Summary or paraphrase

According to Mirković (1991, p. 201), limitations on the use of databases can be external and software-based, or temporary and even discretion-based.

Limitations on the use of databases can be external and software-based, or temporary and even discretion-based
(Mirković, 1991, p. 201).

➤ One author

Boškov (2005) compared the access range...

In an early study of access range (Boškov, 2005), it was found...

➤ When there are **two authors**, both names are always cited:

Another study (Mirković & Boškov, 2006) concluded that...

➤ If there are **three to five authors**, all authors must be cited the first time. For subsequent references, the first author's name will be cited, followed by "et al."

(Jovanov, Boškov, Perić, Boškov, & Strakić, 2004).

In subsequent citations, only the first author's name is used, followed by "et al." in the introductory phrase or in parentheses: According to Jovanov et al. (2004), further occurrences of the phenomenon tend to receive a much wider media coverage.

Further occurrences of the phenomenon tend to receive a much wider media coverage (Jovanov et al., 2004). In "et al.", "et" is not followed by a full stop.

➤ Six or more authors

The first author's last name followed by "et al." is used in the introductory phrase or in parentheses:

Yossarian et al. (2004) argued that...

... not relevant (Yossarian et al., 2001).

➤ Unknown author

If the work does not have an author, the source is cited by its title in the introductory phrase, or the first 1-2 words are placed in the parentheses. Book and report titles must be italicized or underlined, while titles of articles and chapters are placed in quotation marks:

A similar survey was conducted on a number of organizations employing database managers (Limiting database access, 2005).

If work (such as a newspaper editorial) has no author, the first few words of the title are cited, followed by the year: (The Objectives of Access Delegation, 2007)

Note: In the rare cases when the word "Anonymous" is used for the author, it is treated as the author's name (Anonymous, 2008). The name Anonymous must then be used as the author in the reference list.

➔ Organization as an Author

If the author is an organization or a government agency, the organization must be mentioned in the introductory phrase or in the parenthetical citation the first time the source is cited:

According to the Statistical Office of the Republic of Serbia (1978), ...

Also, the full name of corporate authors must be listed in the first reference, with an abbreviation in brackets. The abbreviated name will then be used for subsequent references:

The overview is limited to towns with 10,000 inhabitants and up (Statistical Office of the Republic of Serbia [SORS], 1978).

The list does not include schools that were listed as closed down in the previous statistical overview (SORS, 1978).

➔ When citing **more than one reference from the same author**: (Bezjak, 1999, 2002)

➔ When several **used works by the same author were published in the same year**, they must be cited adding a, b, c, and so on, to the publication date:

(Griffith, 2002a, 2002b, 2004)

➔ Two or more works in the same parentheses

When two or more works are cited parenthetically, they must be cited in the same order as they appear in the reference list, separated by a semicolon.

(Bezjak, 1999; Griffith, 2004)

➔ Two or more works by the same author in the same year

If two or more sources used in the submission were published by the same author in the same year, the entries in the reference list must be ordered using lower-case letters (a, b, c...) with the year. Lower-case letters will also be used with the year in the in-text citation as well:

Survey results published in Theissen (2004a) show that...

➔ To **credit an author for discovering a work**, when you have not read the original:

Bergson's research (as cited in Mirković & Boškov, 2006)...

Here, Mirković & Boškov (2006) will appear in the reference list, while Bergson will not.

➔ When **citing more than one author**, the authors must be listed alphabetically:

(Britten, 2001; Sturlasson, 2002; Wasserwandt, 1997)

➔ When there is **no publication date**: (Hessenberg, n.d.)

➔ **Page numbers must always be given for quotations:**

(Mirković & Boškov, 2006, p.12)

Mirković & Boškov (2006, p. 12) propose the approach by which “the initial viewpoint...

➔ **Referring to a specific part of a work:**

(Theissen, 2004a, chap. 3) (Keaton, 1997, pp. 85-94)

➔ **Personal communications, including interviews, letters, memos, e-mails, and telephone conversations,** are cited as below. (These are *not* included in the reference list.)

(K. Ljubojević, personal communication, May 5, 2008).

FOOTNOTES AND ENDNOTES

A few footnotes may be necessary when elaborating on an issue raised in the text, adding something that is in indirect connection, or providing supplementary technical information. Footnotes and endnotes are numbered with superscript Arabic numerals at the end of the sentence, like this.¹ Endnotes begin on a separate page, after the end of the text. However, *Strategic Management Programming Board* **does not recommend the use of footnotes or endnotes.**

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