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Contents

The main growth strategies of telecommunication operators in the segment of SOHOs

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Abstract

Digital transformation causes a comprehensive change of the company through the use or renewal of information and communication technologies with the aim of greater productivity, growth and competitiveness of the company. Digitization offers new business opportunities to companies, optimization of work processes and operations, more efficient operations, higher productivity, new ways of designing and operating business models, encouraging innovation and development, and new ways of promoting, communicating and connecting companies. Telecom operators are confronted with a choice between remaining a traditional telecommunications operator providing SOHO (small office/home office) businesses basic infrastructure services or switching to digital transformation. This study confirms that the SOHO market segment in the field of basic infrastructure of telecommunications services is saturated, that there is a potential for operators to offer additional services, and that customer loyalty is not related to the amount of implemented business solutions. Operators can thus build a business partnership in terms of mutual development and creating growth for all stakeholders in the process. The main guidelines of growth present a great opportunity for operators, arising from the challenges of SOHO businesses to switch to the process of digital transformation. Therefore, operators have to be prepared; the main guidelines of growth are conditioned by adjusting their strategic goals, redefining business processes, upgrading technology, raising the level of business relationship and developing a partner ecosystem.

Keywords

telecommunications, digital transformation, growth strategies, saturation, market, services, SOHO, optimization

Introduction

Vrana and Singh (2021) explain that the phenomenon of "digitization is around us since the third revolution. Over the last decade or so, digitalization has also been observed to a point where it is now ready for digital transformation, in sync with the fourth industrial revolution. The intermediary step of digitalization overlaps the third and fourth revolution and can sometimes be confusing". Digital transformation will be crucial for growth in business operations in the global market in the future (Fabre & Skorupa, 2020). But what and how to do it poses a major challenge for leaders in the telecommunications (TC) industry. Fabre and Skorupa (2020) state that digital revolution is a revolution in consumer behavior and business opportunities, not technology. The dramatic rise of smart and autonomous devices is leading to radical shifts in business practices and

individual behavior. The forecast for the coming years predicts the continuation of a digital future in a world driven by algorithms and smart devices (Janeš, Biloslavo, & Faganel, 2017). Businesses and individuals face the urgent need to define and develop harmonious relationships between people and devices. Relationships between devices and people are becoming increasingly competitive as smart devices gain more ability to perform more and more everyday activities.

So-called 'smartness' is now present virtually everywhere in the work environment and its consequences are difficult for decision-makers and individuals in companies to predict. Changes are coming fast. Google and Facebook compete and invest billions of dollars in providing online infrastructure through unmanned solar devices - drones and helium balloons. In this way, they will provide access to the Internet to the four billion people who are still without it at the moment (Simonite, 2015).

Katz, Jung and Callorda (2020, p.1) study confirms that a "reliable TC infrastructure and a high level of digitization is crucial to keep the economy running under pandemic conditions". The explosion of global pandemic situation in 2020 and 2021 exposed "the fact that telecommunications are both a lifeline and an enabler for modern societies" (European telecommunications network operators association [ETNO], 2021, p.4). While the TC operators' revenues continue to decline worldwide for over a decade (ETNO, 2021, p.4). In the Slovenian telecommunications sector, where as many as 152 operators are registered (Agencija za komunikacijska omrežja in storitve Republike Slovenije [AKOS], 2021), a relative saturation of traditional fixed and mobile telephony services is being faced. Telekom Slovenia (2021) states in its report: "[…] a further drop in revenues from basic telecommunication services is expected on the Slovenian telecommunications market, which is developed and already in the phase of saturation (including systems integration and cloud services." These developments lead TC operators to thoroughly rethink their strategies.

1. Literature review

Total revenues from traditional basic infrastructure services and related ancillary services and standard and dedicated cloud business solutions are expected to increase (Bailey, 2015). Literature predicts global revenue growth in the micro enterprise segment (Garcia, 2021; Mouelhi &

Ghazali, 2021; Rand & Tarp, 2020; Sahoo & Swain, 2020). These revenues are mostly related to the growth of cloud services and business solutions.

The TC industry evolved significantly from fixed to mobile substitution (FMS) to fixed mobile convergence (FMC) and finally to over-the-top (OTT) services because of the immense growth in data usage (Chen, 2019). OTT services could be seen as complementary, but they can also substitute the traditional TC services offered by the licensed operators (Sridhar, 2019). OTT service offers the content which is a part of basic TC subscriptions without the added features that are usually supplied by TC operators (across an IP network or via a company's existing IP-VPN (Internet Protocol Virtual Private Network) from another provider, instead of owing the access network). The growing OTT business impacted heavily on traditional TC businesses such as short message and voice services, and the fall of revenues from TC operators indicates that the channeling trend is becoming quite obvious. Due to the booming competition in the field of distribution of interests between contents and channels, OTT service providers and TC operators engage in an aggressive cooperation game and competition (Wang, 2021).

Farooq and Raju's (2019) study confirmed that TC companies' revenue is decreasing but it also brings huge opportunities to them. TC companies can benefit from the change of their customer preferences in a way to understand their needs, and to produce and sell Internet and digital value-added products and services in parallel with traditional TC services.

Krüssel and Göbel (2019) suggest that TC operators could enlarge their actual services and start offering services OTT companies serve. Authors believe it would minimize the existing gap between the end user and company, and to do this, TC operators' infrastructure is of huge importance. Their opinion is that OTT companies and resellers will disappear.

Ganuza and Viecens (2014) assert that the technology that permitted the bundling of services helped TC operators to enter the content market; so today online TV could represent their departure gate in case they wouldn't exhibit novel strategies to stay in the quickly evolving market.

According to Farooq and Raju (2019), TC operators could focus on services to provide customer usage trends and other analysis to their clients - SOHO (small office/home office)

companies to help them develop their own marketing strategies, as they possess enormous amount of data that represents a valuable asset. There are diverse strategies that TC operators could develop, such as (Farooq & Raju, 2019; Sujata et al., 2015): blocking OTT, bundling with OTT, partnering with OTT, developing their own services, filling the gap in the market, customized low-price OTT services, specialized OTT bundles, selling apps using customer information, or looking for other revenue streams.

Data analytics is considered by TC operators a viable strategy, and they continue to develop this direction, to further build the loyalty of their customers from micro and SME (small and medium-sized enterprises) companies. In this pursuit, they met several dilemmas in their search of the right use cases, and finding the right technology solutions among conundrum of available choices (Arthur D. Little, 2018). Wiersma and Nijboer (2021) predict global expectations of heavy growth in data usage, because of the introduction of 5G technology. It could be said that 5G systems will bring a revolution to the reliability, speed, and capacity of TC networks of today.

There is a plethora of studies in the last few years' literature dealing with digital transformation consequences of small companies' business models and strategies in different countries (e.g. Kim, 2021; Matarazzo, Penco, Profumo, & Quaglia, 2021; Pelletier & Cloutier, 2019; Peter, Kraft, & Lindeque, 2020), different industries (e.g. Dutta, Kumar, Sindhwani, & Singh, 2020; Faganel, & Costantini, 2020; Garzoni, De Turi, Secundo, & Del Vecchio, 2020; Gošnik & Stubelj, 2021; Novak & Janeš, 2019), and Covid-19 influences (e.g. Mandviwalla, & Flanagan, 2021; Papadopoulos, Baltas, & Balta, 2020; Priyono, Moin, & Putri 2020).

Kääriäinen et al. (2021) argue that small companies are having difficulties with digital transformation due to their limited resources and know-how. Klein & Todesco (2021, 117) agree; they say "scarcity of financial resources and lack of specialized knowledge", together with the current Covid-19 pandemics especially struck small companies. Bouwman, Nikou and de Reuvera's (2019) study on 321 European small companies proves that they can undertake different routes to improve their performance when digital transformation is changing their business model.

Ramnath Babu and Sivanesan (2020, 1123) research on factors influencing the choice decision of mobile network operators showed that small companies mostly value "service provider's brand trust and integrity can be interpreted as a fundamental for a value that is being created and developed by direct experience of consumers". They also gave "higher importance to the intangible values such as reputation as leader in price, service and class of customers as these elements link the overall perception of reputation to identity, image and brand" (Ramnath Babu & Sivanesan, 2020, 1123).

Dasanayaka, Al Serhan, Glambosky and Gleason (2020) analyzed factors which affect the business-to-business relationship between national TC vendors and operators. They found out that TC vendors and operators value commitment, trust, communication and adaptability. Tarvainen (2020) analyzed European telecommunication operators' strategies distinct strategic positioning and concludes that the majority of them noticed the opportunity in developing service offers for small companies.

Curwen and Whalley (2004) already announced key strategic concepts in the TC industry, which included convergence and specialization, protecting core markets, and managing industrial transition. These concepts evolved and developed in different directions, stimulated by changes in the industry and environment.

Hushyar, Braun and Eslambolchi (2021) confirm that an extreme transformation in the telecommunication industry is currently in progress, from a traditional Communication Service Provider (CSP) to a Digital Service Provider (DSP) which implies a total redesign of connectivity services to digital services; "redefinition of the measurements to customer-centric QoE for all digital and connectivity services; the Best-in-Industry processes and practices to ensure a sustainable network performance at a competitively operational efficiency; a Service-over-IP (SoIP) platform to enable the introduction of unified new services with a time-to-market urgency; the regulatory arrangement for content purification, to liberalize CSPs to become DSPs; an architecture for data mining and analytics; and a migration plan from a CSP to a DSP status". This means that the strategies of TC operators have to be very flexible and under constant change.

2. Analysis

It is interesting to know whether operators face saturation in their core business (core infrastructure

services) in the SOHO segment, whether there is a possibility for TC companies to expand their activities to other ICT areas, such as business solutions, where there is still a lot of space left in the SOHO market, and whether companies, by marketing business solutions, reduce the probability of terminating contracts or relationships in basic activities, which will be reflected in the loyalty of business users to the operator.

The survey was conducted in an application developed by Valicon company. Valicon's Assisted Interviewing (AI) software covers all computer-assisted data collection processes and enables computer-assisted survey data collection online (CAWI - computer assisted web interviewing. Respondents have the opportunity to respond when they have the time, which is reflected in a higher response rate. This is especially important for the business segment, where the target group often does not have time to respond to the survey questionnaire at the time the research agency contacts them, which is the case for telephone or field research. Valicon's system exports data in a format suitable for use in the IBM SPSS software tool. The questionnaire on Telco panel comprises 77 survey questions. There are 9 demographic questions: 5 about the respondent and 4 about his/her company and industry; 17 questions about the actual use of TC services and operators. Then there are 51 questions on satisfaction with internet and mobile providers, internet and mobile services, intentions to change the operator, use and intentions to adopt additional services. Out of these, 13 questions use 6-point Likert scale, from 1-very unsatisfied to 6-very satisfied, or 1-very unlikely to 6-very likely. The survey is standardized and carried out continuously in the panel. The questionnaire was tested and the indicators were checked by experts at Valicon in collaboration with their clients. The IBM SPSS, version 24.0 was used for data analysis.

2.1. Collecting data

The survey was conducted on the JazVem web panel (www.jazvem.si) of Internet users in Slovenia, managed by Valicon. It includes 25,000 members, including business users. At the time of the survey, a number of 920 company representatives met the conditions for participation (self-employed, small company owner, director or leading position in a company). Invitations were sent to their e-mail addresses. An additional reminder was sent to selected members who did not respond to the invitation within seven and an additional seven days. The final response rate was 45% (417 companies).

2.2. Hypotheses

Hypothesis 1: *The market of basic infrastructure telecommunications services in the SOHO segment in Slovenia is saturated, so there is no more room for growth.*

The level of saturation represents a point in the market when it is not possible to acquire new users or services due to reduced demand, increased competition or higher supply compared to demand. The equipment of companies in the SOHO segment is on the verge of saturation in terms of the use of basic TC services. All companies use mobile telephony for business purposes and the vast majority of companies use a fixed connection to the Internet for business purposes. The needs of companies differ by activity, so it is assumed that in certain segments of companies (companies whose activities are related to field work) traditional basic TC services such as fixed telephony will no longer be able to reach a large majority or penetration will not be 100%.

The realistic saturation threshold is slightly lower and will be determined based on additional cross-analysis by size and nature of the company. If there are statistically significant differences in use by individual groups of companies, it means that the saturation threshold is lower than 100% and that there is saturation on the market by individual activity or industry. The statistical characteristic will be checked with P-value statistics, which are calculated using the chi-square test. The sample size is taken into account when calculating the P-value. The selected level of risk will be 10% (P-value $p \leq 0.10$), which means that if the P-value $p \leq 0.10$, then it can be concluded that within the group of companies (for example, the size of 0-1 employees) there are differences according to the phenomenon that is the subject of the analysis (for example, the use of a fixed telephone for business purposes).

For the purposes of hypothesis testing, derived variables were prepared in advance. A company can develop certain business solutions on their own. For the purposes of the task, a variable was compiled that indicates the use of a business solution in the form of a lease, such as a cloud service (outsourcing). This means that the company does not develop its own solution, but hires it from a specialized provider in the market, including a TC operator.

Hypothesis 2: *The potential of using business solutions to support business, dictated by digital transformation, in the SOHO segment is high.*

The relevance of the area of supply, which goes beyond infrastructure services, represents the key guidelines for the development of the business of TC operators. In the past, the basic principle was that every company must have a fixed telephone number, which is also published in business directories as well as in publicly available sources (for companies that do business with end users). The current level of use of business solutions within SOHO indicates a market opportunity.

The hypothesis was tested on the basis of quantitative research data, which will analyse the share of companies that use individual business solutions. The potential is represented by all companies that do not use business solutions. The analysis was performed on the basis of descriptive frequency distribution statistics and paired t-tests for two dependent samples, which is a statistical method for determining whether the differences in averages between two pair samples are different from zero or from the desired value. The paired t-test is not based on the assumption of equality of variances of the two samples, nor is it based on the assumption of normality, provided that the distribution is symmetric, unimodal, and continuous.

Hypothesis 3: *SOHO companies, which are more holistically supported by the operator (providing additional business solutions in addition to basic infrastructure services to support business operations), achieve a higher level of loyalty.*

In the saturated market of infrastructure TCs services, the source of the operator's growth is an increase in market share. The key success factors for TC companies are that by expanding the portfolio to other technological areas, they increase loyalty to modern TC companies. Of course, this is a new world of competition, which is very difficult to compete with development services, but they are competitive with their flexibility. Therefore, customer retention activities are key to them. Loyalty to the operator is defined as a situation when a business customer does not express an intention to change the operator. Loyalty to the operator is a key performance indicator and to this end, the operator must identify key activities to ensure the highest level of loyalty of its customers. It could be assumed that there are two key lines of action: (1) achieving loyalty through customer support and care and (2) retaining customers with

additional business solutions that support business, setting up, hosting and managing websites, business mail services with a domain, preparation, setting up and managing an online store, document management system services) dictated by digital transformation.

Logistic regression can be used when you have a dependent categorical variable and one or more independent variables. What has already been done is binary logistic regression - which means that the dependent variable is binary ("loyal", "others"). In normal regression, the dependent variable can take any value. To limit binary logistics to values between 0 and 1, the independent variables have to be transformed with logit transformation. When a regression is being performed, they predict the logarithm of the "prospects" for an event (that a unit is in class 1). Prospects depend on the probability of an event (prospects $= p / (1 - p)$, where p is the probability of an event being in group 1). Thus, the interpretation of the coefficients in logistic regression is slightly different than in conventional regression. The characteristic, similar to normal regression, can be interpreted as being some association between the coefficient and the prospect of the event (that you are in class 1). The number $e^\wedge$ coefficient gives us the ratio of the prospects for this variable between the classes (for the binary independent variable) or how much the outlook changes to increase the variable by 1 (for a numerically independent variable).

2.3. Analysis

2.3.1. Description of data

The sample framework is represented by companies with 0 to 10 employees. The target group is defined in the segment of micro enterprises and sole proprietors. For the purpose of the study, a micro company with 0 to 10 employees is defined as SOHO. On September 30th, 2021 there were 228162 companies in Slovenia; more than half of them were micro companies (AJPES, 2021). Among the newly created companies in Slovenia, they were in the vast majority micro companies - 99.8% (SORS, 2021). In 2020, 23% of small businesses with up to 10 employees and the self-employed generated revenue by selling products or services, receiving orders or reservations via websites (Zupan, 2021). The sample included different company profiles, also by activity. The structure of the sample reflects relatively well the general picture of companies of this size in Slovenia.

2.3.2. Analysis and interpretation of results

Most respondents (90%) use mobile services, just under three quarters (73%) use fixed internet, and a good half (57%) use traditional and IP telephony. A relatively low share (22%) is using Internet TV in companies, while 2% of companies do not use any services.

The survey showed that companies in the micro segment use basic TC services, namely 57% of companies use traditional voice telephony and IP telephony services, 73% of companies use fixed broadband Internet access and 90% of all companies use voice mobile telephony and transmission services messages. In the voice mobile telephony segment, all companies have approximately the same share of users and in the case of companies with zero to one employee and in companies with six to ten employees 89%, and in companies with two to five employees 91%. There are major differences between companies of different sizes in the use of fixed telephony, which is used by 89% of companies with six to ten employees, 72% of companies with two to five employees, while the smallest (44%) is used by companies with zero to one employee. Slightly smaller discrepancies occur between different sizes of companies when using fixed broadband Internet (xDSL, FTTx, cable), which is least used by companies with zero to one employee (66%), followed by companies with two to five employees (81%) and companies with six to ten employees (89%).

Given the nature of work, mobile services, which include calls and messages, are mostly used by those companies that perform work in the field (95%), in the office (90%) and at home (90%). Slightly smaller is the share of users (81%), where work takes place in a bar or shop. Given the nature of work, most users of broadband fixed internet (xDSL, FTTx, cable) are in the segment of companies that perform their activity in offices (80%) or from home (79%), followed by companies that perform their activity in the field elsewhere (66%) or in an office or shop, where the share of companies using broadband fixed internet reaches 70%. The share of the use of traditional telephony and IP telephony is highest in bars or shops (69%), followed by companies that perform their activity in the office (67%) or elsewhere (62%). The services of traditional and IP telephony are used to the least extent by companies that perform their activity from home (39%) or work in the field, where half of them use fixed or fixed telephony services.

The users' shares of services and business solutions offered by TC service providers are decreasing; some services, such as domain registration and website hosting, are more in the domain of specialized companies or providers. The use of additional services, such as mobile internet and calls abroad, is also used in quite a few cases by competing TC service providers (not only the main provider). This means that already in the field of basic activities, companies combine the services of several TC providers at the same time. The analysis of potential market should take into account all users and non-users, as companies may, for economic reasons, decide to abandon solutions from their own development and opt for an outsourcing model.

Loyalty was calculated based on a combination of satisfaction and intention to change the supplier. The largest share of loyal customers comes from the segment of those who work at home - 43% of them, 32% loyal customers work in a bar or shop, third most loyal (29%) customers are those who working in the field, followed by those working in the office (22%), while the lowest share of loyal customers is recorded among those working elsewhere, namely 11%.

2.4. Hypotheses testing

2.4.1. Hypothesis 1 testing

The vast majority of respondents (98%) use at least one of the basic services (fixed telephony, mobile telephony and fixed internet), while 2% of users do not use any of the mentioned services (Table 1).

Table 1 At least one of the basic services: fixed telephony, mobile telephony, fixed internet

	fx	share
doesn't use	8	2 %
use	409	98 %
together	417	100 %

Source: the authors' research

Based on the results in Table 2 and the statistical test, it follows that certain business activities do not require all the services which will therefore never be commissioned. Despite the fact that individual infrastructure services do not achieve full penetration, there are statistical differences depending on the nature of the work. On this basis, the hypothesis that the market is saturated has been confirmed, although it does not achieve a full penetration of the use of all services.

Table 2 Contingency table by nature of work and type of service use classic IP telephony xDSL, FTTx cable modem talks / messages-RS 8

	classic, IP telephony	xDSL, FTTx, cable modem	talks/ SMS RS
other (n = 29)	62 %	66 %	79 %
on field (n = 129)	50 %	65 %	95 %
in office (n = 144)	67 %	80 %	90 %
in bar/shop (n = 54)	69 %	70 %	81 %
from home (n = 61)	39 %	79 %	90 %

Source: the authors' research

There is a statistically significant relationship between the nature of work and the use of certain TC services (F = 60.74, p = 0.000).

2.4.2. Hypothesis 2 testing

The greatest potential is represented by business solutions, where the potential together amounts to 50%, in dedicated business solutions the potential amounts to 37%, and in standard business solutions the potential is slightly lower and amounts to 35%. The lowest potential is represented by the basic infrastructure, where the potential is 13%.

In the case of standard business solutions, the greatest potential is represented by the mobile cash register (15%), with the use on the market being 8%, the second greatest potential (13%) being represented by online security solutions, with 48% of respondents already using this service, the third greatest potential (11%) are solutions for websites where the current use is 45%.

In the field of dedicated solutions, the greatest potential is represented by solutions for mobile service platforms (22%), where the service is currently used by 13% of respondents, the second greatest potential is represented by solutions for mobile POS terminals (10%), where 18% of users use the service. represent SMS / MMS marketing solutions (9%), where the service is used by 21% of respondents.

In the area of ancillary services, all services have about the same potential. Thus, mobile internet on phones and smartphones has a potential of 7%, with a share of use of 68%, a potential of 6% in conversations and sending messages abroad, with a usage of 51%, a potential for using mobile internet on notebooks, modems and similar mobile devices is 7% at current use 23%, while the potential to use an additional data SIM is 7% at current use 18%.

Based on the results from Table 3, it can be seen that there are statistically significant differences in the average level of potential between the basic infrastructure solutions and:

- average level of potential of business solutions together (t = –13.535, sig = 0,00),
- average level of potential of standard business solutions (t = -8.762, sig = 0.00),
- average level of potential of dedicated business solutions (t = –8.633, sig = 0.00).

Table 3 Paired t-tests (part one)

Pair		Paired differences					
		mean	SD	std. error mean	t	df	Sig.
1	bas_inf – business_together	–0.36930	0.55714	0.02728	–13.536	416	0,000
2	bas_inf – stand_business	–0.22542	0.52534	0.02573	–8.762	416	0,000
3	bas_inf – dedic_ business	–0.24221	0.57290	0.02806	–8.633	416	0,000

Source: the authors' research

It follows from the above that statistically significantly higher potential has different forms of business solutions compared to basic infrastructure services.

There are also statistically significant differences between the average values of the potential for joint business solutions and the potential for standard business solutions (t = 8.362, sig = 0.000) and between the average values of the potential for joint business solutions and the potential for dedicated business solutions (t = 7.783, sig = 0.00). This means that joint business solutions have greater potential than other forms of business solutions (Table 4).

Table 4   Paired t-tests mean potential level in business solutions (second part)

Pair		Paired differences			t	df	Sig.
		mean	SD	std. error mean			
1	business together – stand_business	0,14388	0,35139	0,01721	8,362	416	0,000
2	business together – dedicat_business	0,12710	0,33348	0,01633	7,783	416	0,000
3	business together – dedicat_business	–0,01679	0,52091	0,02551	–0,658	416	0,511

Source: the authors' research

Based on this data, the second hypothesis, which says that the potential of business solutions to support business, dictated by digital transformation, is high in the SOHO segment can be confirmed. Thus, there exists a high share of potential customers in the segment of business solutions compared to infrastructure, where there is practically no potential.

2.4.3. Hypothesis 3 testing

In the basic services segment, a lower share of loyalty (25%) has been recorded in companies that use three or more services than in companies that use one or two services, where the share of loyal companies is 32%. In the standard business solutions segment, the lowest share of loyal companies (26%) is recorded in companies that use three or more services, while the share of loyalty is slightly higher for users of one or two standard business solutions and amounts to 31%. For dedicated business solutions, the loyalty rate of companies that use one or two services is 30%, and for those that use three or more services, 28%. In the area of additional services, it is also seen a similar trend as in the other segments already mentioned, with 27% of companies using three or more services being loyal, while the share of loyalty is slightly higher among companies using one or two services, and is 31%.

There are about 2.56 times more unfaithful companies in the main services segment than loyal ones. The ratio between loyal and unfaithful users of mobile services tends in favour of unfaithful users, who are about 1.26 times more than loyal users. A higher rate of unfaithful companies has been recorded among users of fixed services compared to users of mobile services. Thus, in the case of users of fixed TC services, there are about 1.81 times more unfaithful companies than loyal companies.

In the segment of basic services, the largest share (54%) is represented by companies that use one or two services, 44% of companies use three or more basic services, while the share of companies that do not use any service is negligible and amounts to 2%). Just under two thirds of companies (64%) do not use standard business solutions, followed by companies (28%) that use one or two services, while 8 or more services are used by 8% of respondents. Also, in the segment of dedicated business solutions, the largest share (67%) is represented by companies that do not use the service, followed by companies (21%) that use one or two services, while the smallest share (12%) is represented by companies that use three or more services. There are about 1.6 times more users of basic services who use three basic services than users of basic services who use two services.

Most companies use two additional services (n = 74), followed by companies with one additional service (n = 72) and those that use three additional services (n = 63). All in all, 52 users do not use additional services. There are the fewest companies that use five additional services - only four companies are such. Most companies do not use any standard business solution (n = 74), followed by users who use one standard business solution (n = 43) and users who use two business standard solutions (n = 40). Most companies (n = 92) do not use any business solution, followed by companies that use one dedicated business solution (n = 69), and in third place (n = 42) are companies that use three dedicated business solutions, while the share of companies with a larger number of dedicated business solutions is significantly lower.

In the following, three models of logistic regression have been prepared, where the dependent variables are dichotomous (0 - loyal, 1 - disloyal) and refer to the users of fixed services, mobile services and main services, which are shown in Table 5.

Table 5 Presentation of three logistic regression models

Model	Dependent categorical variable	Independent variables
1	Loyal _main3	Basic_services, additional_services, standard_business, dedicated_business
2	Loyal_fix3	Basic_services, additional_services, standard_business, dedicated_business
3	Loyal _mob3	Basic_services, additional_services, standard_business, dedicated_business

Source: the authors' research

In the first model, none of the coefficients is statistically significant, so nothing can be concluded about the influence of independent variables in the model on the loyalty of users of main services (Table 6).

In the second model too, no coefficient is statistically significant, so nothing can be concluded about the influence of independent variables in the model on the loyalty of users of fixed services (Table 7)

Table 6 Model 1 (logistic regression - main)

Deviance residuals				
Min	1Q	Median	3Q	Max
-1.7767	-1.4621	0.768	0.8394	0.9839

Coeff.				
	Estimate	Std. error	z value	Pr(>|z|)
(Intercept)	0.005332	0.693490	0.008	0.994
Basic_services	0.338912	0.263127	1.288	0.198
Additional_services	0.017074	0.110011	0.155	0.877
Standard_business	0.047975	0.063493	0.756	0.450
Dedicated_business	-0.086800	0.097214	-0.893	0.372

Source: the authors' research

Table 7 Model 2 (logistic regression - fixed services)

Deviance residuals				
Min	1Q	Median	3Q	Max
-1.6247	-1.3827	0.8803	0.9521	1.153

Coeff.				
	Estimate	Std. error	z value	Pr(>|z|)
(Intercept)	0.21348	0.66227	0.322	0.747
Basic_services	0.13249	0.24917	0.532	0.595
Additional_services	-0.02050	0.10284	-0.199	0.842
Standard_business	0.07959	0.05969	1.333	0.182
Dedicated_business	-0.11977	0.09117	-1.314	0.189

Source: the authors' research

The results in Table 8 indicate that there is a statistically significant impact of basic services (Wald z-statistics = 2.203, p = 0.0276) on the loyalty of mobile service users, where the coefficient for basic services is 0.533, which means that the outlook will be that the company will become unfaithful will increase by about 70% if the number of basic services would be increased by one unit.

There is a conditionally statistically significant influence of standard business solutions (Wald z-statistics = 1.721, p = 0.0852) on the loyalty of mobile service users, where the coefficient for standard business services is 0.0997, which means that the company becomes unfaithful, increased by 10.4% under other unchanged conditions, if the number of standard business solutions is increased by one unit (Table 8).

Table 8 Model 3 (logistic regression - mobile services)

Deviance residuals				
Min	1Q	Median	3Q	Max
-1.5433	-1.2424	0.8956	1.0596	1.4418
Coeff.				
	Estimate	Std. error	z value	Pr(>|z|)
(Intercept)	-1.285620	0.644087	-1.996	0.0459 *
Basic_services	0.533515	0.242190	2.203	0.0276*
Additional_services	-0.007450	0.099910	-0.075	0.9406
Standard_business	0.099767	0.057955	1.721	0.0852
Dedicated_business	-0.120670	0.089591	-1.347	0.1780

Source: the authors' research

The third hypothesis is rejected, as more comprehensive support for standard business solutions and basic services does not mean greater loyalty of mobile service users. A statistically significant effect of integrated support on the loyalty of users of fixed and main services has not been registered.

Conclusion

The traditional sources of income for TC operators, based predominantly on subscriptions and metered services, became obsolete. This study has found that digital transformation cuts deep into the business as well as the private daily routine. It has been acknowledged that telecom operators face a major turning point - to remain a traditional TC operator that will provide SOHO companies with basic infrastructure services that can be said to be saturated in the market, or cross the digitalization threshold, i.e. remain a "donor" of physical infrastructure to OTT providers or take a step forward and try to monetize content flowing through valuable lines.

The latter may be the subject of further research and controversy, but the real fact is that the SOHO segment of companies represents the potential for long-term and stable growth of TC operators. This fact has been confirmed with the present research. The main challenges that SOHO companies have in their business have been listed, namely revenue and productivity growth, cost reduction, more efficient sales to their customers, efficient transfer of knowledge and information between employees, a single database accessible from anywhere and anytime via any device. The research confirmed that there is potential for business solutions in the SOHO companies' market, with which TC operators would be able to meet the previously mentioned challenges of companies. In this way,

operators can create a partnership in terms of mutual development and creating growth for all stakeholders in the process.

Furthermore, based on the research, it has been proved that loyalty in the SOHO segment of companies is not related to the number of services and business solutions that the company uses. Based on literature, it can be assumed that company loyalty is the basis for creating potential through additional services and business solutions and represents the first phase in a relatively long purchase process of business solutions.

It has been demonstrated in the paper that the market in the segment of SOHO companies on basic infrastructure TC services is saturated; there is potential for operators to offer additional services and business solutions, and the loyalty of companies is not related to the amount of implemented business solutions. The main growth guidelines represent a great opportunity for operators and stem from the challenges of SOHO companies to cross the threshold and enter the process of digital transformation. Therefore, operators need to be prepared - the main growth guidelines are conditioned by adjusting their strategic goals, redefining business processes, upgrading technology, raising the level of relations with companies and establishing a partner ecosystem.

Based on the literature review and study findings, it can be said that there are many different strategic options for TC operators to choose in their field, but the main growth strategy of digital TC operators to recommend in the segment of SOHOs would be to concentrate on establishing a close relationship and develop partnership with their customers, in order to analyse their needs, and provide services and know how, that would allow the multiple rewarding and satisfying growth of all the involved stakeholders. TC operators should

seize the opportunities within the detected high share of potential customers in the segment of business solutions. To be able to confront this transformation, they have to adjust their strategies and strategic goals, redefine their business processes, upgrade the technology, raise the level of business relationship and develop a partner ecosystem. This would allow SOHO companies to concentrate on their core business process and competences, with a strong support from their selected TC operator.

The findings of this article could be useful for TC researchers dealing with transformational projects, institutional investors for establishing and evaluating their development plans and decisions, and TC management consultants, providing them with a basis for their clients' transformation engagement. And, in forefront, there are study results very important for TC operators' leaders and managers.

Limitations of this study are related to the analysis of the companies' activities. The sample of 417 companies is still too small to be able to analyse companies according to the standardized classification activity codes and thus identify differences by very specific industry sectors. For this purpose, segmentation of activities according to the nature of work was used, which to a certain extent indicates differences in the activity of companies and thus the relevance of individual services. Another limitation is the one country case study, which could be subject to specific circumstances in the business environment, which could vary from country to country.

Future business will show how well companies, organizations and government agencies use technology to collaborate with partners and customers through a wide range of digitized processes. However, digital transformation is neither simple nor unambiguous. From the point of view of the organizational market users, despite global trends, there is still a large gap in the exploitation of technologies. While exploring new technological possibilities, organizations need to face the need to change. Organizational and cultural changes and shifts in the nature of their business will pose the most difficult challenges in the future.

The importance of this study is in the fact that only a few similar research studies have been found in the literature review. Other researchers could make use of this study as a conceptual blueprint to start their own investigations in other countries' settings. As the technology is also evolving

extremely fast in this area, it is necessary to follow this progress and offer research results that will be up-to-date, so no study is definitive and absolute.SM

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Leadership role of the Human Resources department in crisis situations: the case of COVID-19 pandemic

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Abstract
The paper points out the leading role of the HR department in crisis situations, with special emphasis on the crisis caused by the COVID-19 pandemic, which affected the whole world in early 2020. Regardless of the intensity and form in which they occur, crises threaten the functioning and survival of organizations.
The HR department is an important factor in the successful functioning of organizations and, in a period of crisis, this department takes a leading role in the process of crisis management and subsequent recovery. During COVID-19 pandemic, the HR department of every organization had to confront new challenges in order to protect the health of employees, while ensuring the normal functioning of organizations.
In order to find out how this department dealt with crisis that occurred, empirical research with a specially designed questionnaire was conducted and filled in by 108 respondents from Serbia, Bosnia and Herzegovina, and Croatia in 2020.
The research results showed that HR department has taken a leading role in preserving the health and safety of employees, as well as in the process of adapting organizations to function in crisis conditions. According to results, the key activities carried out by the HR department in organizations are work from home (wherever the nature of the work allowed), flexible working hours, reorganization of the working space to achieve the required physical distance between employees, improved hygiene measures, etc. In addition, the research results showed that, during the global COVID-19 pandemic, the HR departments took an active role in providing psychological assistance to employees to adapt to new conditions and ways of working.

Keywords:
leadership, HR department, employees, crisis situation, organizational behaviour

Introduction

There is not a single organization that has not been exposed to a crisis situation during its functioning and operating. Unforeseen crisis events such as natural disasters, health and environmental disasters, technological crises, economic and market crises, political instabilities, terrorist attacks, business crises, corporate scandals, defective products, etc., have far-reaching consequences for an organization and employees and require rapid response (Mitroff, 1988; Hart, Rosenthal, & Kouzmin, 1993; Reilly, 2008; Wang, 2008). Whether an organization will survive in the

conditions imposed on it by a crisis situation depends on the speed and the way in which it will react and organize its operation (Lukić, Jaganjac, & Lazarević, 2020). Therefore, knowledge and experience gained by resolving crisis situations are the basis for crisis management and its future success in preventing and minimizing crisis effects, but also in taking advantage of new opportunities.

Due to their talents, knowledge, skills, behaviour, and work results, employees are the driving force of every organization (Lukić & Lazarević, 2019). One important condition that needs to be met is that employees are engaged – hard working, positive, optimistic, full of energy, creative, productive, effective, efficient, ready to help others, ready to stay overtime when needed, ready to learn and adapt to new circumstances (Lukić Nikolić, 2021). Everything that takes place in organizations – production and sale of products, provision of services, innovation, problem solving, decision making, improvement of business processes, happens thanks to employees (Federman, 2009). Human capital is a dynamic category that influences long-term success more than any other factor, depending on how companies invest in it (Jaganjac & Obhođaš, 2019). Human resource management implies a holistic and planned approach to managing human resources and it has become one of the most important factors for the survival, growth, and development of an organization in recent years (Mwaniki & Gathenya, 2015). It includes all activities and processes related to employees and their experience – employee planning, job analysis, job design, recruitment and selection process, onboarding, socialization, training and development, performance measurement, reward and motivation system, employee career development, interpersonal relationships, conflict resolution, communication, team building and teamwork, diversity and inclusion, employee satisfaction, commitment, loyalty, morale and engagement, and employee resignation process. During the implementation of human resource management activities and processes, the organizational unit dealing with HR issues must cooperate with top management and other organizational units to ensure a unique, holistic approach to the organization (Sparrow, Hird, & Cooper, 2015).

One of the crisis situations that the whole world faced at the beginning of 2020 is the appearance of the virus SARS-CoV-2, known as COVID-19. The rapid transmission of the virus and its consequences on human health led to the pandemic declaration in March 2020 (European Centre for Disease Prevention and Control, 2020). Health of people became priority, putting life and safety at the centre of every activity and decision (Figus, 2021).

The sudden onset and far-reaching social, psychological, and economic consequences of the COVID-19 pandemic have led to a number of challenges and difficulties in the functioning of organizations (Yang, Peng, Wang, Guan, Jiang, Xu, Sun & Ghang, 2020). They suddenly had to navigate in unknown and unexpected circumstances with the aim to find new solutions on how to keep their operations and business in existence (Carnevale & Hatak, 2020). Human Resources (HR) departments had to confront new challenges in order to protect and preserve the health of employees, while ensuring the normal functioning of an organization (Meister, 2020; Tansey, 2020). On the other hand, employees are becoming more responsible for their behaviour during this crisis that impacts their health and safety. They must be aware of the importance of physical distance and new, improved hygiene habits.

1. The role and significance of the HR Department in a crisis situation

The HR department is an important factor in the successful functioning of organizations and, in a crisis period, this department takes a leading role in the process of crisis management and recovery that follows it (Barton, 2000; Wooten & James, 2008; Human Resources Management Association, 2014; Mirzapour, Toutian, Mehrara, & Khorrampour, 2019). Human resource management has a leading role in sustaining the organizational performance in times of crisis (Gunnigle, Lavelle, & Monaghan, 2019). The key activities of the HR department in crisis situations are maintaining the health and safety of employees, training and coaching employees on how to function in changed conditions and how to cope with a crisis situation, and sometimes these are less desirable activities – reducing costs, salaries, benefits, and finally the number of employees (Burma, 2014). The HR department should train and prepare employees for a new way of functioning and working in a crisis situation in order to ensure business continuity with as few negative consequences for stakeholders as possible.

Existing knowledge has shown that the spread of COVID-19 can be prevented/slowed down by increasing the physical distance between people and improving their hygiene habits (Dutch Leonard, Howitt, & Giles, 2020). Therefore, employers had to reconsider their processes and ways of working, as well as implement certain organizational changes in order to protect and preserve the health and safety of their employees (Pastakia, Kearsey, Kilpatrick, & Moir, 2020).

During the COVID-19 pandemic, a number of HR policies and practices underwent significant changes. In most countries, government decided that people should work from home as much as possible (Stoker, Garretsen & Lammers, 2021). The implications of this crisis were mostly related to the following HR activities (Vnoučková, 2020):

- (Re)organizing, (re)structuring, and creating conditions for remote work (redesigning jobs, work tasks, job descriptions, and adapting to newly changed working circumstances – providing conditions for working from home, controlling the execution of tasks, organizing employees into work teams.
- Providing conditions for the protection of health and safety of employees (application of measures for the use of protective equipment – masks gloves, disinfectants, etc.).
- Managing all levels of remote management and coordinating different teams' work.
- Activities by the crisis management whose focus is to create an efficient crisis management team that will adapt to the new circumstances on a daily basis.
- Organizing and implementing employees' online training in the use of modern technology, software, systems, digital tools, video conferencing, etc. with the aim of ensuring the most efficient communication and fast and secure exchange of information between employees.
- Dealing with a possible high degree of employee turnover, changed structure of employees, reduction of salaries, dismissals, etc.
- Managing stress caused by fear of change, illness, job loss, etc. and the need for the HR department to show support and greater understanding and empathy for employees.

In practice, organizations have reorganized their functioning and introduced working from home, flexible working hours, shift work, physical distancing in the workplace, enhanced hygiene and disinfection of the workplace (European Centre for Disease Prevention and Control, 2020; Reeves, Faeste, Chen, Carlsson-Szlezak, & Whitaker, 2020). Many organizations have made additional efforts to transparently present all the consequences that may result from the irresponsible behaviour of employees in case they experience cold symptoms, fever, or respiratory problems that may indicate the existence of COVID-19. The results of a survey conducted in companies in China on a sample of 1000 respondents showed that over 90% of employers introduced working from home (wherever possible), flexible working hours, physical distancing, and enhanced hygiene measures (Pastakia et al., 2020). A research in Australia also confirmed the fact that the role of human resource professionals, as well as their professionalism and expertise, has grown significantly in those organizations that sought to be agile and effectively adaptable to the health crisis, and which showed a high level of trust and additional care for its employees (Aitken-Fox et al., 2020). All these activities foster organizational commitment of employees and have significant impact on the overall organizational functioning and performance (Đorđević, Ivanović-Đukić, Lepojević, & Milanović, 2020).

2. Research methodology

An empirical study, using a specially designed questionnaire, was conducted in the paper. One of the aims of the questionnaire was to examine the activities carried out by the HR department in organizations during the crisis caused by the COVID-19 pandemic.

The questionnaire consisted of several groups of questions: (1) questions related to the respondents (gender, length of service in the organization, position in the organization); (2) issues related to the organization in which respondents work (sector, activity, number of employees); (3) statements in the form of a five-point Likert scale related to the role and activities of the HR department in the crisis situation caused by the COVID-19 pandemic. This Likert scale is called *The role of HR department in crisis situations*.

The questionnaire was carried out electronically and placed by sending a direct link to the questionnaire to companies, HR

associations, as well as professional (LinkedIn, ResearchGate) and social networks (Facebook groups of HR experts and managers). During 2020, a total of 108 respondents answered the questionnaire. The collected responses were processed by using the Statistical Package for Social Sciences – SPSS, version 21.0. (Armonk, NY: IBM Corporation).

The Cronbach's Alpha coefficient for all statements in the Likert scale *The role of the HR department in crisis situations* was 0.954 which demonstrated a high degree of reliability of the scale.

Kolmogorov-Smirnov test, as well as histograms, skewness, kurtosis, normal probability curve (Q-Q plot) and boxplot showed the normality of data distribution.

3. Key sample information

The largest number of respondents (44%) come from medium-sized organizations (with 50 to 249 employees), but there are 29% respondents who work in organizations that are small (up to 49 employees) and 27% of respondents who work in large organizations (over 250 employees).

The largest number of respondents work in private sector organizations (63%), while 37% of respondents work in public sector organizations. Respondents who participated in the survey come from three countries: Serbia (56.5%), Bosnia and Herzegovina (30.5%), and Croatia (13%).

In terms of the activities of organizations, the largest number of respondents are from the education (37%), manufacturing (15%), and health sectors (14%). About one third of respondents belong to the sectors: banking and finance (8.3%), trade (7.4%), consulting services (7.4%), government agencies (6.5%), and transport and logistics (4.6 %).

Male and female respondents are almost equally represented in the sample (51% of men and 49% of women). More than half of the respondents (54%) have over 10 years of work experience in a given organization, while 22% have 6 to 10 years, and 21% have 1 to 5 years of work experience.

In terms of position, the majority of respondents are in top management positions (34%) and middle management positions (33%). About 16% of respondents are first-line managers, while 17% of respondents do not hold managerial positions.

4. Research results and discussion

A Likert scale called *The role of the HR department in crisis situatio*ns, consisting of eight statements aimed at identifying activities undertaken by the HR department due to the COVID-19 pandemic, was formed for the purposes of this research. Respondents were asked to mark each of the eight statements with a number from 1 to 5, depending on the degree to which they agreed with the statements (1 indicated that respondents completely disagree, while 5 indicated that respondents fully agree).

Table 1 shows the mean score of respondents for the statements from the scale *The role of the HR department in crisis situatio*ns. The first four statements (numbers 1 to 4 in Table 1) refer to the reorganization and redesign of jobs and ways of working. The three statements in the Likert scale (numbers 5 to 7 in Table 1) refer to the activities of preserving the health and safety of employees during the COVID-19 pandemic. One of the statements in the Likert scale was dedicated to stress management during the COVID-19 pandemic (ordinal number 8 in the table 1).

Table 1 Mean score for the statements in the scale „The role of the HR department in crisis situations"

No.	Statements	Mean score
1	When the crisis event happened, the HR department immediately undertook activities of planning and reorganizing employees.	3.82
2	The HR department redesigned the workplace (physical distance between office desks)	3.70
3	The HR department introduced flexible working hours.	4.25
4	The HR department introduced working from home where possible.	4.33
5	The HR department immediately took measures to improve workplace hygiene.	4.18
6	The HR department provided disinfectants (soap, antiseptic, etc.).	4.27
7	Since the crisis, the HR department has promoted a policy that employees who have symptoms of COVID-19 (fever, dry cough, fatigue, aches and pains, sore throat, diarrhoea, conjunctivitis, loss of taste or smell, a rash on skin) should stay at home.	4.40
8	During the crisis, the HR department helped employees to overcome the problem of adapting to changed working conditions.	4.18

Source: the authors' research results

Mean scores for all statements within the scale *The role of the HR department in crisis situations* are above 3.7, which is a positive result (all scores above the limit value of 3 are positive). Rapid (instant) reaction to emerging crisis events greatly contributes to the process of stabilization of the organization and its way of functioning. Also, an adequate response from the HR department leads to the creation of an agile, sustainable, and resilient organization that is able to change its way of functioning, to be flexible, and to adapt and survive regardless of the circumstances (Paauwe & Boon, 2019).

4.1. Reorganization and redesign of jobs: research results and discussion

One of the first issues that organizations faced was how to make a seating plan so as to provide a safe physical distance between employees (Caminiti, 2020). The results showed that 62% of respondents agree with the statement that, as soon as crisis began, the HR department undertook planning and reorganization activities.

Almost two-thirds of the respondents (61.1%) agree with the statement that the HR department has redesigned the workplace (physical distance between office desks) in order to preserve the health and safety of employees. In situations where this was possible, flexible working hours and the possibility of working from home were introduced. Of the total number of respondents, 75% agree with the statement that the HR department has introduced flexible working hours and 75.9% that the HR department has introduced working from home. These results are not surprising because, even before the COVID-19, work from home and virtual project teams were on the rise.

Responsibilities and duties of employees that work from home are the same as for the employees that are physically present at the office, but there are some challenges that should be overcome (Lukić & Vračar, 2018). It is necessary to provide appropriate guidelines, instructions and advice to employees on how to quickly adjust to circumstances that many of them encounter for the first time. The HR department should maintain a pleasant working atmosphere and provide employees with all the necessary information in real time regarding the current situation with COVID-19, prevention measures, hygiene measures, working conditions.

4.2. Employee health and safety: research results and discussion

Employee health and safety are key priorities for organizations because employees have become the most important source of competitive advantage (Reilly, 2008; Lazarević, 2014).

The results showed that 71.3% of the total number of respondents agree with the statement that the HR department immediately took measures to improve the hygiene of the workplace, while 74.1% of respondents agree with the statement that the HR department provided disinfectants (soap, antiseptic, etc.).

A very important practice implemented by the HR department is to promote the stay-at-home policy if employees experience any of the symptoms of the virus (fever, dry cough, fatigue, aches and pains, sore throat, diarrhoea, conjunctivitis, loss of taste or smell, a rash on skin) – the results showed that 77.8% of respondents agreed with this statement. No organization wants its employees coming to work sick, especially in the conditions of the COVID-19 pandemic.

Organizations that truly care about the health and safety of their employees have a significantly higher chance of long-term success compared to organizations that only care about processes, infrastructure, and legal regulation (Athamneh, 2018). The unpredictable spread of COVID-19 means that circumstances and instructions are changing on a daily basis and HR departments need to provide an adequate answer to them. Through history, modern information and communication technologies transferred businesses beyond the formal boundaries of the organization and consequently raised the importance of organizational trust (Petković & Lukić, 2013). During COVID-19 pandemic, employees more than ever need to trust each other and their managers and to behave responsibly regarding safety measures and changed working conditions.

4.3. Stress management: research results and discussion

Stress management is a very important activity for the normal functioning of both employees and organizations, especially in crisis situations (Reilly, 2008). Every crisis is an emotional event that affects employees (Kaplan, LaPort, & Waller, 2013). World Health Organization stated that COVID-19 pandemic is affecting the mental health of many people around the world because of the new ways of working and fear of global recession

and uncertainty (World Health Organization, 2020). Namely, employees faced new methods and ways of working such as: working from home (where they often do not have ideal conditions - workspace, work atmosphere), intensive communication via e-mail and other online tools, a constant inflow of new information, constant availability of employees during a state of emergency (when managers knew that employees are at home near computers and telephones), changed level of autonomy, changed perception of hierarchies and sense of remoteness (Delfino & van der Kolk, 2021). Some employees even felt a sense of loss because they replaced frequent business travels, meetings, and dinners with isolation, quarantine, and virtual meetings (Caligiuri, De Cieri, Minbaeva, Verbeke, & Zimmermann, 2020). These changed working conditions have been a significant source of stress for many employees. In addition, job insecurity and the fulfilment of set goals, which in recent years have been positioned as a significant stressor for employees, have become even greater during the crisis situation. Workload pressure, task interdependence, concerns about underpayment and/or delayed payment, and family obligations lead to additional stress (Jamal, Anwar, Khan, & Saleem, 2021; Oruh, Mordi, Dibia, & Ajonbadi, 2021).

The way in which employees interpret all those stressors determines their response to stress. Stress leads to numerous negative effects that are not only reflected on the employees' health and work results, but also on the results and the way of functioning of the entire organization (Lukić & Lazarević, 2019). For this reason, it is very important for HR departments to apply a holistic approach to stress management and to provide assistance and support to employees facing stressful situations (Lukić & Lazarević, 2018). Stress management programs for employees that will help them cope with stress, loneliness that is a result of social and physical distancing, and anxiety are especially important in crisis situations (Caminiti, 2020).

The results of the survey showed that 74.1% of respondents agree with the statement that the HR department helped employees to adapt as easily and quickly as possible to new, changed circumstances and ways of working during the crisis situation. A significant activity carried out by the organizations is the training and education of employees on how to fit into the new way of working and working conditions, both physically (adjusting the infrastructure and working environment for working from home) and mentally (how to deal with uncertainty, stress, anxiety, and fear). This activity was very helpful because every time employees face new pressures they need suitable skills, knowledge and abilities (Slavić & Berber, 2019).

5. Implications, contributions and limitations of research

The conducted research has several significant implications and contributions. First, the results of the research showed that the HR department takes a leading role in crisis situations. From the sector that was considered to have a key role in recruitment, payroll, and dismissal, the HR department has gradually gained a strategic role in organizations, which is especially evident in crisis situations (Grant, 2016; Naznin & Hussain, 2016). It is certain that the role of the HR department in the future will evolve further towards exploiting all the potentials of employees and achieving organizational goals (Foot, Hook, & Jenkins, 2016). Second, the research showed that the HR department has several different methods and ways that can enable employees to work in a quality and efficient manner, with maximum safety and health preservation. Many activities, practices, and principles implemented by the HR department during the crisis situation caused by COVID-19 have further strengthened long-term trends such as the flexibility of working hours, opportunities to work from home, compression of the working week. These trends have been largely prompted by the fourth industrial revolution, that is, thanks to the use of modern information and communication technologies and tools. Employees who worked from home and had flexible working hours during COVID-19 pandemic gained valuable experience and perceived what the future of work could look like. Third, the paper presents examples of well-implemented HR practices, so organizations can acquire adequate knowledge through the learning process and be better prepared for future crisis situations. Crises caused by threats to public health have existed in the past (e.g. SARS) and it is certain that they will occur in the future. Therefore, the acquired knowledge and experience can be very beneficial for crisis management and employee care.

The conducted research is accompanied by certain limitations. First of all, the research was conducted in three countries: Serbia, Bosnia and Herzegovina, and Croatia and included a total of

108 respondents, which is why it is not justified to generalize the obtained conclusions. The research should be extended to other countries and include a larger number of respondents. In future research into this topic, it would be valuable to include issues related to the work-life balance, because working from home and modern technology can often blur the boundaries between these two opposing worlds.

The results of this paper indicate that this health crisis in the field of work practice and human resource management will provide guidelines that can be generally accepted by the top management and HR department, which can be a good basis for applying the new working norm in such and similar crisis situations.

HR department in organizations will be a key lever in achieving organizational agility. Agile organizations are able to predict, perceive and quickly respond to unexpected situations in productive, creative, efficient and effective way that creates new added value (Balog, 2020).

Conclusion

The HR department is highly responsible for the functioning and operating of any organization. Many organizations have become aware that employees are the most significant and valuable capital and have begun to direct their efforts towards creating a better and more positive employee experience. If there are problems in the functioning and operating of the HR department, the organization is in danger because it is exposed to many problems and difficulties.

Weaknesses in the functioning of the HR department are especially pronounced in crisis situations that have become inevitable in the life cycle of any organization. One of the crises that affected the whole world at the beginning of 2020 is the COVID-19 pandemic, which poses a threat to human health.

The results of a survey conducted in Serbia, Bosnia and Herzegovina, and Croatia during 2020 on a sample of 108 respondents, have shown that the HR department in organizations responded quickly to the crisis caused by the COVID-19 pandemic. Most employees could work from home (when the nature of the job allowed it), flexible working hours, the process of reorganization of the working space was carried out in order to satisfy the need to maintain physical distance between employees, disinfectants were provided, and workplace hygiene measures were enhanced. In addition, the research results showed that, during

the global COVID-19 pandemic, the HR departments took an active role in providing psychological assistance to employees to adapt to new conditions and ways of working. Apart from all activities undertaken by HR department, employees' cooperation and adaptability are needed to ensure working processes run smoothly.

On the other hand, employees who are aware that the organization truly cares about them, that it has done everything it could to protect and preserve their health, safety, job security during crisis, show a greater degree of loyalty, commitment, and engagement.

Organizations that have a strong HR department and loyal, committed and engaged employees are fearless organizations that can cope with any type of crisis and win.**SM**

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Exploring direct and non-linear effects of entrepreneurial orientation and its dimensions on firm performance in a small, open, transitional economy

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Abstract
Background: The relationship between entrepreneurial orientation (EO) and small firm performance has been extensively researched over the last couple of decades. However, the scientific community still does not have a unanimous view regarding non-linear relationships between EO and performance, especially when adding separate EO dimensions.
Purpose: This paper explores the non-linear relationship between EO, observed as a unidimensional and multidimensional construct, and small business performance within a small, open, and transitional economy. Moderation effects of environmental turbulence on both direct and non-linear EO-performance relationships have been explored, as well.
Study design/methodology/approach: Hierarchical regression analysis was used to test the research hypothesis on the data collected from 109 Montenegrin SMEs.
Finding/conclusions: Results reveal that EO has a direct and inverted U-shaped non-linear relationship with small firm performance. Innovativeness and proactiveness have a direct positive effect on small firm performance. Risk-taking and autonomy have an inverted U-shaped non-linear relationship with small firm performance. Environmental turbulence does not positively moderate direct nor non-linear relationship between EO and small firm performance.
Limitations/future research: Limitations refer to the relatively small dataset which may affect the strength of the result. Specific national institutional and cultural setting could also influence the findings. Information was gathered from the owners and managers of the observed firms which limited the ability to gather more diverse information from other stakeholders. Research focused on only one moderator explaining the non-linear relationship between EO and small firm performance. Therefore, future research should focus on conducting a multi-country analysis with larger data sets to strengthen the external validity of the present study, and should adopt a multi-level perspective in investigating the role of inter-relations among EO dimensions in explaining performance variations. Future studies should continue testing the effects of other moderators in explaining the non-linear relationship between EO and firm performance, especially within a longitudinal context.

Keywords
entrepreneurial orientation, performance, nonlinearity, transitional economy, SMEs

1. Introduction

In the last couple of decades, the concept of entrepreneurial orientation (EO) has gained significant attention within entrepreneurship and management research. Moreover, many authors consider EO as one of the most relevant concepts in the entrepreneurship literature (Mthanti & Ojah, 2017; Gupta & Wales, 2017; Putniņš & Sauka, 2020; Wales, Kraus, Filser, Stöckmann, & Covin, 2021), where most studies have focused on investigating the relationship between EO and firm performance, and have found that this relationship is of a positive character (Lumpkin & Dess, 2001;

Wiklund & Shepherd, 2005; Kraus, Rigtering, Hughes, & Hosman, 2012). However, few studies have explored the nonlinearity between EO and firm performance. Empirical evidence is unclear since some studies found nonlinearity to exists (Tang, Tang, Marino, Zhang, & Li, 2008; Tang & Tang, 2012; Wales, Patel, Parida, & Kreiser, 2013; Kreiser, Marino, Kuratko, & Weaver, 2013), while others have not (Schepers, Voordeckers, Steijvers, & Laveren, 2014; Gupta & Batra, 2016; Lomberg, Urbig, Stöckmann, Marino, & Dickson, 2017). Furthermore, in their research, Su, Xie and Li (2011) determined the existence of nonlinearity; however, not for established firms, which implies that the non-linear relationship between EO and firm performance might be context-dependent.

Research on EO within transitional economies (Bruton, Ahlstrom, & Obloj, 2008; Luu & Ngo, 2019), especially the ones in South-East European (SEE) countries, have gained significant momentum in recent years (Moric Milovanovic, 2012; Moric Milovanovic & Laktasic, 2013; Palalic & Busatlic, 2015; Grabovac & Moric Milovanovic, 2015; Petković & Sorak, 2019; Slogar & Bezic, 2020; Slogar, 2021). Although many studies focused on investigating the linear effects of EO, observed both as uni-and multidimensional concept, on firm performance (Petrovic, Vukotić, Aničić, & Zakić 2015; Moric Milovanovi, Primorac, & Kozina, 2016; Primorac, Milković, & Kozina, 2018; Veselinovic, Kulenović, Turulja, & Činjarević, 2020; Moric Milovanovic, Wittine, & Bubaš, 2021), there is a considerable lack of research focused on exploring their non-linear relationships, especially in the context of transitional SEE economies. Specifically, in transitional economies, environmental turbulence is pronounced as firms face high levels of instability and underdevelopment of institutional and market environments compared to developed economies (Luu & Ngo, 2019). Therefore, the relationship between EO and firm performance may be more complex in transitional economies than in developed ones (Lumpkin & Dess, 2001; Luu & Ngo, 2019).

Following the research as mentioned above, this paper aims to make the following contributions to current literature. One contribution relates to investigating EO's direct linear effects and non-linear effects. EO dimensions affect small firm performance in a small and transitional economy since most of the previous research has been done in large developed countries' economies. Another

contribution is a better understanding of the role environmental turbulence plays in the EO – small firm performance relationship. More precisely, this study aims to clarify how environmental turbulence imposes an important and differential moderating impact on the relationship as mentioned earlier within a context of a small transitional economy of the SEE region.

The paper begins with the literature review on EO, EO dimensions, environmental turbulence, and small firm performance. Four hypotheses are developed to examine the direct, non-linear, and moderating relationships of the previously mentioned variables. Afterward, the research method is discussed, followed by hypotheses testing and a discussion of the results based on data obtained from small and medium-sized enterprises in Montenegro. The paper concludes with the limitations and the implications for future research and management.

2. Literature review and hypotheses

The empirical evidence from earlier academic research investigating the relationship between EO and small firm performance is ambiguous. While many studies have determined their positive relationship (Kraus et al., 2012; Putniņš & Sauka, 2020; Moric Milovanovic et al., 2021), others have found no effect of EO on small firm performance (Moreno & Casillas, 2008; Chaston & Sadler-Smith, 2012; Messersmith & Wales, 2013). Moreover, there is a lack of detailed analysis of the effects of separate EO dimensions on small firm performance. Those who analyzed these effects found that not all EO dimensions have a direct and positive relationship with performance, stressing that a better understanding of their distinct roles is needed (Lumpkin & Dess, 2001; Kreiser et al., 2013; Lomberg et al., 2017; Wales, Covin, & Monsen, 2020; Wales et al., 2021).

Therefore, the following hypothesis and sub-hypotheses are proposed:

- H1: EO has a direct positive effect on small firm performance.
- H1a: Innovativeness, as an EO dimension, has a direct positive effect on small firm performance.
- H1b: Proactiveness, as an EO dimension, has a direct positive effect on small firm performance.
- H1c: Risk-taking, as an EO dimension, has a direct positive effect on small firm performance.

- H1d: Autonomy, as an EO dimension, has a direct positive effect on small firm performance.

- H1e: Competitive aggressiveness, as an EO dimension, has a direct positive effect on small firm performance.

Many authors define environmental turbulence as an environment characterized by high levels of uncertainty and rapid changes in customer needs, market conditions, and technological developments (Davis, Morris, & Allen, 1991; Jaworski, & Kohli, 1993; Wilden & Gudergan, 2015). Lumpkin & Dess (2001) look at it as the level of uncertainty firms face when making decisions in an uncertain environment. Therefore, firms operating in such an environment need to constantly scan to acquire accurate and reliable information to adapt to market changes (Wang & Fang, 2012; Wang, Chen, & Fang, 2020). On the other hand, such environments allow firms to break through traditional industry boundaries and enter new markets by developing new products, services, and technologies (Calantone, Garcia, & Dröge, 2003; Wang et al., 2020). It has been established that the firm environment has a critical role in the strategic decision-making process as firms look for ways to gain market share and compete successfully (Rauch, Wiklund, Lumpkin, & Frese, 2009; Dai, Maksimov, Gilbert, & Fernhaber, 2014). Moreover, Putniņš & Sauka (2020) made a specific call to test further the moderating impact of the turbulence of external environments on the EO-performance relationship.

Therefore, the following hypothesis and sub-hypotheses are proposed:

- H2: Environmental turbulence has a positive moderating effect on the direct relationship between EO and small firm performance.
- H2a: Environmental turbulence has a positive moderating effect on the direct relationship between innovativeness and small firm performance.
- H2b: Environmental turbulence has a positive moderating effect on the direct relationship between proactiveness and small firm performance.
- H2c: Environmental turbulence has a positive moderating effect on the direct relationship between risk-taking and small firm performance.

- H2d: Environmental turbulence has a positive moderating effect on the direct relationship between autonomy and small firm performance.

- H2e: Environmental turbulence has a positive moderating effect on the direct relationship between competitive aggressiveness and small firm performance.

Literature provides empirical evidence that the EO-performance relationship does not necessarily have to be linear. Therefore, a firm being too entrepreneurial has intrigued many scholars (Tang, Tang, Marino, Zhang, & Li, 2008; Su et al., 2011; Wales et al., 2013; Kreiser et al., 2013; Lomberg et al., 2017; Wales et al., 2021). However, not many studies have focused on investigating this notion. Zahra & Garvis (2000) were among the first scholars to notice some nonlinearity while investigating the effects of EO on a firm's profitability (ROA). They determined that with the increase of EO, the levels of profitability (ROA) diminished. Bhuian, Menguc, amd Bell (2005) also observed the presence of nonlinearity in a specific market and structural conditions. Tang (2008) showed the nonlinearity between EO and firm performance in a Chinese context, i.e., firms were achieving reduced gains from higher investments in EO. Furthermore, Su et al. (2011), in the context of young Chinese firms, have determined diminishing returns within EO - performance relationship.

Therefore, based on the arguments of prior research, which suggest that it is very likely high levels of EO might have negative effects on small firm performance, it is proposed to study which of the different dimensions of EO are predictive of such effects:

- H3: EO has an inverted U-shaped non-linear effect on small firm performance.
- H3a: Innovativeness, as an EO dimension, has an inverted U-shaped non-linear effect on small firm performance.
- H3b: Proactiveness, as an EO dimension, has an inverted U-shaped non-linear effect on small firm performance.
- H3c: Risk-taking, as an EO dimension, has an inverted U-shaped non-linear effect on small firm performance.
- H3d: Autonomy, as an EO dimension, has an inverted U-shaped non-linear effect on small firm performance.

- H3e: Competitive aggressiveness, as an EO dimension, has an inverted U-shaped non-linear effect on small firm performance.

Besides the exhaustive literature on the EO – performance relationship, there is a substantial body of knowledge focused on examining the role of environmental turbulence in this relationship (Engelen, Kube, Schmidt, & Flatten, 2014; Zarei & Shaabani, 2016; Wang et al., 2020). Most scholars observed moderating (Balodi, 2019; Zaidi & Zaidi, 2021; Hina, Hassan, Parveen, & Arooj, 2021) and mediating (Vij & Bedi, 2012; Abiodun & Rosli, 2014) effects environmental turbulence has on the relationship between EO and firm performance. However, some fewer scholars tested the possible nonlinearities of these effects. Zahra & Garvis (2000) were among the first scholars who observed that the relationship between EO and profitability exhibits nonlinearity in excessively hostile environments. Following their findings, Rauch et al. (2009) call for a detailed examination of potential moderators specifically in the non-linear relations between EO and firm performance, especially within various contextual settings. Moreover, Wales (2016), Gonzalez & de Melo (2018) and Wales et al., 2021 note that context might be an influential factor in determining non-linear effects and should be further investigated.

Therefore, based on the calls made by prior research, the following hypothesis and sub-hypotheses are proposed:

- H4: Environmental turbulence has a positive moderating effect on the non-linear relationship between EO and small firm performance.
- H4a: Environmental turbulence has a positive moderating effect on the non-linear relationship between innovativeness and small firm performance.
- H4b: Environmental turbulence has a positive moderating effect on the non-linear relationship between proactiveness and small firm performance.
- H4c: Environmental turbulence has a positive moderating effect on the non-linear relationship between risk-taking and small firm performance.
- H4d: Environmental turbulence has a positive moderating effect on the non-linear relationship between autonomy and small firm performance.
- H4e: Environmental turbulence has a positive moderating effect on the non-

linear relationship between competitive aggressiveness and small firm performance.

3. Research method

3.1. Sample

The Statistical Office of Montenegro classifies small firms as those with less than 50 employees, while medium-sized firms have between 50 and 250 employees. The sample database was taken from the database of a private consulting firm, where a total of 1,000 small and medium-sized firms were contacted in February and March of 2020, of which 109 responded and correctly filled out an e-mail questionnaire with a response rate of 10,9%. Sample demographics reveal that 63% of respondents were male, while 37% were female; 62% of the respondents were firm owners, 9% directors, and 29% managers. When looking at the industry sector, most of the respondents operated in tourism and hospitality (29%), retail and wholesale (18%), and financial services (9%). Regarding the firm's work experience, 6% of respondents were less than a year with the firm, 18% worked between 1 and 4 years, 12% between 5 and 7 years, and 64% were more than 7 years with the firm. Among the respondents, 12% have only a high school diploma, 51% university diploma, 24% hold a master's or MBA, and 13% have a doctorate or Ph.D. equivalent diploma.

3.2. Dependent variable

Small firm performance was measured using Gupta and Govindarajan's (1984) six-item, seven-point Likert scale for assessing importance and satisfaction with the following performance criteria: sales growth rate, market share, operating profit, profit/sales ratio, market development, and new product development. Following Naman and Slevin's (1993) approach weighted average performance index was computed. The firm performance index has a mean of 4.79, a standard deviation of 1.23, and a Cronbach's α value of 0.94.

3.3. Independent variables

Entrepreneurial orientation (EO) was measured using Covin and Slevin's (1989) nine-item, seven-point Likert scale for assessing innovativeness (Cronbach's α = 0.71), proactiveness (Cronbach's α = 0.78), and risk-taking (Cronbach's α = 0.82); Lumpkin, Cogliser and Schneider's (2009) three-item, seven-point Likert scale for assessing

autonomy (Cronbach's α = 0.69), and Aktan and Bulut's (2008) three-item, seven-point Likert scale for assessing competitive aggressiveness (Cronbach's α = 0.81). The EO index has a mean of 4.22, a standard deviation of 0.95, and a Cronbach's α value of 0.68.

3.4. Moderating variable

Environmental turbulence was measured using Miller and Friesen's (1982) eight-item, seven-point Likert scale of environmental dynamism (Cronbach's α = 0.58) and environmental hostility (Cronbach's α = 0.70), where environmental turbulence index has a mean of 4.18, a standard deviation of 1.08, and a Cronbach's α value of 0.65. Previous research has found Miller and Friesen (1982) scale to be significantly positively correlated with firm performance (Covin & Slevin, 1989).

3.5. Control variables

Firm size and industry were utilized as control variables in the analysis. Firm size was controlled by classifying the firm as 'small' or 'medium-sized' by the number of employees working there. Therefore, small firms have less than 49 employees, while medium-sized firms have between 50 and 250 employees. Industry was controlled by classifying the firm in one of eight industry categories according to the Statistical Office of Montenegro.

3.6. Analysis

Table 1 reports the means, standard deviations, and correlations for the first-order variables used in the analysis. In contrast, Table 2 reports the means, standard deviations, and correlations for the dimensions of EO, control, moderating, and dependent variables. To be more exact, Table 1 reports that both EO and EO² have significantly positive correlation coefficients of 0.301 and 0.272 with firm performance. On the other hand, table 2 reveals that only innovativeness (0.458), proactiveness (0.339), and competitive aggressiveness (0.220), as dimensions of EO, have significantly positive correlation coefficients with firm performance

A nonresponse analysis was performed by comparing pertinent variables for all firms, and the analysis showed no significant difference between respondents and nonrespondents. Stated differently between early and late respondents. Harman's one-factor test analysis was performed to test for potential common method variance bias. The analysis showed that none of the factors accounted for most of the covariance. Therefore, we can conclude that there is a minimal possibility of nonresponse or common method bias in this research.

Table 1   Means, SDs, and correlations (first-order variables, n = 109)

	Mean	SD	1	2	3	4	5	6	7	8
1. Firm size	1.45	0.63	1.00							
2. Industry	5.88	1.88	-.144	1.00						
3. EO	4.22	0.95	.074	-.099	1.00					
4. Turbulence	4.18	1.08	.057	-.074	.142	1.00				
5. EO²	18.73	7.93	.078	-.130	.989**	.161	1.00			
6. EO x Turbulence	17.81	6.54	.105	-.101	.734**	.757**	.735**	1.00		
7. EO² x Turbulence	79.77	42.33	.115	-.119	.866**	.568**	.878**	961.**	1.00	
8. Performance	4.79	1.23	.082	-.113	.301**	-.315**	.272**	-.015	.080	1.00

Note: *P < 0.05; **P < 0.01

Source: the author's work

Table 2   Means, SDs, and correlations (EO dimensions, n = 109)

	Mean	SD	1	2	3	4	5	6	7	8	9
1. Firm size	1.45	0.63	1.00								
2. Industry	5.88	1.88	-.144	1.00							
3. Turbulence	4.18	1.08	.057	-.074	1.00						
4. Innovativeness	4.44	1.41	.028	-.191*	-.049	1.00					
5. Proactiveness	4.60	1.50	.113	-.119	.259**	.564**	1.00				
6. Risk-taking	3.61	1.46	.014	.045	.146	.172	.437**	1.00			
7. Autonomy	4.67	1.33	-.137	.010	-.021	.036	.077	.182	1.00		
8. Comp. agrees.	3.77	1.50	.203*	-.070	.116	.260**	.621**	.414**	.132	1.00	
9. Performance	4.79	1.23	.082	-.113	-.315**	.458**	.339**	.049	-.088	.220*	1.00

Note: *P < 0.05; **P < 0.01

Source: the author's work

4. Empirical results

Hierarchical regression analysis was used to test the research hypothesis, where independent variables were mean-centered before testing for moderation effects to reduce the potential for multicollinearity. Variance inflation factor (VIF) analysis was conducted in all regression models

showing that none of the VIF values were higher than three, thus confirming that multicollinearity does not have an effect on the obtained results. Tests for the absence of heteroscedasticity and autocorrelation have been conducted, where Durbin-Watson statistic and maximum Cook's distance were well below critical values.

Table 3   Results of hierarchical regression analysis for small firm performance (first-order variables, n = 109)

Variables	Model 1: Control variables	Model 2: Direct effects	Model 3: Non-linear effects	Model 4: Moderation effects
Controls				
Firm size	.130	.125	.124	.151
Industry	-.068	-.064	-.085	-.069
Direct effects				
EO		.438***	.390***	.378
Turbulence		-.424***	-.401***	-.309
Non-linear effects				
EO²			-.165*	-.118
Moderation effects				
EO x Turbulence				-.055
EO² x Turbulence				-.103
Model stats				
R-squared	.017	.236***	.259***	.274***
Adj.R-squared	-.001	.207***	.223***	.223***
ΔR-squared	.017	.219***	.023***	.015***

Note: *P < 0.10; **P < 0.05; ***P < 0.01

Table 3 reports the hierarchical regression analysis results for the first-order variables as independent variables and small firm performance as the dependent variable, where only control variables were included in model 1. Model 2 added direct linear terms for EO and environmental turbulence, and the quadratic term of EO was included in model 3 to test the non-linear relationship with small firm performance. Model 4 added moderation terms of environmental turbulence on EO and EO² with the small firm performance relationship. Results from table 3 provide support for hypothesis 1 and hypothesis 3, while there is no evidence to support hypothesis 2 and hypothesis 4. Stated differently, there is enough statistically significant evidence to confirm that EO ($\beta = 0.438$, $P < 0.01$) has a direct positive effect on small firm performance (H1) and that EO ($\beta = -0.165$, $P < 0.1$) has an inverted U-shaped non-linear relationship with small firm performance (H3). On the other hand, there is no statistically significant evidence to support hypothesis 2 and hypothesis 4 that environmental turbulence positively moderates a direct relationship ($\beta = -0.055$, $P > 0.1$) and non-linear relationship ($\beta = -0.103$, $P > 0.1$) between EO and small firm performance. Moreover, figure 3 further supports

hypothesis 4 as environmental turbulence does not have a positive moderating effect on the non-linear relationship between EO and small firm performance.

Table 4 reports results of hierarchical regression analysis for separate dimensions of EO as independent variables and small firm performance as the dependent variable. Model 1, in Table 4, shows the effects of only control variables on small firm performance. In model 2 direct linear effects of environmental turbulence and dimensions of EO were added. Model 3 included the square terms to test the relationships between five EO dimensions and small firm performance. To test the moderation effects of environmental turbulence in models 4 – 8 linear and quadratic interaction terms were added, while model 9 reports the full model results. As stated in table 4, when looking at the relationships between EO dimensions and small firm performance, only sub-hypotheses 1a, 1b, 2b, 3c, and 3d can be supported. More specifically, model 2 reports that only innovativeness ($\beta = 0.241$, $P < 0.01$) and proactiveness ($\beta = 0.226$, $P < 0.05$) have a statistically significant direct linear relationship with small firm performance, therefore supporting H1a and H1b. As shown in model 3, the quadratic

risk-taking (β = -0.078, P < 0.1) and quadratic autonomy (β = -0.114, P < 0.05) terms were significantly negatively correlated to small firm performance, meaning that only risk-taking and autonomy as EO dimensions have an inverted U-shaped non-linear relationship with small firm performance, thus supporting H3c and H3d.

Models 4 to 8 in table 4 display results of the moderation regression analysis, and provide results supporting only sub-hypothesis 2b. To be more precise, as shown in model 4, both linear (β = 0.038, P > 0.1) and quadratic (β = 0.003, P > 0.1) innovativeness-turbulence interaction terms were not significantly related to small firm performance. In model 5, linear interaction term of proactiveness-turbulence (β = 0.114, P < 0.1) has a significant and positive effect on small firm performance, while quadratic interaction term does not (β = -0.044, P > 0.1), therefore, providing support for sub-hypothesis 2b. Furthermore, Figure

2 provides further graphical support for accepting sub-hypothesis 2b. As shown in model 6, both linear (β = -0.006, P > 0.1) and quadratic (β = -0.009, P > 0.1) risk-taking-turbulence interaction terms were not significantly related to small firm performance. As shown in model 7, both linear (β = -0.125, P < 0.1) and quadratic (β = -0.058, P > 0.1) interaction terms of autonomy-turbulence do not have a positive effect on small firm performance. In model 8, both linear (β = 0.084, P > 0.1) and quadratic (β = -0.001, P > 0.1) competitive aggressiveness-turbulence interaction terms were not significantly related to small firm performance. Since model 9 (full model) only found linear risk-taking-turbulence (β = -0.118, P < 0.1) interaction term to be significantly and negatively related to small firm performance, thus further confirming rejection of sub-hypothesis H2c.

Table 4 Results of hierarchical regression analysis for small firm performance (EO dimensions, n = 109)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Controls									
Firm size	.130	.063	-.028	-.021	-.064	-.030	-.017	-.086	-.066
Industry	-.068	-.028	-.035	-.037	-.026	-.031	-.026	-.036	-.011
Direct effects									
Turbulence		-.427***	-.357***	-.367**	-.235*	-.333**	-.247*	-.319**	.195
Innovativeness		.241***	.235**	.234**	.230**	.228**	.231**	.206**	.255**
Proactiveness		.226**	.237**	.240**	.244**	.247**	.235**	.243**	-.008**
Risk-taking		-.053	-.030	-.025	-.034	-.026	-.029	-.006	-.188
Autonomy		-.109	-.163**	-.164**	-.198**	-.162**	-.142*	-.188**	.005**
Comp. agress.		.043	-.002	-.015	.015	-.010	.011	-.014	-.108
Non-linear effects									
(Innovativeness)²			-.002	.001	.017	-.003	.002	.004	.031
(Proactiveness)²			.010	.003	-.026	.014	.002	.003	-.033
(Risk-taking)²			-.078*	-.069	-.081*	-.076*	-.066	-.081*	-.077
(Autonomy)²			-.114**	-.115**	-.099**	-.113**	-.092*	-.112**	-.085
(Comp. agress.)²			.024	.025	.035	.020	.023	.019	.021
Moderation effects									
Inn x Turbul				.038					-.112
Inn² x Turbul				.003					.028
Proa x Turbul					.114*				.193
Proa² x Turbul					-.044				-.057
Risk x Turbul						-.006			-.118*
Risk² x Turbul						-.009			-.004
Auto x Turbul							-.125*		-.054
Auto² x Turbul							-.058		-.047
Comp. x Turbul								.084	.064
Comp.² x Turbul								-.001	-.012
Model stats									
R-squared	.017	.365***	.425***	.427***	.462***	.425***	.446***	.435***	.499***
Adj. R-squared	-.001	.314***	.346***	.334***	.376***	.333***	.357***	.344***	.364***
ΔR-squared	.017	.348***	.060***	.002***	.038***	.001***	.021***	.011***	.075***

Notes: *P < 0.10; **P < 0.05; ***P < 0.01

Source: the author's work

The non-linear relationships between EO, risk-taking, autonomy, and small firm performance are illustrated in Figures 1a, 1b, and 1c, confirming hypotheses 3 and sub-hypothesis 3c and 3d. Stated

differently, Figures 1a, 1b, and 1c provided additional evidence that EO, risk-taking, and autonomy have an inverted U-shaped non-linear relationship with small firm performance.
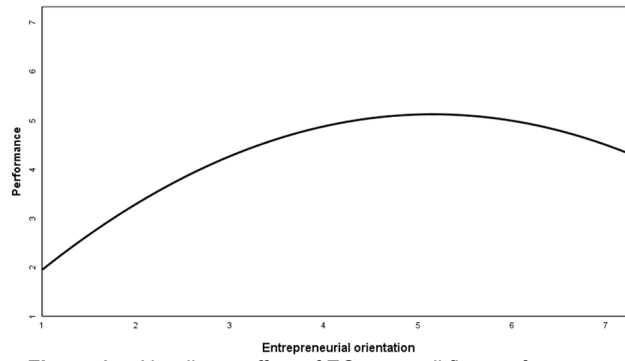
Figure 1a Non-linear effect of EO on small firm performance
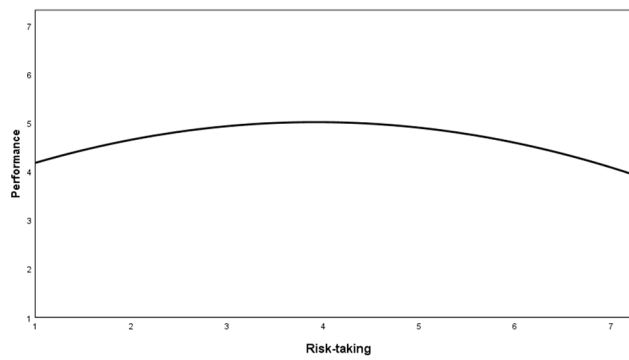**Source:** the author's work

Figure 1b Non-linear effect of risk-taking on small firm performance
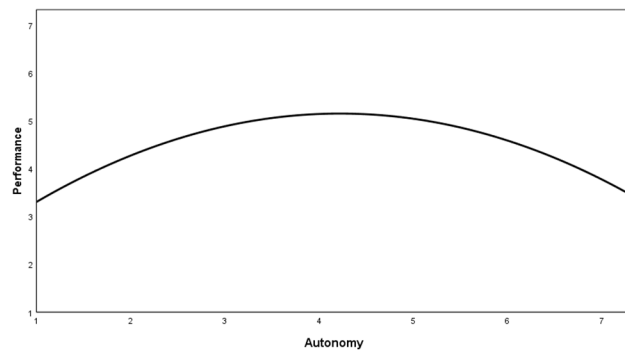**Source:** the author's work

Figure 1c Non-linear effect of autonomy on small firm performance
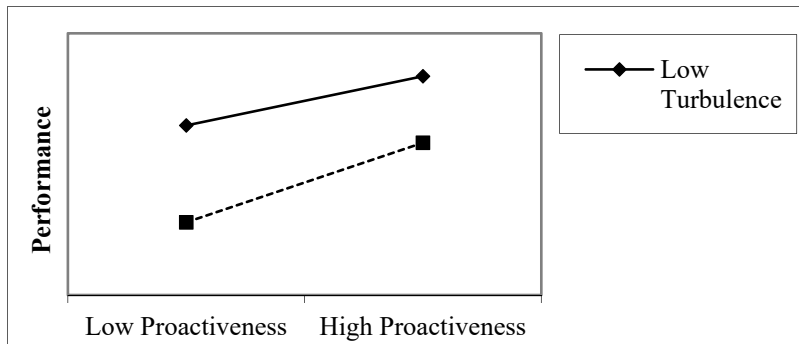**Source:** the author's work

Figure 2   Moderation effect of environmental turbulence
on the proactiveness – small firm performance relationship
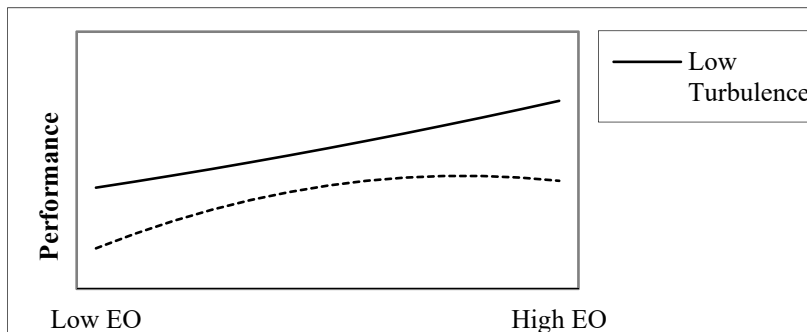**Source:** the author's work

Figure 3   Quadratic moderation effect of environmental turbulence
on EO – small firm performance relationship
Source: the author's work

5. Discussion

This study investigated the contingency effects of the relationships between EO, EO dimensions, environmental turbulence, and firm performance. The use of contingency theory provided a framework in which we explored different conditions of how firms that adopt entrepreneurial strategies can enhance performance. The significant role of environmental turbulence as a moderating variable indicated that the positive relationship between EO and firm performance is often conditional. This paper aimed to explore direct and non-linear relationships between EO, observed as unidimensional and a multidimensional construct, and small business performance. By examining 109 small and medium-sized firms in a small, open, and transitional economy such as Montenegro, the hypotheses and sub-hypotheses reveal the following findings: (1) EO has a direct positive effect on small firm performance, (2) out of all five EO dimensions only innovativeness and proactiveness have a direct positive effect on small firm performance, (3) environmental turbulence does not positively moderate a direct relationship between EO and small firm performance. Out of all

five EO dimensions, it was shown that environmental turbulence positively moderates a direct relationship with small firm performance (4), (5) EO has an inverted U-shaped non-linear relationship with small firm performance, (6) out of all five EO dimensions, only risk-taking and autonomy have an inverted U-shaped non-linear relationship with small firm performance, and (7) environmental turbulence does not moderate the non-linear relationship between EO and small firm performance, nor between any of EO dimensions and small firm performance.

5.1. Theoretical contribution

This study provides several contributions to academic literature. Firstly, this study reinforces the current understanding of the EO – performance relationship in the context of a small, open and transitional economy, where empirical results support the observation of a positive influence of EO on small firm performance (Putniņš & Sauka, 2020; Moric Milovanovic et al., 2021). Secondly, the study offers a better understanding of the small firm's EO, viewed both as a uni- and multidimensional concept, by analyzing effects of the environmental turbulence (Wang et al., 2020; Wales et al., 2020). Thirdly, the study confirmed

the nonlinearity of effects between EO and small firm performance, thereby extending the empirical evidence within a small transitional economic context (Lomberg et al., 2017; Luu & Ngo, 2019). Finally, this study adds to the existing literature by exploring environmental turbulence as the moderator of the inverted U-shaped relationship between EO, EO dimensions, and small firm performance (Wales, 2016; Gonzalez & de Melo, 2018). The findings suggest that such interactions are more complex and convoluted and may even be nonmonotonic (Lomberg et al., 2017).

5.2. Implications for management

For small firm decision-makers, i.e., owners and management, this study provides several interesting implications for their decision-making framework. Results of this study highlight that EO helps small firms successfully reach their intended performance, where innovativeness and proactiveness have an especially important role in this process (Gupta & Batra, 2016; Putniņš & Sauka, 2020; Moric Milovanovic et al., 2021). Moreover, the positive moderating effect of environmental turbulence on EO – performance relationship shows that investing in EO-related strategies in uncertain environments brings affirmative effects to the firms' overall performance (Zaidi & Zaidi, 2021; Hina et al., 2021). Thus, firms should pay particular attention to the changes in their environment, i.e., to invest in environmental scanning activities, set up risk controls emerging from potentially too high levels of EO, focus on and engage in an only limited number of opportunities, as not to waste or deplete their limited and scarce resources (Wales et al., 2021). Furthermore, this study confirmed the relationship between EO and small firm performance to be non-linear (Lomberg et al., 2017). Therefore, small firm decision-makers pay attention not to engage in overly aggressive EO strategies while pursuing their business goals. Although small firms benefit from an entrepreneurial mindset, it needs to be appropriate by focusing on adequate investments in environmental scanning and putting in place controls for not overdoing with EO activities (Luu & Ngo, 2019). Small firm management should also be aware of the non-linear nature of risk-taking and autonomy and small firm performance (Yang & Ju, 2018). Firms need to be very careful not to over-focus on risk-taking activities or allow too much autonomy to their employees in developing tactical and operational plans.

6. Conclusion

This analysis performed on 109 small and medium-sized firms demonstrated that EO positively influences small firm performance, even when moderating effect of environmental turbulence has been added. Moreover, the analysis provided empirical evidence for the existence of nonlinearity between EO and small firm performance within a small, open, and transitional economy such as Montenegro. However, no evidence was found to support the moderation effect environmental turbulence would play on the non-linear relationship between EO and small firm performance. When decomposing EO to its dimensions, this study provides empirical evidence that only innovativeness and proactiveness have a direct positive effect on small firm performance, that only for proactiveness environmental turbulence positively moderates direct relationship with small firm performance, and that only risk-taking and autonomy have an inverted U-shaped non-linear relationship with small firm performance.

As in any academic research study, this study suffers from certain limitations. These limitations can be summarized in the following categories: the data set, subjective perceptions of the respondents, having only one firm representative as a respondent, focusing on one point in time, providing only a 'snapshot' of the complex interrelationships between the observed variables, and contextual nuances related to a single small and transitional economy.

The first limitation refers to the relatively small dataset of only 109 SMEs which may affect the strength of the results. Moreover, since the data in this research considered only Montenegrin SMEs, their national institutional and cultural setting could influence the findings. Therefore, future research should focus on conducting a multi-country analysis with larger data sets to strengthen the external validity of the present study. While the influence of the environment is a core finding of the study, it may be necessary to explain further that the EO-performance relationship may differ depending on the context. Another limitation concerns the empirical approach based on gathering the responses from owners and managers, which limited the ability to gather more information from other employees and stakeholders, adding different layers to the analysis of the observed concepts and reducing the common method bias. Although this study focused on examining the effect that each EO dimension has

on small firm performance, it has not addressed particularities related to the inter-relations between these dimensions. Therefore, future research could adopt a multi-level perspective and investigate the role of these inter-relations in explaining performance variations. Another limitation is focusing on only one moderator explaining the non-linear relationship between EO and small firm performance. Future studies could continue testing the effects of other moderators such as other environmental factors, institutional environments, strategic networking capabilities, market orientation, internalization capabilities, etc. Lastly, future research should address EO implementation strategies within a longitudinal context. SM

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A short descriptive analysis of the European evolutions of input price indices of agricultural products between 2008 – 2017: patterns, trends and implications

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Abstract
Background: The evolutions of the inputs price and investment indices of the products in agriculture are not only determinant elements in understanding the fluctuations of the food price and the market instability, specific to the agricultural sector but also affects the agricultural production and traceability. Analyzing the European evolutions of the inputs price indices of agricultural products offer the possibility to understand the main trends and tendencies in the agricultural system by reviling the main trend tenancies during a nine year period long.
Purpose: The main aim of the study is to investigate the evolution of input price indices of agricultural products in order to underline the specific patterns, trends and implications of the agricultural policies. In addition, the research pays a special attention to the investigation of the Romanian agricultural policy evolution on the most relevant time frame of economic conformity with the European agricultural model. The descriptive analysis is based on the specific annual datasets of price indices of the means of inputs in agricultural production, and the index of real prices of goods and services for investments in agriculture during 2008 – 2017, reported to 2010 as the baseline year.
Findings/conclusions: The analyses confirms that the agricultural sector evolution has generated significant input and investment prince changes and unprecedented trend evolutions that led to the massive changes on the agricultural pattern. We strongly advocate and recommend for promoting a solid capacity and durable

agricultural production systems and policies through sustainable and long term investments in order to avoid disruptive tendencies in the agricultural market system.

Limitations/future research: The research explore the evolutions of the inputs price and investments indices of the products in the European agriculture only form the descriptive analysis without covering an extensive framework or considering other additional variables which consist the main limitation of this study. In a future research the authors will address and extend the research framework by inserting additional variables and items and propose a large and integrative model of analysys.

Introduction

Obtaining competitive, advantageous pricing policies with a low level of food prices requires the adoption of resilient measures to improve the food supply and production chain and, at the same time, to increase the efficiency and competitiveness of the agricultural sector. In the literature of this domain there are numerous papers that argue the need to increase the competitiveness of agriculture by improving the price mechanism as in (Serra, Goodwin & Featherstone, 2005; Sckokai & Moro, 2006; Cardwell, 2015; Saghaian, Nemati, Walters & Chen, 2018; Hill, 2018; Dong, 2019). Such an approach would require a constructive trajectory of the production and supply chain, especially from the perspective of maintaining the price/value ratio that remains at a realistic level to reflect the specific phenomena of the agricultural market.

In a market economy, the production processes specific for agriculture feature a special complexity arising not only from the functionality of the processes of this economic branch, but also from the nature of the mobilised factors, of the attracted resources that give a certain dynamics and complexity. The agricultural production process is a dynamic one, defining certain traceability along the entire value chain. The transformation of the acquired production factors, for example of the inputs into final products to be traded on the market, requires a certain production time, a certain production process and a certain market value. This is how prices of products (PP) and factors of production (FP) are formed in the mix of market forces traded on the market, which include the production effort and the newly created value.

Obtaining and anticipating low prices in the agricultural production chain requires not only the application of adequate management in terms of inputs and training of primary production factors, but also a wide capacity for innovation and investment in the agricultural sector. Gohin and Zheng (2020) argue that, by their nature, price and

source risk expectations are often neglected in static analyses, while the dynamic analyses often argue with a high degree of generality that they are critical. On the other hand, the realization of the production imposes a combination and use of the production factors as close as possible to the optimum, having in the background an adequate training of these factors, which validates exclusively the immediate benefits generated by the low prices.

As argued in Timmer, 2002; Webb and Block, 2012; Andrei and Drăgoi, 2019 and Nowak and Różańska-Boczula, 2022, the analysis of the role, place, and influence of the agricultural sector and agriculture in general in the contemporary economy cannot be achieved without a deep understanding of the system of specific sectoral flows and determinants.

The performance of agriculture and its ability to provide the necessary volumes of food, raw materials and fodder are inextricably linked to the evolution of agricultural inputs. From this perspective, the evolution of agricultural performance at the European level is closely linked to the manifestations and restrictions imposed by both the Common Agricultural Policy (CAP) and national specificities. From the perspective of economic practice, it is often impossible to restrict the decision to attract new factors of production into the system, and agricultural consumption is determined by the production structure, the type of production, the targeted volume or the production system, without listing the influencing factors exhaustively. Identifying ways to mitigate or even reduce factors that have a low degree of influence or that do not adequately reflect the demand for agricultural products is essential, given that food production and food security of the population is important. As evidenced by Manski (2004) there have been many debates about the nature of farmers' expectations regarding the evolution of prices and the degree to which they compensate the effort, and, more generally, about the expectations

of trading entities regarding the evolution of the market.

The structural factors that determine and contribute equally to the increase in agricultural prices, including inputs, persist over a medium period of time and the fluctuations generated highlight an increase in the degree of volatility of both input and output agricultural prices. Agricultural markets are volatile and they have a considerable absorption of the increase in demand in global markets, being even less predictable in terms of evolution or behaviour. As Hansen (2022) argues, the supportive mechanism shown in the case of market prices and payments to compensate for market dysfunctions are two very important tools in agricultural policy at the European level. Specialized studies (Berry & Schlenker, 2011; Hendricks, Smith & Sumner, 2014; Miao, Khanna & Huang, 2016; Haile, Brockhaus & Kalkuhl, 2016) show that the elasticity of output and input can be understood and applied as sectoral policy tools.

Adaptation to the demand-driven mechanism caused by speculative price manipulation, including input, is severely affected by the limitation of the level of flexibility often incompatible with the characteristics and potential of agricultural production and the degree of effective absorption in the market. Analysing the relationship between energy prices and agricultural products by applying the self-regressive vector model (VECM), Nemati (2017) clearly demonstrates the existence of a long-term decisive relationship between these price categories, especially an intensification for the period 2007–2014.

The reduction of the amplitude of the volatility of prices of agricultural products can be achieved through an adequate management of the input prices, the ratio being a direct and immediate one, with significant consequences in the sphere of production.

The special attention to and focus on the immediate benefits of low prices can often be detrimental to the production system, if due attention is not paid to the system and the mix of inputs as (Bojnec & Swinnen, 1997; Solakoglu & Civan, 2006; Ucak, 2012) claim. Fluctuations in agricultural input prices affect not only the agricultural sector in particular but also the whole economy. Through food prices, all consumers are affected, and from the upstream branch perspective, the other economic branches that use agricultural production as input are affected as

well. At the same time, abrupt, difficult-to-control and major fluctuations lead to and impose the need to rethink the position of the agricultural sector in the ensemble of modern economies (Anderson, Cockburn & Martin, 2010).

The correction of the imbalances occurring and existing in the relations specific to the food supply chain generates the need to adopt some functional sectoral policy measures that would contribute to a resilient positioning of the agricultural sector against the consequences of the accentuated opening and liberalization of the national markets. The analysis of the European evolution of the inputs price indices of agricultural products is a topical subject, with multiple influences, which, although they were given special attention in the dedicated literature and specialized studies, still arouse a deep interest. From this perspective, the central objective of this research is the analysis of the European evolution of the inputs price indices of the products in agriculture, from the perspective of the global sectoral transformations. In addition to the introductory section, the paper contains the data and methodology section, the results and discussion section, and ends with the conclusions and references sections. It is therefore structured in a classic, traditional way, trying to offer an integrative approach on the analysed subject. From the perspective of the research subject, it comes in line with the specialized literature, specific to the domain of analysis of agricultural products, in our case the subject of agricultural inputs. The understanding of the evolution of the prices of the inputs of the products in agriculture offers conclusive information for the thorough understanding of the price formation mechanisms for agricultural products, of their fluctuations, and of the impact by which they determine consumers' behaviour patterns.

2. Data, materials and methodology

In this context, one of the ways of analysing and understanding the specific mechanisms of agricultural production and evaluating the intimate specificity of achieving market stability is the analysis of the evolution of real price indices of the inputs of agricultural production processes. In order to achieve the objective of this research, meaning, to deepen, compare and understand the role and place of Romanian agriculture in the European agricultural environment from the perspective of the prices of the inputs of the production processes in agriculture, we decided to

use data compatibility and sustainability, Eurostat database. For this purpose, the data series "Price indices of the means of agricultural production, input (2010 = 100) - annual data" and "Index of real prices of goods and services for investments in agriculture" (2010 = 100 - annual data) were selected and presented in the table below:

Table 1 Description of the variables used and their units of measurement, 2008-2017

Variables	Significance of variables	UM
INCRT_08	Index of real prices of goods and services currently consumed in agriculture (input_1) in 2008, (initial year of analysis)	%
INCRT_12	The index of real prices of goods and services currently consumed in agriculture in 2012	%
INCRT_17	The index of real prices of goods and services currently consumed in agriculture in 2017	%
ININV_08	Index of real prices of goods and services for investment in agriculture (input_2) 2008, (initial year analysis)	%
ININV_12	The index of real prices of goods and services for investments in agriculture, in 2012	%
ININV_17	The index of real prices of goods and services for investments in agriculture, in 2017	%

Source: the authors' own selection based on Eurostat database

On the other hand, although, with the exception of the INCRT_17 variable, the other variables do not have a normal distribution, the very small differences between the mean and median values lead to the conclusion of a uniform distribution of the variable values.

3. Results and discussion. European developments in the input price index of agricultural products.

The first picture of the evolution of indices for real prices of goods and services currently consumed in agriculture (INCRT) and of the goods and services prices for investment in agriculture (ININV) is given by the characteristics of the data series corresponding to them (Table 2).

The first and very important conclusion, resulting from the analysis of the characteristics of the data series on the real prices indices of agricultural inputs, in all the three reference years, is that the averages (mean) of the variables at EU28 level are representative and, as a result, cluster analysis is no longer required. This is evidenced by the low values of the variation coefficient (VC), as well as of the dispersion values (Simple Variance) and the standard error (Standard Error).

Table 2 Main features of the data series on real indices of agricultural input prices for 2008, 2012 and 2017

	INCRT_08	INCRT_12	INCRT_17	ININV_08	ININV_12	ININV_17
Mean	111.07	110.80	99.74	106.56	99.63	103.05
Standard Error	1.26	0.69	0.83	5.20	1.51	1.24
Median	110.65	111.05	99.95	100.05	98.95	101.35
Standard Deviation	5.91	3.63	4.38	23.27	7.97	6.58
Sample Variance	34.98	13.15	19.20	541.57	63.58	43.31
Kurtosis	2.25	8.91	0.65	15.70	22.07	4.55
Skewness	1.22	-2.17	-0.20	3.85	4.42	1.12
Minimum	102.50	96.40	89.80	95.70	91.30	86.90
Maximum	127.50	117.50	109.60	200.50	138.20	125.00
Cnf. Level (95.0%)	2.62	1.41	1.70	10.89	3.09	2.55
VC (%)	5.33	3.27	4.39	21.84	8.00	6.39

Source: the authors' own computations

On the other hand, although, with the exception of the INCRT_17 variable, the other variables do not have a normal distribution, the very small differences between the mean and median values lead to the conclusion of a uniform distribution of the variable values.
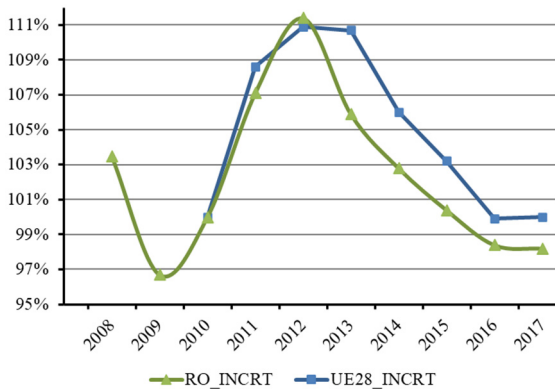
Figure 1 Evolutions of real price indices of goods and services currently consumed in agriculture in Romania and the EU28 in the period 2008-2017 (2010 = 100%)
Source: the authors' calculations

In the period 2008-2017, the index of the real prices of goods and services currently consumed in agriculture in Romania (RO_INCRT) had a fluctuating evolution (Figure 1).

After a decrease by 6.8 percentage points, from 103.5% to 97.5% in 2009 (3.3 percentage points less than in the base year 2010), a period of increase in RO_INCRT followed, reaching 111.4% in 2012. One of the causes of the increase is the economic and financial crisis that started in 2009.

It is notable that the increase in real prices of this input in the agriculture of Romania is in line with the increase in the average annual index of real prices of goods and services currently consumed in agriculture in the EU28, the differences being insignificant.

From 2013 until the end of the analysed period, there is a trend of stability, both in Romania and at EU28 level, so that they reach, in the case of the EU28 average, the level recorded in 2010; in Romania they reached a level just 0.2 percentage points lower than in 2010. A positive fact is that the reduction of real prices of goods and services currently consumed in agriculture in Romania happened at a faster pace than in the European Union. This feature remained constant from 2013 until the end of the analysed period.

In relation to the other states included in the analysis, from the point of view of the index of real prices of goods and services currently consumed in agriculture (input_1) calculated on the basis of 2010 (INCRT), Romania was in the group of states where INCRT recorded relatively low values, which is a positive fact.
Thus, in 2012, only Cyprus recorded a lower value compared to 2010 (96.4%), while in the other states (Figure 2) INCRT values went up from 2010

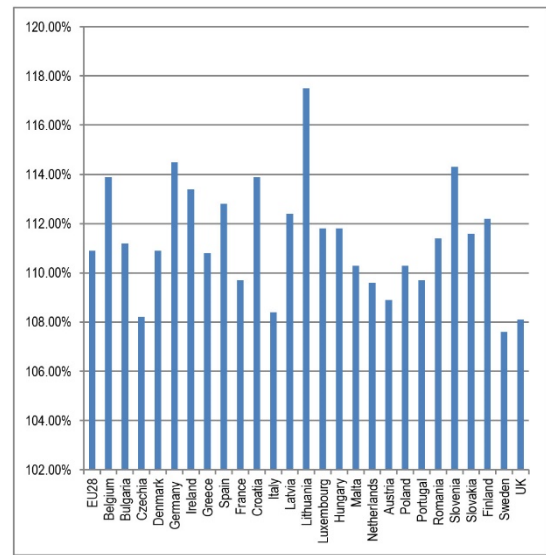values in a range between 107.6% in Sweden, and 117.5% in Lithuania.

Figure 2 Romania's place among the EU28 states, with the exception of Cyprus, in terms of INCRT values in 2012, compared to 2010.
Source: the authors' calculations

Romania, in 2012, recorded an INCRT value of 111.4%, ranking 14th, 0.5 percentage points above the EU28 average (110.9%) and 3.8 percentage points higher than Sweden. It should be noted that Romania, in terms of INCRT value, recorded in 2012, is ahead of countries such as Spain (by 1.4 percentage points) and Germany (by 3.1 percentage points).

The economic developments in the EU28 countries during the period from 2012 to 2017 have led to changes in the positions occupied in relation to the changes in the index of real prices of goods and services currently consumed in agriculture. This period was one of return to economic stability, so that while in 2012 only Cyprus recorded lower INCRT values compared to 2010 (100%), in 2017, the number of countries increased to 14.

In 2017, INCRT values, compared to 2010, ranged from 89.8% in Slovakia to 109.6% in Denmark (Figure 3).
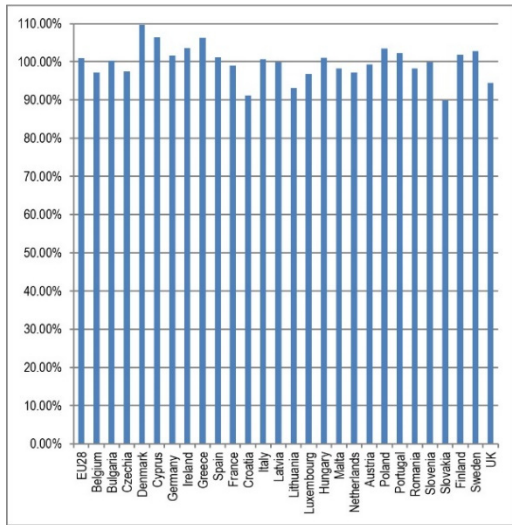
Figure 3 Romania's place among the EU28 states, in terms of INCRT values in 2017, compared to 2010.
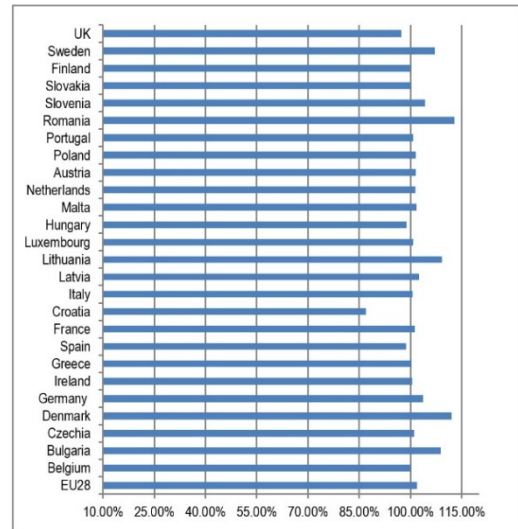**Source:** the authors' calculations

Figure 4 The places occupied by Romania among the EU28 states, in terms of ININV values in 2012 and 2017, compared to the values recorded in 2010.
Source: the authors' calculations

In the new hierarchy, Romania comes 10th, with an INCRT value of 98.2% (1.8 percentage points below the EU28 average), ahead of countries such as France (by 0.9 percentage points), Spain (by 3.0 percentage points), Germany (by 3.4 percentage points) or Poland (by 5.3 percentage points), although in 2012, France and Poland were ahead of Romania.

If there were favourable results from the point of view of INCRT in Romania, the same cannot be said about the evolution and position of Romania within the EU28 from the point of view of the index of real prices of goods and services for investments in agriculture (ININV).

From the point of view of the second category of inputs, regarding the index of real prices of goods and services for investments in agriculture, in Romania the 2012 value on record was 99.5% of the 2010 value, 0.02 percentage points above the EU28 average. ININV values for EU Member States in 2012 ranged from a low of 91.3% in Slovakia to a high of 138.2% in Lithuania. It should be noted that the value recorded in Lithuania, which is the last, is an exception given that in Malta, the penultimate state in the classification, the ININV value was 102.7%.

In terms of position among the other EU states, Romania held the 17th place in 2012, with Hungary in the second place with an ININV_12 value of 92.6%, and Bulgaria coming fifth with an ININV_12 value of 95.8%.

A specific feature of 2012 is the fact that in 20 EU countries the values of the indices of real prices of goods and services for investment in agriculture were lower than in the top year (2010 = 100%) and, with the exception of Lithuania, the others exceeded very little the value of 100%.

In the period 2012-2017, in contrast to the tendency of stability in terms of prices in the first category of inputs (INCRT), the ININV was marked by divergent tendencies, meaning that, while in some states there were reductions in the real prices of goods and in the investment services in agriculture, in others the trend was to increase them.

In 2017, the lowest value of ININV was recorded in Croatia (86.9%) and the highest in Cyprus (125.0%). Due to the very high value of ININV registered in Cyprus, which placed this state on the last place in terms of performance for this criterion, compared to the ININV value of 112.8%, recorded in the penultimate state in terms of this performance criterion (Romania), Cyprus is not entered in Graph 2.14.b.

Unlike in 2012, a characteristic of ININV in 2017 is that most EU countries have higher values of real prices of goods and services for investment in agriculture than in 2010, as demonstrated by the existence of 21 values of ININV greater than 100%, including the EU28 average (101.8%).

Regarding Romania, the period 2012-2017 was particularly unfavourable for agriculture due to the significant increase in the prices of goods and services for investment. While in 2012 the value of ININV was 99.5% of the one recorded in 2010, in

2017 the value of investment was just 25.5% higher.

Rising prices of agricultural inputs generally affect small producers, who have to allocate a significant share of their revenues to purchasing inputs and starting agricultural production. This phenomenon is specific and indissolubly linked to the degree of development and solidity of the agricultural sector, which leads to rising food prices, including a limited access to the specific market. On the other hand, the high level of agricultural input price also affects the level of inflation in EU28 member states. Although agricultural input prices have a degree of sensitivity to market information, they may remain volatile and sometimes difficult to adapt.

As can be seen from the analysis, the fluctuation of agricultural input prices is also determined by the existence of possible major dysfunctions in the production and supply chain with production factors, including the ability to produce food.

The dispersion and evolution of prices at specific agricultural inputs closely and equally reflects the ability of each link in the production and supply chain to protect and promote its specific interests.

According to Muflikh, Smith, Brown and Aziz (2021), the high volatility of prices in agricultural goods often bear a negative effect on the business entities that operate along the value chain in agriculture. Due to this, the prices of agricultural inputs trigger a long sequence of factors in contemporary agricultural systems, adding to their dynamics and complexity. Several dedicated studies (De Roest, Ferrari & Knickel, 2018; Morales, 2018; Lanfranchi, Giannetto, Rotondo, Ivanova & Dimitrova, 2019; Yan, Cai, Lin & Ambaw, 2021; Viganò, Maccaroni & Righi, 2022) claim that the analysis of inputs price indices of agricultural products makes it necessary to render a no lesser attention to the degree of volatility of this category of prices, which, in agriculture as a complex economic system, must be able to reflect the sector's capacity to mobilise specific resources. When analyzing the drivers of grain price volatility, (Gaetano, Emilia, Francesco, Gianluca & Antonio, 2018) point out that a thorough analysis of the critical factors of price instability is mandatory, because the interpretation of the curve of prices of farm inputs will help predict the role and dynamics of demand and supply for agricultural produce in complex economic markets.

Conclusions

The analysis of the evolution of agricultural product input price indices at EU28 Member State level reflects the significant, massive and important changes that the European agricultural sector has undergone over the period of reference.

During the time span analysed, the index of the real price of goods and services currently consumed in Romanian agriculture had a fluctuating evolution, often in the form of "saw teeth", reflecting the high degree of volatility of sectoral prices, although there was a significant increase of the prices of goods and services for investments in agriculture. At European level, the developments in the positions of the Member States were different, due to significant changes in relation to the real price index of goods and services currently consumed in agriculture as a result of counteracting significant fluctuations in agriculture. From the analyses performed, one can notice, in the entire reference period, but particularly during the time segment 2012-2017, a tendency to return to economic stability, and, along with it, a tendency to stabilize prices. In 2012, only Cyprus recorded lower INCRT values compared to 2010 (100%); in 2017, at the end of the analysed period, the number of states had increased to 14.

Given the data presented in the results and discussion section, we can say that in the case of the two elements analysed – the real prices of goods and services currently consumed in agriculture and real prices of goods and services for investments in agriculture – we can see the evolution of specific sectoral trends and we can better understand the nature of fluctuations in agricultural and food prices in the European space. In this context, the results of the analysis so conducted complement the overall picture deriving from the general survey specific for complex agricultural markets in terms of inputs price indices of agricultural products. An in-depth approach of the central issue of this research may act as the ground for further, extended, research, with a widening of the scope of the data series used herein. The analysis of the inputs price indices of agricultural products opens up more relevant avenues of research, all promising interesting prospects for the entire domain.SM

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Learning analytics: prospects and challenges

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Abstract
Owing to its high promises for improving learning support, teaching, and learning outcomes in higher education, learning analytics has captured much interest from both academics and practitioners over the last several years. Considering that it is rooted in several disciplines, researchers and practitioners have approached learning analytics from a range of perspectives. Although many studies concerning learning analytics have highlighted its great potential for improving learning practice, there is little evidence of successful transfer of the suggested potential into the practice of higher education happening. This clearly indicates a need for rethinking many aspects of learning analytics usage: first, the goals that can be achieved, but also the actions necessary to attain these goals. The aim of the descriptive research presented in this paper is to provide an updated and realistic view of the state of the art in learning analytics, its potential benefits, and tangible challenges that need to be overcome for a successful application of learning analytics as educational technology.

Keywords
Learning analytics, technology-enhanced learning, action analytics, learning

Introduction

Contemporary teaching and learning practices are considerably influenced by the integration of digital technology into higher education. Data, mainly available from online learning environments, can be very useful in improvement of students' learning. Empowering interactions and communications within a virtual environment (Broadbent & Poon, 2015), online learning became

an integral part of higher education, where there is an obvious need to shift its focus "from providing access to university education to increasing its quality" (Lee, 2017). Learning Analytics (LA) systems are implemented by the higher education (HE) institutions in order to improve their understanding and support of student learning (Schumacher & Ifenthaler, 2018). LA emerges as a fast-growing and multi-disciplinary area of Technology-Enhanced Learning (Ferguson, 2012),

which forms its own domain (Strang, 2016) with an evolving interest among practitioners and researchers.

The primary purpose of learning analytics is to improve learning, which is achieved through analysis and representation of data concerning learners and learning environments. It provides teachers with a new lens through which they can better understand and advance the learning process. In LA, information about learners and learning environments is used to "access, elicit, and analyse them for modelling, prediction, and optimization of learning processes" (Mah, 2016). The emergence of LA is closely linked to the impressive increase in the amount of data available on learners, as well as with management approaches focused on quantitative metrics – often inconsistent with the educational perspectives of teaching. However, there is a belief that LA can contribute to a better understanding of students and more efficient use of limited resources.

Among many definitions of learning analytics, the most popular is certainly the one adopted at the first International Conference on Learning Analytics held in 2011: "Learning analytics is the measurement, collection, analysis, and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs."

Analyzing the previous definition it is easy to notice that it includes three basic elements.

Data used in LA is usually gathered while the learning process is in progress and concern information about learning environment, learning interactions, learning outcomes and, quite naturally, the students. The typical data sources for learning analytics are:

- Student Information Systems (SIS), as a source of academic and demographic data
- Learning Management Systems (LMS), as a source of data about students' activities and performance
- Other systems as a source of various types of information, which could incorporate library records, consumption patterns of electronic learning material, data on social network interactions, etc.

Data analysis refers to the process of gaining actionable insights from the collected data (Fig. 1). The analysis is based on machine learning techniques utilizing various mathematical and statistical algorithms. It can be said that more sophisticated algorithms usually lead to more

valuable insights, but at the same time these algorithms also set significantly higher requirements in terms of volume, type, time frame and other characteristics of data. Therefore, in the implementation of the learning analytics process, the greatest skill is to choose appropriate data and algorithms.
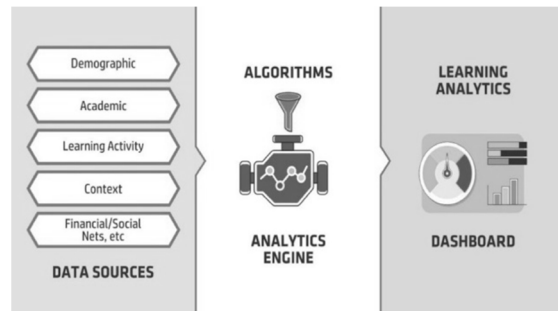

Figure 1 Learning analytics as a process of obtaining insights from the collected data
Source: Omedes, 2018

For the results of the analysis to be in the instrumental to improvement, they must be followed by appropriate actions. Absence of appropriate action can be considered a complete failure and render the entire LA process meaningless. The quality of predictions can be considered irrelevant if one is unwilling or unable to turn them into appropriate action. Although this is usually understood, it should be emphasised that the appropriate internal processes need to be arranged for interventions to happen.

In many fields of activity, especially new ones, there are difficulties in making clear distinctions between related efforts, as well as different interpretations. When it comes to learning analytics, it is not difficult to notice the existence of certain overlaps with two other emerging areas: academic analytics and educational data mining (EDM). The focus of academic analytics is not on individual students and courses, but rather on the institutional and national level (Long & Siemens, 2011). The main subject of interest of the educational data mining (EDM) is the development of methods for the analysis of educational data, where it is much more focused on technical challenges than on pedagogical issues (Ferguson, 2012). Unlike EDM, learning analytics is primarily about learning, more specifically, about the generation of actionable (learning) intelligence related to the possibility of using insights gathered from data in order to improve learning (Campbell, De Blois & Oblinger, 2007).

Campbell, De Blois and Oblinger (2007) set out five steps of the LA process: Capturing, Reporting, Predicting, Acting, Refining. These five steps occupy a central place in the learning analytics cycle presented by Clow (2012) (Fig. 2). The cycle starts with students, whose main characteristic is the generation of data. Students can be either students in a traditional higher education environment or attendees in a less formal context. Data can refer to demographic information, network activities, estimates, and other types of data. These data are processed and converted into metrics whose values serve as the basis for taking actions that affect the participants. The content and way of visualizing metrics is very diverse: from a simple monitoring of learning progress, to a more complex comparison of achieved results with the desired (reference) values or a graphical presentation (visualization) of activity in an online forum. Actions are also very diverse and can be initiated by different subjects: actions can be taken by students in response to metrics that compare their activity to that of their colleagues, but also by teachers who contact those students for whom the need for additional support has been identified.
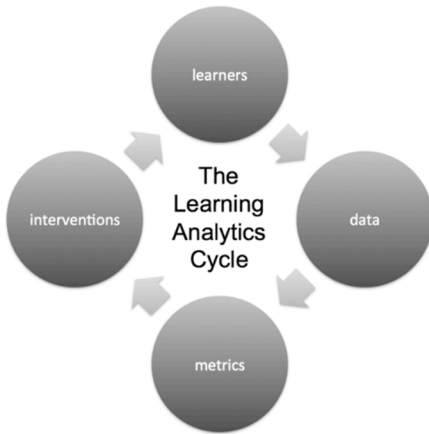

Figure 2 The Learning Analytics Cycle
Source: Clow, 2012

There is no doubt that learning analytics has a number of drivers and facilitators. Like many other areas, there is an obvious pressure towards the implementation of performance management, metrics and quantification in the field of learning. On the other hand, an increasing amount of data on students and learning is available, as more and more learning takes place online. In theory, every page visited, every click made can be easily memorized. Third, advances in big data have led to the wide availability of statistical and computational tools needed for managing large data sets (Sønderlund, Hughes, & Smith, 2019).

As an emerging and promising field, LA is attracting the interest of a growing research community. There are now conferences and special issues dedicated to this topic, as well as established dedicated international research network (Society for Learning Analytics Research – SoLAR). Along with growing interest, vendors of learning technology have been offering an increasing number of learning analytics packages, which is evidenced by the fact that learning analytics and its related technologies have been a part of the "Horizon Report" for a while.

2. Learning analytics as it is

Learning analytics cannot be considered as an established academic discipline with well-defined methodological approaches, but rather a field of enquiry and a random selection of promising techniques, tools, and methodologies. Although this may seem like a strength that allows rapid development, this lack of coherent epistemology essentially appears much more as a weakness and an obstacle to further development (Ferguson, Clow, Griffiths & Brasher, 2019).

Indeed, vendors of learning technology are providing an increasing number of analytics packages. Different packages provide different levels of sophistication in terms of data analysis. Most of the existing solutions are providing only descriptive learning analytics. These types of solutions provide an understanding of the past but do not influence the present or provide any additional help in terms of getting insights into the future events. Unlike these solutions that tend to be reactive, lately we are witnessing a noticeable shift towards predictive learning analytics which should be proactive by influencing the present and thus improving ongoing learning processes. The transition from descriptive to predictive analytics is not easy at all: first of all, it requires accurate and readily available data (which many organizations really do not have) and appropriate algorithms. Below, we describe some of the methods and techniques that currently attract the most attention when it comes to applying LA in practice.

As a result of the aspiration to move from descriptive to predictive analytics, predictive modelling has become one of the most current topics in LA. Application of predictive modelling in education offers many possibilities. Predictive modelling is often used to estimate the probability with which an individual student will complete a course, with the purpose of providing focused support to certain students in order to improve the

overall completion rate. Based on large dataset containing information about previous students who took the course and sophisticated mathematical techniques a model is developed to be applied it in the future to the information available for current students. The purpose of applying the model to the data on current students is to perform a quantified assessment of the course completion probability for each student. The results of this prediction can be presented to teachers, department heads, administrators, and others in a certain form (usually within a dashboard-type control panel). In principle, there is a certain similarity between predictive modelling and a teacher noticing which students have difficulties in learning, and providing them with additional help based on their observations; predictive modelling could be seen as a kind of extension of this ability to the world of online learning. However, it is necessary to note that there are some important practical differences: in learning analytics, insight is not restricted to student's teachers and can be used directly, without involving teachers at all, to initiate actions and interventions. If we want to be realistic, it should be noted that these models are not (always) perfect. If the probabilities created by these models are not completely accurate, then estimates of the student's chances of completing a course based on available data cannot be reliable. However, practice shows that these models are still much more often right than wrong, and, with a certain amount of caution, they can be used to improve student completion rates.

When speaking about Social Network Analysis (SNA), it is necessary to point out that there are specific tools specially developed for the context of online learning, such as Social Networks that adapt pedagogical practice - SNAPP (Bakharia & Dawson, 2011). SNAPP enables monitoring of students' activities on LMS/VLE forums, showing a diagram of the social network which graphically depicts the number and strength of connections between students. SNAPP significantly facilitates the identification of students who are completely excluded from the network or students who are central to the network (and who can be treated as key drivers of communication). It can also be used to determine the pattern of interaction on the forum as well as for identification of stand-alone (isolated) groups that interact with each other, but not with those outside the group.

There are examples that show that SNA can find its successful application in more complex educational contexts. We could mention here the research conducted by Suthers and Chu (2012) in which they, based on SNA, researched the community for professionals in education "Tapped In" (http://tappedin.org). Instead of simple diagrams of social networks, they opted for a more detailed and richer approach, based on an "associogram". They were able to identify real communities by relying exclusively on data describing online activity on the site, without taking into account any other data (considering affiliation, geographical location, etc.). The identification of communities among the student population, provided by this approach, can be of great importance when it comes to making decisions regarding placements, group work, projects and other things.

A common feature of the examples given so far is their predominant reliance on quantitative data created by learners. However, today it is equally possible to analyse qualitative data, primarily owing to advances in computing that are clearly reflected in areas of natural language processing and latent semantic analysis. The analysis of textual data has long transcended simple frequency counts and is nowadays done in a richer, more meaningful way. Content analysis and semantic analysis can be very useful in determining students' contributions to an online forum and the extent to which their online talk is exploratory, as well as in offering suggestions how they might contribute more effectively.

A recommender (or recommendation) system (platform or engine), is an information filtering system which is used to predict items (or ratings for items) that the user may have an interest in. These systems are used in a variety of areas, with commonly recognised examples taking the form of playlist generators for video and music services (Netflix, YouTube), product recommenders for online stores (Amazon), or content recommenders for social media platforms (Facebook, Twitter) and open web content recommenders. The techniques on which these systems are based can also be applied in the educational environment. The recommendation system could make suggestions to the student regarding learning resources, primarily based on what resources where previously used and the rating of their usefulness, but also the experiences of other students. In the case of conventional universities with inflexible curriculum, this approach would have limited effects: in such settings, students usually have limited options for choosing the track of their

study. Along with the increase in the level of studies and the change in the character of studies, which at higher levels is increasingly taking the form of research, the application of this approach could have much greater potential. However, this approach could, as expected, be most widely used in various forms of open and less formal learning.

The examples given above illustrate the potential benefits of applying learning analytics. However, the application of learning analytics inevitably leads to a number of issues. The first and probably the most difficult issue concerns the ethics of personal data. In most countries there is comprehensive data protection legislation, while universities usually have their own data governance policies. In cases where learning analytics is applied within an explicit research context, all activities are carried out under the supervision of an appropriate body (ethics committee or audit committee). However, in cases where learning analytics is applied outside this context, all responsibility regarding ethical standards rests with practitioners.

One of the main drivers of learning analytics' research and application is the expectation that it will improve students' learning outcomes. However, according to comprehensive research conducted by (Viberg, Hatakka, Bälter, & Mavroudi, 2018) this expectation has been confirmed by only few studies (9%) (Fig. 3).
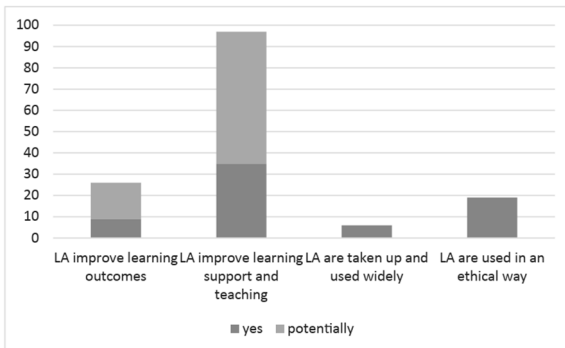
Figure 3 Evidence for learning analytics in higher education (%)
Source: Viberg et al., 2018

As shown in Fig. 3, research indicates that there is a belief in the high potential of learning analytics in terms of improving learning support and teaching, as well as improving learning outcomes, but over the years we have not witnessed many examples of successful transfer of this potential to higher education. This raises many questions and the need to rethink how the potential of LA could be better exploited in higher education practice.

Below we will try to highlight some of the barriers and possible causes of this situation:

- There is no doubt that learning analytics is based on data, but at the same time it is often criticized for being rather theoretical, more precisely, for not being explicit enough in terms of its theoretical basis. There have been several attempts to establish these theoretical foundations by various authors (Clow, 2012; Dawson 2008; Atkisson & Wiley 2011), but none of the offered solutions are universal, and there is an ongoing risk of treating the gathered data as the data that matters. One must not overlook that the choice of what is measured, the choice of metrics, is equally critical when it comes to learning analytics. It is very important for education system to be set up to optimize metrics that really concern learning, otherwise it is not realistic to expect a progress in learning optimization.
- The application of LA in practice is associated with the use of purpose-developed tools and solutions, but being new and popular, also means that the term "learning analytics" is used by the industry in a variety of ways. Unfortunately, some of the offered solutions do not reflect the spirit and/or are not in line with the technological progress in the field of LA.
- There is a tension between shaping education as an economic activity and as an activity that primarily concerns the effective acquisition of knowledge and competencies. This tension has very practical consequences for teachers and students that are manifested in limited resources, class sizes, and general time pressures. The application of quantitative metrics for measuring teachers' practices in such a resource-constrained environment makes teachers very vulnerable in terms of accountability processes.

3. How to increase the odds of success in LA endeavours

In analytics, and thus in learning analytics, data is treated as a primary raw material and has the status of a very sensitive asset. The correct approach in collecting LA data can be described as an effort to gather as much useful data as possible and as little sensitive as required.

Although some tend to characterize learning analytics as "big data in education," a typical learning analytics project does not involve big data as such. The term "big data" refers to data that is so large, rapidly accumulating, or complex that it is difficult or impossible to process using traditional methods. Some of the characteristics of these data (known as the Vs of big data) may not always apply to the data collected in a learning environment. Therefore, there is often no need for the real Big Data processing associated with specific computing tools that can handle the complexity of the 4 Vs. For the majority of LA projects data analysis techniques that are commonly used for mid/small data and concern standard machine learning and analytical algorithms are quite enough.

Despite many promising descriptions of LA, its consideration should always start from the following facts:

- The world around us is increasingly data-driven – it is not realistic to expect education to be an exception
- Learning analytics by improving education make educational institutions more competitive – don't forget that LA is useful only if its implementation results in coherent action.
- To really benefit from LA as an important tool of increasing student success the institutions must implement predictive analytics – descriptive analytics is useful but not enough.

Implementing learning analytics projects in HE may be challenging (Francis, Broughan, Foster & Wilson, 2020). This is especially true for an institution's first LA project, the success of which may be crucial to the attitude towards further LA efforts. In order for an institution to be successful in implementing LA projects (especially the first one), there are certain recommendations that should not be ignored:

- Start modestly: The initial LA project should have a limited scope and duration. It is not a good practice to start with a project that covers the entire company.
- Focus on the problem, not the technology: Technology is useful to the extent that it helps to solve a problem, consequently higher education institutions should focus primarily on specific problems they want to solve when launching LA projects/solutions.

- Successes on smaller projects open the door to larger ones: Proving on (simpler) examples that LA can improve current learning processes is an effective approach to gaining trust and valuable experience.
- Involve all the critical stakeholders from the very beginning: This will help to ensure their long-term support.

Following a more formal approach to learning analytics implementation can also contribute to the greater success of this process. There are several learning analytics readiness assessment tools available to HEIs to conduct self-assessment on how they score in relation to each of the elements critical to an endeavour to establish an analytics-driven culture. There are several elements that can be highlighted as the most significant:

- Data capture: Learning analytics only considers events that leave a digital trace, but it is evident that the digital environment is not the only place where students interact. It means that learning analytics is not capable of providing a holistic view of the entire educational environment.
- Data variety: Learning analytics is much more than a simple extension of LMS. Learning analytics should combine data from different sources, which sometimes appears to be a great challenge.
- Comparable analytics: Currently, no open standard defines relevant metrics and their significance. This represents a significant obstacle when it comes to comparative analyses in which standardized learning analytics metrics should be compared.
- Prediction accuracy: All statistical conclusions are subject to some sort of error. Depending on its expected size and practical importance, we assess whether this error is acceptable or not. And in the case of learning analytics, as for any other analytical process, it can hardly be expected to be (ever) perfect.
- Partial view: Learning processes are much more complex than they seem at first glance and how they are usually treated. We must not forget that we are dealing with people who cannot be fully defined by equations, at least for now.
- Data literacy: Consumers of analytics need special skills to properly interpret the results and apply adequate actions.

Although all the above present reasonable challenges, ethics should probably be highlighted as the most relevant of all. Respect for ethical principles must be treated as a fundamental requirement in all phases of the learning analysis process. We should never forget that learning analytics essentially predicts human success or failure. Therefore, it is very important, or even critical, how we obtain the data and predictions, and even more how we act in relation to these predictions. It is definitely necessary to be highly sensitive to ethical issues.

Conclusion

Learning Management Systems are able to provide information (statistics) on average grades, student progress, time spent on online learning platforms, etc. However, learning analytics is not restricted to data provided by the LMS, it goes far beyond the LMS: in LA we are trying to combine data extracted from the LMS with data available in other systems to obtain more relevant insights. We are making a shift from computing simple statistics (average time, average progress, etc.) to applying machine learning algorithms to make predictions and act proactively. In other words, as opposed to the descriptive analytic capabilities of LMSs, learning analytics should be predictive.

Although the identified potential of LA for improving learning support and outcomes is highly promising, the transfer of this potential into practice falls short of what was expected. This raises a question of how this transfer can be facilitated to ultimately benefit learners. Learning analytics is expected to empower teachers and students to understand and make better use of the abundance of data relevant to their learning. Through involvement in this process, teachers and students, and the entire institution, are given the opportunity to control their agenda to a greater extent and much more successfully, in a way that economic framing is complemented by care for learning. It is neither a simple nor a direct process. In order to achieve institutional change, it is not enough to focus only on data, it is necessary for data to be analysed and contextualized in ways that can initiate organizational change and development (Macfadyen & Dawson, 2012).

The application of LA process in educational institutions is often initiated by the demands and views of managers which is basically connected with the economic staffing of education. There is a gap in the perception of the role and value of LA between managers and teachers. And while managers usually give preference to the economic aspects of value, for teachers that value appears as having more information about their students. Satisfying the management demands, the LA environment of an education institution will certainly include metrics that measure the economic success of the learning process, but teachers should not be burdened with these metrics, but should try to understand the strengths and limitations of tools and techniques, and use this understanding for directing learning analytics to its basic purpose: improving teaching and learning.

Additional research is needed to improve the understanding of how higher education can benefit from the application of learning analytics, with particular focus on opportunities, barriers and challenges. This paper reviews the current state of art in learning analytics, which is fraught with many questions, issues, and disappointments regarding the observed effects. After outlining the most significant problems identified in the theory and practice of LA, we provided several practical guidelines and recommendations that could benefit HEIs that are starting or considering starting their LA endeavours.**SM**

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Viberg, O., Hatakka, M., Bälter, O., & Mavroudi, A. (2018). The current landscape of learning analytics in higher education. *Computers in Human Behavior 89*, 98–110. https://doi.org/10.1016/j.chb.2018.07.02

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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).

The DOI number or URL of a full text version should be added if it exists.
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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 sentences 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:

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

Tanasijević, V. (2003, March). Putting the user at the center of software testing activity. *Strategic Management*, *8* (4).
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➲ **Document from an organization**

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      http://www.ef.uns.ac.rs/papers/acrm.html

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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 occurences of the phenomenon tend to receive a much wider media coverage.

> Further occurences 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).

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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.

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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), …

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The overview is limited to towns with 10,000 inhabitants and up (Statistical Office of the Republic of Serbia [SORS],
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The list does not include schools that were listed as closed down in the previous statistical overview (SORS, 1978).

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(Griffith, 2002a, 2002b, 2004)

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(Bezjak, 1999; Griffith, 2004)

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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).

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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.**