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Engineering management

THE CHOICE FOR GROWTH OF SMALL LOW-TECH MANUFACTURING COMPANIES IN BULGARIA*

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Abstract

In recent decades, as a result of the political and economic development of Bulgaria, many of the small companies in low-tech industries operate as subcontractors for foreign clients or large Bulgarian companies. This puts limits to their growth, and their existence is determined by the policies of other companies. We conducted a survey with the aim to reveal the determinants that may affect the transformation of subcontractors into independent companies with their own production, protected by intellectual property rights on their trademark. The purpose of this paper is to present a growth model in which the entrepreneur's personality is central. His attitudes and risk assessment as well as the valuation of company's capabilities and the opportunities of the external environment, have certain level of influence on the motivation of the entrepreneur and determine the choice of the firm growth strategy. This paper presents the results of our face-to-face survey in selected small clothing companies in the region of Ruse, Bulgaria.

Keywords: *small manufacturing company, clothing industry, growth, trademark property rights*

1. INTRODUCTION

The transformation of the Bulgarian economy from planned to market-oriented in the 90s led to privatization of the state-owned enterprises. As a result the industrial business has lost its traditional markets. Relationships with suppliers and customers were cut off, and sources of raw materials were limited. A lot of large industrial companies have shrunk their production over the years or stopped their activity which enabled small and medium-sized firms to enter on the market. Demographic changes in Bulgaria have led to population decline (as a result of migration processes) and have reduced the household income and purchasing power of Bulgarians. Low-tech manufacturing companies faced the dilemma to decide how to continue their development. To protect their market positions many small companies were forced to work as subcontractors for foreign clients or large Bulgarian companies.

The European Union strategy "Europe 2020" adopted in 2010 set a goal for all of its members - smart, sustainable and inclusive economy delivering high levels of employment, productivity and social cohesion through a knowledge-based economy. To meet the

* *This paper is presented at „18th Students symposium on strategic management"*

requirements Bulgaria has made it a priority to increase the transfer of technology by attracting foreign investments and to enhance the competitiveness of SME's.
Ganchev and Naydenov (2018) analyze foreign investment activity in Bulgaria. The authors find that foreign investments in Bulgaria have been declining in recent years. Moreover, they are unevenly distributed and are concentrated mostly in Sofia, in the big cities, on the Black Sea coast and in some border areas. The result is socio-economic development imbalance of regions in Bulgaria.
In compliance with the Small Business Act for Europe, the Bulgarian National Strategy for SME is directed to encourage and support SMEs to increase their innovation activity and competitiveness. For small low-tech companies sustainable competitive development and growth can be achieved by their own production, protected through trademark rights.
Many theoretical and empirical studies use different determinants in their models for company growth, but there is no specific model adapted to the small low-tech manufacturing companies in Bulgaria. This provokes our interest to analyse what is the attitude and motivation of subcontractors to change their firm strategy
The objects of this study are small apparel company's /subcontractors/ in Ruse, Bulgaria. The subject of this study is the entrepreneur's choice of growth strategy of small low-tech manufacturing companies
The purpose is to present the results of a survey on the determinants that may affect the entrepreneur's choice of strategy for own production protected through trademark rights.

2. LITERATURE REVIEW

In last decades the small firm growth and its determinants have been widely studied in the economic literature. O'Farrell and Hitchens (1988) present a review of different theories of the small firm growth. Hristova (2018) analyzes the problems of entrepreneurship in Bulgaria. Todorov (2001) studies the strategic management in small and medium enterprises. Papazov and Mihaylova (2010) emphasize on the importance of strategic planning in SMEs, which should be based on prompt and accurate information on internal determinants (human resources, fixed assets, financial opportunities, etc.) and on external factors (branch position, competitive opportunities and etc.). The information can be obtained by professional consulting assistance (statistical, marketing and other) about the environment where company operates. In another study Papazov and Mihaylova (2018) present techniques for identifying firm's existing direct business competitors. Bogdanova et al. (2012) study risk management in business organizations. The authors suggest that the implementation of risk management systems in the company reduces operating costs and the probability of human error, increases the quality of service and productivity and helps to optimize processes and integrate existing systems.
For the purpose of our dissertation on small firm growth, we conducted a survey with the aim to reveal which are the determinants that may affect the transformation of subcontractors into independent companies with their own production, protected through trademark rights. This subject is significant because the sustainable growth of small low-tech companies may contribute to job creation and regional development. Also it has a great importance for overcoming the economic imbalance between the regions in Bulgaria, and improving the welfare of the population. Registration of trademark rights is the fastest and the cheapest way for small manufacturing companies to protect their production, to increase competitiveness and expand market share. Studies by Landes & Posner (1987),

Economides (1988), Davis (2006) show the economic functions of the brand and its importance for firm growth.
Based on the existing theoretical and empirical research, we have created a model for small low-tech manufacturing firms growth which has been tested in small apparel companies in Ruse region, Bulgaria. Deneva (2008) also studies the problems of SMEs in the apparel industry and finds that they have to change their survival strategy with that of a growth. These companies shouldn't strive for low costs and prices but to offer high quality products at higher prices which can be achieved through their own brand and internationalization. The author does not study the determinants that may change the entrepreneurs'strategy. An international team of scientists (Bakracheva at al., 2020) put the focus on intergenerational family businesses.
In our firm growth model the entrepreneur's personality is central. We define that his attitudes and risk assessment as well as the valuation of company's capabilities and the opportunities of the external environment, have certain level of influence on the motivation of the entrepreneur and determine his choice of firm growth strategy. The proposed model is based on Davidssons's economic-psychological model (1991). Because each entrepreneur has different individual characteristics, the motivation and behaviour of firms are different. The determinants that influence the motivation for growth are the Ability, Need and Opportunity perceived by the entrepreneur, with the variables showing differences in the need for growth having the greatest impact. The personal characteristics of the entrepreneur and his motivation for growth are important for the effective utilization of firm's resources and the abilities for their combination. Wiklund's model (1998) focuses on entrepreneurial orientation. The results of his empirical research show that company's strategy has the strongest impact on firm growth.
We think that entrepreneur's attitudes and motivation define his choice of strategy which the small low-tech manufacturing company will follow - to be independent with its own production, protected through trademark rights or to work as a subcontractor and the existence of the firm to depend on the policy of the contracting company. In times of crisis and unstable foreign policy environment, own-brand production can be of great importance for the survival of small business and its fast restructuring.

3. EMPIRICAL RESULTS

The target group in our survey includes small apparel companies from Ruse region, Bulgaria with personnel of 10 to 50 people. Our interest is focused on firms that have passed the initial stage of their development and now they face the challenge to protect market positions and grow. Apparel industry is of great importance for the Ruse region. For many years it has established traditions and nowadays is well developed in the area.
From a total of 31 selected companies, 15 enterprises responded to the survey, which represents 48% of the target group. The results show that the majority of these firms, 53% operate as subcontractors, 20% have mixed production/own production and production as subcontractors/ and only 27% have own production.
This paper presents the results concerning subcontractors. First we studied the trends in firms' sales revenue and staff. The results show that from 2017 to 2019, these companies manage to maintain their revenues and personnel. The conclusion is that work as a subcontractor provides small business with steady market position and even growth for some of the firms. To find out what is the attitude of entrepreneurs to own production, we asked them if they are interested in it. The results are:

- 38% of the entrepreneurs are interested to start own production;
- 38% of respondents don't have an interest to start own production;
- the majority of the entrepreneurs (62%) either do not have an interest in own production (38%) or do not feel such a need now (24%).

The conclusion is that work as a subcontractor fully satisfies the majority of small business entrepreneurs. The fact that for most of the companies this is a family business should also be taken into account.
For the purpose of our study it is important to identify what are the main constraints for motivation of entrepreneurs to start own production. Therefore, we asked the respondents to evaluate various barriers for production related to:

- characteristics of the owner – risk taking propensity and proactive behaviour;
- firm resources – qualify personnel, technological equipment and availability of funding;
- external /market/ environment – information for suppliers of raw materials, intensity and power of competitors, access to external financial resources, as well as the institutional / administrative and legislative/ barriers.

A descriptive analysis of the results was done, as well as a correlation analysis of the variable "interest in own production" and the variables related to the key constraints which companies have to overcome to change their strategy for firm development. The results from our analysis can be summarized as follows:

- The entrepreneur's risk assessment is the main constraint for own production. 75% of the respondents find own production as too risky.
- For over 60% of the entrepreneurs work as a subcontractor is a source of regular income and there's no need for additional investments. Correlation analysis shows that the entrepreneur's assessment for higher risk correlates to his weaker interest in own production. Economic risk and the long payback period of investment in new products are serious psychological barriers that entrepreneurs have to overcome. In most cases small business owners don't want to take the risk and to change the firm's strategy /from subcontractor to manufacturer of own production/. This finding corresponds with the fact that most of the subcontractors manage to keep their revenues and personnel.
- The entrepreneur's interest in own production depends on his ability to overcome a number of constraints. With regard to firm resources and external environment, the correlation analysis reveals a stronger relation between entrepreneur's interest in own production and constraints, related to: lack of qualified staff, insufficient information on raw material suppliers, access to external financing and intensity and power of the competitors.

For almost all of the entrepreneurs (88% of subcontractors) the main constraint to start own production is to attract and retain highly qualified and experienced personnel - technologists, designers, marketing specialists, etc. The regional profile of Ruse, prepared by Institute for Market Economics, reveals that in recent years, the demographic situation in the region is characterized by a declining and aging population. This together with the deterioration of education quality lead to a lack of personnel who is prepared to meet the business requirements. The problem is significant for companies from all branches in Ruse.

The low pay levels in the apparel industry have led to a lack of interest for work in this branch and to retraining of personnel. Moreover, only a small number of firms invest in trainings to improve the competence and skills of their personnel. Unlike large companies, managers of small firms often can't provide an adequate remuneration to attract qualified professionals.

Insufficient information for suppliers of raw materials is another important obstacle for decision to start own production. Small companies don't have enough funds for market research and they don't have specialists who can do it. Another reason for companies to prefer working as subcontractors is that materials and sales are provided by the client. The use of consulting services is not a practice for small firms yet.

Access to finance is essential for the business. Half of the respondents share that they rely on limited own funds. 63% of firms don't have access to external funding. In fact the bank financing for micro- and small enterprises is more limited compared to medium and large companies, due to the higher risk assessment and the requirements for collateral. Accounting statements of small firms are often incorrect which is another obstacle when applying for funding. Venture capital funds and "business angels" are not popular practices in Bulgaria. The access to the national and European funding programs is still limited, because the application procedures are difficult, cumbersome and time consuming.

In our survey half of the respondents define market competition as strong for the survival of firms with own production. A lot of medium-sized apparel companies in the Ruse region have a well-known own production with registered trademarks. Most of them have a decentralized structure and functional departments for finance, planning, marketing, R&D, and have established long-term relations with suppliers and customers.

Our analysis shows a weaker correlation between interest in own production and constraints related to staff turnover, need for additional investment in own production, lack of information on access to markets, limited own funds and availability of numerous legislative and administrative obstacles.

To define the entrepreneur's attitude to own production, we asked the respondents if they have information about the procedures related to protection of own production through trademark rights. Another question was directed to their intention to receive information how to achieve firm growth with own production. The results show that:

- 50% of the entrepreneurs are aware of the procedures for trademark registration, but 75% of the interviewed don't show interest in it.
- 50% of the entrepreneurs have the intention to receive information on how to achieve firm growth with their own production. It should be noted that there are no entrepreneurs who have categorically stated this intention. The answer "rather yes" (50%) is an indication of a weaker attitude and hesitation in the interviewees.

Based on the results obtained, we find that subcontractors show modest interest in information about the opportunities for firm growth with their own production, protected through trademark rights. The assessment of the company's capabilities, lack of qualified personnel and financial resources, and the opportunities of the external environment, strong competition and lack of suppliers of raw materials, define the low motivation of the entrepreneur to start his own production and to change firm's strategy.

4. CONCLUSIONS AND RECOMMENDATIONS

In our survey we find that working as a subcontractor satisfies the majority of entrepreneurs because this business provides them with steady market positions. Most of small apparel companies manage to keep their revenues and personnel. The main constraints that have an impact on attitudes for own production are: lack of qualified staff, insufficient information on raw material suppliers, access to external financing and intensity, and power of the competitors. To change their motivation the entrepreneurs must have information about market opportunities and the benefits of own production. Therefore, our recommendations are below.

Improvement of cooperation networks between small business and educational institutions - the University of Ruse "Angel Kanchev", Professional high school of apparel "Nedka Ivan Lazarova", Ruse. Entrepreneurs should be encouraged to assign academic research on trends in economic development, state of apparel industry in Bulgaria and in the region, technological innovations, etc. The University of Ruse may take the initiative to organize seminars for small firms with participation of the Bulgarian Patent Office representatives who to present the regulations and procedures for trademark registration and its benefits for the business.

Stimulation of cooperation between the small business and regional intermediate Organizations - Regional Industrial Association, Ruse Chamber of Commerce and Industry, Bulgarian-Romanian Chamber of Commerce and Industry (BRCCI), Business Innovation Center - Innobridge, Bulgarian Association for Transfer of Technology and Innovation (BATTI). The activities of these organizations have been directed to support business and its internationalization – to provide access to information about potential clients in Bulgaria and abroad, to organisee seminars and trainings, to connect local authority, university and business, to implement cross-border cooperation projects Bulgaria-Romania.

Participation of small apparel companies in Specialized Cluster Institute for Apparel and Textile / SCIAT / Danube. The cluster provides consultation of textile and clothing companies on organization, rationalization, optimization of production, engineering technology, better productivity, quality control, quality improvement, job fairs and staff training.

IZBOR ZA RAST MALIH NISKOTEHNOLOŠKIH PROIZVODNIH KOMPANIJA U BUGARSKOJ

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Izvod

Poslednjih decenija, kao rezultat političkog i ekonomskog razvoja Bugarske, mnoge male kompanije u niskotehnološkoj industriji posluju kao podizvođači za strane klijente ili veće bugarske kompanije. Ovo ograničava njihov rast, a njihov opstanak je uslovljen politikama drugih kompanija. Sproveli smo istraživanje sa ciljem da otkrijemo odrednice koje mogu uticati na trasnformaciju podizvođača u samostalne kompanije sa sopstvenom proizvodnjom, zaštićene pravima intelektualne svojine na svom žigu. Svrha ovog rada je da predstavi model rasta u kome je ličnost preduzetnika centralna. Njegovi stavovi i procena rizika kao i vrednovanje sposobnosti kompanije i šansi iz eksternog okruženja, imaju određeni nivo uticaja na motivaciju preduzetnika i određuju izbor strategije rasta firme. Ovaj rad prestavlja rezultate licem u lice anketa u odabranim malim kompanijama koje se bave proizvodnjom odeće iz Rusenske oblasti u Bugarskoj.

***Ključne reči**: mala proizvodna kompanija, industrija odeće, rast, imovinska prava na žig*

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ANALIZA MODELA UPRAVLJANJA RIZIKOM DRUŠTVENIH MEDIJA U ORGANIZACIONOM KONTEKSTU

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Izvod

Kroz brz protok i neograničenu dostupnost informacionih sadržaja i servisa, stvoreni su uslovi za kvalitativan iskorak čovečanstva u jedan potpuno novi svet. Društveni mediji kao produkti revolucionarnog razvoja, su neminovno postali sastavni deo života ljudi. Međutim, njihovom upotrebom, mogu se ispoljiti različite pretnje i rizici bezbednosti. Ovaj rad je prevashodno usmeren na rizike društvenih medija koji mogu naneti štetu organizacijama. Istraživanje bazirano na modelu upravljanja rizikom korišćenja društvenih medija, ima za cilj da pruži smernice organizacijama koje u svom poslovanju primenjuju društvene medije. Teorijski model podrazumeva četiri glavne komponente, čiji su međusobni uticaji i veze detaljno ispitani. Rezultati modelovanja su dobijeni uz pomoć softvera WrapPLS 7.0, dok je za deskriptivnu statistiku, faktorsku analizu i korelaciju, korišćen program SPSS Statistics 17.0.

Ključne reči: *Društveni mediji, Rizik upotrebe, Implementacija politike, Tehnička kontrola*

1. UVOD

Evidentno je da se društveni mediji, kao sredstva za interakciju, primenjuju u gotovo svim sferama života, kao i u mnogim privrednim granama (Ostojić et al., 2014). Kada se Internet društveni mediji koriste u poslovne svrhe, oni mogu doneti izuzetne poslovne efekte (Božić & Zubanov, 2018). Sa jedne strane društveni mediji olakšavaju komunikaciju sa korisnicima i dovode do jačanja konkurentske prednosti, a sa druge strane mogu doneti i brojne rizike (Stošić et al., 2015). Nove, ali i nedovoljno ispitane tehnologije donele su veliki broj opasnosti po bezbednost pojedinca i društvene zajednice (Slavković & Kršljanin, 2015). Kao uobičajeni rizici navode se uglavnom mogućnosti postavljanja neprikladnog sadržaja, zlonamerni programi koji nanose veliku štetu, gubitak i zloupotreba važnih poslovnih podataka (Stošić et al., 2015). Iako je reč o relativno novom načinu poslovanja, popularnost društvenih medija neminovno raste (Sarabdeen, 2014). Organizacije će sve više zaostajati za novim trendovima ukoliko su ograničene u pogledu primene društvenih medija ili iskazuju negodovanje prema ovakvom načinu poslovanja (Ćirić et al., 2015). Društvene mreže su dobile više od milijardu korisnika širom sveta za samo deset godina postojanja (Icha & Edwin, 2016). Internet zajednice pružaju mogućnost organizacijama da imaju bolji sistem upravljanja odnosima sa klijentima, što je dovelo do razvoja novog koncepta gde kompanije mogu poboljšati svoje performanse (Gupta & Dhami, 2015). Neminovno je da sa ekspanzijom korišćenja Interneta, primene i razvoja elektronskog poslovanja može doći do mnogih neželjenih pratećih pojava, odnosno rizika i opasnosti, ali pojavom Interneta i Internet aplikacija, svet je postao povezaniji nego ikada pre (Raičević et al., 2014; Khan et al., 2014). Izraz Web 2.0 definiše drugu generaciju

Internet aplikacija koje su uobičajeno poznate pod pojmom *društveni mediji* (Schluze et al., 2015). Na Slici 1 su prikazani društveni mediji koji danas zastupljeni.

Slika 1. Društveni mediji
Izvor: https://pixabay.com/illustrations/icon-social-networking-presentation-908163/

Tako se na primer, moć organizacije često ogleda u stepenu koji određuju pojedinci i mreža, u središtu odnosa trenutnog predmeta posla (Pajić, 2010). Većina razvijenih kompanija u globalnom kontekstu učestvovala je u pokretu „Dot-Com“ koji se dogodio krajem 90-ih i početkom 2000. godine. U ovom vremenskom periodu, kompanije su mnogo uložile u izradu web lokacija koje bi kupcima pružale ogromnu količinu informacija (Abuhashesh, 2014). Sasvim je očigledno da razvoj ovih društvenih medija čini relativno kratak vremenski period, ali izuzetno dinamičan i sa značajnim implikacijama u različitim sferama društvenog života (Khan et al., 2014). Podatak da se kapaciteti društvenih medija konstantno uvećavaju, govori činjenica da je 2010. godine postojalo čak 350 000 poslovnih stranica i naloga na društvenim mrežama (Hajli, 2013).

2. TEORIJSKI OKVIR ISTRAŽIVANJA

2.1. Primena društvenih medija u poslovanju i upravljanje rizicima

Uspešno brendiranje danas zahteva angažovanje potrošača i lično, ali i putem digitalnih sredstava za efikasnu integrisanu promociju brenda (Scheinbaum, 2016). U tom smislu važno je da kompanija ima jasnu strategiju i bira prave medije u svoju svrhu, kako bi stvorila uspešnu komunikaciju i dostigla pravu ciljnu publiku (Greven & Sibring, 2013). ISACA, vodeća svetska organizacija znanja i obrazovanja o osiguranju i bezbednosti informacionih sistema, identifikovala je najdominantnije rizike izazvane upotrebom društvenih medijia, a to su: *virusi, zlonamerni softveri, gubitak brenda, nedostatak kontrole nad sadržajem, nerealna očekivanja korisnika na Internetu i neusklađenost sa propisima* (He, 2012). Pretnje se prenose putem Interneta sa jednog servera na drugi pod uslovom da je pojedinac ili kompanija povezana na Internet (Krubhala et al., 2015). Stoga se savetuje promišljeno postavljanje sadržaja, pri čemu je uzajamna korist pravilo, a ne izuzetak (Krstić & Lazarević, 2014). Institut za upravljanje rizicima, iz Londona, informatički rizik definiše *kao finansijsku štetu, gubitak ili narušavanje ugleda organizacije* (Jovanović, 2017). Najdominantniji informatički rizici, predstavljeni su u Tabeli 1 (He, 2012).

Tabela 1. Vrste izazova na društvenim medijima i rizici sigurnosti informacija

Vrsta izazova	Rizici informacione sigurnosti
Eksterni napadi na zaposlene i kompaniju	Zlonamerni softver, neželjena pošta, nepouzdane aplikacije, nesigurna internet veza.
Izazovi koji proističu iz radnji nesavesnih zaposlenih	Prevare, krađe identiteta, gubitak informacija, gubitak reputacije.
Izazovi vezani za usluge	Društveni mediji kao alat za umrežavanje (komunikacija sa klijentima, nedoumice oko privatnog i profesionalnog identiteta…)

2.1.1. Kategorizacija rizika na društvenim medijima

Od izuzetnog značaja je pravilno prepoznavanje rizika, koji se mogu javljati na najrazličitije načine (Tabela 2). Postojanjem rizika se svakako ne smanjuju prednosti i koristi društvenih medija, već je cilj korisnike upozoriti na moguće napade i posledice od upotrebe istih (Samčović, 2013). Pored toga, postoji i nekoliko dostupnih zakona o medijima, jer marketing društvenih mreža uključuje objavljivanje ili prenos *online* sadržaja. Prema tome, postoje i određene zakonske odredbe kada se radi o reklamiranju na nekoj društvenoj mreži (Assaad & Gomez, 2011). Prema mišljenju Vilson-a, postoji pet glavnih rizika koji mogu zadesiti organizaciju prilikom upotrebe društvenih mreža: smanjenje produktivnosti, curenje podataka, šteta reputaciji, sajber prevare i zastarele lozinke (Abuhashesh, 2014). Rizici su takođe ugrađeni u, čini se, bezazlene osobine mnogih alata društvenih medija (Andreesen & Slemp, 2011). Razvojem interaktivne komunikacije sa kupcima, menadžment kompanije se izlaže velikom riziku (Abuhashesh, 2014). Najčešći rizici u praksi sa kojima se organizacije mogu susresti tokom svog poslovanja su (Andreseen & Slemp, 2011):

- ***Transparentnost*** – kada kompanije postaju transparentne zbog društvenih medija, što znači da potrošačima omogućavaju uvid u poslovanje organizacije i;
- ***Zanimljiv sadržaj*** – može predstavljati rizik za kompanije koje žele da budu na društvenim mrežama, jer neuspeh u ažuriranju sadržaja može imati negativan uticaj na uspeh preduzeća (Greven & Sibring, 2013).

Treba naglasiti da bi trebalo da oni koji pohranjuju svoje podatke u *Cloud-u*, bolje kontrolišu rad onoga kod koga se podaci skladište (Pak, 2014). Često, određene organizacije, podatke sa svojih računara ne čuvaju na sopstvenim, već na serverima kompanija koje ih čini dostupnim putem Interneta (Outreville, 1998; Avakumović et al., 2013).

Tabela 2. Kategorizacija rizika na društvenim medijima

Rizik	Opis
Klasične i savremene pretnje	Klasične pretnje koriste se za izvlačenje ličnih podataka korisnika. Sa druge strane, obično je fokus savremenih pretnji na pribavljanju privatnih informacija korisnika i njihovih prijatelja. Na primer, kada napadač želi da sazna nešto o poslodavcu (Greven & Sibring, 2013).
Pravni aspekti	Prikriveni marketing poput blogova objavljenih tako da izgledaju kao preporuke korisnika nije zakonit (Greven & Sibring, 2013).
Kritike korisnika	Nezadovoljstvo i razočaranja lako se mogu izraziti na web lokacijama, što dugoročno može predstavljati opasnost za organizaciju (Greven & Sibring, 2013).
Nedostatak znanja	Prema mišljenju Carlsson-a, kompanije se mogu suzdržati od aktivnosti na društvenim medijima ukoliko nemaju dovoljno znanja o načinu njihove upotrebe (Greven & Sibring, 2013).
Agresivno	Ukoliko organizacije nisu pažljive sa agresivnim oglašavanjem, potrošači mogu napustiti

oglašavanje	stranicu na određenoj društvenoj mreži (Greven & Sibring, 2013).
Računarska sabotaža	Ova pretnja se sastoji u uništenju ili oštećenju računara i drugih uređaja za obradu podataka u okviru kompjuterskih Sistema (Raičević et al., 2014).
Računarska špijunaža	Počinioci računarske špijunaže koriste različite maliciozne programe i tehnike u cilju infiltriranja u računarsku mrežu koja za njih predstavlja ciljnu metu (Raičević et al., 2014).
Sajber kriminal	Sajber (*cyber*) pretnje podrazumevaju uznemiravanje pojedinca ili grupe putem Interneta ili društvenih medija. Može se koristiti za nadgledanje, krađu identiteta, pretnje ili uznemiravanje (Siddiqui & Singh, 2016).
Računarski vrusi	Ovo su mali maliciozni programi, koji imaju sposobnost samoumnožavanja i prevashodni cilj im je da naprave štetu zaraženom računaru (Raičević et al., 2014).
Računarski crvi	Na primer crv, kao što je *Conficker*, uvek napada web lokacije koje nisu zaštićene od strane kompanije ili internim podešavanjima servera (Krubhala et al., 2015).
Računarske prevare	Računarske prevare predstavljaju najraširenij vid računarskog kriminaliteta, koji često može prouzorkovati enormne štetne posledice (Raičević et al., 2014).
Krađa identiteta	Krađa identiteta znači lažno predstavljanje nekog drugog na ilegalan način, obično u cilju pristupa resursima ili dobijanja kredita i drugih pogodnosti u ime druge osobe (Outreville, 1998).

2.2. Tehnike za upravljanje rizicima na društvenim medijima

Kako postoje mnogi sigurnosni rizici upotrebe društvenih medija u organizacijama, ključno je da organizacije budu svesne tih rizika i preduzmu korake za njihovo ublažavanje (He, 2012). Neophodno je identifikovati vrstu rizika koja se opaža prilikom korišćenja nekog društvenog medija, kako bi se definisao plan reagovanja (Šekarić & Kešetović, 2018). Kao što postoje ograničenja i smernice za druge oblike komunikacije, ni društvne medije ne bi trebalo tretirati kao izuzetak (Witzig et al., 2012). U mnogim preduzećima IT odeljenja često imaju malu kontrolu nad mobilnim uređajima zaposlenih zbog njihovog visokog stepena mobilnosti i drugih opravdanih razloga (Munnukka & Järvi, 2013). Istraživanje sporovedeno u SAD-u ukazuje da su približno 12% velikih i srednjih organizacija bile žrtve zlonamrnih softvera, dok je 9% organizacija izjavilo da su imale problem gubitka informacija zbog upotrebe društvenih medija i drugih Web 2.0 aplikacija (Savić, 2012). Virtualni svet postaje sve značajnije mesto za organizacije (Witzig et al., 2012). Pokušaji definisanja informatičkih rizika sveli su se na određivanje sadržine pretnje ili opasnosti koja u smislu osiguravajućih pokrića može prouzrokovati štetne posledice (Jovanović, 2017). Organizacije moraju biti oprezne prema etičnosti pitanja poput upada u privatnost korisnika, agresivnog oglašavanja i spamova, kao i zloupotrebe podataka (Bolotaeva & Cata, 2011). U Tabeli 3 su prikazane tehnike za upravljanje rizicima na društvenim medijima. U cilju što efikasnije upotrebe društvenih medija, organizacije često koriste društvene mreže u kombinaciji sa tradicionalnim medijima (Radenković et al., 2015). Holistički pristup integrisanju novih tehnologija pomaže da se organizacija osigura da se rizici razmatraju u kontekstu širih poslovnih ciljeva (Rico et al., 2010).

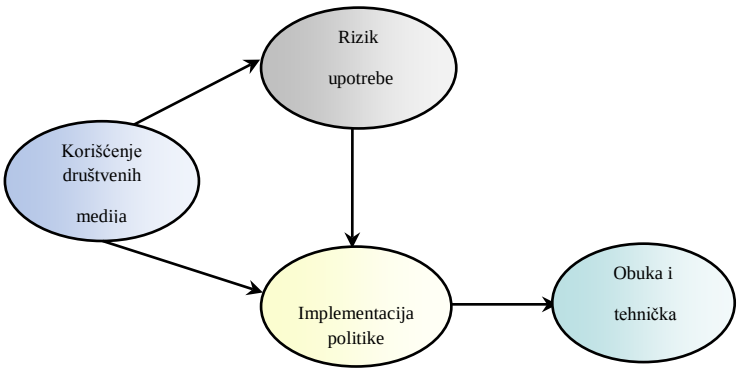
Tabela 3. Tehnike za upravljanje rizicima na društvenim medijima

Tehnike za upravljanje rizicima na društvenim medijima	
Politika	Formalna politika obično sadrži smernice koje određuju šta je prihvatljivo, a šta nije prihvatljivo prilikom njihove upotrebe, koje informacije zaposleni mogu da dele, a koje ne (He, 2012).
Pravilnik	Pažljivo kreirana politika koju svi razumeju i slede umanjiće rizike povezane sa korišćenjem društvenih medija pružajući neophodne smernice za iskorišćavanje mogućnosti, a izbegavajući opasnosti (Yehuda, 2012).
Obuka i obrazovanje	Zaposleni koji su učestvovali u nekom obliku obuka o bezbednosti u oblasti primene društvenih medija, manje je verovatno da će namerno otkriti potencijalne štetne informacije o svojoj kompaniji ili kolegama (Arnone & Deprince, 2016).

Sigurnosni softver	Zaposleni takođe moraju redovno ažurirati softver i aplikacije trećih strana na uređajima kako bi minimizirali rizike (Munnukka & Järvi, 2013)..
Sigurni protok	Napadi kao što su prevare i krađa podataka mogu se kontrolisati kada je mrežni IP postavljen na podrazumevane vrednosti kako bi se sakrio identitet korisnika od mogućih hakera (Krubhala et al., 2015).
Nadgledanje i kontrola	Na primer, organizacije bi trebalo da redovno skeniraju Internet u cilju uočavanja zloupotrebe korporativnog Brenda (He, 2012)..
Praćenje aktivnosti	Ukoliko zaposleni suviše vremena na radnom mestu provode na društvenim mrežama, to će direktno uticati na smanjenu produktvinost i utrošeno vreme (Väyrynen et al., 2012).
Arhiviranje	Automatizovani alati, poput Symantec-ovog *Enterprise Vault* softvera za arhiviranje, stvoreni su da pomognu organizacijama sačuvaju informacije o društvenim medijima koje objavljuju zaposleni (He, 2012).
Polise osiguranja	Na savremenom tržištu osiguranja postoje različite Internet polise koje pokrivaju sve štete prouzrokovane nestankom, oštećenjem ili manipilacijom podataka čak i onda kada hardver nije oštećen (Radenković et al. 2015).

3. METODOLOGIJA ISTRAŽIVANJA

Za potrebe istraživanja koje je prikazano u ovom radu primenjena je metodologija anonimnog upitnika za prikupljanje podataka. Cilj ove istraživačke studije je identifikovanje i razumevanje opsega i obima rizika povezanih sa korišćenjem društvenih medija od strane organizacija. Za dobijanje deskriptivne statistike, faktorske analize i korelacije primenjen je SPSS Statistics 17.0, a za testiranje modela, softver - WrapPLS 7.0. Zbog prirode korišćenja društvenih medija, pretpostavlja se da organizacije preduzimaju reaktivan pristup upravljanju rizikom na društvenim medijima. Dalje, ovo sugeriše na razvijanje teorijskog modela koji je predstavljen na Slici 2, a ima za cilj razumevanje međusobnog uticaja i veza između sve četiri grupe pitanja iz upitnika.



Slika 2. Teorijski model

4. ANALIZA I REZULTATI

4.1. Analiza pouzdanosti indikatora

Da bi se podaci obradili na najkvalitetniji način, neophodna je ocena njihove pouzdanosti i validnosti. Za ocenu interne konzistentnosti korišćen je *Cronbach alpha test*. Test služi za proračun prosečnih vrednosti korelacija među stavkama mernog instrumenta – *alpha koeficijent* (Manasijević, 2016). U skladu sa ovim testom, vrednosti koeficijenata alpha (α)

veće od 0.70 predstavljaju dobar potencijal za modelovanje rezultata ankete razmatrane populacije. Na osnovu dobijenih vrednosti *Cronbach* koeficijenata prikazanih u Tabeli 4, dokazana je validnost upitnika, čime se mogu očekivati pouzdani rezultati sprovedenog istraživanja.

Tabela 4. Koeficijenti interne konzistentnosti grupacija pitanja u upitniku

Grupa pitanja	**Broj stavki u okviru grupe**	**Cronbach alpha koeficijent**
KDM	6	0.752
RU	6	0.753
IP_L	2	0.776
IP_RM	2	0.773
IP_LJR	2	0.776
OTK	2	0.748

4.2. Deskriptivna statistika ispitivanog uzorka

Rezultati iz programa SPSS Statistics pokazuju osnovne parametre deskriptivne statistike. Dakle, reč je o pojedninačnim odgovorima iz ukupno četiri grupe pitanja: korišćenje društvenih medija (KDM), rizik upotrebe društvenih medija (RU), implementacija politike društvenih medija (IP), koja uključuje odgovore na pitanja vezana za politiku/smernice koje se odnose na ličnu upotrebu društvenih medija (IP_L), upotrebu društvenih medija na radnom mestu (IP_RM) i upotrebu društvenih medija od strane službe za ljudske resurse (IP_LJR). Na samom kraju, poslednju grupu pitanja čine obuka i tehnička kontrola (OTK).

Tabela 5. Deskriptivna statistika ispitivanog uzorka

Promenljiva	**Srednja vrednost**	**Medijana**	**Modus**	**Standardna devijacija**	**Varijansa**
KDM_1	3.77	4.00	4.00	1.137	1.293
KDM_2	3.45	4.00	5.00	1.323	1.750
KDM_3	3.66	4.00	5.00	1.167	1.362
KDM_4	3.05	3.00	3.00	1.311	1.719
KDM_5	2.98	3.00	2.00	1.400	1.961
KDM_6	3.30	3.00	5.00	1.379	1.902
RU_1	3.25	3.00	3.00	1.277	1.630
RU_2	2.96	3.00	3.00	1.244	1.499
RU_3	3.01	3.00	3.00	1.319	1.740
RU_4	2.85	3.00	3.00	1.099	1.207
RU_5	2.66	3.00	3.00	1.175	1.381
RU_6	3.50	4.00	4.00	1.226	1.502
IP_L_1	1.72	2.00	2.00	0.449	0.202
IP_L_2	1.80	2.00	2.00	0.402	0.162
IP_RM_1	1.80	2.00	2.00	0.402	0.162
IP_RM_2	1.70	2.00	2.00	0.458	0.210

IP_LJR_1	1.70	2.00	2.00	0.458	0.210
IP_LJR_2	1.76	2.00	2.00	0.428	1.183
OTK_1	2.51	2.00	1.00	1.279	1.637
OTK_2	2.62	3.00	3.00	1.236	1.527

Kao najzanačajni parametri posmatraju se aritmetička sredina i modus. Modus pokazuje vrednost obeležja koja u posmatranom uzorku ima najveću frekvenciju, odnosno najčešće se javlja i zato je najtipičnija vrednost u ispitivanom uzorku. Kada je u jednoj seriji samo jedna vrednost obeležja sa najvećom frekvencijom kaže se da je unimodalna, a ukoliko postoje dve ili više takvih vrednosti, serija je bimodalna, odnosno multimodalna, što i jeste slučaj sa ovim uzorkom ispitanika (Manasijević, 2016).

4.3. Mere adekvatnosti uzorka i validacije strukture

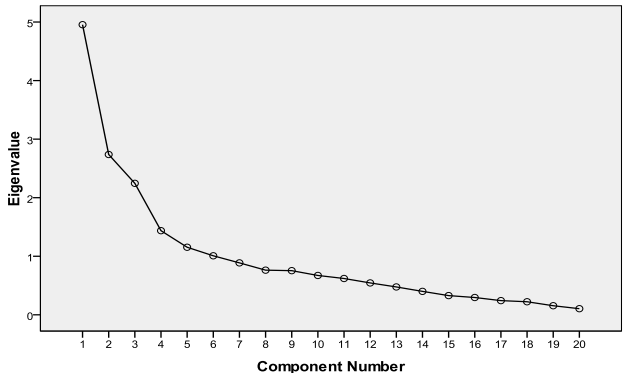
Merenje adekvatnosti uzorkovanja je izvršeno primenom *Kaiser–Meyer–Olkin* (KMO) testa. Minimalno prihvatljiva vrednost *Kaiser–Meyer–Olkin* indikatora jeste 0.6, a njegova vrednost na razmatranom uzorku iznosi 0.713, što pokazuje da podaci prikupljeni u ovom istraživanju jesu adekvatni i kao takvi su pogodni za primenu faktorske analize. Takođe, *Barttlett-ov test* sferičnosti je statistički značajan (χ^2 = 893.681, Sig. = 0.000), što ukazuje da postoje određene korelacije između grupa pitanja u okviru upitnika i da korelaciona matrica nije jedinična (Manasijević, 2016). Kako bi se moglo odrediti koliko komponenti, odnosno faktora treba izdvojiti, razmatra se deo rezultata. Po Kajzerovom kriterijumu, u obzir se moraju uzeti samo one komponente čija je karakteristična vrednost 1 ili više. Da bi se stekao uvid u to koliko komponenata zadovoljava taj kriterijum, posmatra se Tabela 6 u kojoj je prikazana ukupna objašnja varijansa.

Tabela 6. Total Variance Explained

Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings[a]**
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	4.955	24.773	24.773	4.955	24.773	24.773	3.453
2	2.738	13.688	38.461	2.738	13.688	38.461	3.078
3	2.245	11.226	49.687	2.245	11.226	49.687	2.689
4	1.437	7.184	56.871	1.437	7.184	56.871	1.686
5	1.154	5.769	62.640	1.154	5.769	62.640	2.328
6	1.008	5.039	67.680	1.008	5.039	67.680	2.533
7	.887	4.434	72.114				
8	.762	3.812	75.926				
9	.754	3.769	79.696				

10	.672	3.360	83.056				
11	.620	3.100	86.156				
12	.544	2.722	88.878				
13	.476	2.379	91.257				
14	.400	2.001	93.258				
15	.328	1.640	94.898				
16	.295	1.477	96.376				
17	.242	1.212	97.588				
18	.223	1.114	98.702				
19	.155	.775	99.478				
20	.104	.522	100.000				

Od ukupno 20 komponenti, samo prvih šest komponenti imaju karakteristične vrednosti preko 1. (4.955, 2.738, 2.245, 1.437, 1.154, 1.008), respektivno. Ovih šest komponenti objašnjavaju ukupno 67.68% varijabiliteta kao i što je prikazano u koloni *Cumulative* %. Broj komponenti koje zadovoljavaju Kajzerov kriterijum je često prevelik, pa obavezno treba pogledati i dijagram prevoja (*Screeplot*) koji se kreira SPSS-u. Na dijagramu prevoja (Slika 3) se zadržavaju se samo one komponente iznad prevojne tačke. U ovom primeru je uočen lom dijagrama na spoju sedme i osme komponente.



Slika 3. Dijagram prevoja

Pre sprovođenja PCA (*Principal Component Analysis*), bila je ocenjena prikladnost podataka za faktorsku analizu. Pregledom korelacione matrice uočeno je mnogo koeficijenata vrednosti 0.3 i više. Vrednost *Kajzer-Meyer Olkinovog* pokazatelja bila je 0.713, što premašuje preporučenu vrednost 0.6. *Bartletov test* sferičnosti dostigao je statističku značajnost, što dalje ukazuje na faktorabilnost korelacione matrice. Analiza glavnih komponenata otkrila je prisustvo šest komponenti sa karakterističnim vrednostima preko 1, koje objašnjavaju ukupno 67.68 procenata varijabiliteta. Pregledom dijagrama prevoja utvrđeno je postojanje jasne tačke loma iza šeste komponente.

Tabela 7. Pattern Matrix

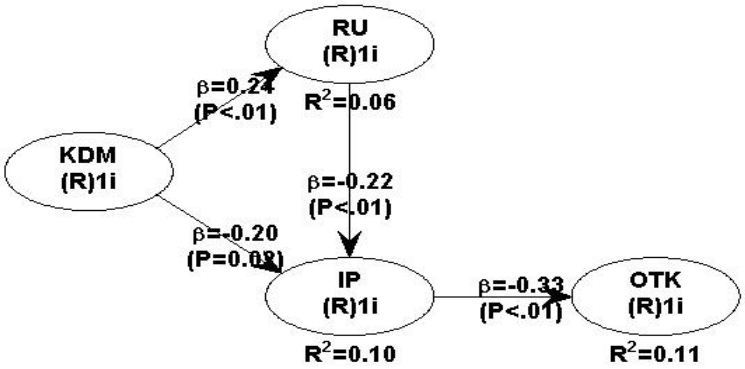
	Component					
	1	**2**	**3**	**4**	**5**	**6**
KDM 2	.882					
KDM 3	.831					
KDM 1	.830					
KDM 4	.670					-.414
RU 4		-.812				
RU 6		-.768				
RU 5		-.679				
RU 3		-.629				
IP LJR 2			.815			
IP LJR 1			.755			
OTK 1	.319		-.441		-.426	-.341
KDM 6	.361		-.402			
IP RM 1				.703		
IP L 1				.685		
IP RM 2			.394	.554		
RU 1					-.786	
RU 2					-.701	
OTK 2	.303		-.385		-.444	-.350
IP L 2						-684
KDM 5		-.429				-.603

Da bi se lakše protumačile komponente sprovedena je *oblimin* rotacija (Tabela 7). Rotirano rešenje je otkrilo postojanje jednostavne strukture, pri čemu sve komponente imaju ne tako veliki broj faktorskih težina gde sve promenljive daju znatne težine samo po jednoj od komponenata. A kada je reč o korelaciji među komponetama, ne uočava se niti preterano snažna niti slaba međusobna korelacija, o čemu će biti nešto više reči u nastavku rada.

4.4. Testiranje modela uz pomoć softvera WrapPLS 7.0

Program WrapPLS 7.0. je softver koji je razvio Ned Kock, koristeći MATLAB, C++ i Javu. Softver pomaže da se sprovede modeliranje pomoću različitih metoda na bazi kompozita i faktora, koristeći metod parcijalnih najmanjih kvadrata (*engl. PLS – Partial Least Squares*). Kako bi se testirao uticaj grupe pitanja iz modela predstavljenog na Slici 1, primenjen je WrapPLS 7.0. Obzirom da je KDM nezavisna varijabla (prediktor), najpre je utvrđeno kako ona utiče na rizik upotrebe društvenih medija (RU) i na implemantaciju politike (IP). Potom kako rizik upotrebe utiče na implementaciju politike

i na kraju pod kakvim je uticajem obuka i tehnička kontrola (OTK) u odnosu na implementiranu politiku (IP). Primenom ovog softvera, dobijeni su rezultati tri koeficijenta determinacije, nivoi statističke značajnosti, kao i standardizovani regresioni beta koeficijenti (β), a izlazni rezultat je prikazan na Slici 3.



Slika 4. Istraživački model i PLS rezultati

Testiran je model istraživanja sa Slike 2 pomoću programa WarpPLS 7.0. koji omogućava upotrebu dihotomskih mera. Budući da koristi tehniku *bootstrappin* za modelovanje parametara i *p*-vrednosti, mere ne moraju da zadovolje parametarska očekivanja. Koeficijent determinacije (R^2) je relativna mera reprezentativnosti regresione linije i ona na taj način pokazuje učešće (*procenat*) objašnjenog varijabiliteta. Njegove vrednosti se kreću od 0 (0%) do 1 (100%). Što je vrednost koeficijenta determinacije bliža jedinici to je regresioni model bolji, odnosno reprezentativniji. Najpre je ispitano kako korišćenje društvenih medija (KDM) utiče na rizik upotrebe društvenih medija (RU) i na implementaciju politike (IP). Rezultati iz softvera WrapPLS 7.0 ukazuju da je procenat varijabilnosti zavisne promenljive RU koji je objašnjen nezavisnom promenljivom KDM, izuzetno nizak i iznosi R^2=0.06 (6% varijabiliteta). Sa Slike 4 se može videti i da postoji statistička značajnost između ove dve varijablie, obzirom da je $p<0.01$ što se kod ovog programa definiše kao standardno utvrđeni nivo značajnosti. Kada je reč o uticaju korišćenja društvenih medija (KDM) i rizika upotrebe (RU) na implementaciju politike (IP), koeficijent determinacije R^2=0.10 (10% varijabiliteta) ukazuje na neznatno viši procenat varijabilnosti. Ali ne postoji statistička značajnost između grupa pitanja KDM i IP, jer je u ovom slučaju (p=0.02), što ukazuje na nepostojanje statističke značajnosti. Međutim kada govorimo o odnosu RU i IP, zaključujemo da postoji statistička značajnost ($p<0.01$). Na kraju je razmatran uticaj koji implementacija politike (IP) ostvaruje na obuku i tehničku kontrolu (OTK). Procenat varijabiliteta koji promenljiva (IP) ostvaruje na (OTK) je R^2=0.11 (11% varijabiliteta), a analiza ukazuje i da postoji statistička značajnost između implementacije politike i obuke i tehničke kontrole. Beta koeficijenti pokazuju intenzitet pedikcije odnosno objašnjavanja između promenljivih. U tom smislu se uočava da IP najviše doprinosi objašnjavanju poslednje grupe pitanja (OTK), jer je na liniji između ove dve varijable prikazan najveći beta koeficijent (β=0.33). Odnosno, OTK pod uticajem IP i RU, u ovom modelu najviše doprinosi objašnjavanju nezavisne promenljive KDM.

4.5. Korelacija

Nakon ispitivanja korelacije pomoću programa SPPS Statistics 17.0, između sve četiri grupe pitanja, iz Tabele 8, može se videti da ne postoje jake veze, osim između grupe pitanja KDM i OTK, gde je uočena jaka pozitivna korelacija i iznosi r=0.551, uz postojanje statističke značajnosti (Sig=0.031).

Tabela 8. Korelacija

		KDM	RU	OTK	IP
KDM	Pearson Correlation	1	.211*	.551**	-.190
	Sig. (2-tailed)		.031	.000	.052
	N	105	105	105	105
RU	Pearson Correlation	.211*	1	.314**	-.173
	Sig. (2-tailed)	.031		.001	.077
	N	105	105	105	105
OTK	Pearson Correlation	.551**	.314**	1	-.319**
	Sig. (2-tailed)	.000	.001		.001
	N	105	105	105	105
IP	Pearson Correlation	-.190	-.173	-.319**	1
	Sig. (2-tailed)	.052	.077	.001	
	N	105	105	105	105

Između rizika upotrebe (RU) i obuke i tehničke kontrole (OTK), je Pirsonov koeficijent korelacije umeren i iznosi r=0.314 i kao takav jeste statistički značajan (Sig=0.001). Izuzetno mala, ali pozitivna korelacija postoji između RU i KDM, gde je koeficijent korelacije r=0.211 i jeste statistički značajan. Postojanje negativnih veza između grupa pitanja IP sa jedne strane i preostale tri grupe sa druge, pokazuje da će implementacijom politike doći do smanjenja korišćenja društvenih medija, rizika upotrebe i obuke i tehničke kontrole.

5. ZAKLJUČAK

Merenje adekvatnosti uzorkovanja je izvršeno primenom (KMO) testa koji je pokazao da su podaci prikupljeni u ovom istraživanju adekvatni i kao takvi pogodni za primenu faktorske analize. Takođe, *Barttlett-ov test* sferičnosti je statistički značajan što ukazuje da postoje određene korelacije između grupa pitanja u okviru upitnika i da korelaciona matrica nije jedinična. Testiranje modela programom WrapPLS 7.0, je dalo rezultate koji su pokazali da model ima umerenu moć objašnjavanja, odnosno nije najreprezentativniji, obzirom na to da su koeficijenti determinacije izuzetno niski i da je standardizovani β keoficijent najznačajniji između poslednje dve grupe pitanja. Kada je reč o korelaciji koja je ispitana uz pomoć programa SPSS Statistic 17.0, utvrđeno je da između grupa pitanja postoji korelacija koja je uglavnom slaba, ali najznačajnija između grupe pitanja koja se odnosi na korišćenje društvenih medija (KDM) i obuku i tehničku kontrolu (OTK), ali ona kao takva i jeste statistički značajna. Društveni mediji su doslovno promenili način funkcionisanja ljudi bilo u privatnom ili u poslovnom smislu. Međusobni odnos ljudi i kompanija je danas baziran na mogućnostima digitalnog sveta koji uključuje društvene medije kao neizostavan alat komunikacije. Iz svega predstavljenog, može se zaključiti da bi neracionalna upotreba društvenih medija u poslovanju mogla usloviti postojanje velikog broja rizika koji mogu doprineti nastanku drastičnih gubitaka. Neminovno je da razultati ispitivanja ukazuju na to da su mnoge organizacije u svim svojim sistemima nedovoljno

usvojile strategije upravljanja rizicima. Organizacije bi trebalo da najpre sprovedu formalnu procenu rizika koja identifikuje i procenjuje rizike korišćenja društvenih medija, a zatim da odrede odgovarajuće odgovore na te rizike. Apsolutno je neophodno da menadžeri i zaposleni na svim nivoima u organizaciji u potpunosti shvate i razumeju važnost i mogućnosti upotrebe tehnologija 21. veka.

ANALYSIS OF SOCIAL MEDIA RISK MANAGEMENT MODELS IN ORGANIZATIONAL CONTEXT

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Abstract

Through the rapid flow and unlimited availability of information content and services, the conditions have been created for a qualitative step forward of humanity into a completely new world. Social media, as products of revolutionary development, have inevitably become an integral part of people's lives. However, their use can pose various security threats and risks. This paper is primarily focused on the risks of social media that can harm organizations. The research, based on the social media risk management model, aims to provide guidance to organizations that apply social media in their business. The theoretical model includes four main components, whose mutual influences and connections have been examined in detail. Modeling results were obtained with the help of WrapPLS 7.0 software, while for descriptive statistics, factor analysis and correlation, the program SPSS Statistics 17.0 was used.

Keywords: *Social media, Usage risk, Policy implementation, Technical control*

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UPRAVLJANJE RIZICIMA PRIMENOM FMEA METODE NA PRIMERU MIKRO PREDUZEĆA

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Izvod

U uslovima globalizacije, rastuće konkurencije i stalnih promena na tržištu, upravljanje riizicima u preduzeću je impretiv. I dok velike kompanije izdvajaju pozamašna finasijska sredstva i formiraju posebna odeljenja za upravljanje rizikom, u domenu mikro preduzeća i preduzetnika, dok se poslovni rizik veoma retko razmatra. Vlasnici mikro priduzeća su mišljenja da se smanjenjem njihovog biznisa smanjuju i opasnosti i rizici kojima su oni izloženi, što je potpuno pogrešno, jer su njihove poslovne situacije, aktivnosti i okruženje identične velikim kompanijama. Delaju reaktivno u odnosu na rizik, fokusiraju se na prodaju i operativno funkcionisanje i zanemaruju rizike u poslovanju koji mogu da dovedu do katastrofalnih gubitaka od kojih se neka preduzeća nikad ne oporave. Cilj ovog rada je da se odgovarajućom metodologijom u mikro preduzeću „*Studio Ideal*“ identifikuju rizici, da se kvantifikuju njihovi uticaji i da se primenom odgovarajućih tehnika kontrole rizika utiče na smanjenje tih uticaja u poslovanju preduzeća.

Ključne reči: *rizik, upravljanje rizikom, FMEA, identifikacija rizika*

1. UVOD

Rizik je neminovnost. Svaka odluka bilo lična, poslovna ili društvena sadrži neki rizik. Kompanije će se u svom poslovanju susretati sa različitim vrstama rizika iz kojih mogu proisteći negativni uticaji na poslovanje. Saveremena praksa pokazuje da će samo uspostavljanje sveobuhvatnog i pouzdanog sistema za upravljanje rizikom, koji je uključen u sve poslovne aktivnosti, osigurati da kompanija uspešno posluje u uslovima globalizacije, konkurencije i neizvesnosti. Velike kompanije se ozbiljno bave razmatranjem rizika, formiraju posebna odeljenja za upravljanje rizicima, koriste skupe softvere i isdvajaju finansijska sredstva za usko specijalizovane konsultantske usluge.
Mikro preduzeća i preduzetnici su, sa druge strane, uglavnom prepušteni sebi samima. Mnogi vlasnici i rukovodioci preduzeća smatraju da se smanjenjem veličine njihovog biznisa smanjuju i opasnosti i rizici kojima su oni izloženi, što je pogrešno, jer su njihove poslovne situacije, aktivnosti i okruženje identične velikim kompanijama. Kao posledica toga, poslovni rizik se veoma retko razmatra. Delaju reaktivno u odnosu na rizik, fokusiraju se na prodaju i operativno funkcionisanje, dok znatno zanemaruju rizike u poslovanju koji mogu da dovedu do poslovnih gubitaka. Pored umanjenja posledica nepovoljnih događaja i zaštite ekonomske snage preduzeća, sistemsko upravljanje rizicima povećava poverenje zaposlenih u bezbednost i sigurnost radnih mesta, kao i klijenata u kavalitet i integritet proizvoda i usluga.

Osnovno polazište istraživanja sprovedenog u ovom radu je da se preduzeće posmatra kao sistem sa veoma složenim mehanizmom funkcionisanja. U procesu rada sistema, ulazne veličine se pretvaraju u izlazne, odnosno u proizvod koji će zadovoljiti potrebe potrošača. Što je sistem pouzdaniji, to će preduzeće brže, bolje i kvalitetnije uslužiti svoje klijente.
Predmet ovog rada je teorijska obrada i istraživanje rizika i faktora koji mogu da dovedu do otkaza sistema ili drastičnog smanjenja njegove efikasnosti i efektivnosti, ispitivanje uticaja relevantnih rizika na pouzdanost preduzeća kao sistema, kao i davanje predloga za kontrolu rizika, kako bi se uticaj negativnih faktora minimizirao, a samim tim i uspešnost poslovanja preduzeća poboljšala.

2. TEORIJSKI OKVIR ISTRAŽIVANJA

2.1. Pojmovno određivanje mikro preduzeća

Preduzeće predstavlja skup ljudi i sredstava organizovanih na određeni način, koji obavlja određenu delatnost u cilju sticanja zarade i ostavrivanja drugih ciljeva koji se pred njega postavljaju. To je pre svega, samostalni ekonomski sistem koji se osniva da bi ostvarili ekonomski ciljevi (Bošnjak & Rodić, 2020).
Klasifikacija preduzeća u Republici Srbiji, uređuje se po Zakonu o računovodstvu, koji je objavljen u Službenom glasniku broj 62/2013. Na osnovu člana 6. ovog Zakona, pravna lica se klasifikuju na mikro, mala, srednja i velika preduzeća prema sledećim kriterijumima (Sl. glasnik RS, br.62/2013):

- Prosečni broj zaposlenih,
- Poslovni prihod, i
- Prosečna vrednost poslovne imovine.

U mikro preduzeća svrstavaju se ona preduzeća koja ne prelaze dva od sledećih kriterijuma:

- Prosečan broj zaposlenih je manji od 10,
- Prosečni prihod je manji od 700.000 evra u dinarskoj protvvrednosti,
- Prosečna vrednost poslovne imovine (izračunata kao aritmetička sredina vrednosti na početku i kraju poslovne godine) ne prelazi 350.000 evra u dinarskoj protivvrednosti.

Prema navedenoj klasifikaciji, u grupu mikro preduzeća spadaju i preduzetnici koji se definišu kao fizička lica koja samostalno obavljaju neku delatnost radi sticanja dobiti.

2.2. Pojmovno određivanje rizika

Kada je u pitanju rizik, ne postoji jedinstvena i opšte prihvaćena definicija pojma rizik. Etimološki, termin rizik potiče od grčke reči riza (ριζα), koja označava podmorske stene, hridi, i metaforično opasnosti koje prete mornarima u plovidbi (Vujošević, 2008).
Određenje termina rizik varira, kako istorijski, tako i sa aspekta ljudske delatnosti. Preko „dobre i loše sreće“, „kockarske igračke“ i teorije verovatnoće, rizik zaokuplja pažnju naučnika do savremenog doba, kada je usvojen kao standard. Od izraza koji je označavao opasnosti neobeleženih mora, do stava u kome rizik predstavlja poznatu, merljivu i predvidivu kategoriju (Živković & Savić, 2013).
Za razliku od neizvesnosti, koja se može definisati kao nemogućnost da se unapred odrede ishodi aktivnosti (nije izračunljiva), rizik je merljiva kategorija i podrazumeva ostvarenje

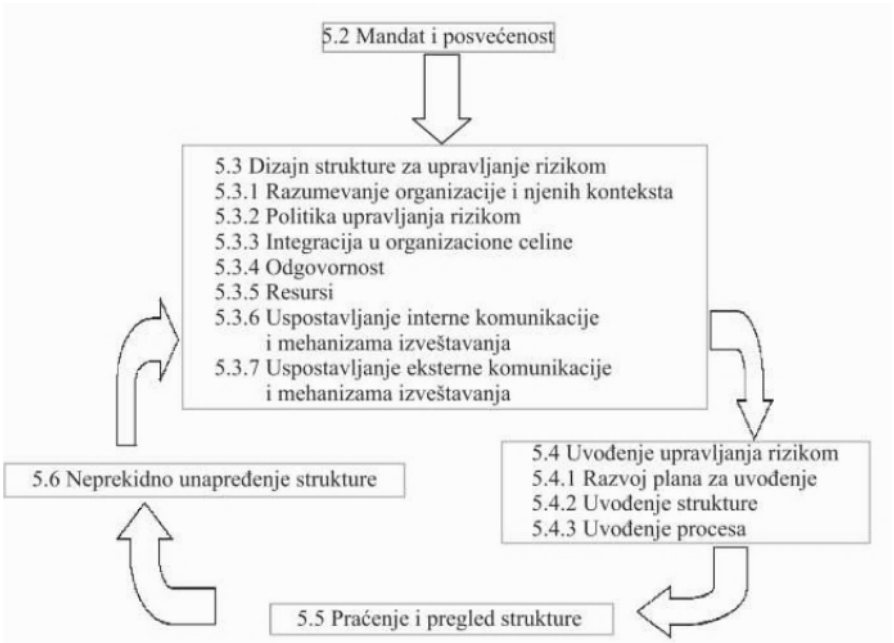
neželjenog toka događaja, tj. gubitak (Croughy et al., 2004). Neizvesnost je osnovni uzrok rizika i na makro nivou ona predstavlja neizvesnosti sistema, procesa i okruženja u okviru kojih se donose odluke, dok na mikro nivou predstavlja neizvesnost informacija, znanja i modela kojima raspolaže donosilac odluke u donošenju konkretne odluke. Aven i Renn (2009) tumače rizik kao nesigurnost i ozbiljnost događaja i posledica u odnosu na nešto što je ljudima vredno. Klasić i Andrijanić (2013) definišu rizik kao preteću mogućnost da nastupe određeni vremensko i prostorno nepredviđeni događaji izazvani subjektivnim okolnostima.
Iz svih definicija može se zaključiti da koncept rizika sadrži najmanje dva elementa, a to su:

1) verovatnoća dešavanja neželjenog događaja u određenom vremenu;
2) posledice tog događaja na ljude, imovinu i okolinu.

Eliminacija rizika niti je izvodljiva, niti je poželjna, iz najmanje tri razloga: prvi razlog je da, za ljude, ne postoji apsolutna kontrola budućnosti; (finansijski) resursi koji se izdvajaju za prevenciju su uvek ograničeni; preuzimanje rizika je srce inovativnih aktivnosti, a samim tim i ekonomskog i društvenog progresa (Habegge, 2008). Međutim, kontrolisanje rizika je neophodno, naročito u domenu poslovanja preduzeća.

2.3. Upravljanje rizikom u preduzeću

Upravljanje rizicima je disciplina novijeg datuma, nastala kao odgovor preduzeća na faktore koji utiču na poslovanje, bilo da su ti faktori spoljašnji, bilo unutrašnji. Upravljanje rizikom podrazumeva koordinisane aktivnosti vođenja organizacije i upravljanja njome u odnosu na rizik. Težnja je da se postigne balans između stvaranja mogućnosti za dobit i minimiziranja gubitka.
Upravljanje rizikom se definiše kao pristup koji je zasnovan na identifikaciji i kontroli onih oblasti i događaja koji su potencijalni izazivači neželjenih promena u sistemu (Sage, 1995). Da bi upravljanje rizikom bilo uspešno i održivo, treba da bude ugrađeno u organizaciju i podržano od strane menadžmenta. Struktura sistema za upravljanje rizicima (Slika 1) ima za cilj da pomogne organizaciji da upravlja rizicima efikasno, kroz primenu procesa upravljanja rizicima na različitim nivoima i specifičnim kontekstima organizacije. Takva struktura treba da obezbedi da se informacije o riziku koriste kao osnova za donošenje odluka na svim relevantnim nivoima u organizaciji. Cilj strukture nije da opiše sistem upravljanja, već da pomogne organizaciji da izvrši integraciju upravljanja rizikom u okviru ukupnog sistema upravljanja (Kokić Arsić, 2019).



Slika 1. Elementi strukture za upravljanje rizicima (Kokić Arsić, 2019)

3. PRAKTIČNI DEO ISTRAŽIVANJA

3.1. FMEA metoda

FMEA (engl. *Failure Modes and Effects Analysis* – FMEA) ili metoda analize načina otkaza i efekata je metoda kojom se analiziraju potencijalni defekti na sredstvima i njihove posledice. Metodu je 1949. godine razvila vojska Sjedinjenih Američkih Država i propisana je standardom MIL-STD-1629 (MIL-STD-1629). Tokom 60-ih godina, metodu počinje da koristi aeronautička i svemirska industrija sa naglaskom na sigurnosnim karakteristikama.

Do naglog povećanja broja korisnika došlo je 80-ih godina prošlog veka, izdvajanjem standarda za kvalitet autodelova QS-9000 od strane američke automobilske industrije i taj standard su morali zadovoljiti svi njihovi dobavljači (Brdarević et al., 2015). Ubrzo, FMEA postaje alat za menadžment totalnog kvaliteta (engl. *Total Quality Management*), a devedestih i *Six Sigma* alat za unapređenje procesa, identifikovanjem uzroka problema i smanjivanjem defekata i kašnjenja u proizvodnim i poslovnim procesima.

FMEA je tehnika kojom se identifikuje na koji način komponente, elementi, sistemi i procesi neće uspeti da ispune svoju projektovanu funkciju. Cilj FMEA metode jeste (Kokić Arsić, 2019):

- blagovremeno otkrivanje i lokalizovanje potencijalnih grešaka;
- izbegavanje ili ublažavanje rizika u projektu;
- sprečavanje troškova zbog mogućeg opoziva zbog pojave greške;
- sprečavanje gubitka imidža na tržištu.

U praksi, ovo je najviše korišćena metoda. Najčešće se koristi u početnim fazama razvoja, da bi se osiguralo da svi potencijalni otkazi budu uočeni i eliminisani na vreme. FMEA je primenljiva na svaki sistem i na bilo koji željeni nivo – sistem, podsistem, sklop ili komponentu. Aktivno se koristi u skoro svim tehničkim sistemima: autoindustrija i brodogradnja, vazduhoplovna i svemirska industrija, hemijska i naftna prerada, izgradnja,

proizvodnja industrijske opreme i mehanizama i dr. U poslednjih nekoliko godina, ova metoda otkrivanja rizika se sve više koristi u neproizvodnoj sferi. Može se koristiti samostalno, ili kao deo šire studije. Analiza može da obuhvati:

- tehničke sisteme;
- dizajn i proizvode;
- procese proizvodnje, ugradnje, montaže i održavanja proizvoda.

U zavisnosti od primene, postoje procesna i proizvodna FMEA analiza (Drljača, 2010). Proizvodna FMEA metoda analizira projekat proizvoda ili sistema, ispitivanjem načina na koji otkaz elemenata utiče na proizvod ili sistem. Procesna FMEA metoda analizira procese uključene u proizvodnju, korišćenje i održavanje proizvoda; ispituje način na koji otkazi u procesu utiču na proizvod ili sistem. FMEA metoda kratkoročno daje listu potencijalnih otkaza i identifikuje ozbiljnost njihovih efekata. Međutim, dugoročno gledano, ima mnogo širu primenu (Venuk, 2012):

- razvija kriterijume za planiranje testiranja sistema;
- obezbeđuje dokumentaciju za buduće analize pouzdanosti;
- obezbeđuje osnovu za planiranje održavanja.

U nastavku je izvršen prikaz osnovnih pojmova koji se koriste u FMEA analizi.

- *Otkaz* predstavlja odstupanje od planirane funkcije ili ponašanja, odnosno nemogućnost sistema, podsistema ili komponente da obave potrebnu funkciju.
- *Način otkaza* podrazmeva način na koji element otkazuje.
- *Uzrok otkaza* predstavlja proces ili mehanizam odgovoran za pokretanje otkaza. Procesi koji mogu prouzrokovati otkaz su, na primer, fizički otkaz, mana u modelu, defekt u proizvodnji, uticaj okoline itd.
- *Efekat otkaza* predstavlja posledicu otkaza na funkcionisanje sistema.

3.1.1. FMEA – metodologija primene

FMEA procedura obuhvata sledeće korake:

1. Identifikovanje komponenti ili procesa koje će se analizirati.
2. Identifikovanje načina, uzroka, efekata i akcija za svaku komponentu ili proces.
3. Ocena rizika komponenti.
4. Određivanje prioriteta korektivnih akcija.

Da bi se odredio broj za prioritet rizika (RPN) (*engl.* Risk Priority Number), potrebno je oceniti ozbiljnost svakog efekta (*engl.* Severity – S), verovatnoću pojavljivanja otkaza (*engl.* Probability of Occurence – O) i mogućnost detekcije otkaza (*engl.* Detectability – D). Prioritet rizika (RPN) se određuje pomoću sledećeg obrazca:

$$RPN = S*O*D \tag{1}$$

Za ocenjivanje parametara ozbiljnosti, verovatnoće i mogućnosti detekcije, koriste se skale koje su prikazane u nastavku (Tabele 1-3).

Tabela 1. Skala za ocenu ozbiljnosti efekata

Ocena	Ozbiljnost efekata
1–2	Zanemarljiv
3–4	Mali
5–6	Ozbiljan
7–8	Kritičan
9–10	Katastrofalan

Tabela 2. Skala za ocenu verovatnoće pijavljivanja otkaza

Ocena	Verovatnoća pojavljivanja
1	Veoma mala
2–3	Mala
4–6	Srednja
7–8	Velika
9	Veoma velika
10	Gotovo sigurna

Tabela 3. Skala za procenu detekcije otkaza

Ocena	Primetljivost
1–2	Veoma visoka
3–4	Visoka
5–6	Srednja
7–8	Niska
8–9	Veoma niska
10	Neprimatljiva

Pri oceni rizika, koristi se skala koja je data u Tabeli 4.

Tabela 4. Skala za ocenu rizika

RPN broj	Ocena rizika
RPN < 10	Rizik je prihvatljiv / nisu potrebne nikakve akcije
10 < RPN < 100	Rizik je prihvatljiv / rizikom se može upravljati poštovanjem propisanih procedura
100 < RPN < 200	Rizik uslovno prihvatljiv / potrebno je uvesti mere kontrole rizika, monitoring i praćenje
200 < RPN < 400	Neprihvatljiv rizik / zahteva se prekid rada i redefinisanje sistema
RPN > 400	Neprihvatljiv rizik / rizikom se ne može upravljati

3.2. Primena FMEA metode i diskusija dobijenih rezultata

„*Studio Ideal*“ je mikro preduzeće iz Kladova koje se bavi proizvodnjom nameštaja po meri. Osnovano je 2012. godine i opslužuje tržište borskog okruga devet godina. Nastalo kao mala stolarska radionica. Preduzeće se godinama razvijalo, kako u pogledu tehnologije i procesa, tako i u pogledu asortimana. U ponudi preduzeća nalaze se: kuhinje, spavaće, dnevne i dečije sobe, trpezarije, komode, plakari, kancelarijski nameštaj, kupatilski i ostali nameštaj. „*Studio Ideal*“ se ubraja u mikro preduzeća, jer godišnje prihoduje sa manje od 100.000 evra, i zapošljava četiri lica. Sam proces proizvodnje se odvija u nekoliko faza:

- *Prva faza* procesa proizvodnje je **dizajn**. Da bi se proizvod dizajnirao, koristi se softver Korpus RC standard (*engl.* Corpus RC). To je program za dizajniranje nameštaja sa trenutnim trodimenzionalnim prikazom. Softver, pored dizajna elemenata, omogućava i kalkulaciju troškova i optimizaciju krojenja. Verzija

softvera koja se koristi u preduzeću ima i mogućnost nadograđivanja posebnim modulima za digitalne narudžbine pločastih materijala, bušenje, detaljne analize troškova, itd.

- *Druga faza* je proces **sečenja** materijala. Sam proces sečenja nije komplikovan, ali pločasti materijali zbog svoje strukture zahtevaju posebne mašine za sečenje sa više testera. Ove mašine se nazivaju formatizeri. Samo korišćenjem formatizera, može se dobiti pravilna neoštećena ivica, bez naknadne dorade. Pored kvalitetnog reza, potrebno je dobiti i preciznost sečenja, što ova mašina omogućuje sopstvenim programom, ili direktnim povezivanjem sa softverom za dizajn preko koga dobija dimenzije.
- *Treća faza* je proces **kantovanja**. To je proces lepljenja trake na kantovima (bočnim stranama) isečenog komada. Ovaj proces se vrši pomoću mašine sa popularnim nazivom kanterica. Trake koje se lepe su različite širine, zavisno od debljine ploče, i osim estetske imaju i zaštitnu funkciju.
- *Četvrta faza* se odnosi na **bušenje** i **tiplovanje**. Oba procesa izvršava CNC mašina za bušenje i tiplovanje. CNC kontrola sve tri ose osigurava precizno bušenje i tiplovanje. Mašina je opremljena pumpom za lepak niskog pritiska, koja osigurava kvalitetno i precizno lepljenje.
- *Peta faza* je faza **sklapanja**, ukoliko se radi o elementima koji se dopremaju u gotovom stanju. Ako se radi o elementima koji se sklapaju na licu mesta, oni se pakuju za transport.
- *Šesta faza* je faza **transporta**, proizvod se transportuje do klijenta. Preduzeće u svom posedu ima sopstveno vozilo za transport Volkswagen Crafter Maxi.
- *Poslednja faza* je **montaža**, koja se ne naplaćuje dodatno klijentima, već je uračunata u cenu proizvoda. Kada se govori o velikim elementima ili celim kuhinjama i sobama, montaža i sklapanje se vrše na licu mesta, dok se manji elementi (npr. komode, police) sklapaju u radionici i kod klijenata se samo montiraju.

U saradnji i uz konsultacije sa vlasnikom preduzeća, rizici su podeljeni na: rizike u procesu proizvodnje, bezbedonosne rizike i ostale rizike. Identifikovani rizici u procesu proizvodnje prikazani su u Tabeli 5. U obzir su uzeti svi rizici koji dovode do prekida samog procesa proizvodnje ili dovode do stvaranja defektnih proizvoda.

Tabela 5. Identifikacija rizika u procesu proizvodnje prema proizvodnim fazama

FAZA	Rizik	Uzrok	Posledice	S	O	D	RPN	Akcija
Dizajn	Greške softvera	Greške sistema / neažuriranje sistema	Gubitak zbog kašnjenja sa izradom proizvoda	9	2	8	144	Ažuriranje sistema na vreme, konsuktacija sa stručnim licima
	Pogrešne dimenzije proizvoda	Ljudska greška	Stvaranje škarta	5	5	6	150	Provera pre unosa podataka
Sečenje	Kvar formatizera	Kvar elektromotora/ neispravni ležajevi	Otlaz sistema / nemogućnost korišćenja mašine	10	1	8	80	Redovni servisi i održavanje / zamena ležajeva u propisanom roku

	Tupe testere	Habanje materijala	Loši rezovi na pločama	8	8	2	128	Redovna inspekcija testera
	Kvar na klizačima	Habanje materijala	Nemogućnost sečenja ploče	5	3	1	15	Redovna inspekcija
	Neprohodnost aparata za usisavanje prašine	Previše prašine i opiljaka	Dovodi do otkaza sistema	5	9	1	45	Redovno čišćenje uređaja za skupljanje prašine
Kantovanje	Kvar motora	Zamor materijala	Otkaz sistema / nemogućnost korišćenja mašine	10	1	8	80	Redovno održavanje kako bi se produžio vek trajanja motora
	Kvar glodalica	Zamor materijala	Defektan proizvod	6	6	3	108	Redovna inspekcija stanja glodalica / zamena istrošenih
	Kvar grejača	Pregrevanje	Traka se ne lepi	7	5	5	175	Korišćenje mašine prema uputstvima
	Kvar pritiskača	Pucanje glave pritiskača	Traka se ne lepi	7	3	2	42	Redovno održavanje
	Kvar glave sa četkama i polirkama	Zamor materijala	Smanjen kvalitet proizvoda	4	7	4	112	Redovono održavanje i zamena pohabanih delova
Tiplovanje	Raspored rupa nije dobar	Nije urađena kalibracija	Nemogućnost sklapanja	7	2	7	98	Pažljivo čitanje i praćenje uputstva
	Nedovoljno lepka za tiplove	Ljudska greška	Nekvalitetan proizvod	7	2	5	70	Provera pre puštanja u rad
Sklapanje	Nedovoljno učvšćeni elementi za celinu	Ljudska greška / nekvalitetan materijal	Smanjen kvalitet proizvoda	5	6	2	60	Provera nakon skalpanja
Transport	Kvar transportnog sredstva	Zamor materijala	Nemogućnost transporta proizvoda do klijenata	7	4	3	84	Redovno održavanje vozila kako bi se produžio vek trajanja
	Oštećenje prozivoda tokom trasnporta	Neadekvatno pakovanje / nepažnja vozača	Nemogućnost montiranja oštećenih delova	7	3	4	84	Obezbediti i osigurati proizvod adekvatno tokom transporta
Montaža	Nedovoljno dobro montiran proizvod	Ljudska greška	Mogućnost da se proizvod otkači i padne	10	2	4	80	Provera proizvoda da li stoji čvrsto i da li je dobro zakačen

U procesu kantovanja, iz Tabele 5 se mogu videti tri kritična rizika: kvar glodalica, kvar grejača i kvar glave sa četkama. Za sva tri rizika predložene su mere prevencije, kako bi se smanjila učestalost dešavanja ovih rizika, a samim tim i troškovi njihovog pokrića.

Kao što je prikazano u Tabeli 5, u procesu proizvodnje u većini slučajeva je dovoljna prevencija rizika kako bi se učestalost i ozbiljnost rizika smanjile, a neki rizici čak i potpuno eliminisali. Kao bezbedonosne rizike, vlasnik je naveo rizike koji su dati u Tabeli 6.

Tabela 6. Identifikacija bezbednosnih rizika

Rizik	Uzrok	Posledice	S	O	D	RPN	Akcija
Povrede na radu	Ljudske greške / nepažnja, nepraćenje uputstva	Neplanirani gubici na isplatu bolovanja / prekid procesa zbog nedostatka radnika	4	2	10	80	Čitati uputstvo / korisititi zaštitnu opremu
Rizik od požara	Neispravne instalacije / nepravilno rukovanje alatima	Gubitak imovine	10	1	10	100	Inspekcija ispravnosti instalacija / obuka za rad
Rizik od krađe	Neobezbeđen prostor	Gubitak imovine / šteta na imovini	4	1	10	40	Dodatno obezbediti prozore i vrata

Rizik od požara predstavlja rizik koji je na granici kritičnosti, a mere koje bi dodatno smanjile ovaj rizik su i mere redukcije, ugradnjom protivpožarnih prskalica, odnosno čak i ukoliko požar ne bi bilo moguće sprečiti, bila bi ublažena nastala šteta. Bez adekvatnih mera za redukciju gubitka, ukoliko bi došlo do realizacije ovog rizičnog događaja, nastale posledice – šteta bi bila katastrofalna, tako da bi predlog za finansiranje rizika bio transfer rizika, odnosno osiguranje kod najpovoljnijeg osiguravača.
Iako bi bilo realno očekivati da povrede na radu imaju veću ocenu rizika, to nije slučaj u ovoj situaciji, jer su mašine na kojima se radi, ako se poštuju uputstva za korišćenje, vrlo bezbedne, a korišćenjem zaštitne opreme, rizik se dodatno smanjuje, tako da je prevencija u ovom slučaju najbolje i najekonomičnije rešenje. Kao ostale rizike, vlasnik je naveo sledeće rizike koji su prikazani u Tabeli 7.

Tabela 7. Identifikacija ostalih rizika

Rizik	Uzrok	Posledica	S	O	D	RPN	Akcija
Loši materijali	Loši distributeri	Nekvalitetan proizvod	8	2	4	64	Obezbeđivanje pouzdanih ditributera
Pad tražnje za proizvodima	Kriza na tržištu	Smanjenje prihoda / gubici	8	2	4	64	Pozicioniranje na tržištu / izgradnja reputacije
Nedostatak kvalifikovane radne snage	Nedostatak kadrova na tržištu	Smanjena produktivnost	8	5	2	90	Obuka radnika

Kao što se može videti iz Tabele 7, vlasnik je kao ostale rizike naveo rizike čiji se uzrok nalazi van organizacije. Samim tim, na njih se ne može uticati u direktnom smislu kako bi se eliminisali rizici, ali se može upravljati takvim rizicima pomoću tehnika prevencije i redukcije, i tako smanji ozbiljnost tih rizika kada se dese i ako se dese.

4. ZAKLJUČAK

Rizik je realnost sa kojom moraju da se suoče sve organizacije, bez obzira na model poslovanja. I dok su velike kompanije svesne da upravljanje rizikom moraju da uključe u

upravljanje organizacijom, mikro preduzeća i preduzetnici su prilično nesvesni rizika sa kojim posluju.

Uspostavljanje procesa upravljanja rizicima u ovim preduzećima je dug put, i zahteva sistemsko angažovanje države na edukaciji vlasnika preduzeća, kao i njihovu volju da svoje poslovanje unaprede. Kvalitativne metode, kao što je FMEA metoda primenjena u ovom radu, su dobar početak upoznavanja vlasnika ovih preduzeća sa mogućim rizicima u preduzeću, sa procenama rizika i adekvatnim tretiranjem identifikovanih glavnih i sporednih rizika. Suočavanje sa rizikom je prvi korak u rešavanju problema, a ova metoda to i omogućuje.

U radu je prikazan jednostavan i ekonomičan način za primenu ove metode, kako bi se vlasnici ohrabrili da započnu proces upravljanja rizikom, i tako unaprede svoje procese i zaštite imovinu svojih preduzeća.

RISK MANAGEMENT USING THE FMEA METHOD ON THE EXAMPLE OF MICRO-ENTERPRISES

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Abstract

In the conditions of globalization, growing competition and constant changes in the market, risk management in the company is imperative. While large companies allocate substantial financial resources and form special risk management departments, in the domain of micro-enterprises and entrepreneurs, business risk is very rarely considered. Owners of micro companies are of the opinion that by reducing their business the dangers and risks to which they are exposed are reduced too, which is completely wrong, because their business situations, activities and environment are identical to large companies. They act reactively to risk, focus on sales and operations, and ignore business risks that can lead to catastrophic losses from which some companies never recover. The aim of this paper is to identify risks in the micro-enterprise "Studio Ideal", to quantify their impacts and to apply appropriate risk control techniques to reduce those impacts on the company's operations.

Keywords: *Queueing theory, Service, Design, Warehouse systems*

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NEW WINGS APPROACH – WINGS OF FINITE SUM OF INFLUENCES†

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Abstract

The Weighted Influence Non-linear Gauge System (WINGS) is a multi-criteria decision making method. It is used as a structural model to analyze the interaction between the elements. WINGS is a relatively new method, but it is increasingly used. Some authors have already improved the original method and also included fuzzy numbers in it. The convergence problem may occur, when the total strength-influence matrix is derived. We proposed that instead of using an infinite sum of terms in the total strength-influence matrix a finite sum of influences is used. The aim of this study is to propose a new concept of WINGS method - finite sum of WINGS influences (FSI WINGS). The FSI WINGS method gives comparable results to the WINGS method and is therefore suitable for use.

Key words: *multi-criteria decison making method, finite sum of WINGS influences, fuzzy numbers, convergence problem*

1. INTRODUCTION

Multi criteria decision making (MCDM) is the collective term for mathematical methods used to find solutions to decision problems with multiple (usually) conflicting goals (Eggers et al., 2019). There are many different methods that deal with MCDM, such as Analytic Hierarchical Process (AHP), Technique for Order Performance by Similarity to Ideal Solutions (TOPSIS), VIse Kriterijumska Optimizacija I Kompromisno Resenje (VIKOR), Decision Making Trial and Evaluation Laboratory (DEMATEL) and others (Tavana et al., 2021). One of them is the Weighted Influence Non-linear Gauge System (WINGS), which is similar to the DEMATEL method.
WINGS method was proposed by Michnik (Michnik, 2013). It is used to evaluate elements of the system, where not all elements are equally important (do not have the same strength). So, the WINGS improve DEMATEL method, because it includes strength of elements, while the DEMATEL method does not. In WINGS method elements are treated as a system of relationships, focusing on the internal importance of the system's element (strength) and its interrelationship with other elements (influence). The method is combined with graph theory to analyze the logical relationship between elements and formulate a direct strength-influence matrix D. In this process the information derived from the total strength-influence matrix T is used to calculate the exerted effects (impact) and the received effects (receptivity) of each element, as well as the involvement (engagement) and role (position) of the elements in the system to quantify the interrelationships between each element and the importance of each element in the system (Wang et al., 2021).

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WINGS method has been used in the various fields such as economy (Banaś & Michnik, 2019), construction management (Fedorczak-Cisak et al., 2020), business processes (Kashi & Franek, 2014), urbanization (Adamus-Matuszyńska et al., 2019) and others.
The acronym of the WINGS method reflects important features of the method (Michnik, 2013):

- Weighted – means that the method considers the internal strength (importance of the element);
- Influence – stresses the crucial role of interrelationships between elements;
- Non-linear - the mathematical processing of input data introduces the non-linearity into the model;
- Gauge System is self-explanatory.

Nowadays, many decisions are made in an uncertain environment. Zadeh (1965) introduced fuzzy set theory as a mathematical tool to represent and manage vagueness and uncertainty in decision making (Tseng, 2009). Therefore, many authors use triangular fuzzy numbers (TFNs) in MCDM to represent decision makers evaluations. The WINGS method considers the strength and influence of elements. When the TFNs are included, uncertainty can be added to the method.
In WINGS method, when the total strength-influence matrix T is calculated, the convergence problem may occur. If all row sums or column sums of the normalized strength-influence matrix X are equal to 1, then the matrix is stochastic (Bronson, 1989) and the infinite sum of normalized influences does not converge, therefore the total strength-influence matrix T does not exist (Chen et al., 2017). Therefore, some authors have proposed a different normalization, to solve convergence problem (Michnik, 2013).
The aim of this paper is to introduce a new concept in the WINGS method - Finite sum of WINGS influences method (FSI WINGS), to solve the convergence problem.
The rest of this paper is organized as follows. In Section 2, we introduce the WINGS method, triangular fuzzy numbers, the fuzzy WINGS method and a new approach – Finite sum of WINGS influences method (FSI WINGS). In Section 3, we show an example with different types of WINGS methods (WINGS method, fuzzy WINGS method and FSI WINGS method. At the end of the paper, we give a summary of our research.

2. METHODS

2.1. WINGS

The procedure for implementing the WINGS method is presented below through the following steps:

1. step: Generate the strength-influence matrix D
Experts select the $n>2$ elements that constitute the system and then determine the relationships between them. It is recommended to create a map of influences that represents the system. The nodes on the graph represent the elements of the system and the arrows represent the nonzero influence of one element on another. When the system is determined, the decision makers assess all the influences of one element on another and strength of each element using scalar values, where 0 represents no influence/strength and 4 represents very high influence/strength. The assessments of the decision makers, influences and strengths, are inserted into the direct strength influence matrix D. This is a $n \times n$ matrix with elements d_{ij}. Values representing strength of elements are inserted into principal diagonal d_{ii} (strength of element i). Values representing influences of elements

are inserted in such a way that for $i \neq j$, d_{ij} is influence of element *i* on element *j* (Michnik, 2013).

2. step: Derive the normalized strength-influence matrix X
There are different ways of normalization of the strength-influence matrix *D*, that effect on the final results.
$X = \left[x_{ij} \right]$ is the normalized strength-influence matrix and x_{ij} is calculated as follows

$$x_{ij} = \frac{d_{ij}}{s},\ j = 1,...,n; \tag{1}$$

Where the normalizing factor s is given by:

$$s = \max_{1 \le j \le n} \sum_{j=1}^{n} d_{ij} \tag{2}$$

$$s = \sum_{i=1}^{n} \sum_{j=1}^{n} d_{ij} \tag{3}$$

$$s = \max(\max_{1 \le i \le n} \sum_{j=1}^{n} d_{ij}, \max_{1 \le j \le n} \sum_{i=1}^{n} d_{ij}) \tag{4}$$

3. step: Derive the total strength-influence matrix T
Total strength-influence matrix T is an infinitive sum of influences among factors. $T = \left[t_{ij} \right]$ is calculated as follows

$$T = X + X^2 + X^3 + ... + X^n + ... = X(I - X)^{-1}. \tag{5}$$

4. step: Sum the rows and columns and construct the causal diagram
For each element in the system the rows sum R_i (total impact of elements) and the column sum C_j (total receptivity of elements) of the matrix T is calculated as follows:

$$R_i = \sum_{j=1}^{n} t_{ij},\ i = 1,...,n, \tag{6}$$

$$C_j = \sum_{i=1}^{n} t_{ij},\ j = 1,...,n. \tag{7}$$

Then $R_i + C_i$ and $R_i - C_i$ are calculated. $R_i + C_i$ is called prominence value and represent the importance of element *i*. $R_i - C_i$ called relations value. The causal diagram consists of $R_i + C_i$ on the horizontal axis, while $R_i - C_i$ on the vertical axis divides the elements into cause (positive values) and effect (negative values) groups.

2.2. Fuzzy sets

Fuzzy sets were first developed by Zadeh (1965). In decision making, fuzzy sets are used to represent and deal with uncertainty. In fuzzy sets each number between 0 and 1 indicates a partial truth, so we can express and handle uncertain judgments mathematically (Wu, 2012). Fuzzy set is defined as follows:

$$\tilde{A} = \left\{ (x, \mu_{\tilde{A}}(x)) \middle| x \in X \right\}, \mu_A(x) : \mathrm{X} \to [0,1], \tag{8}$$

where $\mu_{\tilde{A}}$ represents membership function. Membership functions can have different shapes (triangular, trapezoidal or Gaussian) (Li, Li, Liu, & Deng, 2018). In fuzzy WINGS triangular fuzzy numbers (TFNs) are commonly used (Tavana et al., 2021). They can be used to express human linguistic evaluations. TFN is defined as $\tilde{A} = (l, m, u)$ where *l* is the lower bound, *m* is the middle value and *u* is the upper bound of TFN, and with the membership function (Aouag, Soltani, & Mouss, 2020)

$$\mu_{\tilde{A}}(x) = \begin{cases} 0, & x < l \text{ or } x > u \\ (x-l)/(m-l), & l \le x \le m. \\ (u-x)/(u-m) & m < x \le u \end{cases} \tag{9}$$

2.3. Fuzzy WINGS

Fuzzy WINGS method consists of the same steps as the WINGS method, except that fuzzy WINGS method uses TFN evaluations, so some steps are adapted to the use of fuzzy numbers. In first step the decision maker assess all the influences of one element on another and strength of each element using linguistic terms. In third step, where the total strength-influence matrix $\widetilde{T}$ is generated, the lower bounds, the middle values, and the upper bounds, are derived separately.

Step 1: Generate the strength-influence matrix $\widetilde{D}$
Step one is similar to the WINGS method, except that in fuzzy WINGS method the linguistic assessments of decision makers are converted into the corresponding TFNs (Table **1**).

Table 1. Linguistic terms, their corresponding scalar numbers and their corresponding triangular fuzzy numbers

Corresponding scalar value	**Linguistic terms**	**Abbreviation**	**Corresponding triangular fuzzy number**
0	No influence/strength	NI/NS	(0, 0, 0.25)
1	Very low influence/strength	VLI/VLS	(0, 0.25, 0.5)
2	Low influence/strength	LI/LS	(0.25, 0.5, 0.75)
3	High influence/strength	HI/HS	(0.5, 0.75, 1)
4	Very high influence/strength	VHI/VHS	(0.75, 1, 1)

Source: (Tavana et al., 2021)

All values, influences and strengths of the elements are then written into the strength-influence matrix $\widetilde{D}$.

$$\widetilde{D} = \begin{pmatrix} (l_{11}, m_{11}, u_{11}) & (l_{12}, m_{12}, u_{12}) & \cdots & (l_{1n}, m_{1n}, u_{1n}) \\ (l_{21}, m_{21}, u_{21}) & (l_{22}, m_{22}, u_{22}) & \cdots & (l_{2n}, m_{2n}, u_{2n}) \\ \vdots & \vdots & \ddots & \vdots \\ (l_{n1}, m_{n1}, u_{n1}) & (l_{n2}, m_{n2}, u_{n2}) & \cdots & (l_{nn}, m_{nn}, u_{nn}) \end{pmatrix} \tag{10}$$

Step 2: Derive the normalized strength-influence matrix $\widetilde{X}$

The strength-influence matrix $\widetilde{D}$ normalized using normalization (11), to obtain the normalized strength-influence matrix $\widetilde{X}$.

$$x_{ij} = \frac{(l_{ij}, m_{ij}, u_{ij})}{\sum_{j=1}^{n} u_{ij}}, i, j = 1, ..., n \tag{11}$$

Step 3: Derive the total strength-influence matrix $\widetilde{T}$

Total strength-influence matrix $\widetilde{T} = (T_l, T_m, T_u)$ is derived separately for the lower bounds (12), the middle values (13), and the upper bounds (14).

$$T_l = X_l (I - X_l)^{-1} \tag{12}$$

$$T_m = X_m (I - X_m)^{-1} \tag{13}$$

$$T_u = X_u (I - X_u)^{-1} \tag{14}$$

For the defuzzification the following equation is chosen.

$$T = \frac{T_l + 4T_m + T_u}{6} \tag{15}$$

Step 4: Sum the rows (6) and the columns (7) and then construct the causal diagram.

2.4. Convergence problem in WINGS

When the total strength-influence matrix T is derived, the convergence problem may occur, because the infinite sum of terms does not converge:

Let $X = \left[x_{ij} \right]_{n \times n}$, $0 \le x_{ij} < 1, 0 < \sum_{j=1}^{n} x_{ij} \le 1,\ 0 < \sum_{i=1}^{n} x_{ij} \le 1.$

Then $\sum_{i=1}^{h} X^i = X + X^2 + X^3 \ldots + X^h = X(I + X + X^2 + X^3 + \ldots + X^{h-1})\left[(I - X)(I - X)^{-1} \right] =$

$= X(I - X^h)(I - X)^{-1}.$

The total strength-influence matrix T can be obtained by

$T = X + X^2 + X^3 + ... = \lim_{h \to \infty} \sum_{i=1}^{h} X^i$, when $\lim_{h \to \infty} X^h = \left[0 \right]_{n \times n}$. If all row sums are not equal to 1, then we can provide $\lim_{h \to \infty} X^h = \left[0 \right]_{n \times n}$ (Chen et al., 2017). If all row sums are equal to 1, then $\lim_{h \to \infty} X^h \neq \left[0 \right]_{n \times n}$, and a convergence problem arises.

2.4.1. Example with convergence problem

There is one example, where the convergence problem arises in WINGS method. Figure 1 shows the graph of system with corresponding linguistic evaluations.

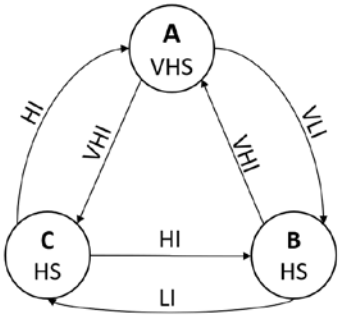

Figure 1. The graph of system (Example 1)

Assessments of decision maker are written into the strength-influence matrix D.

$$D = \begin{pmatrix} 4 & 1 & 4 \\ 4 & 3 & 2 \\ 3 & 3 & 3 \end{pmatrix}$$

Table 2. The normalized strength-influence matrix X with Row sums

X	A	B	C	Row sums
A	0,444	0,111	0,444	1
B	0,444	0,333	0,222	1
C	0,333	0,333	0,333	1

The normalized strength-influence matrix X has all row sums equal to 1, therefore the total strength-influence matrix T cannot be determined, because $T = X + X^2 + X^3 + ... + X^n + ... = X(I - X)^{-1}$ does not exist. The WINGS method cannot be used.
Some authors solved convergence problem with different normalization, where instead of (2) take (3) (Michnik, 2013).
We propose a new approach – Finite sum of WINGS influences (FSI WINGS), that interpretaion folowing.

2.4.2. Interpretation of new approach

The total strength-influence matrix T represents the sum of all normalized influences and strength of elements. $T = X + X^2 + X^3 + ...,$ where X represents direct normalized influences and strength, and $X^2, X^3, X^4, ...$ represent indirect influences and strength of the element. The different levels of influences and strengths are determined. The first level are

direct influences and strength collected in matrix X. The second level are indirect influences and strength through one element, represented in matrix X^2. The third level are indirect influences and strength through two elements gathered in X^3 and so on. The indirect influences and strength of elements on a selected element are initially large and then decrease with the levels. The higher levels of influences are smaller and contribute less to the total influence.
So, our new proposal differs from the WINGS method in step 3, where the total strength-influence matrix T is calculated. Instead of an infinite sum, a finite sum (a certain number of terms) is used (one term less than the number of elements).

2.5. Finite sum of WINGS influences – FSI WINGS

Step 1: Generate the strength-influence matrix D

Step 2: Derive the normalized strength-influence matrix X (1)

Step 3: Derive the total strength-influence matrix T

This step differs in the FSI WINGS method from the WINGS method. In FSI WINGS, matrix T is a finite sum of influences between factors. T is calculated as follows

$$T = X + X^2 + ... + X^{n-1}. \tag{16}$$

Step 4: Sum the rows (6) and the columns (7) and then construct the causal diagram

3. EXAMPLE

An example from the literature (Tavana et al., 2021), where the fuzzy WINGS is examined, is selected. The data is computed with different types of WINGS method (WINGS, fuzzy WINGS and FSI WINGS). Then, the results are compared with each other.

Figure 2 shows the map of influence relationships between factors, with the corresponding linguistic evaluations of decision maker.

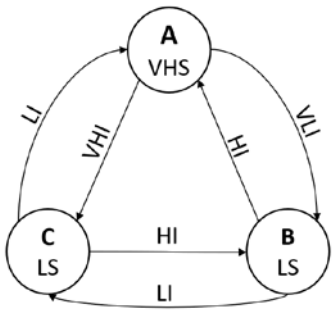

Figure 2. The graph of system (Example 2)

3.1. WINGS method

First the calculation with WINGS method is made. Assessments of decision maker are written into the strength-influence matrix D.

$$D = \begin{pmatrix} 4 & 1 & 4 \\ 3 & 2 & 2 \\ 2 & 3 & 2 \end{pmatrix}$$

The normalized strength-influence matrix X derived by (1), but instead of maximum of row sums (2) we take sum of all row sums (3).

$$X = \begin{pmatrix} 0.174 & 0.043 & 0.174 \\ 0.130 & 0.087 & 0.087 \\ 0.087 & 0.130 & 0.087 \end{pmatrix}$$

In Table 2 the results derived with the WINGS method are presented.

Table 3. T matrix obtained with WINGS method, Row sums (R), Column sums (C), Prominence values (R_i+C_i) and Relations values (R_i-C_i)

T (WINGS)	A	B	C	R	C	$R_i + C_i$	$R_i - C_i$
A	0.252	0.095	0.247	0.594	0.591	1.185	0.003
B	0.193	0.125	0.144	0.462	0.390	0.851	0.072
C	0.147	0.170	0.139	0.456	0.531	0.986	-0.075

3.2. Fuzzy WINGS method

The strength-influence matrix D shows assessments written in corresponding TFNs.

$$D = \begin{pmatrix} (0.75,\ 1,\ 1) & (0,\ 0.25,\ 0.5) & (0.75,\ 1,\ 1) \\ (0.5,\ 0.75,\ 1) & (0.25,\ 0.5,\ 0.75) & (0.25,\ 0.5,\ 0.75) \\ (0.25,\ 0.5,\ 0.75) & (0.5,\ 0.75,\ 1) & (0.25,\ 0.5,\ 0.75) \end{pmatrix}$$

The normalized strength-influence matrix X of upper bounds, middle values and lower bound derived by (12), (13) and (14).

$$X = \begin{pmatrix} (0.100,\ 0.133,\ 0.133) & (0.000,\ 0.033,\ 0.067) & (0.100, 0.133,\ 0.133) \\ (0.067,\ 0.100,\ 0.133) & (0.033,\ 0.067,\ 0.100) & (0.033,\ 0.067,\ 0.100) \\ (0.033,\ 0.067,\ 0.100) & (0.067,\ 0.100,\ 0.133) & (0.033,\ 0.067,\ 0.100) \end{pmatrix}$$

In Table 3 the results derived with the fuzzy WINGS method are presented.

Table 4. T matrix obtained with fuzzy WINGS method, Row sums (R), Column sums (C), Prominence values (R_i+C_i) and Relations values (R_i-C_i)

T (fuzzy WINGS)	A	B	C	R	C	$R_i + C_i$	$R_i - C_i$
A	0.168	0.061	0.166	0.394	0.401	0.796	-0.007
B	0.134	0.089	0.098	0.321	0.273	0.593	0.048
C	0.100	0.123	0.096	0.318	0.359	0.677	-0.041

3.3. FSI WINGS method

The normalized strength-influence matrix X derived by (1).

$$X = \begin{pmatrix} 0.174 & 0.043 & 0.174 \\ 0.130 & 0.087 & 0.087 \\ 0.087 & 0.130 & 0.087 \end{pmatrix}$$

In Table 4 the results derived with the FSI WINGS method are presented (16).

Table 5. T matrix obtained with FSI WINGS method, Row sums (R), Column sums (C), Prominence values (R_i+C_i) and Relations values (R_i-C_i)

T (FSI WINGS)	A	B	C	R	C	$R_i + C_i$	$R_i - C_i$
A	0.225	0.078	0.223	0.526	0.524	1.049	0.002
B	0.172	0.112	0.125	0.408	0.346	0.754	0.062
C	0.127	0.157	0.121	0.405	0.469	0.873	-0.064

3.4. Summary of example

Figure 2 shows the results derived with different types of WINGS method (WINGS method, fuzzy WINGS method and FSI WINGS method) in cause and effect diagram.

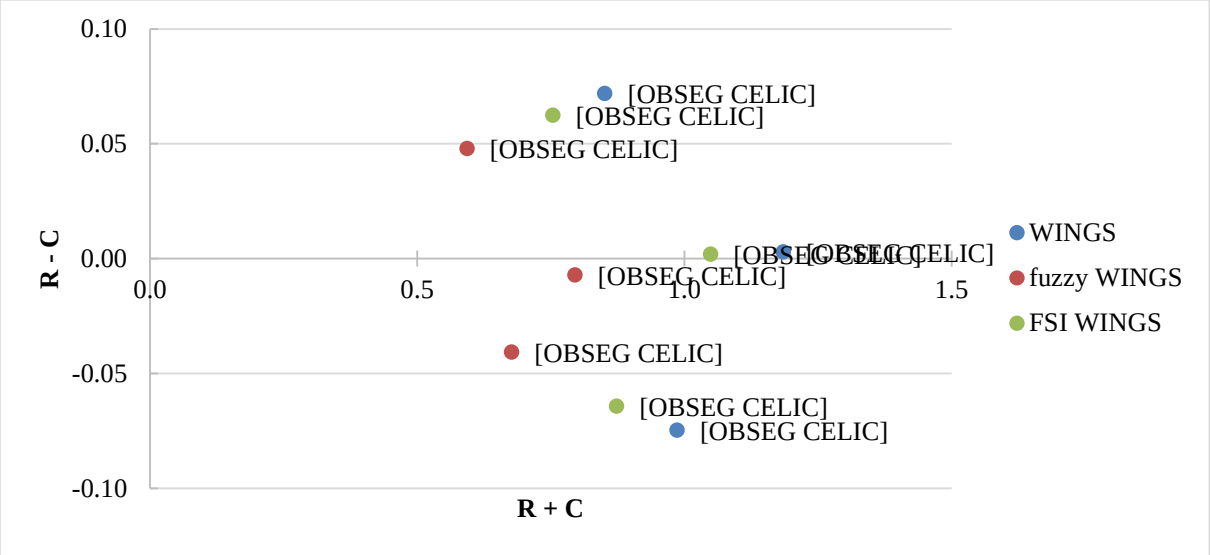

Figure 3. Cause and effect factor calculated with different types of WINGS method

The distribution and relationships between the elements of the all three methods are similar as can be seen in the diagram. Elements in the cause group and elements in the effect group are the same for all methods. We can see, that the absolute values of the elements, that depend on the normalization of assessments, are different, while the relative values of the elements, that represent the relationships between the elements, remain similar regardless of which method is used. We can conclude that the FSI WINGS method is suitable since it provides comparable results to the WINGS method and fuzzy WINGS method.

4. CONCLUSION

In this paper, we have discussed the WINGS method and fuzzy WINGS method. WINGS method, as a descendant of DEMATEL method, inherits all merits, good and bad, of its predecessor. One of drawback is that the convergence problem occurs when the infinite sum of normalized influences does not converge.

We proposed the new method Finite sum of WINGS influences – FSI WINGS. Instead of an infinite sum, the FSI WINGS method uses a finite sum (a certain number of terms) of influences. This method has successfully solved the problem of convergence. In order to validate the new method, it was compared with the WINGS method and the fuzzy WINGS method from the literature. The results show, that FSI WINGS method is suitable for the application, since it gives similar results to the other two methods.

In summary, the FSI WINGS method can be used as an MCDM method to evaluate the relationships between elements in system in many different fields.

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NOVI WINGS PRISTUP – WINGS KONAČNI ZBIR UTICAJA

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Izvod

WINGS (engl. Weighted Influence Non-linear Gauge System) je višekriterijmska metoda odlučivanja. Koristi se kao strukturni model za analizu interakcije između elemenata. WINGS je relativno nova metoda, ali sve više koristi. Neki autori su već unapredili originalnu metodu i uključili u nju fazi brojeve. Problem konvergencije može nastati kada se izvodi matrica konačnog zbira uticaja. Predložili smo da se umesto korišćenja beskonačnog zbira članova u matrici ukupne jačine uticaja koristi konačan zbir uticaja. Cilj ovog rada je da se predloži novi concept WINGS metode – WINGS konačni zbir uticaja (engl. Finite Sum of WINGS Influences - FSI WINGS). FSI WINGS metoda daje rezultate koji su uporedivi sa WINGS metodom, pa je stoga pogodan za upotrebu.

Ključne reči: *metoda višekriterijumskog odlučivanja, WINGS konačni zbir uticaja, fazi brojevi, problem konvergencije*

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ANALYSIS OF FLUCTUATION AND ABSENTEEISM IN PRODUCTION ENTERPRISES IN THE CITY OF BOR

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Abstract

This paper work has aims to analyze fluctuation and absenteeism, also the extent to which employees are satisfied with their work, and the reasons why they leave the organization and the reasons why employees are absent from work. Workforce fluctuation and absenteeism are some of the most important attitudes towards work and work organization, which affect the motivation of workers, and indirectly the outcomes of some forms of work behavior. The research for this paper work was conducted on the territory of the city of Bor, and it refers to job satisfaction as the basic element that has the greatest impact on the behavior of employees in the organization.

Key words: *fluctuations, absenteeism, job satisfaction, leaving the organization, absence from work*

1. INTRODUCTION

Every organization, or any form of enterprise, is basically made up of people, who are united in certain groups, in order to achieve certain goals. Individuals and groups, within the organization, enter into different types of relationships, which can be formal and informal, and can be connected by certain interests. Accordingly, within human resource management, in addition to the educational approach, there must be a sociological approach.

Successful organizations around the world view employees as their primary development resource. Motivation and employee satisfaction are becoming the basis of a modern organization. Among the most important aspects of work behavior that organizations want to influence are certainly employee turnover and absenteeism. The goal of every work organization, both for-profit and non-profit, is to ensure the highest possible productivity of employees and to reduce the turnover of quality staff to a minimum. For that reason, the subject of this paper is focused on these two aspects of work behavior, and their connection with the above attitudes towards work and work organization.

Job satisfaction has been observed in two aspects in previous research. On the one hand, the authors sought to determine the factors that condition it, and on the other hand, the consequences of job satisfaction or dissatisfaction on mental and physical health, productivity, absenteeism, turnover and various other forms of work behavior were examined. As personal potentials change over the years, the change in work potentials is in step with the development of new technologies and globalization. Therefore, the factors that affect the ability to work are constantly changing. Initially, research into the causal

factors of job satisfaction implied the existence of only one general factor, but later the indisputable fact was confirmed that there are many factors that affect job satisfaction. They act interactively and change depending on the individual, work situation, characteristics of the organization, superiors and the like (Joković et al., 2018).

2. THEORETICAL PART

2.1. Workforce fluctuation

Labor fluctuation is a complex psychological and social phenomenon, caused by a combination of social, economic, technological, psychological and other factors. From a psychological point of view, fluctuation is seen as a form of avoidance, dissatisfaction, as well as maladaptation to the work situation. Most often, a worker leaves the collective when he is dissatisfied with something or when another work organization gives him a better chance of meeting certain expectations. If we look at fluctuation as a process, it means that the final decision is preceded by a longer or shorter period of dissatisfaction. It can be concluded that fluctuation means self-initiated leaving of the collective, which usually occurs because of dissatisfaction and expectations that the other work organization will satisfy them more and more adequately (Gidens, 2003).

The amount of fluctuatuon is expressed as a quantitative expression of the relationship between the number of workers who left the work organization and the average number of employees in that organization. Such results show whether the fluctuation is high or low.

To find out the factors and causes of fluctuation, a specific procedure is applied in the form of an exit interview, which according to the degree of standardization can have different forms from unsystematic to standardized. It analyzes only the end result of the process, while the essence, the course of dissatisfaction and the final decision to leave remain undiscovered and unknown.

The interest of theorists and practitioners in studying employee turnover stems from the knowledge that this is a very important and potentially expensive phenomenon that describes the end result of the decision-making process. The topic that has been attracting the attention of many analysts in the last few decades is the attempt to answer the question of what influences the employee's decision to leave his previous job. Despite the lack of a single answer, organizations and organizational theorists are concerned about understanding the reasons for (involuntary) leaving the organization because each form of abandonment entails significant costs that burden the overall organizational business. When employees decide to leave the organization voluntarily, its overall efficiency decreases for a number of reasons, including loss of knowledge and skills of outgoing employees, or an increase in the cost of recruiting, selecting and training new ones (Mihajlov et al., 2020).

At first glance, it may seem to some that the turnover does not cost the company anything, in the sense that one employee left and another came to his job, who continues to work for the same salary, which means that the total labor costs remain unchanged. However, this forgets the time it takes to replace one employee with another, as well as the costs incurred on that occasion. There is no pre-determined limit beyond which fluctuations are considered high because the conclusion as to whether fluctuations in a company are high or not depends on the size of the company and the business it is engaged in. In principle, companies that have a harder-to-replace workforce are more affected by higher turnover than companies whose workforce is easily replaceable.

Recruitment is one of the key steps in retaining employees in an organization. Too many people are looking for jobs that are not in line with their education, experience, competencies and behavior, and employers are unwilling or unable to determine which

candidates are properly suited to the jobs offered. McNally argues that high rates of absenteeism and fluctuations can be avoided by creating a realistic job overview. This implies quality design of the job, apropos defining the nature of the job, which requires a detailed and precise analysis of the needs of the job within the job description and the necessary qualifications through the specification of jobs.
All job details (compensation, benefits, working conditions, managerial style, challenges and all requirements) must be clearly defined in advance as well as expectations from employees, at least orally and informally, if there is no official document to convey such information. Since expectations have a distinct influence on the feelings, attitudes and intentions, it is important to examine the expectations of employees from the workplace and the organization. Holtom emphasizes that time is an important determinant of monitoring expectations, and advises examining expectations when entering an organization and examining expectations from future organizations of already established employees, explaining that future expectations determine current and future behaviors (Živković, 2020).

2.2. Types of fluctuation

Numerous studies of the work environment have proven that there are various types of fluctuations, for example inevitable, voluntary, useful, useless, internal, external and others. And the most attention with researchers is inevitable and voluntary.
The inevitable fluctuation implies the departure of human resources from the company due to force majeure. These are reasons that we cannot influence, such as: retirement by force of law, severe disability, death, joining the army or serving a prison sentence, then marrying or getting married outside the workplace, climate and health problems, nostalgia for family and fig.
Voluntary fluctuation is one that, as a rule, can be influenced by certain corrective factors, and it is the subject of various researches, primarily economic, sociological and psychological. The main characteristic of this type of fluctuation is that it mainly causes negative consequences on the business plan and the achievement of the company's goals (Keranović, 2005).
The term fluctuation is often used in different meanings, so some authors avoid it, taking in their opinion more precise terms such as leaving or leaving the organization. This is because the term fluctuation often means not only those who have left the company but also their replacements, therefore the total movement from the organization and in the organization. However, according to the narrower definition, fluctuation is any permanent departure from the organization. It arises due to resignations, transfers from organizational units, dismissals, retirement, death and the like. Departures are what need to be determined when planning and determining human resource needs. There are two basic forms of fluctuation: intentional and unintentional.
Intentional fluctuations include: dismissal from the organization based on the personal decision and wishes of the person leaving or due to organizational needs. It can be controlled, that is, the organization can influence the facts that condition it.
Unintentional fluctuations are caused by departures from the organization: due to retirement, death, therefore those forms of departure that cannot be influenced by either an individual or an organization (Bahtijarević, 1999).

2.3. Fluctuation factors

Fluctuation exists in every company, regardless of its size, activity, technical equipment, location and the like. It exists to a greater or lesser extent in every organization, company, institution. It depends on numerous factors: the character of the economic system, the level of employment or unemployment, capacity, accumulative and reproductive capabilities of the company, its location, natural distribution of profits, the nature of interpersonal relationships, psychological characteristics of human resources and the like. All these factors can be grouped into three groups: external, internal and personal (Rajkov et al., 1996).

External factors of fluctuation are all those factors over which the work organization has no direct influence and control. These are actually external factors and these factors include: the character of the socio-economic system, the level of employment or unemployment, the company's capacity, the company's location, the seasonal nature of business and the like.

Internal fluctuation factors are all those factors that are directly related to the work and business of the company. They refer to the internal, physical and social conditions of the working environment. These factors include: branch of activity, company size, character and content of work, salary, physical conditions of the working environment (microclimate, lighting, noise, noise and vibration) and finally the social conditions of the working environment (management and interpersonal relations).

Personal fluctuation factors are directly related to the personality of employees, their biological and work characteristics, these factors relate to the characteristics of employees such as: gender, marital status, age, qualifications, length of service and the like (Marković et al., 2009).

2.4. Absenteeism

In a business organization, absenteeism deals with the phenomenon of absence of employees from work on different grounds, with different motivation, causes and consequences for employees, but also for the organization itself. The extent to which absenteeism will exist in a business organization depends primarily on the integration of human resources of that organization, the existence of organizational or corporate culture, leadership style, and the existence of a positive work atmosphere (Frančesko et al., 2008).

Absenteeism to a certain extent and form exists in every organization. If it is unjustified and arbitrary, it is the most obvious indicator of a problem in an organization, and because of its easy observation and clear parameters that define it, the management of each organization can approach in-depth analysis of motives that led to absenteeism. those indicators. Of course, not all absences from work are unjustified and arbitrary, but there are justified or forced absences, but if you look at the classification of these absences, and determine the extent to which they are represented, as in the case of unjustified and voluntary absences, you can get valuable, fast and reliable indicators of employee dissatisfaction with the organization, or management. When the causes of absenteeism are determined, depending on the type and factors, an analysis of organizational and managerial relations must be approached.

Absence from work is a rare phenomenon that is given little importance. Frequent absences of workers from work processes adversely affect costs as well as the overall productivity of the business system, which ultimately results in the competitiveness of the final product or service. In most cases, the employer sees only the direct costs of leave (for example, sick leave), while other (indirect) costs are usually not taken into account by the employer. Indirect costs such as replacement costs (education, management hours for additional

supervision), administrative costs and costs associated with declining productivity are very difficult to understand without specialized knowledge and skills. As a result, employers generally declare the costs of absences immeasurable, small and difficult to manage without affecting the organization and cost of labor. Previous models of absenteeism control were mostly repressive in nature and most often negatively affected the organizational culture and reputation of the employer in the context of socially responsible business. With repressive control, absenteeism is initially reduced, while real costs rise rapidly, and organizational culture deteriorates at the same time. In order to counteract the above, it is recommended to introduce such measures and activities that result in significant financial savings while increasing employee satisfaction and improving the overall efficiency of the organization (Ilić, 2020).

From the point of view of an individual, frequent and unjustified absences mean dissatisfaction, insufficient attachment to work and involvement in the work organization, or they can be a way of solving some family or material problems. There are different definitions of absences, but most often absence means self-initiated, temporary interruption of work, ie. absence of a worker lasting at least one working day.

Absence from work, ie. absenteeism, is the most important parameter to be monitored, along with the fluctuation of the workforce. The reason for that is that high absenteeism has a negative effect not only on colleagues and superiors who have to deal with a larger volume of work, but ultimately on the company's profit. Namely, when it comes to the costs incurred due to the use of sick leave, then, in addition to the payment of sick leave borne by the employer, one should take into account the possible costs of temporary employees who are replaced, additional engagement of managers dealing with replacement instead of more constructive jobs. we should not forget the missed opportunities, such as lost sales, decline in the quality of services, which all reduces the company's revenue.

2.5. Types of absenteeism

There are different types of absenteeism in every organization, because employees are absent for different reasons. These absences can be divided into two categories:

- justified or forced absences, and
- unjustified or arbitrary absences.

Justified absences include absence from the organization on various grounds: illness (treatment, rehabilitation, including various occupational diseases and injuries at work), motherhood (pregnancy, childbirth, raising a minor child, etc.), going to military service, participating in military exercises, response to a call from a state body, suspension from work due to breach of duty, annual leave, paid and unpaid leave, and finally an agreement with the organization, ie. the superior manager.

Unjustified or arbitrary absences are exclusively related to the employee's will not to come to work or to the organization. These are absences without agreement and justification.

Solving the problem of absenteeism in the organization is important for several reasons:

- Absenteeism reduces the productivity and profitability of the organization and its management;
- makes it difficult to achieve strategic goals, primarily the organization of the total quality;
- weakening of competitiveness in the domestic and foreign markets;
- makes it difficult to plan human resources for expected tasks;
- indicates the symptoms of the problem and the specific disease of the organization that is it most often manifests itself in the high costs of replacing abstainers, by

training new ones workers, by introducing them to work, all through the so-called "Lost profits".

2.6. Factors of absenteeism

As with fluctuation, absenteeism is affected by certain factors, which can be classified into external, internal and personal (Tanasijević, 2007).
External factors of absenteeism are objective in nature and include:

- the character of the socio-economic system;
- employment rate, ie. unemployment rate;
- migration;
- location of the organization and the nature of its activities.

Internal factors of absenteeism are those that are directly related to the work and business of the organization. These factors include:

- size of the organization;
- character and content of the paper;
- amount of rent;
- microclimatic working conditions;
- interpersonal relations and management system.

Personal factors of absenteeism refer to the characteristics of employees, such as gender, marital status, age, education, work experience and the like.

Before deciding what to do to reduce absenteeism, he takes sick leave or for what reasons he is most often absent from work in a certain company. Namely, useful information is whether it is an extremely physically and mentally difficult and stressful job, whether mothers with small children or middle-aged employees who take care of old parents predominate among the employees. Or maybe they are very young employees, without family obligations, who thus make themselves an extended weekend that they use for travel and entertainment. Or it is a company in which there is a mentality of overemphasized rights, according to which employees look at how to take as much as possible from the company, and do not look at how they will contribute to the company's success. In such companies, employees believe that the company exists because they would have a job and receive a salary (Keranović, 2005).
Strategies to reduce absenteeism aim to increase employee motivation to keep absenteeism to a minimum. This can be achieved in different ways: enriching work, improving selection, harmonizing work requirements, opportunities and interests of executors, democratic leadership style, open communication between superiors and subordinates, valuing, rewarding and giving bonuses for accurate job arrivals, designing and creating healthy working environment, establishing counseling and assistance programs in solving personal and family problems, implementing stress reduction programs, providing recreation, sports and other activities in order to achieve employee loyalty (Rodić, 2020).

3. RESEARCH RESULTS WITH DISCUSSION

In order to research job satisfaction, as the basic element that achieves the greatest impact on the behavior of employees in organizations, 112 workers were surveyed in the city of Bor. The survey was conducted in the production dependent companies of one company from the territory of the municipality of Bor. In this paper, we will examine how a random sample of employees perceives their work and how satisfied they are with it, and whether it can be noticed that someone in their organizations deals with human resources. Is human resource management in use in this organization, and are employees satisfied and motivated, and what motivates them given their position in the organization. The research was conducted both among managers and staff, where based on the results obtained, a comparison can be made of how different employees, managers and staff look at the reasons for turnover and absenteeism.

The main method in this research is a random sample survey, where the questionnaire is anonymous, and an analysis of the results obtained based on the collected data was performed. For the gradation of the obtained answers, the Likert five-point scale was used, where 1 mean “completely disagree” and 5 “completely agree”. The questionnaire consists of two parts, where the first part consists of 5 questions that provide demographic data on respondents such as gender, age, level of education, occupation and place of residence, and the second part consists of 25 questions divided into 4 groups.

According to the gender structure of the total of 112 respondents, 71 respondents (63%) are male and 41 respondents (37%) are female.

Regarding the age structure, the largest number of respondents is between 46 and 55 years old and a total of 31 respondents from that age group (28%), followed by respondents aged 36-45 years, a total of 28 respondents (25%), the age group 26-35 has 24 respondents (21%), the next group is 18-25 years old and it has 15 respondents (13%), and the smallest number of respondents has an age group of 56 and over, 14 respondents %).

In the educational structure of respondents, out of a total of 112 respondents, the largest number has a high school, a total of 52 respondents (46%), and only one respondent has a doctorate (1%), 4 respondents have a master's degree (4%), a total of 34 respondents have a university degree 30%), and finally 21 respondents (19%) have a college degree.

By years of service, the largest number of respondents has more than 20 years of service, a total of 44 respondents (39%), followed by respondents with work experience ranging from 10 to 20 years, a total of 31 respondents (28%), 19 respondents %) have work experience between 3-10 years, followed by respondents with work experience from 1 to 3 years, 11 respondents (10%), and the smallest number of respondents 7 (6%) have up to one year of work experience.

Among the managers with a total of 40 managers, top management has 8 managers (7%), and 32 managers (29%) are middle managers, and finally the staff that includes the largest number of respondents, a total of 72 respondents (64%). For each of the above criteria, the obtained results are presented in percentage in Table 1.

Table 1. Demographic data of respondents

Demografske varijable	Kompozicija uzorka	
	Kategorije	Procenat (%)
Pol	muški	63
	ženski	37
Godine starosti	od 18 – 25 godina	13
	od 26 – 35 godina	21
	od 36 – 45 godina	25
	od 46 – 55 godina	28

	preko 56 godina	13
Stručna sprema	srednja škola	46
	viša škola	19
	fakultet	30
	magistratura	4
	doktorat	1
Godine radnog staža	do 1	6
	od 1 – 3	10
	od 3 – 10	17
	od 10 – 20	28
	preko 20	39
Pozicija u preduzeću	radni kadar	64
	menadžment srednjeg nivoa	29
	top menadžment	7

In addition to the five criteria within the demographic data, the second group of questions was analyzed, which refers to whether the organizational system is the reason for leaving the organization, management, i.e. superiors, whether colleagues are the reason for leaving, whether absences from work (justified and unjustified) indicator of employee dissatisfaction.

3.1. Organizational system as a reason for employees to leave the organization

The most common reason why employees leave the organization is the organization itself, ie the organizational system is the reason for their departure, because employees do not have the opportunity to advance within that organization, working conditions are bad, the management is not ready to invest in staff, and there is no possibility for training. the amount of income is low and there are many other reasons why employees leave the organization, and the reason is the organizational system. By surveying employees, both managers and staff, we came to the results that reflect the current state of influence of the organizational system as a reason for the departure of employees.

Employees do not have the opportunity to advance within the organization. When asked whether employees do not have the opportunity to advance within the organization, the largest number of surveyed workers gave a positive answer, i.e. 32 respondents (28%) answered that they partially agree with this statement, while 28 respondents (25%) partially disagree, 21 the respondent (19%) completely agreed, 19 (17%) completely disagreed, while 12 (11%) remained neutral.

Management is not ready to invest in staff - small opportunities for the development of professional knowledge. When asked whether there are few opportunities for the development of professional knowledge, the largest number of respondents, 31 (28%), partially agree with this statement, while 25 respondents (22%) partially disagree.

Lack of benefits as a problem of the organizational system. When asked whether the lack of benefits is a problem of the organizational system, the largest number of respondents, 71 respondents (64%) partially or completely agree with this statement, which is more than half of the surveyed workers, concluding that lack of benefits is a problem of organizational system in accordance with the opinion of the employees themselves.

The amount of income is low in relation to the income that employees have in similar or the same jobs. Whether the level of income in relation to the income of employees in similar or the same jobs is satisfactory, 66 respondents (59%) out of a total of 112 surveyed workers agree.

3.2. Management - assumed as the reason for the departure of employees from the organization

One of the reasons for employees leaving the organization, or their leaving the organization is management or superiors, because superiors favor certain employees within the organization, because employees have poor communication with superiors, there is conflict with superiors or perhaps because superiors do not understand employee problems.
Supervisor favors individual employees within the organization. When asked whether the superior favors certain employees within the organization, 30 respondents (27%) believe that this is the case and agree with the statement, while 29 respondents (26%) took a neutral position, and only 9 respondents disagreed with with this claim.
Poor communication with superiors. When asked if poor communication with superiors is the reason why employees leave the organization, 33 surveyed workers (29%) took a neutral position on this statement, while most of the 48 surveyed workers took the position that they agree with this statement and it represents almost 50% of respondents.
Conflict with superiors. When asked whether the conflict with their superiors was the reason why employees left the organization, the largest number of surveyed workers took a neutral position 37 (33%), while 21 (19%) respondents agreed or disagreed with the statement.

3.3. Colleagues as a reason for leaving one job and moving to another

A good relationship with colleagues at work is important because of a good work atmosphere. Colleagues at work have the same effect on men and women, but it turned out that those women who are in leading positions in a certain company fare worse, while with men in leading positions, things are different. Unlike women in the same positions, they have the same number of good colleagues, while women very often do not have the support of colleagues. Regarding colleagues, the most common reasons why employees move from one job to another are conflict with colleagues, poor communication with colleagues, laziness of colleagues, and mobbing by colleagues.
Conflict with colleagues. Whether the conflict with colleagues is the reason for the departure of employees from one job to another, 32 (29%) respondents are neutral, while 33% of respondents are completely or partially inconsistent with this statement.
Poor communication with colleagues. When asked whether poor communication with colleagues is the reason why employees leave one job to another, 15 (13%) respondents completely agree, while 11 (10%) completely disagree with it, while as many as 29 (26%) respondents the worker has a neutral attitude.
Sexual harassment. Based on the results obtained, the largest number of respondents 29 (25%) are neutral on sexual harassment, and 45 respondents (41%) are completely or partially inconsistent with this statement, while 26 surveyed workers (23%) said that it was completely agree that sexual harassment is the reason why employees leave their jobs.

3.4. Absences from work (justified and unjustified) as an indicator of employee dissatisfaction

As a consequence of employee dissatisfaction, there are justified and unjustified absences from work. Absences lose an average of 10% of working time. More short-term absences cause bigger problems for the organization than one long-term absence, because with more short-term absences, the organization cannot be reorganized. The reasons why employees are absent from work are dissatisfaction with the work performed, paid leave, small benefits, difficulties caused by occupational diseases, clear instructions on the tasks that employees should perform and other reasons.

Impossibility of advancement and professional career development. When asked whether employees are absent from work because they do not have the opportunity for career development, almost 50% of respondents gave an affirmative answer, 36 respondents (33%) partially agree with this statement while 16 respondents (14%) fully agree. The same number of 16 respondents (14%) completely disagrees with this statement.
Dissatisfaction with the work being done. When surveyed, when asked if employees are absent from work because they are dissatisfied with the work they perform, the largest number of surveyed workers, 51 (45%) expressed their partial or complete agreement with this statement, while 34 respondents (30%) took a neutral attitude.
Poor results of the organization and low compensation of employees as a reason for absence from work. Based on the question asked in the research, it can be concluded that the poor performance of the organization and low compensation of employees are the reason why the employee is absent from work. Most of the surveyed workers partially agree with 36 (32%) and completely agree with 24 (21%) with this statement.

4. CONCLUSION

The human factor in the organization is an unavoidable and most important resource. It consists of smaller or larger groups of people with all their differences, smaller or larger abilities and needs. With quality management, it is possible to reconcile all differences and make the most of them. Successful coordination of these two sectors can compensate for some other shortcomings in the organization. Good interpersonal relationships are difficult to create, but once they are established, they need to be maintained and improved. The governing role has a decisive role in that. She must, by personal example, promote the creation of a pleasant working atmosphere and good interpersonal relationships. If interpersonal relations are bad, the first person, i.e., the manager, is most responsible for that (Radosavljević et al., 2007).
The problem of measuring organizational performance signals the orientation of companies towards quality, achieving business excellence in their organizational performance primarily by focusing on people. The key performance of measuring the quality of human resources in the organization is primarily employee satisfaction and evaluation of their success. Employee satisfaction can be measured through subjective assessments of employee satisfaction with certain aspects of membership in the organization or objective, turnover and work absenteeism. Performance appraisal is measured using a variety of methods and techniques with the participation of multiple evaluators. In this way, a complete picture of employees is obtained, which creates a basis for compensation, further training, promotion, selection.
Successful organizations around the world view employees as their primary development resource. Motivation and employee satisfaction are becoming the basis of a modern organization. At the same time, special emphasis is placed on job satisfaction, as a significant indicator of job stimulation and the overall work dimension, because a satisfied worker is less absent from work,
and even less thinking about leaving the organization. Job satisfaction is often seen in empirical research and practice as an important indicator of work motivation. Fluctuation and absenteeism are conditioned by job satisfaction and dedication or dedication to work, and if these two conditions are not met, there is a distance from work.
Respondents cite working conditions, insufficient and inadequate work incentives and insufficient job security as reasons for dissatisfaction with work. The majorities of respondents who assess that they are satisfied with their job cite independence in work and love for work as reasons. In order to see the level of job satisfaction, and thus the fluctuation and absenteeism in organizations in our country, a survey was conducted in the

city of Bor. The research tried to come up with data that will indicate at what level employees are satisfied with their work, and what the reasons are why they leave the organization and why they are absent from work. The research was conducted both among managers and among the working staff, who expressed their opinion on various performances that define fluctuation and absenteeism. Based on the obtained results, it can be noticed that the opinions of the manager and the working staff on certain elements are divided, while on some they are completely in agreement. Motivation as one of the most important elements in human resource management is at the lowest level. The obtained results indicate that very little attention is paid to motivating employees, and this attitude was taken by both managers and staff.

It is necessary to pay special attention to the organization in the way in which employees are rewarded, promoted and to pay attention to the development of staff within the organization, which would further lead to a high degree of success of the organization itself.

ANALIZA FLUKTUACIJE I APSENTIZMA U PROIZVODNIM PREDUZEĆIMA U BORU

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Izvod

Ovaj rad ima za cilj da analizira fluktuaciju i apsentizam, odnosno u kojoj meri su zaposleni zadovoljni svojim poslom, i koji su to razlozi zbog kojih oni napuštaju organizaciju i zbog kojih razloga zaposleni odsustvuju sa posla. Fluktuacija radne snage i apsentizam predstavljaju neke od najznačajnijih stavova prema radu i radnoj organizaciji, koji utiču na motivaciju radnika, a time posredno i na ishode nekih oblika radnog ponašanja. Istraživanje za ovaj rad je sprovedeno na teritoriji grada Bora, i odnosi se na zadovoljstvo poslom kao osnovnog elementa koji ima najveći uticaj na ponašanje zaposlenih u organizaciji.

Ključne reči: *fluktuacija, apsentizam, zadovoljstvo poslom, napuštanje organizacije, odsustvo sa posla*

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