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S poštovanjem,

Dr Dejan Kojić, docent
Glavni i odgovorni urednik

EDITORS' INTRODUCTION

Dear fellow authors, distinguished readers,

In the front of you is the first issue of the scientific journal of social and technological development - STED Journal in 2020, published by the University of Business Engineering and Management. The first issue in 2020 includes 10 papers. Published papers have got a positive review by two independent reviewers. Reviews are anonymous and reviewers do not know the authors identity. Reviewers have also suggested the sorting of papers into scientific and expert category. Reviewers have given their consent for publishing of paper based on their assessment of originality, novelty, used methodology and literature of paper.

Each paper is assigned COBISS, UDC and DOI number by the National and University Library of the Republic of Srpska. The journal has its analytically revised articles which are published in the current national bibliography, and it is included in the central electronic catalogue. All members of the editorial board have scientific or educational titles from the narrow scientific fields covered by the journal. The journal is included in the DOAJ, INDEX COPERNICUS, EBSCO, ROAD, CEEOL i GOOGLE SCHOLAR citation databases.

On the last pages of the journal, there is also the bibliography of papers published in second issue in 2019.

We thank the reviewers of papers whose professionalism and critical approach have greatly contributed to the quality of published papers.

With best wishes,

Dr Dejan Kojić, docent
Editor-in-Chief

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PHYTOCHEMICAL STUDY TO VALIDATE THE ETHNOBOTANICAL IMPORTANCE OF *Dioscorea steriscus* TUBERS OBTAINED FROM ZIMBABWE

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ABSTRACT

Modern people have embraced plants as a source of useful bioactive compounds. As such, plants with medicinal properties have become essential components in human life. The purpose of this study was to investigate the phytochemical profile of the extract of *Dioscorea steriscus* tubers obtained from Zimbabwe. Phytochemicals were extracted from tubers of *D. steriscus* using aqueous acetone. UV-Visible Spectrophotometry, Fourier transform infra-red (FTIR) spectrometry and high-performance liquid chromatography (HPLC) techniques were used to determine the phytochemical profile of the tuber extract. The yield of phytochemicals extracted from *D. steriscus* tubers was found to be 6.38 %. The presence of bioactive compounds possessing phenyl, organic hydroxyl, amine, carboxyl, carbonyl, acyl, alkyl and aromatic functional groups was confirmed using UV-Visible and FTIR analysis. The presence of substantial amounts of vanillic acid and kaempferol in *D. steriscus* tubers was confirmed using HPLC analysis. In support of the ethnobotanical values of *Dioscorea* species, the study confirmed the presence of potent phytochemicals in the extract of *D. steriscus* tubers obtained from Zimbabwe.

Keywords: *Dioscorea steriscus*, ethnobotany, medicinal plant, phytochemicals.

INTRODUCTION

Plants have been used as sources of food and medication by man since ancient times (Eleazu, Eleazu, & Ikpeama, 2012). Plants that are known to contain chemical substances with definite physiological action on biological systems are called medicinal plants or herbs. Medicinal plants have been discovered long back by ancient man through trial and error methods (Dar, Shahnawaz & Qazi, 2017). The presence of biologically active and potent chemical substances in these plants makes them ethnobotanically important. Various studies have shown that many plants are rich sources of phytochemical compounds that

possess useful medicinal properties (Altemimi, Lakhssassi, Baharlouei, Watson, & Lightfoot, 2017). A number of researchers have been extensively studying the possible applications of phytochemicals in resolving current health problems (Altemimi, Lakhssassi, Baharlouei, Watson, & Lightfoot, 2007; Sheikh, Kumar, Misra, & Pfoze, 2013; Dzomba & Musekiwa, 2014; Musila, Nguta, Lukhoba, & Dossaji, 2017; Abdel-Hady et al., 2018). Medicinal plants have been used for many years to treat medical conditions, as food flavorants, food preservatives and to combat disease epidemics (Dar et al., 2017). It is recommended that research on medicinal plants and tubers is performed to investigate their unknown agronomic qualities, physicochemical characteristics and other possible medicinal properties (Musila et al., 2017; Abdel-Hady et al., 2018; Tapera, 2019).

The *Dioscoreaceae* family members, also known as yam species are widely distributed medicinal plants in the world. Among the *Dioscoreaceae* family members, the *Dioscorea* genus is known to be one of the oldest yams found wildly or cultivated by man (Dutta, 2015). Other tubers of the same genus with *Dioscorea steriscus* include *Dioscorea alata*, *Dioscorea pentaphylla*, *Dioscorea bulbifera*, *Dioscorea villosa*, *Dioscorea orbiculata*, *Dioscorea hispida* and *Dioscorea pubera*. Among these members, *D. alata*, *D. pentaphylla*, *D. bulbifera*, *D. villosa* and *D. hispida* have been utilized as traditional medications especially for skin infections and wound healing (Dutta, 2015). *Dioscoreaceae* tubers have been reportedly used as sources of traditional medicine to treat several ailments including diarrhea and diabetes (Sakthidevi & Mohan, 2013).

Dioscorea steriscus is a yam commonly found in Zimbabwe and southern Africa. It is popularly used as food as well as a source of traditional medications in the northern parts of Zimbabwe. Preliminary phytochemical screening assays on *D. steriscus* tuber extracts confirmed the presence of flavonoids, terpenoids, saponins, alkaloids, polyphenols, tannins, steroids and glycosides (Tapera & Machacha, 2017). Moreover, total phenolic content of above 69.00 mg/g was recorded from extracts of *D. steriscus* tubers obtained from Zimbabwe (Tapera & Machacha, 2017). Similar studies on different *Dioscorea* yams confirmed the presence of potent phytochemicals that possess medicinal potential (Sheikh et al., 2013; Roy & Geetha, 2013; Narkhede et al., 2013). Figure 1 shows a pictorial view of *D. steriscus* tubers obtained from Zimbabwe.

Figure 1. A pictorial view of D. steriscus tubers

Enormous evidence shows that *D steriscus* is widely used as a source of supplementary food and traditional medicine in Zimbabwe (Dzomba & Musekiwa, 2014; Tapera & Machacha, 2017; Washaya, Mupangwa, & Muranda, 2016). *D. steriscus* is acclaimed to treat a variety of diseases which include hypertension, diabetes, heart attacks, stomach pains, erectile dysfunction in man and obesity (Dzomba & Musekiwa, 2014). *D. steriscus* has been categorized as an underutilized or neglected plant (Washaya et al., 2016). Underutilized plants are those crops that were once grown more extensively but their cultivation has dwindled due to economic, agronomic or genetic reasons (Czarapata, 2005). Moreover, *Dioscorea* species are also listed under priority underutilized root and tuber crops of Africa, Asia and Latin America (Wagner, Herbst, & Sohmer, 1999).

The frequency of use of *D. steriscus* tubers among residents of Bindura, Zimbabwe has been reported (Washaya et al., 2016). The plant is known to be an integral component of the traditional medicine and food system of some tribes in Zimbabwe. Washaya et al., confirmed that *D. steriscus* is a popular food and medicinal tuber consumed in Bindura, Zimbabwe (Washaya et al., 2016).

There is need to verify traditional and oral information regarding the chemical properties and biological activities of plant materials. The most appropriate approach towards authentication of chemical and biological properties of plant materials is through chemical analysis. Several analytical chemistry instruments and methods have been developed and validated for the purpose of analyzing different sample matrices. Advancement in science and technology has also seen the development of several methods and techniques for extraction, isolation and identification of medicinal compounds in plant materials (Naczk & Shahidi, 2004).

In this work, UV-Visible spectrophotometry, FTIR and HPLC techniques have been employed to evaluate the phytochemical profile of *D. steriscus* tuber extract.

EXPERIMENTAL

Chemicals and reagents

Analytical reagent grade methanol, acetone, hexane, chloroform, formic acid, potassium bromide and acetonitrile were obtained from Labcraft, Zimbabwe. Vanillic acid and kaempferol standards were procured from Sigma Aldrich, Germany.

Plant material and preparation of extract

Fresh and mature *D. steriscus* tubers (voucher specimen number 43) were collected in July 2019 from Bindura, Zimbabwe. Identification and authentication of the plant was done by a Botanist at Harare Polytechnic's horticultural section. The phytochemical extract of the plant tubers was prepared as per the protocol reported earlier (Adeogun, Maroyi, & Afolayan, 2017; Zhang, Lin, & Ye, 2018). In short, the fresh plant tubers (250.0 g) were reduced to a pulp using a porcelain mortar and pestle. The ground material was subjected to cold extraction with 60 % acetone (v/v) in distilled water. The extraction process was accelerated by shaking for 24 hours on a mechanical shaker. The extract obtained was sequentially extracted using chloroform and hexane in a separating funnel to get rid of lipids and other non-polar components. The crude extract solution was evaporated to dryness under reduced pressure at 50 °C using a rotary evaporator. The yield of the phytochemical extract was determined using the formula in Equation 1 as recommended (Ruwali, Ambwani, Gautam, & Thapliyal, 2015). The dried crude *D. steriscus* tubers extract was refrigerated at 4 °C before further use.

$$\text{Extraction yield (\%)} = \frac{\textit{Final dry weight of extract}}{\textit{Initial weight of fresh plant material}} \times 100 \quad (1)$$

UV-Visible spectrophotometric analysis

For UV-Visible spectrophotometric analysis, the dried extract (2.0 g) was dissolved in methanol and diluted appropriately with the same solvent. UV-Visible spectrophotometric analysis was then performed on the extract solution using a UV-Visible spectrophotometer (*Specroquant 300*) at ambient temperatures. The UV-Visible spectrophotometric spectrum of the tuber extract in the wavelength range 200-800 nm was captured.

Fourier transform infra-red (FTIR) analysis

FTIR analysis of *D. steriscus* tuber extract was conducted using an *Infra 3000A* FTIR instrument system. Briefly, a small portion of the tuber extract was thoroughly mixed with previously dried potassium bromide salt in a ratio of 1:10 using a mortar and pestle. The mixture was pressed into thin disks prior to FTIR analysis. FTIR analysis was then performed to identify characteristic peaks and their functional groups in the wavenumber range of 400-4000 cm^{-1}. The FTIR spectrum for the extract was captured.

High performance liquid chromatography (HPLC) analysis

In order to confirm the presence of potent phytochemical compounds in *D. steriscus* tuber extract, HPLC analysis of the tuber extract was performed on an *Agilent 1100* HPLC system equipped with a binary pump (G1312A), degasser (G1379A) and a photodiode array detector (PDA G1315A). Two reference phenolic compounds (vanillic acid and kaempferol) were used for HPLC analysis. Before conducting HPLC analysis, the *D. steriscus* tuber extract was further cleaned using column purification. Column purification of the crude tuber extract was conducted according to the process described by Bajpai et al., with small changes (Bajpai, Majumder, & Park, 2016). A column was filled with a silica gel paste made in hexane-ethyl acetate mixture of ratio 1:1. The packed column was given enough time to settle. Organic solvents with different polarities were used to sequentially fractionate the crude tuber extract following the order petroleum ether, acetone, ethyl acetate, methanol and finally water. The different fractions were collected and preserved for further use.

The HPLC method was validated by determination of linearity, limits of detection, limits of quantification and precision as recommended in similar works (Nour, Trandafir, & Cosmulescu, 2013). For the purpose of validation, six different standard concentrations in the range 0.05-0.5 ug/mL were prepared for both vanillic acid and kaempferol. Concentrations of the standards versus their HPLC peak area values were used to plot calibration curves. The correlation coefficients (R^2) values were used to indicate the linearity of the method. The precision of the method was calculated from the standard deviations determined from the analysis of a series of replicate standards. The precision was reported as percent relative standard deviation (% RSD) and was calculated using Equation 2.

$$\text{Precision} = \frac{SD}{Mean} \times 100 \qquad (2)$$

where, SD = standard deviation of replicate standard measurements

Limits of quantification and limits of detection for both standards were calculated using equation 3 and 4 respectively.

$$\text{Limit of quantification} = \frac{10 \times \delta}{S} \qquad (3)$$

where, δ = standard deviation of response (peak area) and S = slope of the calibration curve.

$$\text{Limit of detection} = \frac{3.3 \times \delta}{S} \qquad (4)$$

where, δ = standard deviation of response (peak area) and S = slope of the calibration curve.

Conditions for HPLC analysis

HPLC analysis was conducted as recommended by other researchers (Abdel-Hady, 2018; Theerasin & Baker, 2009). HPLC grade acetonitrile, methanol and water were used as solvents. The volume of injection for each sample was 20 µL and a reversed phase C-18 column (Agilent, Zorbax ODS, 5 µm, 4.6 mm x 150 mm) was used. The sample flow rate was set at 0.3 mL/min under gradient mode of elution employing 0.1 % formic acid in HPLC grade water as solvent number 1 and a blend of methanol and acetonitrile (1:1.5; v/v), acidified with 0.1 % formic acid as solvent number 2. The gradient of elution was maintained as follows: 50 % solvent 2 for 0-2 minutes, 20 % solvent 2 for 2-4 minutes, 70 % solvent 2 for 4-6 minutes and finally 5 % solvent 2 for 6-30 minutes. The chromatogram was monitored at 254 nm using a PDA detector. The HPLC chromatogram obtained was processed using the Masylynx software. The HPLC chromatogram was provisionally interpreted by comparison of retention times of the sample chromatogram with that of the reference compounds.

RESULTS AND DISCUSSION

Extraction yield

The yield of phytochemicals extracted from *D. steriscus* tubers was calculated using the formula for yield of extraction in Equation 1.

Extraction yield (%) = 15.96 g ÷ 250.00 g × 100= 6.38 %

The phytochemical yield was very low. The low yield can be attributed to the use of the solvent extraction technique, which typically gives poor yields (Ajila et al., 2011). Costly methods could be used in order to improve the yields; however, the focus of the work was not on the yield of extraction, and rather it was on the quality of the extract. Low yields of phytochemicals in the range 5 %-15 % have also been reported in other researches (Acharyya, Patra, & Bag, 2009; Joy & Siddhuraju, 2017).

UV-Visible analysis

From the UV-visible analysis, *D. steriscus* tuber extract showed characteristic UV-Visible spectrophotometric absorption peaks at wavelength 216 nm, 288 nm and 326 nm. Phytochemicals, specifically flavonoids and their derivatives, have characteristic absorption peaks in the range 230-290 nm and 300-360 nm (Dhivya, 2017). The UV-Visible spectrophotometric absorption bands of *D. steriscus* tuber extract are therefore typical for flavonoids and their derivatives. The precise location and relative intensities of the UV-Visible absorption bands may vary a bit and gives important data on the quality and nature of the flavonoids present (Saxena & Saxena, 2012). The occurrence of UV-Visible spectrophotometric bands in the 200-400 nm range for a given sample typically shows the presence of unsaturated groups and hetero-atomic compounds (Jain, Soni, Jain, & Bhawsar, 2016). The UV-Visible spectrophotometric profile of *D. steriscus* tuber extract showed the presence of organic chromophores characteristic of polyphenolic compounds.

Fourier transform infra-red (FTIR) analysis

D. steriscus tuber extract was analyzed using FTIR in the range 400-3800 cm^{-1}. Figure 2 displays the FTIR spectrum for *D. steriscus* tuber extract.

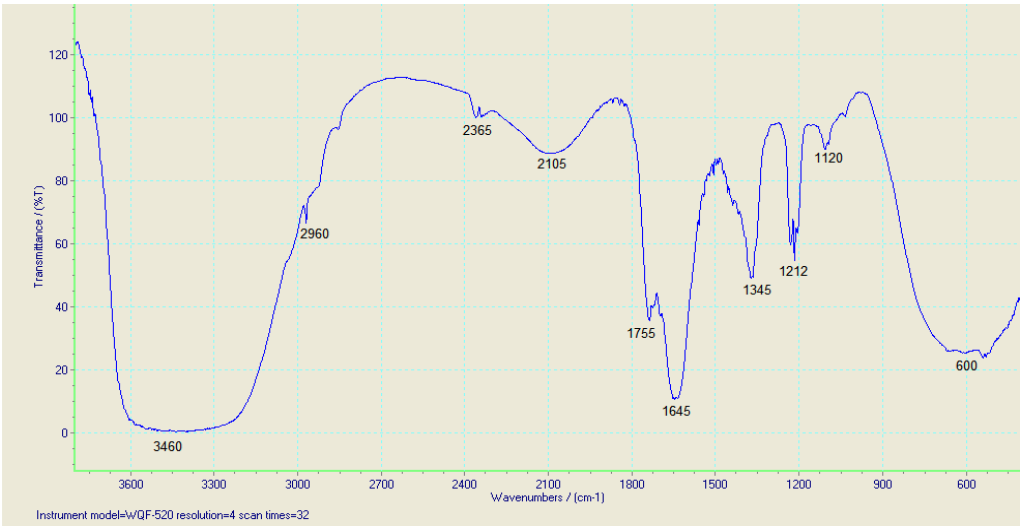

Figure 2. FTIR spectrum for *D. stericus* tuber extract

As shown in Figure 2, the following key peaks were found in the FTIR absorption pattern of *D. steriscus* tuber extract: 3460 cm^{-1}, 2960 cm^{-1}, 2105 cm^{-1}, 1755 cm^{-1}, 1645 cm^{-1}, 1345 cm^{-1}, 1212 cm^{-1}, 1120 cm^{-1} and 600 cm^{-1}. Table 1 summarizes the probable allocations of bonds to each of the distinctive peaks. The findings showed that the *D. steriscus* tuber extract contains phenyl, organic hydroxyl, organic nitro, carboxyl, carbonyl, acyl, alkyl, and aromatic compounds, as elaborated in Table 1. The FTIR study results are consistent with other studies performed on other natural products.

Trifunschi et al., determined flavonoids and phenolic compounds in *V. album* and *A. sativum* herbal extracts using FTIR analysis and confirmed the presence of O-H groups, C=O groups and C=C systems (Trifunschi, Munteanu, Agotici, Pintea, & Gligor, 2015). Similar functional groups were also described on FTIR analysis of Indian medicinal plant extracts (Ashokkumar & Ramaswamy, 2014).

Table 1. Probable bond assignments to FTIR peaks

Absorption peak	Possible assignment
3460 cm^{-1}	Vibration due to O-H (alcohol at 3200-3400 cm^{-1} and carboxylic acid at 3500 cm^{-1})
2960 cm^{-1}	Stretching vibrations of CH_3, CH_2 and CH
2105 cm^{-1}	Stretching vibration of variable bonds
1755 cm^{-1}	Stretching vibration of C=O in aldehydes
1645 cm^{-1}	Stretching vibration of C=O in ketones
1345 cm^{-1}	Bending vibration of CH_3
1212 cm^{-1}	Stretching vibrations of acyl or phenyl C-O
1120 cm^{-1}	Bending vibrations of -C-C-C-
600 cm^{-1}	Bending vibrations and aromatic ring vibrations due to C=C

High performance liquid chromatography (HPLC) analysis

HPLC method validation

Table 2 summarizes the validation parameters for the HPLC method used in this study. As indicated in Table 2, high R^2 values that are greater than 0.99 were obtained. The high R^2 values for the vanillic acid and kaempferol calibration curves used for validation purposes indicate a good response linearity of the method. The repeatability for both vanillic acid and kaempferol retention times was below 1.0 %, indicating the accuracy of the method. The percentage relative standard deviations for the peak areas of both standards were less than 1 .0 %, indicating the precision of the method. The results on the validation parameters in Table 2 indicate that the HPLC technique was reliable and sensitive enough for the study.

Table 2. Regression equations, R^2 values and validation parameters for HPLC analysis of phenolic standards

Phenolic standard	Regression equation	R^2 value	Limit of detection (µg/mL)	Limit of quantification (µg/mL)	Precision (% RSD)
Vanillic acid	y = 100435x+7961.4	0.999	0.00085	0.0026	0.44
Kaempferol	y = 10739x+348.76	0.994	0.00340	0.0102	0.98

HPLC analysis of D. steriscus tuber extract

Vanillic acid and kaempferol in *D. steriscus* tuber extract were determined using the HPLC method. The characteristic retention times for vanillic acid and kaempferol were used to identify them from the HPLC chromatogram of *D. steriscus* tuber extract. To determine their concentrations in the tuber extract, calibration curves for both vanillic acid and kaempferol were used. The typical HPLC chromatogram for the standards (vanillic acid and kaempferol) and the *D. steriscus* tuber extract are shown in Figure 3 and Figure 4 respectively.

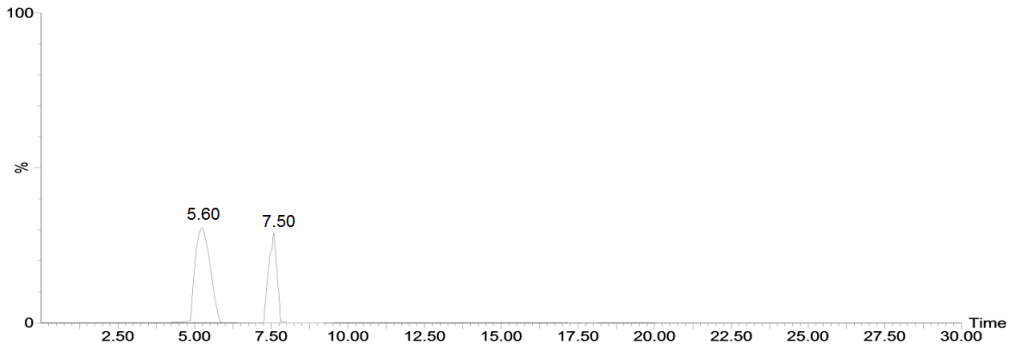

Figure 3. Typical HPLC chromatogram of the standards (kaempferol and vanillic acid)

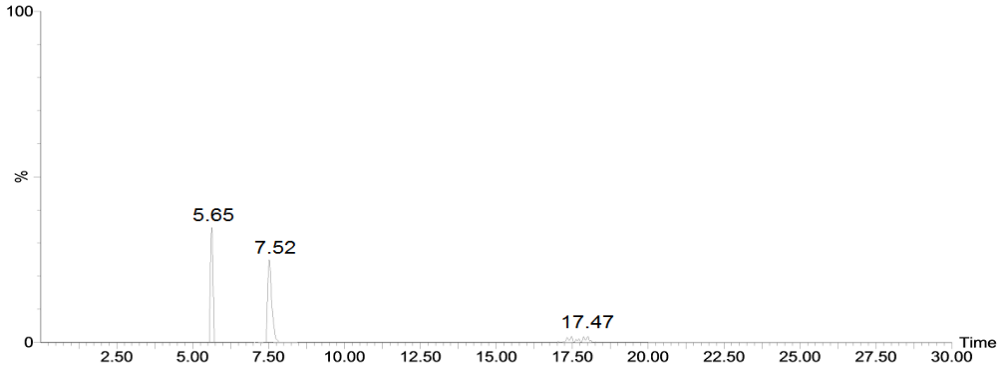

Figure 4. Typical HPLC chromatogram of *D. steriscus* tuber extract

As can be seen in Figure 4, vanillic acid and kaempferol in the *D. steriscus* tuber extract were detected at 7.52 minutes and 5.65 minutes respectively. The concentration of vanillic acid in *D. stersicus* tuber extract was found to be 0.0829 ±0.003 µg/g whilst that of kaempferol was found to be 0.0108 ±0.001 µg/g. The findings confirmed the presence of vanillic acid and kaempferol in the *D. steriscus* tuber extract. Many other polyphenolic compounds proven to possess potent biological activity can also be found in *D. steriscus* tubers.

The reported compounds (vanillic acid and kaempferol) are powerful bioactive compounds which have extensive applications in the food, medical and related industries. Other researchers also detected and quantified vanillic acid and kaempferol in other plant extracts (Theerasin & Baker, 2009; Calderon-Montano, Burgos-Morón, Pérez-Guerrero, & López-Lázaro, 2011; Seal, 2016). It is evident from the presence of vanillic acid and kaempferol in *D. steriscus* that the plant is a possible source of other essential medicinal compounds.

CONCLUSION

This investigation provided basic evidence on *Dioscorea steriscus's* phytochemical composition using UV-Visible spectrophotometry and FTIR techniques. The HPLC analytical approach additionally verified the presence of vanillic acid and kaempferol in *D. steriscus* tuber extract. *Dioscorea steriscus* can be concluded to contain several active phytochemicals. The presence of potent phytochemicals in *D. steriscus* tuber extract authenticates its ethnobotanical importance. The use of *D. steriscus* tubers as a source of folk medicine is therefore highly recommended. However, there is need to further isolate, identify and ascertain the bioactivity and toxicity of phytochemicals from *D. steriscus* tubers.

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DEVELOPMENT OF GEOGRAPHIC INFORMATION SYSTEM IN EDUCATION BY USING THE RATIONAL UNIFIED PROCESS IN BANDUNG

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ABSTRACT

Education must be obtained and guaranteed by the government with quality and equitable services in all regions in Indonesia. Geographic information systems become one of the solutions that can help the process of equitable education and help the government take appropriate actions. This study discusses how the development of a website-based geographic information system that can be used to map the distribution of educational data in the city of Bandung using the Rational Unified Process (RUP) and Unified Modeling Language (UML) methods for system modeling. The process of making maps in this study uses Quantum GIS (QGIS) software with database storage using PostgreSQL. The output target of this study is in the form of a geographic information system website mapping educational data distribution in the city of Bandung. This website is created as a graphic summary dashboard based on the spatial field of education so that the public and government can easily draw conclusions about the distribution of existing education such as knowing the balance of the number of schools, teachers and students in an area that can affect the quality of teaching and learning activities in schools and the quality of education in that area.

Keywords: Education, Webgis, RUP, GIS, Qgis

INTRODUCTION

Geographic Information Systems (GIS) are systems that can be applied in various fields of science, events, and occupations that require good and interactive spatial data display so that system users can more easily understand the concepts of data distribution in education, population, location, spatial, etc. (Hamdani & Virgana, 2019). An example of the application of GIS in the field of education is GIS distribution of educational data that results in thematic maps of the distribution of schools in an area, this map can be used for analysis of school distribution and assisting in the distribution of education programs in the area.

The zoning system is one of the efforts of the Indonesian government to realize equitable access to services and quality of education throughout Indonesia as stated in Law No.20 of 2003 concerning the National Education System Chapter IV Article 5 (1) namely that every citizen has the same right to get a quality education. And Article 11 (1), namely the Government and Regional Governments must provide services and facilities, as well as guarantee the quality of education for every citizen without discrimination (Pemerintah Indonesia, 2003). With this zoning system, it is expected to be able to overcome problems around education such as student capacity, inequality of infrastructure, and equitable quality of teachers.

The purpose of this study is to create a website-based geographic information system that maps the distribution of educational data including schools, teachers, students and zoning in the city of Bandung. This mapping is expected to help the educational equality process and help the government take appropriate actions. To create this system, researchers used Rational Unified Process (RUP) software development methods with Unified Modeling Language (UML) modeling language tools. In addition, for the process of making maps using Quantum GIS (QGIS) software, while for database storage using PostgreSQL. QGIS (Quantum GIS) is a free desktop geographic data (GIS) framework application that is used to survey, change, and investigate geospatial information. The advantages that QGIS has besides being free are a shorter preparation time, good rendering capacity, and are easy to use in making GIS Applications (Khan & Mohiuddin, 2018). PostgreSQL is an open source object relational database system (ORDBMS) that uses standard SQL as an interface language and uses a GiST index that can be used to index geometric data types, as well as full text search (Makris, Spiliopoulos, Tserpes, & Anagnostopoulos, 2019). In PostgreSQL there is a special extension called PostGIS which integrates several geographical functions and supports geographical objects and geometry types for Points, LineStrings, Polygons, MultiPoints, MultiLineStrings, MultipPolygons and GeometryCollections. GIS in this study is a Web-based Geographic Information System (WebGIS), a geographic information system (GIS) application that uses a computer network to integrate and convey geographical information in the form of map data visualization on the World Wide Web (Rizky, Nugraha, & Wijaya, 2015).

In the literature, several examples of educational mapping can be found. There is a paper discusses about the analysis of the spatial distribution of kindergarten facilities in the Mukalla district in Yemen (Lagrab & Aknin, 2015). Another paper discusses about school mapping and school geospatial analysis in Jasra block of Allahabad district, India (Agrawal & Gupta, 2016).

METHODS

To define a good software project flow, researchers use the Rational Unified Process (RUP) software engineering approach developed by IBM, and can be done repeatedly (iteratively) as shown in Figure 1 (Mubarok, Harliana, & Hadijah, 2015).

RUP has 4 stages or phases, namely inception, elaboration, construction, and transition. Inception is the first stage that is doing business modeling and identification of system requirements to be made. Elaboration (expansion/planning) is the stage of architectural planning, analysis and system design. Construction is the stage of developing, implementing and testing the system. Transition is the stage of system installation, user training, system maintenance and testing.

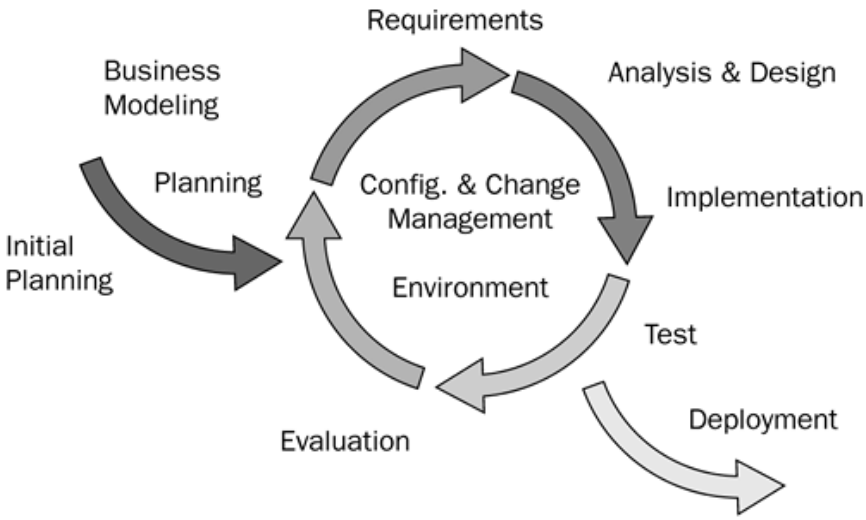

Figure 1. RUP Iterative Process

RESULTS AND DISCUSSION

In this section the results of the research carried out will be described. From the research that has been done, some data on the distribution of Bandung city education in the Bandung City Education Office has not been visualized into a map and is still in the form of a table. This makes the data distribution of education such as the distribution of schools, teachers and students difficult to understand directly and requires further analysis to obtain information about the distribution of data needed. The following is an example of data on the number of primary schools in the city of Bandung in the form of a table as shown in Table 1 and 2.

Table 1. Sample Data on Number of Public and Private Primary Schools in Bandung City

No.	ID	Sub-district	Number of public elementary schools	Number of private elementary schools
1	3273050	Astanaanyar	11	6
2	3273190	Cicendo	15	12
3	3273070	Lengkong	11	11
4	3273110	Cibiru	12	2
5	3273111	Panyileukan	5	3
6	3273250	Sukasari	15	7
7	3273030	Bojongloa Kaler	5	5
8	3273010	Bandung Kulon	17	10
9	3273210	Cibeunying Kidul	10	6
10	3273170	Sumur Bandung	5	9
11	3273230	Coblong	14	8
12	3273130	Arcamanik	10	7
13	3273150	Kiaracondong	13	4
14	3273040	Bojongloa Kidul	7	7
15	3273020	Babakan Ciparay	13	7
16	3273060	Regol	13	9
17	3273180	Andir	6	18
18	3273240	Sukajadi	13	10
19	3273101	Gedebage	5	2

Table 2. Sample Data on Number of Public and Private Primary Schools in Bandung City (continue from table 1)

No.	ID	Sub-district	Number of public elementary schools	Number of private elementary schools
20	3273100	Rancasari	5	3
21	3273080	Bandung Kidul	6	3
22	3273141	Antapani	10	4
23	3273142	Mandalajati	10	3
24	3273220	Cibeunying Kaler	6	4
25	3273160	Batununggal	10	6
26	3273260	Cidadap	7	8
27	3273121	Cinambo	2	0
28	3273090	Buahbatu	9	3
29	3273200	Bandung Wetan	2	15
30	3273120	Ujung Berung	7	1

To facilitate the process of designing a geographic information system website for the distribution of Bandung city education data, researchers used UML diagrams that are easy to learn and illustrate systems with different perspectives (De Sousa, Kelvin, Neto, & De Carvalho, 2017). UML diagrams used by researchers are use case diagrams with 2 actors namely Admin and Public. Admin in this system is the official of the education office in charge of managing the GIS website and the Public is another user such as the public or parties who need information on the distribution of educational data, the user can only view maps on this GIS website as shown in Figure 2.

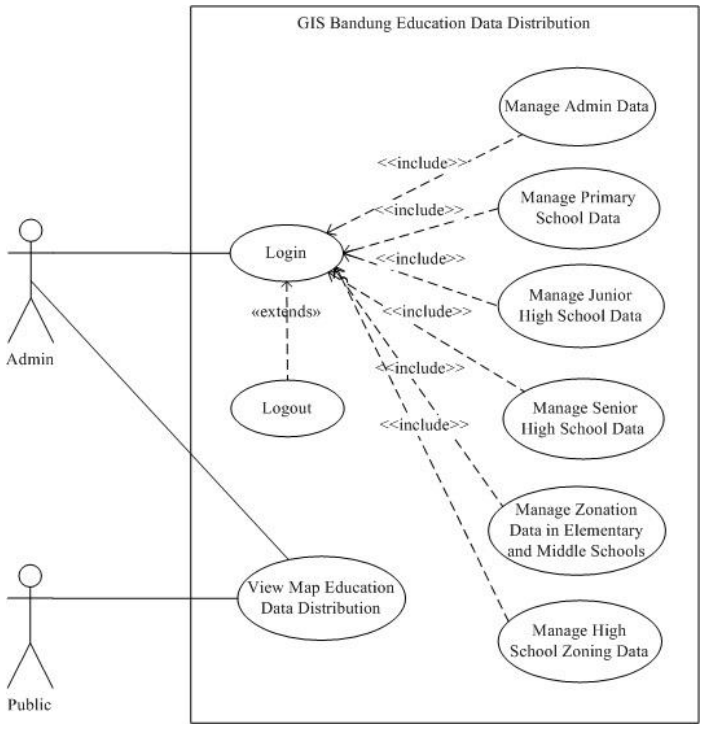

Figure 2. Usecase Diagram of WebGIS Bandung Education

The following Figures 3, 4 and 5 which are examples of the appearance of a geographic information system website that has been designed:

Figure 3. Display Page Home Website GIS Bandung Education

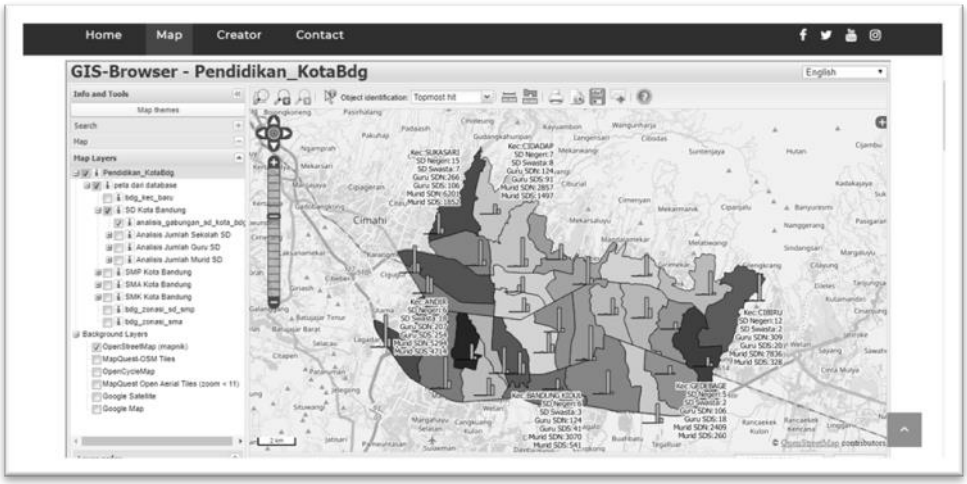

Figure 4. Display Page Map Website GIS Bandung Education

Figure 5. Display Page Login Admin Website GIS Bandung Education

Figure 3 is the main page display/ home website of the Bandung city education geographic information system which contains some information related to the Bandung city education department. Figure 4 is a map or map page that can be accessed by the public and the admin. On the map or map page there are several maps of education analysis in the city of Bandung such as the analysis of the number of schools, teachers and students of elementary, junior high, high school, and vocational education. This map is equipped with captions, histogram diagrams, and different colors to make it easier and faster to understand. Figure 5 shows the login page for the admin to be able to enter the admin dashboard page to manage map and website data.

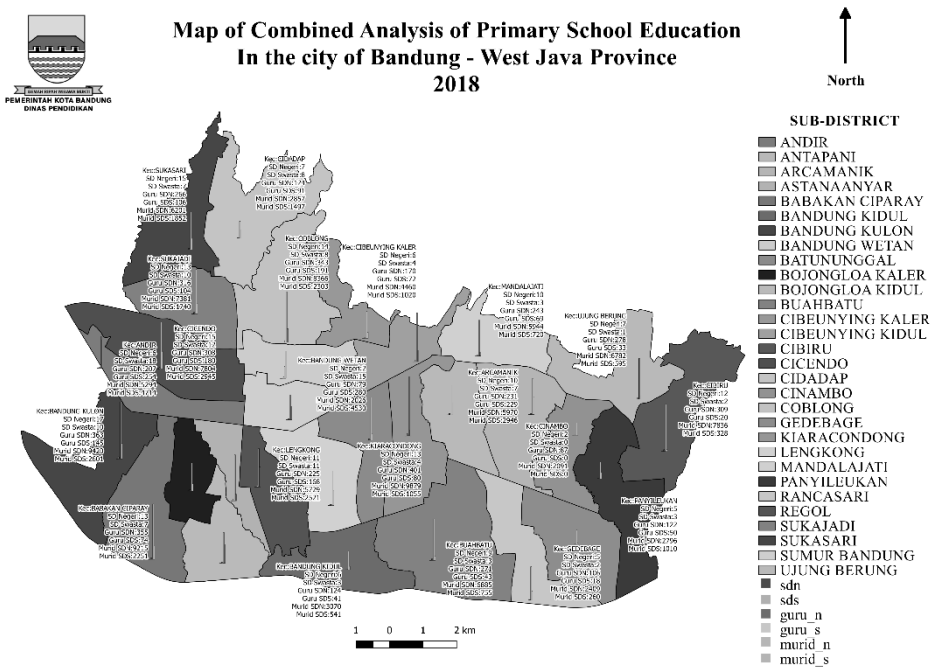

Figure 6. Map of Combined Analysis of Education in Primary School with Legend

Figure 6 is a map of the analysis of education based on districts in the city of Bandung that has been made. Figure 6 also features a legend that shows districts and information for charts of the number of public and private primary schools, the number of teachers, and the number of students.

In this study the researchers conducted a black box testing process to test the website to function as expected. Testing is done by testing the function, appearance, and navigation of the website. Blackbox test results can be seen in the following table:

Table 3. Website Display and Navigation Test Results

No.	Tested Functions	Testing Scenarios	Expected results	Test result	
1.	Displays website	Run a local web server, then access the website through a browser.	The browser can display web pages	According to expectations	Succeed
2.	Display the home page	Access the Home page through the Home menu navigation.	The browser can display the Home page	According to expectations	Succeed
3.	Displays the Map page	Access the Map page via the Map menu navigation.	The browser can display the Map page	According to expectations	Succeed
4.	Displays the Creator page	Access the Creator page via the Creator menu navigation.	The browser can display the Creator page	According to expectations	Succeed
5.	Displays the Contact page	Access the Contact page through the Contact menu navigation.	The browser can display the Contact page	According to expectations	Succeed
6.	Display the Login page	Access the Login page via the Login menu navigation.	The browser can display the Login page	According to expectations	Succeed

Table 4. Process Function Testing Results on the website

No.	Tested Functions	Testing Scenarios	Expected results	Test result	
1.	Perform the login process	Fill in your username and password correctly as they are registered in the database, then click Enter.	Login successful	According to expectations	Succeed
		Fill in the username correctly and fill in the wrong password, then click Enter.	Login failed	According to expectations	Succeed
		Fill in the wrong username and fill in the password correctly, then click Enter.	Login failed	According to expectations	Succeed
		Fill in the wrong username and fill in the wrong password, then click Enter.	Login failed	According to expectations	Succeed
		Leave the username and password field blank, then click Enter.	Login failed	According to expectations	Succeed
2.	See a map of the distribution of educational data	Enter the Map menu then select the analysis result you want to display.	The map of the selected analysis results is displayed	According to expectations	Succeed
		Enter the Map menu and then don't select the results of the analysis.	Map of analysis results is not displayed	According to expectations	Succeed

CONCLUSION

Geographic information system website for educational data that is designed can present thematic maps of the distribution of educational data in the city of Bandung in the form of a more interesting, informative, and accessible visualization at any time. With this system, it can also help the process of analyzing the distribution of education that is useful for the government in making decisions regarding the distribution of education in the city of Bandung. In addition, residents of the city of Bandung get information about the distribution of education in the city of Bandung easily and quickly.

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PORODIČNA AFEKTIVNA VEZANOST KOD SUICIDALNIH PACIJENATA

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SAŽETAK

Rad se oslanja na Bowlby-jevu teoriju afektivnog vezivanja, u skladu sa pretpostavkom da kvalitet afektivne vezanosti u detinjstvu predviđa kasnije psihološko funkcionisanje osobe, te da samoubistvo, kao autodestruktivni čin, može biti posledica nesigurne vezanosti. Cilj ovog rada bio je utvrditi da li se pacijenti, koji su ispoljili suicidalno ponašanje, češće svrstavaju u neki od nesigurnih obrazaca vezanosti, u odnosu na zdrave ispitanike bez suicidalnih tendencija. Istraživanje je provedeno u Specijalnoj bolnici za psihijatriju u Sokocu, a uzorak je činilo 80 ispitanika muškog pola, svrstanih u dve grupe: grupu suicidalnih pacijenata (N1=40) i grupu zdravih, nesuicidalnih ispitanika (N=40). Kratkim, strukturiranim upitnikom napravljenim za potrebe ovog istraživanja, prikupljeni su podaci o subjektivnom doživljaju majke i oca. Ispitivanje porodične afektivne vezanosti provedeno je modifikovanim Brennanovim upitnikom, za procenjivanje porodične afektivne vezanosti (Stefanović-Stanojević, 2005). Za testiranje razlika između grupa korišćen je χ^2 test. Rezultati pokazuju da postoji statistički značajna razlika između ispitivanih grupa i to tako, da su se ispitanici iz grupe suicidalnih, značajno češće svrstavali u nesigurno-okupirani i nesigurno-plašljivi obrazac vezivanja ($\chi^2(3)=23,928$; $p=0,000$) i češće su odrastali uz prezaštićujuću, agresivnu ili majku sa psihičkim problemima ($\chi^2(3)=28,976$; $p=0,000$), dok razlike u odnosu na doživljaj oca nemaju statističku značajnost ($\chi^2(2)=3,436$; $p=0,179$).

Ključne reči: porodična afektivna vezanost, suicidalno ponašanje, nesigurna afektivna vezanost

UVOD

Fenomen suicidalnosti predstavlja široko polje istraživanja, u koje su uključena različita naučna područja, a u okviru koga se postavlja niz veoma kompleksnih pitanja, na koja još uvek nije nađen odgovor. Već i po pitanju same definicije suicida postoje neslaganja, tako da ne postoji jasna i opšteprihvaćena definicija ovog pojma. Činjenica je, da je suicid suštinski jedinstven fenomen, karakterističan isključivo za ljudsku vrstu. On podrazumeva krajnje složeno ponašanje, koje za ishod ima smrt kao direktnu ili

indirektnu posledicu delovanja same žrtve. Pri pokušaju suicida takva težnja takođe postoji, često i najavljena, ali je ponašanje zaustavljeno, odnosno, nije dovršeno (Bukelić, 2009).

Samu dinamiku suicidalnog ponašanja razni teoretičari različito objašnjavaju. Psihoanaliza u ovom činu otkriva postojanje suprotnih tendencija, gde s jedne strane suicidant želi da pobegne od svega, da nestane i umre, a s druge strane očajnički poručuje da želi da živi, ali da je postojeće stanje neizdrživo i da ga mora promeniti, za šta mu treba pomoć drugih (tzv. apel-funkcija), (Bukelić, 2009). Poslednjih godina među psihonalitički orijentisanim istraživačima sve veće značenje dobijaju saznanja psihologije selfa, prema kojima su suicidalne reakcije najčešće izraz narcističke krize, prouzrokovane nekom narcističkom povredom (obično je reč o fantaziranom ili realnom gubitku voljenog objekta, neke životne vrednosti, gubitku samopoštovanja, i sl), (Dragišić-Labaš, 2019).

Danas se za suicid s pravom tvrdi da je to vrlo složeno ponašanje multifaktorske etiologije. Treba pomenuti dijateza-stres model suicida, koji su predložili Mann i saradnici (Mann, Waternaux, Haas, & Malone, 1999), a po kome predisponirajući faktori (suicid u porodici, genetska opterećenost, rana traumatska iskustva, roditeljsko zanemarivanje i zlostavljanje) u kombinaciji sa razvojnim (imulsivne i agresivne crte ličnosti, loša kontrola impulsa) i precipitirajućim faktorima (životni događaji, stres, psihijatrijski poremećaji), povećavaju rizik od suicida.

Suicidalno ponašanje naročito je prisutno kod psihijatrijskih bolesnika. Tako, kao najučestaliji pojedinačni uzrok smrti kod shizofrenih bolesnika navodi se upravo suicid (Roy, 1992; Samuel, 2001; Carlborg, Winnerbäck, Jönsson, Jokinen, & Nordström, 2010). Alkoholizam se takođe povezuje sa povećanim rizikom od samoubilačkog ponašanja (Sher, 2006a; Sher, 2006b). Pri tom, Flensborg-Madsen i saradnici (Flensborg-Madsen et al., 2009) navode da kod zavisnika od alkohola postoji povećan rizik od izvršenog suicida, bez obzira na to da li su, ili nisu registrovani komorbidni psihijatrijski poremećaji. U tom smislu, alkoholizam je često udružen sa afektivnim poremećajima, koji takođe predstavljaju značajan riziko-faktor suicidalnog ponašanja. Udružena depresija i alkoholizam sreću se kod ličnosti, čije je samopoštovanje izuzetno podložno uticaju sredine, pa se tako nedostatak podrške i pažnje značajnih drugih osoba, interpretira kao pokazatelj sopstvene bezvrednosti. Meta-analiza suicidalnog ponašanja, koju je proveo Lester (Lester, 1993), pokazala je da kod pacijenata sa unipolarnim poremećajem ima više dovršenih suicida, dok se kod bipolarnih javlja više ponovljenih suicidalnih pokušaja.

Istraživanja su pokazala da su i poremećaji ličnosti u povećanom riziku od auto-agiranja (Krysinska, Heller, & De Leo, 2006; Stepp et al., 2008; Blasco-Fontecilla et al., 2009). Ovo se posebno odnosi na granični i antisocijalni poremećaj ličnosti, koje karakteriše visok stepen agresivnih i impulsivnih crta.

Osim navedenih psihijatrijskih dijagnoza, suicidalnom riziku doprinose i brojni drugi faktori, među kojima svakako svoje mesto imaju određene demografske karakteristike, nepovoljni socijalni faktori i životni događaji, stanja bespomoćnosti, beznadežnosti, agitacije, itd. Činjenica je da u svakom pojedinačnom slučaju samoubistva može biti prisutno više faktora, koji se različito kombinuju.

Za teorijski koncept ovog istraživanja uzeta je Bowlby-jeva teorija afektivnog vezivanja. Opisujući afektivno vezivanje, Bowlby se fokusirao na unutrašnji osećaj sigurnosti koji osoba razvija na osnovu ponavljajućih iskustava sa roditeljima, te se u tom smislu razlikuju četiri stila afektivnog vezivanja: sigurni, okupirani, odbacujući i plašljivi. Pri tom, sigurni stil vezivanja karakteriše pozitivan model sebe i pozitivan model drugih: ove osobe su odrastale uz osetljive, tople majke, pa su, zahvaljujući pozitivnim interacijama, izgradile osećaj sopstvene vrednosti i vrednosti drugih ljudi. Osobe sa odbacujućim stilom vezivanja razvijaju pozitivan model sebe ali negativan

model drugih, što govori o povlačenju, nepoverenju i nesigurnosti u druge, uz ulepšavanje slike o sebi. Nasuprot njima, okupirano vezane osobe definiše negativan model sebe a pozitivan model drugih: ove osobe imaju iskustvo majčine nedoslednosti u reagovanju na njihove potrebe, pa polaze sa pozicije manje vrednosti i visoko su zavisne. Plašljivo vezane osobe razvijaju negativan model i sebe i drugih, dezorijentisane su i neorganizovane, zavisne od tuđeg prihvatanja, visoko anksiozne i nisko vrednuju sebe (Stefanović-Stanojević, 2005).

METOD

Problem istraživanja

Bowlby-jeva teorija afektivnog vezivanja polazi sa stanovišta da su rana iskustva koje dete uspostavlja sa značajnim drugim osobama (pre svega roditeljima) od presudnog značaja za razvoj ličnosti, te da neadekvatno roditeljstvo uglavnom rezultira razvojem nesigurnih obrazaca afektivnog vezivanja kod dece, što kasnije može dovesti do pojave patoloških obrazaca ponašanja i psihičkih poremećaja.

Problem ovog rada bio je da se ispita veza suicidalnosti i porodične afektivne vezanosti kod pacijenata koji su u nekom trenutku svoje bolesti ispoljili ovakvo ponašanje. Predmet interesovanja bio je: da li se suicidalni pacijenti, u odnosu na grupu zdravih, nesuicidalnih ispitanika, češće svrstavaju u neki od nesigurnih obrazaca vezanosti.

Hipoteze

Očekivalo se da će, u odnosu na afektivno vezivanje, postojati značajne razlike između grupe suicidalnih i grupe zdravih ispitanika i to tako, da će za grupu suicidalnih ispitanika biti karakterističan nesigurno-okupirani i nesigurno-plašljivi obrazac, jer je, po Bowlby-jevoj teoriji, u osnovi ova dva obrasca negativni model selfa.

Takođe, očekivalo se, da će se i razlike između ispitivanih grupa u odnosu na subjektivni doživljaj majke, odnosno oca pokazati statistički značajnim.

Uzorak i procedura

Uzorak čini 80 ispitanika muškog pola, prosečne starosne dobi od 45 do 66 godina. Ispitanici uglavnom potiču iz seoskih sredina (62%), srednjoškolskog su obrazovanja (65%) i neoženjeni (52%). Svrstani su u dve grupe za poređenje: grupu suicidalnih pacijenata (N1=40) i grupu zdravih ispitanika, bez suicidalnog ponašanja (N2=40). Istraživanje je provedeno u Specijalnoj bolnici za psihijatriju u Sokocu u periodu jun – decembar 2018. godine, a uključeni su ispitanici koji su, do trenutka provođenja istraživačkog postupka, u svojoj istoriji bolesti imali pokušaj suicida. Što se tiče prve grupe, najveći broj suicidalnih ispitanika dijagnostikovan je kao shizofreni poremećaj (20), zatim alkoholizam (13), poremećaj ličnosti (6) i depresivni poremećaj (1). Pri tom, dužina hospitalizacije ispitanika je različita i u rasponu je od mesec dana do dve godine. Grupu zdravih ispitanika čine osobe koje su dolazile na psihološku procenu radi provere sposobnosti za polaganje vozačkog ispita i za nošenje oružja. Uzorak zdravih ispitanika sačinjen je od onih ispitanika za koje se, posle psihološke provere, utvrdilo odsustvo duševne bolesti ili poremećaja ponašanja, odnosno, za koje se utvrdilo da su duševno zdravi.

Instrumenti

Za svakog ispitanika primenjena su dva upitnika. Kratkim, strukturiranim upitnikom za opšte podatke i socijalnu anamnezu, koji je napravljen za potrebe ovog istraživanja, prikupljeni su podaci o starosti ispitanika, mestu življenja, obrazovanju, bračnom statusu, psihijatrijskom hereditetu unutar primarne porodice, te subjektivnom doživljaju majke i oca.

Za ispitivanje usvojenih obrazaca porodične afektivne vezanosti korišćen je modifikovani Brennanov Upitnik za procenjivanje PAV, čiji su autori Brenan, Clark i Shaver (Stefanović-Stanojević, 2005). Upitnik se sastoji od 18 tvrdnji vezanih za osećanja ispitanika u porodičnim odnosima: 9 tvrdnji meri anksioznost, a

drugih 9 meri izbegavanje. Kombinacijom rezultata na subskalama Anksioznost i Izbegavanje dobijaju se četiri obrazaca afektivne vezanosti: sigurni, okupirani, odbacujući i plašljivi. U originalnoj verziji instrumenta koristi se sedmostepena skala Likertovog tipa, dok je u ovom istraživanju, po ugledu na neka ranija istraživanja (Letić, 2007), a prvenstveno zbog boljeg razumevanja i lakšeg snalaženja psihotičnih ispitanika, primenjena prilagođena petostepena skala.

REZULTATI

U tabeli 1 su prikazane statističke vrednosti varijabli Upitnika PAV za ukupni uzorak. Dobijene vrednosti skjunisa, kao i Kolmogorov-Smirnov test, ukazuju da dobijeni rezultati statistički značajno ne odstupaju od normalne distribucije.

Tabela 1: Deskriptivne statističke vrednosti varijabli Upitnika PAV za ukupni uzorak (N=80)
Table 1: Descriptive statistical values of variables of Questionnaire PAV for overall sample (N=80)

	N	M	SD	Skew	e_{Skew}	Kurt	e_{Kurt}	KS-Z	p
Anksioznost Anxiety	80	24.49	10.173	.468	.269	-.730	.532	.085	.200
Izbegavanje Avoiding	80	21.01	7.873	.616	.269	-.127	.532	.089	.186

U proveravanju hipoteze o razlikama u učestalosti raspodele ispitanika po obrascima vezivanja u odnosu na varijablu uzorak, korišćen je χ^2 test. U cilju provere da li se ispitanici po učestalosti značajno različito raspoređuju u definisane obrasce PAV, prvo je urađen χ^2 test na nivou celog uzorka, a zatim i na nivou obe grupe ispitanika.

Tabela 2*:* Frekvencije uzorka po obrascima PAV
Table 2: Frequency of a pattern according to PAV sample

Obrasci PAV PAV patterns	**Frekvencije Frequency**	**Procenat Percent**	χ^2	D_f	p
Sigurni Secure	41	51%	33.000	3	**.000**
Okupirani Occupied	19	24%	/	/	/
Odbacujući Rejecting	7	9%	/	/	/
Plašljivi Afraid	13	16%	/	/	/

Na osnovu dobijenih rezultata, prikazanih u tabeli 2, zaključuje se da se ispitanici najčešće raspoređuju u sigurni obrazac vezivanja (51%), što je u skladu sa teorijskim okvirom i dosadašnjim istraživanjima, po kojima populaciju odraslih najčešće karakteriše sigurni obrazac afektivnog vezivanja. S obzirom da je dobijeni χ^2 statistički značajan na nivou 0.001, može se zaključiti da postoji statistički značajna razlika u raspodeli uzorka po obrascima vezivanja.

U daljem postupku posmatrana je frekvencija ispitanika koji pripadaju različitim grupama: grupi suicidalnih pacijenata i grupi zdravih ispitanika bez suicidalnih pokušaja. Rezultati su prikazani u tabeli 3.

Tabela 3 : Frekvencije grupa po obrascima PAV
Table 3: Frequency of groups according to PAV patterns

			PAV				Ukupno Total
			Sigurni obrazac Secure pattern	Okupirani obrazac Occupied pattern	Odbacujući obrazac Rejecting pattern	Plašljivi obrazac Afraid pattern	
Uzorak Sample	Grupa suicidalnih Suicidal group	N	10	13	5	12	40
		%	25,0%	32,5%	12,5%	30,0%	100,0%
	Grupa zdravih bez pokušaja suicida Group of healthy people without attempt of suicide	N	31	6	2	1	40
		%	77,5%	15,0%	5,0%	2,5%	100,0%
Ukupno Total		N	41	19	7	13	80
		%	51,2%	23,8%	8,8%	16,3%	100,0%

$\chi^2(3)=23,928$; p=0,000

Rezultati pokazuju da postoji statistički značajna razlika u distribuciji frekvencija varijabli ($\chi^2(3)=23,928$; p=0,000). Iz priložene tabele se uočava da je, u grupi zdravih ispitanika bez ispoljenih suicidalnih tendencija, još veći broj sigurno vezanih (77,5%), dok se samo četvrtina suicidalnih pacijenata svrstava u sigurni obrazac porodičnog afektivnog vezivanja. Dalje, za ispitanike iz grupe suicidalnih karakterističan je neki od nesigurnih obrazaca vezivanja: pri tom dominiraju okupirani obrazac vezivanja (gde se svrstava 32.5% ispitanika iz ove grupe), kao i plašljivi obrazac (30% suicidalnih ispitanika).

Provera razlika između grupa u odnosu na doživljaj majke prikazana je u tabeli 4. Vidimo da postoje značajne razlike između grupa i to tako da su suicidalni ispitanici, u odnosu na zdrave ispitanike, češće odrastali uz prezaštićujuću, agresivnu ili majku sa psihičkim problemima. S druge strane, najveći broj zdravih ispitanika prezentuje doživljaj majke kao tople.

Tabela 4: Frekvencije grupa u odnosu na varijablu majka
Table 4: Frequency of groups in relation to variable mother

			Majka Mother				Ukupno Total
			Agresivna Aggressive	Topla Warm	Sa psihičkim problemima With mental problems	Prezaštićujuća Overprotective	
Uzorak Sample	Suicidalni Suicidal	N	5	17	7	11	40
		%	12,5%	42,5%	17,5%	27,5%	100,0%
	Zdravi ispitanici healthy subjects	N	0	39	0	1	40
		%	0,0%	97,5%	0,0%	2,5%	100,0%
Ukupno Total		N	5	56	7	12	80
		%	6,3%	70,0%	8,8%	15,0%	100,0%

$\chi^2(3)=28,976$; p=0,000

Nisu nađene značajne razlike između grupa u odnosu na doživljaj oca ($\chi^2(2)=3,436$; p=0,179). Suicidalni pacijenti jesu češće odrastali uz očeve alkoholičare, ali dobijene razlike ne dostižu nivo statističke značajnosti (tabela 5).

Tabela 5: Frekvencije grupa u odnosu na varijablu otac
Table 5: Frequency of groups in relation to variable father

			Otac Father			
			Agresivni alkoholičar Aggressive alcoholic	**Neagresivni alkoholičar Nonaggressive alcoholic**	**Psihički zdrav, topao Mentally healthy, warm**	**Ukupno Total**
Uzorak Sample	**Suicidalni Suicidal**	N	4	16	20	40
		%	10,0%	40%	50%	100,0%
	Bez pokusaja suicida Without suicidal attempt	N	3	9	28	40
		%	7,5%	22,5%	70,0%	100,0%
Ukupno Total		N	7	25	48	80
		%	8,8%	31,3%	60,0%	100,0%

$\chi^2(2)=3,436$; p=0,179

DISKUSIJA

U literaturi se, u okviru istraživanja suicidalnog ponašanja, može naći više parametara, koji se posmatraju kao potencijalni riziko-faktori eventualne suicidalnosti: od demografskih karakteristika, preko mentalnih poremećaja, do hereditarne opterećenosti. Ipak, veoma mali broj istraživanja bavi se uticajem stila afektivnog vezivanja na pojavu suicidalne ideacije i ponašanja.

U malobrojnim pokušajima ovakvih istraživanja, naveli bismo rezultate studije Palitsky-og i saradnika (Palitsky, Mota, Afifi, Downs, & Sareen, 2013), koji su istraživali vezu obrazaca afektivnog vezivanja, mentalnih poremećaja i suicidalnosti: njihovo istraživanje je pokazalo da su nesigurni stilovi vezivanja u visokoj, pozitivnoj korelaciji sa suicidalnom ideacijom i suicidalnim pokušajima, dok osobe sa sigurnim stilom vezivanja imaju manje suicidalnih ideja i pokušaja, kao i ređe obolevaju od anksioznih poremećaja.

U ovom istraživanju očekivano je, u skladu sa Bowlby-jevom teorijom vezivanja, da će se različito vezani ispitanici razlikovati u odnosu na suicidalno ponašanje, te da će se suicidalni ispitanici češće svrstavati u nesigurne obrasce vezivanja. U tom smislu, razvijeno je očekivanje da će u grupi suicidalnih ispitanika dominirati okupirani i plašljivi stil vezivanja, što se temelji na činjenici da ova dva obrasca vezanosti karakteriše negativan model sebe: kod oba stila imamo dominantan osećaj manje vrednosti i lične manjkavosti, te povišenu zavisnost u odnosima sa drugima. Smatra se, da je zbog negativnog vrednovanja sebe, moguće okretanje agresije prema sebi.

U literaturi se uglavnom mogu naći istraživanja vezana za adolescente, ali i ti rezultati nisu u potpunosti konzistentni. Neke ranije studije, provedene na adolescentnoj grupi, povezuju suicidalnu ideaciju i pokušaje sa okupiranim i plašljivim stilom vezivanja (Adam, Sheldon-Keller, & Wes, 1996; Lessard & Moretti, 1998). Sheftall i saradnici (Sheftall, Schoppe-Sullivan, & Brige, 2014) su istraživali vezu afektivnog vezivanja kod adolescenata i nesigurno vezivanje, a njihovi rezultati ukazuju na značajno veće prisustvo nesigurnih obrazaca vezivanja

kod suicidalnih adolescenata, mada se, kao značajniji prediktor pokušaja suicida, izdvojio odbacujući stil vezivanja.

S druge strane, Venta (Venta, 2012) je, na grupi adolescenata, istraživala povezanost obrazaca afektivnog vezivanja sa nekoliko kategorija suicidalnog ponašanja (suicidalne ideje, jedan pokušaj suicida, više pokušaja suicida, samopovređivanje). Dobijeni rezultati nisu identifikovali nikakvu značajnu vezu između stila vezivanja s jedne strane, i samoubilačkih misli, pokušaja i kognitivnog stila, s druge strane, ali je identifikovana veza između okupiranog stila vezivanja i višestrukih pokušaja suicida u smislu da su se osobe sa višestrukim suicidalnim pokušajima manje svrstavale u ovaj stil vezivanja.

Na temu afektivnog vezivanja bilo je i istraživanja uticaja stilova vezivanja kod roditelja depresivnih osoba, na samoubilačko ponašanje njihovih potomaka (MacGregor et al., 2014), gde se pokazalo da su nesigurni stilovi vezivanja kod ovih roditelja bili povezani sa impulsivnošću, depresijom i težim suicidalnim ponašanjem kod potomaka.

U odnosu na Bowlby-jevu teoriju afektivnog vezivanja rekli bismo da su nalazi ovog istraživanja u skladu sa pretpostavkom da će se suicidalni pacijenti češće svrstavati u okupirani i plašljivi obrazac afektivne vezanosti. Kao što je već naglašeno, oba ova obrasca karakteriše negativan model sebe: to pokazuje da su negativna iskustva ranog vezivanja verovatno dovela do razvoja pesimističkog sagledavanja sveta, niskog samopouzdanja, mogućeg osećaja beznadežnosti i bespomoćnosti, te niskog opšteg vrednovanja sebe. Istraživanje je pokazalo da su suicidalni ispitanici značajno češće odrastali uz prezaštićujuće majke – što se može teoretski povezati sa razvojem okupiranog obrasca ponašanja i sa tim u vezi, sa razvojem osećanja manje vrednosti i povišene zavisnosti; takođe, značajno češće su odrastali i uz duševno bolesne i agresivne majke, što je opet u vezi sa plašljivim stilom vezivanja koji, kao i kod okupiranog stila, ukazuje na povišenu zavisnost ali i teškoće u realizaciji bliskosti, te visoku ambivalentnost.

S druge strane, odrastanje uz očeve alkoholičare, bez obzira da li su agresivni ili ne, nije se pokazalo kao statistički značajno u pojavi suicidalnog ponašanja. Ovakav istraživački rezultat svakako nije očekivan. S obzirom da očevi alkoholičari u suštini nisu adekvatne identifikacione figure i da često razvijaju ambivalentan odnos prema svojoj deci, očekivalo se da odrastanje uz njih nosi velike emocionalne frustracije, koje bi doprinele sniženju samopouzdanja, potcenjivanju sopstvenih vrednosti i razvoju inferiornosti, odbačenosti i straha od emocionalnog gubitka, pogotovo što su ispitanici muškog pola. Međutim, ovakav rezultat može svedočiti o teškom deficitu identiteta: moguće je da odrastanje uz ovako slabe očeve nije dozvolilo ispitanicima da otac, makar i delimično, kompenzuje (ili amortizuje) razvojne defekte nastale u, očigledno patološkim, objektnim odnosima sa majkama.

ZAKLJUČAK

Provedeno istraživanje je pokazalo da su suicidalni ispitanici češće odrastali u interakciji sa neadekvatnim (prezaštićujućim i/ili duševno bolesnim) majkama, što je uticalo da zadrže zavisan odnos u interpersonalnim relacijama i verovatno onemogućilo dalji razvoj stabilnog osećaja identiteta. Ovo, pak, doprinosi njihovoj vulnerabilnosti i neotpornosti u suočavanju sa različitim životnim događajima, te ih predisponira za eventualnu psihološku destabilizaciju u stresnim i provocirajućim situacijama. Razvijajući negativan model selfa, oni razvijaju sklonost ka okretanju agresije prema sebi. Stoga se nesigurno vezivanje, posebno okupirano i plašljivo vezivanje, mogu posmatrati kao faktori koji doprinose suicidalnom ponašanju.

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FAMILY AFFECTIVE ATTACHMENT AT SUICIDAL PATIENTS

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ABSTRACT

In this work we rely on Bowlby's theory of attachment. We are led by assumption that the quality of attachment in the childhood predicts later psychological action of a person, and the suicide, as the auto-destructive act, can be the consequence of unsure attachment. The aim of this work is to find out if patients, who have shown a suicidal behavior, are classified in some of unsure patterns of attachment, and comparing them with healthy subjects without suicidal tendencies. The research has been carried out in Special Hospital for Psychiatry in Sokolac, on a sample of 80 male subjects, categorized in two groups: a group of suicidal patients (N1=40) and a group of healthy, nonsuicidal subjects (N=40). Short, structural questionnaire has been made for the research purposes; and it helped to collect some data about subjective experience of mother and father. Survey of family affective attachment has been carried out by modified Berann's questionnaire for assessing of family affective attachment (1995, taken from Stojanović-Stanojević, 2005). χ^2 test was used for testing differences between groups. The results show that there is a statistically significant difference between questioned groups. The subjects from suicidal group were quite often classified in unsure-occupied and unsure-frightened pattern of attachment ($\chi^2(3)=23,928$; p=0,000), and they would more often grow up with overprotective, aggressive mother or mother with mental problems ($\chi^2(3)=28,976$; p=0,000). As the differences in relation to experience of father do not have statistical importance ($\chi^2(2)=3,436$; p=0,179).

Keywords: family affective attachment, suicidal behavior, unsure affective attachment

PARADOKSALNI ODNOS KOGNICIJE I NEKOGNICIJE

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SAŽETAK

Istraživanje je izvršeno od aprila do jula 2019. godine u Republici Srpskoj. Uzorak su činila 294 ispitanika uzrasta između 15 i 73 godine. Prosječan uzrast ispitanika je bio 22,92 godine. Muških ispitanika je bilo 120 ili 40.82%, a ženskih 174 ili 59.18%. Nezavisne varijable su pol i uzrast. Zavisna varijabla je kognitivna komponenta socijalnog stava. Za ispitivanje nivoa kognicije i nekognicije (nesaznanja) u kognitivnoj komponenti socijalnog stava korišćena je Milosavljevićeva Skala PARADOKHIP&BM-2006-02-26. Cilj istraživanja je bio provjera hipoteze o paradoksalnom odnosu kognicija–nekognicija u kognitivnoj komponenti socijalnog stava, prema kojoj većem obimu kognicije odgovara još veći obim doživljaja nekognicije i obrnuto. Potvrđeno je da većem obimu kognitivne komponente socijalnog stava odgovara još veći obim doživljaja nekognicije, bez obzira na pol ispitanika. S povećanjem uzrasta raste i spoznaja da većem obimu kognitivne komponente socijalnog stava odgovara još veći obim doživljaja nekognicije, a postojanje statističke značajnosti (p<.05) utvrđeno je između kategorija ispitanika uzrasta 15-18 godina i uzrasta 24-73 godine.

Ključne riječi: kognicija, nekognicija, pol, uzrast.

UVOD

Često se dešavaju situacije u društvu u kojima jedna ista osoba dominira u objašnjavanju problema iz različitih oblasti i istovremeno (najčešće brzo, bez velikog razmišljanja) samouvjereno nudi „rješenja“ tih problema kao ubjedljivo najbolja. Izgleda da oni koji malo znaju o nečemu imaju tendenciju da misle da sve znaju o svemu. S druge strane, ljudi koji su se obrazovali za određena zanimanja, pročitali mnogo knjiga, pa i sami pisali o oblastima iz svog obrazovanja, u društvu su najčešće „tihi“, kao da preispituju odnos svog znanja i neznanja i kao da uviđaju koliko znaju, a koliko toga im je još nepoznato i nejasno, čak i u oblasti za koju su se obrazovali. Da li je to tako?

TEORIJSKI OKVIR

Odgovor na postavljeno pitanje pokušao je dati prof. Milosavljević formulisanjem hipoteze o paradoksalnom odnosu kognicija–nekognicija u kognitivnoj komponenti socijalnog stava, prema kojoj „većem obimu kognitivne komponente

socijalnog stava odgovú još veći obim doživljaja nekognicije (nesaznanja) i obrnuto“ (Milosavljević, 2001, str. 129). Ovako postavljenu hipotezu podržavaju i sljedeće izreke i citati: „Znam da ništa ne znam“ (Sokrat, 470-399. p.n.e., prema Wikicitat, n.d.), „Glupak misli da je mudrac, ali mudrac zna za sebe da je neznalica“ (Shakespeare, n.d., prema Wikicitat, n.d.), „Ko nema u glavi, on misli da ima više nego svi drugi“ (Obradović, n.d., prema *Citati o pameti i gluposti*, n.d.), „Ne plaši se neznanja, boj se lažnog znanja, jer od njega dolaze sve nesreće na svetu” (Bajron, n.d., prema Džordž Gordon Bajron - biografija, n.d.), „Tragično je što su glupaci toliko sigurni, a mudri puni sumnje” (Rasel, n.d., prema *Citati o pameti i gluposti*, n.d.) i dr.

Pored pomenute kognitivne komponente, socijalni stavovi imaju emocionalnu i konativnu komponentu (Milosavljević, 2001). Kognitivnu komponentu čine sva znanja pojedinca o objektu socijalnog stava. Emocionalna komponenta se odnosi na pozitivna, negativna ili neutralna osjećanja koja kod osobe izaziva objekat socijalnog stava. Konativna komponenta predstavlja tendenciju da pojedinac reaguje prema objektu socijalnog stava. Navedene komponente socijalnog stava su u međusobnoj interakciji, što znači da kognitivna komponenta može uticati na emocije i ponašanje čovjeka (Ostrom, 1969). Zato je razmatranje navedene paradoksalne hipoteze veoma važno, jer posljedice skromne kognitivne komponente socijalnog stava onih koji imaju mogućnost da odluče ili postupe mogu biti velike, jer nemaju dovoljno znanja o eventualnim negativnim posljedicama svojih postupaka (Jain, 2014).

EMPIRIJSKI DIO

Problem, zadaci i ciljevi istraživanja

Osnovni problem ovog istraživanja glasio je: Da li većem obimu kognitivne komponente socijalnog stava odgovara još veći obim doživljaja nekognicije (nesaznanja), i ako odgovara, da li pol i uzrast značajno utiču na obim doživljaja nekognicije?

Zadaci istraživanja bili su:

- Ispitati da li većem obimu kognitivne komponente socijalnog stava odgovara još veći obim doživljaja nekognicije.
- Ispitati da li većem obimu kognitivne komponente socijalnog stava odgovara još veći obim doživljaja nekognicije kod ispitanika različitog pola.
- Ispitati da li većem obimu kognitivne komponente socijalnog stava odgovara još veći obim doživljaja nekognicije kod ispitanika različitog uzrasta.

U teorijskom smislu cilj ovog istraživanja bio je dobijanje odgovora na pitanje da li većem obimu kognitivne komponente socijalnog stava odgovara još veći obim doživljaja nekognicije, te da li da pol i uzrast značajno utiču na obim doživljaja nekognicije. U praktičnom smislu rezultati ovog istraživanja mogu biti od koristi agensima socijalizacije da konstruktivno utiču na nastanak i mijenjanje socijalnih stavova, tj. da kroz proces socijalizacije nauče ljude da pažljivo procjenjuju ispravnost svojih i tuđih argumenata o objektima socijalnih stavova, da razumiju svoja, ali i tuđa osjećanja, razmišljanja, potrebe, namjere i dr., i da uvijek imaju u vidu kakvu posljedicu može prouzrokovati njihova odluka ili postupak.

Hipoteze

U ovom istraživanju postavljena je jedna opšta i dvije specifične hipoteze.

Opšta hipoteza: Većem obimu kognitivne komponente socijalnog stava odgovara još veći obim doživljaja nekognicije (nesaznanja).

Prva specifična hipoteza: Osobe ženskog pola više nego osobe muškog pola uviđaju da većem obimu kognitivne komponente socijalnog stava odgovara još veći obim doživljaja nekognicije. Argument za postavljanje ove hipoteze nalazi se u shvatanju Karol Giligen (Nel, 1984), prema

kojem su žene bržnije nego muškarci i više prihvataju odgovornost za svoje postupke.

Druga specifična hipoteza: Starije osobe više uviđaju da većem obimu kognitivne komponente socijalnog stava odgovara još veći obim doživljaja nekognicije. Polazimo od pretpostavke da će starije osobe, zbog toga što su duže izložene socijalizaciji kao cjeloživotnom procesu učenja, više uviđati da većem obimu kognitivne komponente socijalnog stava odgovara još veći obim doživljaja nekognicije.

Varijable

U ovom istraživanju nezavisne varijable su pol i uzrast, a zavisna varijabla je kognitivna komponenta socijalnog stava. Nezavisne varijable su kategoričke, a zavisna varijabla je kontinuirana. Varijabla pol ima dvije kategorije: muško i žensko. Varijabla uzrast ima tri kategorije. Prvu kategoriju čine ispitanici uzrasta 15–18 godina (82 ispitanika ili 27,89%), drugu uzrasta između 19 i 23 godine (141 ispitanik ili 47,96%) i treću ispitanici uzrasta 24–73 godine (71 ispitanik ili 24,15%). Kognitivna komponenta socijalnog stava je operacionalno definisana kao rezultat dobijen na Skali PARADOKHIP&BM-2006-02-26. Viši skor na skali znači veći nivo kognicije u kognitivnoj komponenti socijalnog stava.

Metod

Uzorak

Uzorak su činila 294 ispitanika uzrasta od 15 do 73 godine. Prosječni uzrast ispitanika je 22,92 godine. Muških ispitanika je bilo 120 ili 40.82%, a ženskih 174 ili 59,18%.

Instrument

Za prikupljanje podataka korišćena je Skala PARADOKHIP&BM-2006-02-26. Autor Skale je prof. Milosavljević (Milosavljević, 2007). Skalu čini petnaest ajtema, koji operacionalno definišu međusobni odnos kognicije i nekognicije. Skala PARADOKHIP&BM-2006-02-26 je petostepena skala. Uz svaku tvrdnju dato je pet alternativnih reakcija ispitanika koje su simetrično raspoređene duž dimenzije slaganja – neslaganja. Zadatak ispitanika je bio da pored svake tvrdnje zaokruže mjeru svoga slaganja sa pojedinom tvrdnjom (1 – uopšte se ne slažem, 2 – ne slažem se, 3 – dijelom se slažem, 4 – slažem se i 5 – jako se slažem). Što je viši rezultat na skali – veći je nivo kognitivne komponente socijalnog stava. Pouzdanosti Skale PARADOKHIP&BM-2006-02-26 je zadovoljavajuća. Cronbachov alpha koeficijent je .86 (Milosavljević, 2007). U ovom istraživanju Cronbachov alpha koeficijent je .85.

Tok ispitivanja

Ispitivanje je izvršeno u periodu april - juli 2019. godine na području Republike Srpske. Prije početka ispitivanja ispitanicima je dato precizno uputstvo. Ispitivanje je bilo anonimno.

Obrada podataka

Za provjeru pretpostavki za primjenu statističkih postupaka korišćen je Kolmogorov-Smirnov test. Psihometrijska provjera Skale PARADOKHIP&BM-2006-02-26 vršena je izračunavanjem Cronbach alpha koeficijenta. Testiranje hipoteza vršeno je izračunavanjem deskriptivne statistike, t-testa, F-testa i post-hoc Bonferroni testa.

REZULTATI I DISKUSIJA

Kolmogorov-Smirnov test je pokazao da distribucija dobijenih podataka kognitivne komponente socijalnog stava statistički značajno ne odstupa od teorijske distribucije (normalne raspodjele) (p=.284). Provjera postavljenih hipoteza izvršena je primjenom parametrijske statistike.

Odnos kognicije i nekognicije

Vrijednosti aritmetičkih sredina za sve pojedinačne ajteme Skale PARADOKHIP&BM-2006-02-26 su M=2,66-3,95; a prosječna vrijednost aritmetičke sredine je M=3,34 (vidjeti Tabelu 1). Standardne devijacije pojedinačnih ajtema ne pokazuju neuobičajeno niske ili visoke vrijednosti

(*SD*=1,06-1,31), a prosječna vrijednost *SD*=.67. Navedeni rezultati su u skladu sa postavljenom opštom hipotezom ovog istraživanja prema kojoj većem obimu kognicije u kognitivnoj komponenti socijalnog stava odgovara još veći obim doživljaja nekognicije i obrnuto.

Tabela 1. Aritmetičke sredine i standardne devijacije kognitivne komponente socijalnog stava
Table 1. Arithmetic means and standard deviations of cognitive component of social attitude

Ajtem /Item	M	SD
Neznalice vjeruju da sve znaju	3.65	1.26
U sreću vjeruju oni koji je nisu doživjeli	2.66	1.24
Najlakše nas je uvjeriti u ono o čemu malo znamo	3.56	1.11
Velikim radikalnim promjenama u bilo čemu skloni su oni koji ne znaju njihove mane	3.11	1.09
Sa više znanja otkriva se još više nepoznanica	3.95	1.08
Neznalice su sposobne za sve	2.87	1.26
Kada je neznalici nešto nejasno, on to smatra nevažnim	3.70	1.09
Oni koji nešto znaju najteže podnose one koji se predstavljaju kao sveznalice	3.67	1.06
Samo neznalice vjeruju da su bezgrešni	3.26	1.23
U svakom društvu najglasnije su neznalice	3.54	1.12
Neznalice veseli ono što znalce zabrinjava	3.54	1.06
Ko ima malo znanja njemu je sve jasno	2.93	1.24
Obično mogu objasniti sve oni koji ne znaju o čemu pričaju	3.12	1.27
Neznanje je problem jedino za one koji nešto znaju	3.53	1.16
Još nisam upoznao nekoga zabrinuta zbog njegova neznanja	3.01	1.31
Ukupno/Total	50.10	10.04
Prosjek/Average	3.34	.67

Kognitivna komponenta socijalnog stava osoba različitog pola

Vrijednosti aritmetičkih sredina na ajtemima Skale PARADOKHIP&BM-2006-02-26 muških ispitanika su *M*=2,70-3,86 (*SD*=1,09-1,38), a ženskih ispitanika su *M*=2,56-4,02 (*SD*=.95-1,27) (vidjeti Tabelu 2). U jedanaest ajtema vrijednost aritmetičke sredine je bila viša kod ženskih ispitanika. Prosječna vrijednost aritmetičke sredine Skale PARADOKHIP&BM-2006-02-26 muških ispitanika je *M*=3,28 (*SD*=.77), a ženskih ispitanika je *M*=3,38 (*SD*=.59). Primjenom t-testa utvrđeno je da kod tri ajtema vrijednosti aritmetičkih sredina ženskih ispitanika su više na nivou statističke značajnosti .05 (Tabela 2). Nije utvrđeno postojanje statistički značajne razlike vrijednosti aritmetičkih sredina cijele Skale PARADOKHIP&BM-2006-02-26 ispitani-ka različitog pola. Navedeni rezultati (na većini ajtema viša je vrijednost aritmetičkih sredina ženskih ispitanika nego muških, na tri ajtema je vrijednost aritmetičke sredine ženskih ispitanika statistički značajno viša nego muških, prosječna vrijednost aritmetičke sredine na Skali PARADOKHIP&BM-2006-02-26 ženskih ispitanika je viša nego muških) sugerišu da osobe ženskog pola više nego osobe muškog pola uviđaju da većem obimu kognicije u kognitivnoj komponenti socijalnog stava odgovara još veći obim doživljaja nekognicije, što je u skladu sa shvatanjem Karol Giligen da su žene brižnije i više prihvataju odgovornost za svoje postupke, ali, ipak, ne može se konstatovati da postoji statistički značajna razlika između ispitanika različitog pola u uviđanju da većem obimu kognicije u kognitivnoj komponenti socijalnog stava odgovara još veći obim doživljaja nekognicije.

Kognitivna komponenta socijalnog stava osoba različitog uzrasta

Vrijednosti aritmetičkih sredina na ajtemima ispitanika uzrasta 15-18 godina su *M*=2.72-3.66 (*SD*=1.11-1.41), ispitanika uzrasta 19-23 godine *M*=2.40-4.14 (*SD*=.93-1.23) i ispitanika uzrasta 24-73 godine *M*=2.68-4.06 (*SD*=.88-1.42) (Tabela 3). Vrijednost prosječne aritmetičke sredine ispitanika uzrasta 15-18 godina je *M*=3.24

(*SD*=.74), ispitanika uzrasta 19-23 godine *M*=3.31 (*SD*=.58) i ispitanika uzrasta 24-73 godine *M*=3.51 (*SD*=.67). Dakle, vrijednosti aritmetičkih sredina svih uzrasnih kategorija su iznad teorijski očekivane vrijednosti.

Tabela 2. Testiranje značajnosti razlika aritmetičkih sredina kognitivne komponente socijalnog stava ispitanika različitog pola.
Table 2. Testing the significance of differences in arithmetic means of cognitive component of social attitude of respondents of different gender

Ajtem/Item	Pol/Gender	*M*	*SD*	*t*	*p*
Neznalice vjeruju da sve znaju	Muški/Male	3.60	1.34	-.52	.601
	Ženski/Female	3.68	1.20		
U sreću vjeruju oni koji je nisu doživjeli	Muški/Male	2.80	1.33	1.65	.100
	Ženski/Female	2.56	1.18		
Najlakše nas je uvjeriti u ono o čemu malo znamo	Muški/Male	3.45	1.22	-1.39	.166
	Ženski/Female	3.64	1.02		
Velikim radikalnim promjenama u bilo čemu skloni su oni koji ne znaju njihove mane	Muški/Male	3.06	1.18	-.66	.509
	Ženski/Female	3.14	1.02		
Sa više znanja otkriva se još više nepoznanica	Muški/Male	3.86	1.15	-1.25	.214
	Ženski/Female	4.02	1.02		
Neznalice su sposobne za sve	Muški/Male	2.70	1.29	-1.98	.048*
	Ženski/Female	2.99	1.22		
Kada je neznalici nešto nejasno, on to smatra nevažnim	Muški/Male	3.53	1.23	-2.17	.031*
	Ženski/Female	3.82	.97		
Oni koji nešto znaju najteže podnose one koji se predstavljaju kao sveznalice	Muški/Male	3.59	1.09	-1.06	.291
	Ženski/Female	3.72	1.03		
Samo neznalice vjeruju da su bezgrešni	Muški/Male	3.27	1.28	.13	.894
	Ženski/Female	3.25	1.20		
U svakom društvu najglasnije su neznalice	Muški/Male	3.47	1.18	-.99	.325
	Ženski/Female	3.60	1.07		
Neznalice veseli ono što znalce zabrinjava	Muški/Male	3.43	1.19	-1.45	.148
	Ženski/Female	3.61	.95		
Ko ima malo znanja njemu je sve jasno	Muški/Male	2.74	1.35	-2.09	.038*
	Ženski/Female	3.06	1.15		
Obično mogu objasniti sve oni koji ne znaju o čemu pričaju	Muški/Male	3.19	1.33	.81	.417
	Ženski/Female	3.07	1.23		
Neznanje je problem jedino za one koji nešto znaju	Muški/Male	3.47	1.23	-.79	.433
	Ženski/Female	3.57	1.11		
Još nisam upoznao nekoga zabrinuta zbog njegova neznanja	Muški/Male	3.05	1.38	.40	.693
	Ženski/Female	2.99	1.27		
Ukupno/Total	Muški/Male	49.19	11.56	-1.28	.201
	Ženski/Female	50.72	8.83		
Prosjek/Average	Muški/Male	3.28	.77		
	Ženski/Female	3.38	.59		

* Statistički značajno na nivou .05 / The mean difference is significant at the .05 level

Tabela 3. Aritmetičke sredine i standardne devijacije kognitivne komponente socijalnog stava ispitanika različitog uzrasta
Table 3. Arithmetic means and standard deviations of cognitive component of social attitude of respondents of different ages

Ajtem/Item	Uzrast/Age	M	SD
Neznalice vjeruju da sve znaju	15-18 g./years	3.24	1.37
	19-23 g./years	3.77	1.15
	24-73 g./years	3.86	1.22
U sreću vjeruju oni koji je nisu doživjeli	15-18 g./years	3.09	1.27
	19-23 g./years	2.40	1.12
	24-73 g./years	2.68	1.32
Najlakše nas je uvjeriti u ono o čemu malo znamo	15-18 g./years	3.48	1.18
	19-23 g./years	3.61	.97
	24-73 g./years	3.56	1.27
Velikim radikalnim promjenama u bilo čemu skloni su oni koji ne znaju njihove mane	15-18 g./years	3.24	1.11
	19-23 g./years	3.01	1.00
	24-73 g./years	3.15	1.23
Sa više znanja otkriva se još više nepoznanica	15-18 g./years	3.54	1.34
	19-23 g./years	4.14	.93
	24-73 g./years	4.06	.88
Neznalice su sposobne za sve	15-18 g./years	2.84	1.28
	19-23 g./years	2.77	1.14
	24-73 g./years	3.13	1.42
Kada je neznalici nešto nejasno, on to smatra nevažnim	15-18 g./years	3.55	1.28
	19-23 g./years	3.72	.97
	24-73 g./years	3.83	1.10
Oni koji nešto znaju najteže podnose one koji se predstavljaju kao sveznalice	15-18 g./years	3.66	1.11
	19-23 g./years	3.72	.96
	24-73 g./years	3.59	1.18
Samo neznalice vjeruju da su bezgrešni	15-18 g./years	3.20	1.35
	19-23 g./years	3.16	1.11
	24-73 g./years	3.51	1.30
U svakom društvu najglasnije su neznalice	15-18 g./years	3.35	1.19
	19-23 g./years	3.60	1.06
	24-73 g./years	3.66	1.15
Neznalice veseli ono što znalce zabrinjava	15-18 g./years	3.30	1.19
	19-23 g./years	3.63	.94
	24-73 g./years	3.62	1.09
Ko ima malo znanja njemu je sve jasno	15-18 g./years	2.72	1.30
	19-23 g./years	2.90	1.21
	24-73 g./years	3.23	1.20
Obično mogu objasniti sve oni koji ne znaju o čemu pričaju	15-18 g./years	3.09	1.37
	19-23 g./years	2.99	1.21
	24-73 g./years	3.44	1.23
Neznanje je problem jedino za one koji nešto znaju	15-18 g./years	3.38	1.33
	19-23 g./years	3.50	1.05
	24-73 g./years	3.76	1.13
Još nisam upoznao nekoga zabrinuta zbog njegova neznanja	15-18 g./years	2.96	1.41
	19-23 g./years	2.78	1.23
	24-73 g./years	3.54	1.23
Ukupno/Total	15-18 g./years	48.63	11.07
	19-23 g./years	49.68	8.65
	24-73 g./years	52.61	11.03
Prosjek/average	15-18 g./years	3.24	.74
	19-23 g./years	3.31	.58
	24-73 g./years	3.51	.67

U šest ajtema vrijednosti razlika aritmetičkih sredina ispitanika različitog uzrasta su statistički značajne, a post hoc Bonferroni testom je utvrđeno između kojih kategorija ispitanika i na kojem nivou postoji statistička značajnost (vidjeti Tabelu

4). Za cijelu Skalu PARADOKHIP&BM-2006-02-26 razlika aritmetičkih sredina ispitanika različitog uzrasta je značajna na nivou statističke značajnosti .05 (F=3.26; p=.04). Post hoc Bonferroni testom utvrđeno je da ispitanici uzrasta 24-73 godine više nego ispitanici uzrasta 15-18 godina, na nivou statističke značajnosti .05, uviđaju da većem obimu kognicije u kognitivnoj komponenti socijalnog stava odgovara još veći obim doživljaja nekognicije. Vrijednosti aritmetičkih sredina ukazuju da ispitanici uzrasta 19-23 godine, takođe, više uviđaju da većem obimu kognicije u kognitivnoj komponenti socijalnog stava odgovara još veći obim doživljaja nekognicije, nego mlađi ispitanici, i manje nego stariji ispitanici, ali između ovih kategorija nije utvrđeno postojanje statistički značajne razlike. Ipak, može se konstatovati da starije osobe, najvjerovatnije zbog dužeg uticaja socijalizacije kao cjeloživotnog procesa učenja, više uviđaju da većem obimu kognitivne komponente socijalnog stava odgovara još veći obim doživljaja nekognicije, što je u skladu sa postavljenom hipotezom ovog istraživanja.

Tabela 4. Testiranje značajnosti razlika aritmetičkih sredina kognitivne komponente socijalnog stava ispitanika različitog uzrasta
Table 4. Testing the significance of differences in arithmetic means of cognitive component of social attitude of respondents of different ages

Ajtem/Item	F	Sig.	Post hoc Bonferroni test		
			Uzrast/Age	Uzrast/Age	*p*
Neznalice vjeruju da sve znaju	6.14	.002**	15-18 g/years	19-23 g./years	.007**
				24-73 g./years	.007**
U sreću vjeruju oni koji je nisu doživjeli	8.37	.000***	15-18 g/years	19-23 g./years	.000***
Sa više znanja otkriva se još više nepoznanica	9.12	.000***	15-18 g/years	19-23 g./years	.000***
				24-73 g./years	.007**
Ko ima malo znanja njemu je sve jasno	3.26	.040*	15-18 g/years	24-73 g./years	.036*
Obično mogu objasniti sve oni koji ne znaju o čemu pričaju	3.15	.044*	19-23 g/years	24-73 g./years	.039*
Još nisam upoznao nekoga zabrinuta zbog njegova neznanja	8.30	.000***	24-73 g/years	15-18 g./years	.019*
				19-23 g./years	.000***
Ukupno/Total	3.26	.044*	15-18 g/years	24-73 g./years	.044*

* Statistički značajno na nivou .05 / The mean difference is significant at the .05 level
** Statistički značajno na nivou .05 / The mean difference is significant at the .01 level
*** Statistički značajno na nivou .05 / The mean difference is significant at the .001 level

ZAKLJUČAK

Većem obimu kognitivne komponente socijalnog stava odgovara još veći obim doživljaja nekognicije, bez obzira na pol. S povećanjem uzrasta raste i spoznaja da većem obimu kognitivne komponente socijalnog stava odgovara još veći obim doživljaja nekognicije, najvjerovatnije zbog dužeg uticaja socijalizacije kao cjeloživotnog procesa učenja.

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THE PARADOXICAL RELATIONSHIP OF COGNITION AND NONCOGNITION

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SUMMARY

The research was carried out from April to July 2019, in Republika of Srpska. The sample was suitable. It was made up of 294 respondents aged between 15 and 73. The average age of the respondents was 22,92 years. Male respondents numbered 120 or 40,82%, and females 174 or 59.18%. Independent variables are gender and age. The dependent variable is the level of the cognitive component of the social attitude. Milosavljevic's Skala PARADOKHIP & BM-2006-02-26 was used to examine the levels of cognitive component of the social attitude. The aim of the research was to verify the hypothesis about the paradoxical relationship of cognition and non-cognition in the cognitive component of the social attitude, according to which a greater scope of the cognitive component of the social attitude corresponds to an even greater extent of the experience of non-cognition (not-knowing) and vice versa. It has been confirmed that the greater scope of cognition in the cognitive component of the social attitude corresponds to an even greater extent of the experience of non-cognition, regardless of the gender of the respondents. With the aging, there is also a growing awareness that a greater scope of cognition in the cognitive component of the social attitude corresponds to an even greater extent of the experience of non-cognition, and the existence of statistical significance ($p<.05$) has been confirmed between the categories of subjects aged 15-18 and 24-73.

Keywords: cognition, non-cognition, gender, age.

ANALYSIS OF APPROACHES TO THE MATERIAL FLOW IN THE PRODUCTION PROCESS WITH THE USE OF SIMULATION

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ABSTRACT

Simulation in the production process represents the implementation of processes in real-time and space. Current trends are heading towards the implementation and expansion of various types of automated delivery systems in many industrial enterprises. These efforts are supported by requirements to increase reliability, reduce operating costs and time as well as meet operational schedules. The present article pays attention to the use of simulations, which are supporting tools in ensuring the operation of the production process, focusing on the evaluation and planning of the material flow. The first part of the paper presents a theoretical description of problems in the area of application of simulation tools in the production process with a subsequent focus on material flow analysis. The core of the paper presents a description of the analysis of approaches to material flow assessment, using supportive simulation tools in line with the ideas of business digitization. At the end of the article, the overall evaluation and summary of the issue are described.

Keywords: simulation, material flow, production process, analysis

INTRODUCTION

The use of simulations in the real world brings time, material and realization savings. Simulations of production and distribution processes are used to optimize throughput, reduce deficiencies and minimize work in the manufacturing process. Simulation is a representation of how a system or process works. Through simulation, the model can be implanted with unlimited variations and create complex scenarios. These capabilities allow you to analyze and understand how individual elements integrate and influence the simulated environment.

The simulation in the approach of the production process and production system is, in the subset, the use of software to produce computer models of production systems that are analyzed with subsequent retrieval of important information. At present, a simulation is a valuable tool used in evaluating the production process as a whole. The simulation can be used to

predict the performance of an existing or planned system and to compare alternative solutions for a particular project problem (Baron, Panda, Pollak, & Cmorej, 2017). Some reasons to use simulations (Hroncová, et al., 2019):

- the system under study is so complex that there is no suitable mathematical method and problem formulation;
- the system under investigation changes its properties too slowly or too quickly,
- the system under investigation could cause a disaster to itself or its surroundings in a poorly chosen experiment, and the danger of such an experiment cannot be predicted in advance,
- the system under investigation is difficult or even impossible to manipulate (economic systems), therefore it cannot be experimented or is too expensive.

By means of simulation methods it is possible to comprehensively capture dynamic (with time variables) and stochastic (random) errors in the system, the possibility to experiment if it would not be possible in reality for various reasons (cost, danger, slowness, lack of real system) under controllable changing conditions. Wider practical deployment of simulation into the production process was possible only with the development of computer technology in the 1990s because of the need to work with large volumes of 2D and 3D data, preferably in real-time, both in the creation of simulation models, preparation of experiments, and subsequent evaluation (Buchmeister, Palcic, & Ojstersek, 2019).

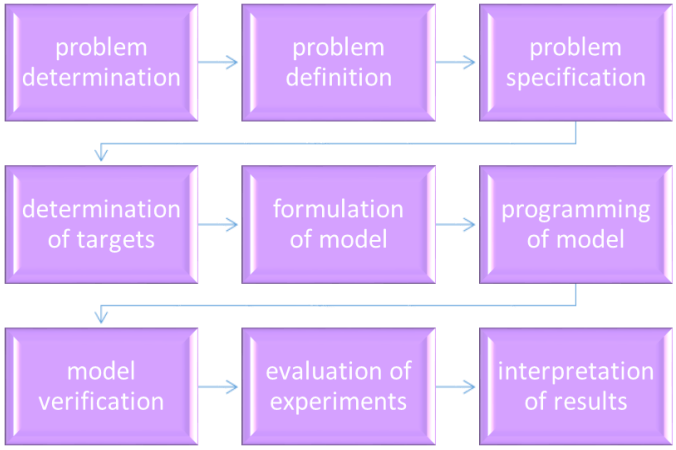

Figure 1. Implementation of simulation in the production process.

The most important goal of manufacturing simulation is to understand the change of the whole system due to some local changes. It is easy to understand the difference caused by changes in the local system, but it is very difficult or impossible to assess the impact of this change on the whole system. The simulation gives us some measure of this impact. The objectives of the production process or its factors that can be obtained by simulation analysis are (Behunova, Behun, & Knapcikova, 2018):

- parts produced per unit of time,
- time spent in the system by section,
- time spent in queue parts,
- time spent in transit from one place to another,
- timely deliveries,
- build inventory,

- inventory in process,
- percentage of machines and workers.
-

The basic principle of simulation is to simplify the real system by creating a simulation model describing the specific properties of the real system that are the subject of the simulation. Simulation experiments will be implemented after the authentication and validation of the simulation model. The results of these experiments will improve the possibilities of various simulated systems and verify their impact on the modelled system. The results of the experiments are re-applied to the real system to improve its properties.

The main methods of using digital factory technology are computer simulations supported by experts. Simulation systems offer comprehensive solutions for the analysis of manufacturing processes implemented in manufacturing companies. The scope of application covers the whole production process from design and preparation of production, production and planning of installation of machines to assembly and sale of finished products. One of the most used methods from production system designers is discrete event simulation. This type of simulation allows you to evaluate system performance statistically and probably reproduce the interactions of all its components over a specified period of time. In some cases, modelling production systems requires a continuous simulation approach. These are cases in which the conditions of the system change, such as the movement of liquids in oil refineries or chemical plants. Since continuous simulations cannot be modelled using digital computers, they do so use small discrete steps. This is a useful feature because there are many instances where both continuous and discrete simulation, called hybrid simulation, that is needed in many industries, must be combined (Čep, Brychta, Janásek, Petrů, & Zlámal, 2013).

At present, a large number of specialists deal with the issue of material flow in production. For example, Michlowicz and Smolinska present the example of Witness simulation software for use to improve flow continuity in the production process. They analysed the availability, processing time, number of operators, etc. and determined the highest productivity in the examined system (Michlowicz & Smolinska, 2019). Authors Kodym et al. described the optimization of material low using simulation software. In this study, the creation of a new assembly workplace simulation model with automatic identification via barcoding is presented (Kodym, Čujan, Turek, & Mikušová, 2019). In further research, the issue of assembly line optimization was described. Authors Hamzas et al. presented the investigation of current state model and two independent proposals in real conditions of manufacturing production. They used Witness simulation software and CAE diagram. On the basis of results, they provided the recommendations for elimination of bottleneck and reduction of production time (Hamzas, Bareduan, Bahari, Zakaria, & Zakaria, 2019). Simulation of material flow is possible to use not only in the engineering industry. The research of Lopez-Davalos presents the simulation of material flow operations in the aerospace factory. The results of this research describe the main problems causing blockages and other non-value activities (Lopez-Davalos, Liaqat, Hutabarat, Tiwari, & Tiwari, 2018). The issue of material flow analyzes was described by authors: Duplakova et al., 2018; Centobelli, Cerchione, Murino, & Gallo, 2016; Uriarte, Ng, Zúñiga, & Moris, 2017; Popa et al., 2018; Seewaldt, Nagel, Geckler, & Bracht, 2017; Drastich, 2017, etc.

SIMULATION AND MATERIAL FLOW IN THE MANUFACTURING PROCESS

Most organizations that implement simulation tools in manufacturing processes and systems use commercial software products to manipulate materials. The two most common criteria for selecting simulation software are the flexibility of

modelling (the ability to model any system regardless of its complexity or uniqueness) and a simple work environment. The simulation language is a software package and is of a general nature (in terms of the applications it can solve) and the simulation model itself is done by "programming". The main advantage of a good simulation language is the flexibility of modelling. The main disadvantage is that programming expertise is needed. A production simulation language is one where particular modelling constructs are oriented to production or material handling. Over the past five to ten years, there has been considerable interest in simulation software that is easier to use, which largely means reducing the amount of programming needed to build the model. The main disadvantage of simulators is that they are not as flexible as language simulations because they do not allow full layout (Mikušová et al., 2018).

There are five different types of models that are used in different simulation programs:

- Simulation of tasks
- Standardized situation simulation
- Virtual reality simulation
- Process-based simulation
- Simulation of complex tasks in processes

The above-mentioned types of models can be applied to the tasks related to the material flow of the production process. Material flow in the enterprise is a system that needs to be directed and managed. In order to do this, the material flow must first be analyzed according to the determined parameters. For the analysis itself to make sense, it is necessary to use specific quantities related to the material flow - the number of goods, length of travel and time, speed of movement, travel speed and acceleration, size of goods flow, the intensity of loading, frequency of loading, goods, handling, transport, network complexity, number of interruptions (related to production and storage functions), number of reverse flows and number of changes (Sadílek, 2011).

The material flow is structured according to how the movement of the centre of gravity of the material in space and time is realized. A distinction is made between the continuous and discontinuous material flow. Continuous material flow is a material movement in which matter occurs at the material flow points to be examined and has no initial or final boundary. Discontinuous material flow is a material movement in which an alternating state occurs at the examined points of the material flow, i. j. the presence and absence of matter, having an initial and final boundary (Lehocká, Hlavatý, & Hloch, 2016).

The material flow is divided into three parts. The first part is the information flow. It is the flow of information in a written or spoken form that is necessary to manage all logistics activities in an enterprise. It includes the flow of information relating to the material flow of individual technological processes of the company. The second part is the cash flow. This is a cash flow that is realized between individual market players. Cash flow is the most important part of being and operating a business in the market. The last part is the flow of material that passes from the supplier to the customer and undergoes a number of operations during the production of the material to the finished product. The material flow begins already during the extraction of the raw material. The third part represents a key role in the implementation of simulation in the production process (Lehocka et al., 2016).

ANALYSIS OF APPROACHES WITH THE USE OF SIMULATION

A large number of companies are trying to optimize material flows using primarily classical methods. These methods are very successful, but care must be taken to use them correctly in the industry, otherwise, it may have the opposite consequences for the business. Therefore, computer simulations that are able to

estimate the future behaviour of the production system are used today to optimize production process flows. An overview of the simulation tools used to address material flows in the production process is described briefly below.

Plant Simulation

The software enables simulation and optimization of production and logistics systems and their processes (figure 2). Use this software to optimize material flow, resource utilization and logistics for all levels of company planning, from global facilities to local workshops to production lines. In the freely assembled object library, all basic Plant Simulation building objects are clearly stored. Each user can compose them graphically and interactively with individual objects. These include (Tecnomatix Plant Simulation, 2019):

- Integrated neural networks,
- Factor analysis,
- Experiment control,
- Automatic optimization of system parameters,
- Sequencing.

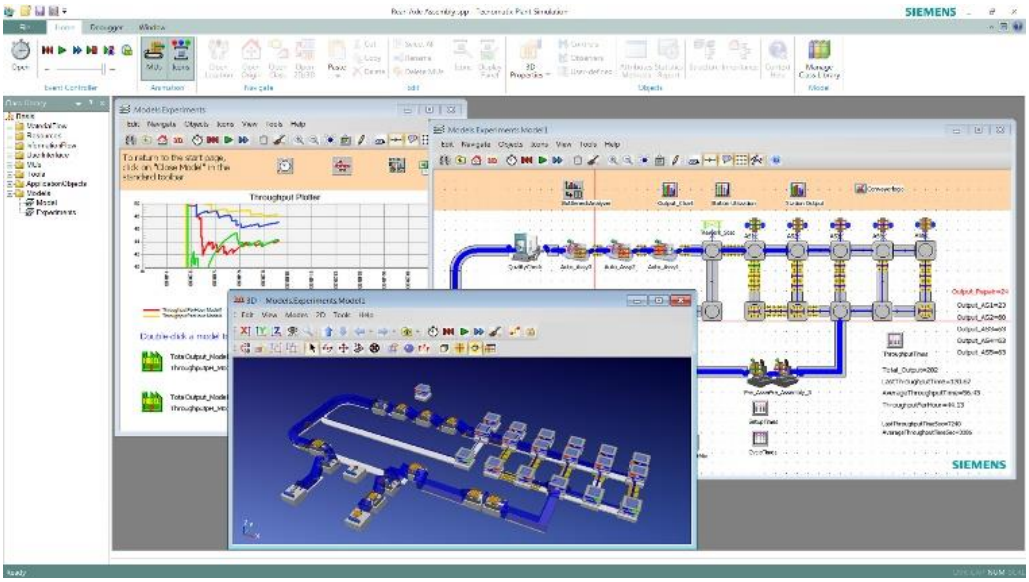

Figure 2. Working environment – Plant Simulation (Tecnomatix Plant Simulation, 2019).

Arena

This software is the most widely used integrated graphical simulation tool for discrete systems that models, designs, visualizes and performs statistical analyzes. Arena Simulation (figure 3) allows you to (Arena, 2019):

- Production management (production process evaluation, capacity planning, JIT, ERP, Six Sigma, stockpile optimization, etc.),
- Packaging (arrangement of conveyors, the efficiency of packaging equipment, machines, palletizing equipment, etc.),
- Logistics chain management - analysis of transport variants, expedition, inventory control.

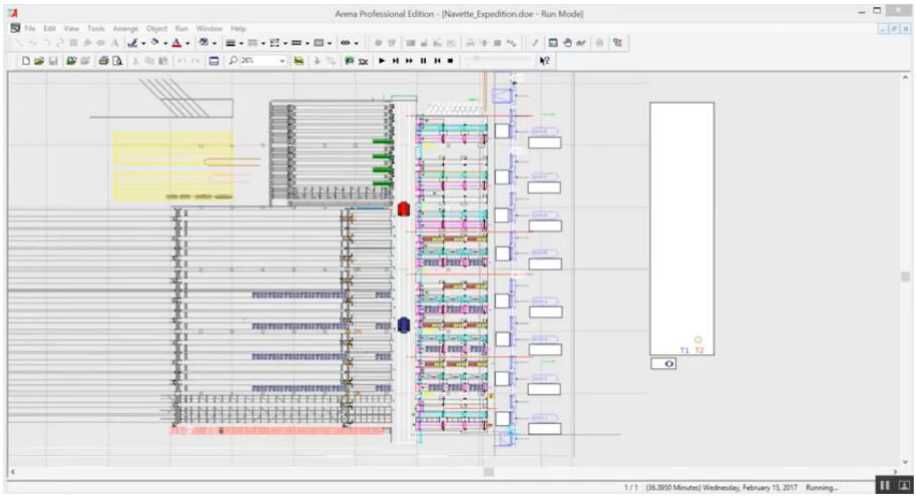

Figure 3. Working environment – Arena (Arena, 2019).

Simul8

Simul8 (figure 4) is a cost-effective and easy-to-use simulation software that helps you to give quick answers to various questions related to eg. financial and production processes, information flows, logistics systems and supply chains. Simul8 is well-suited for all industries, from the automotive industry to the food industry, banking, government and healthcare. Simulations can be created in Simul8 using five basic elements. These symbols are placed on the bar and can be used with the desired properties such as processing time, buffer size, etc. The visual logic of Simul8 is based on an event-oriented structured language that can be used to construct an accurate simulation model (Simul8, 2019).

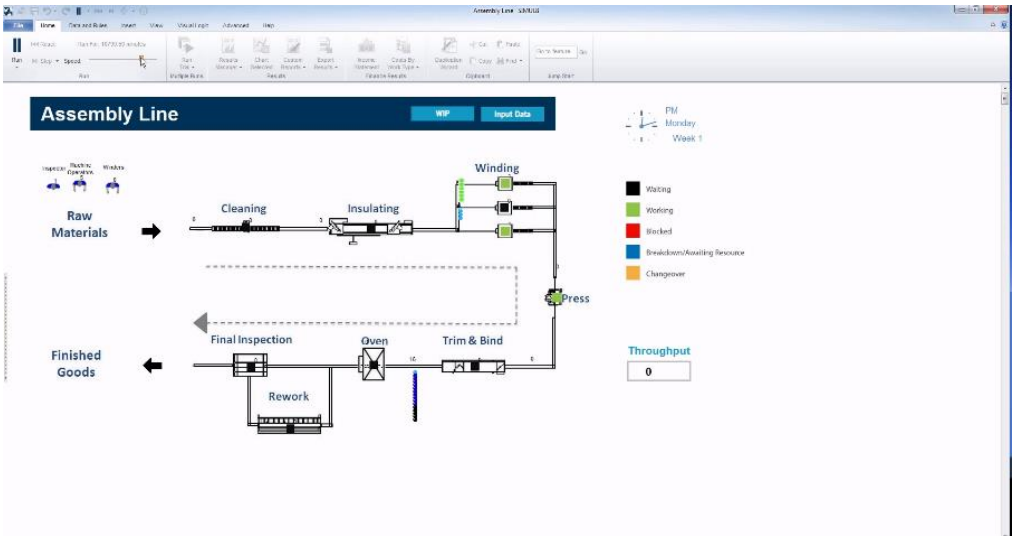

Figure 4. Working environment – Simul8 (Simul8, 2019).

AutoMod

Simulation software AutoMod (Figure 5) provides a variety of deployment options. These range from production process modelling, warehouse simulation, supplier-customer relationships, to online binding/emulation. The base system includes a process system, Simulator, DTrace, ACE, IGES and the ability to import SDX. The following modules are available as building blocks (Applied smart factory, 2019):

- AS / RS (warehouse technology),
- Conveyor,
- Kinematics,
- Pathmover,
- Bridge Crane,
- Power and Free (overhead crane),
- Tanks and Pipes,
- AutoTruck.

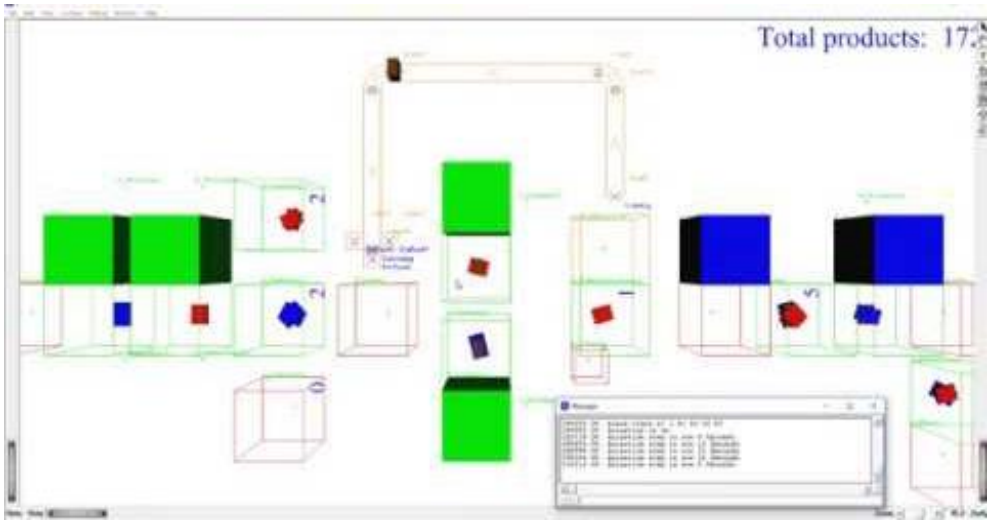

Figure 5. Working environment – AutoMod (Applied smartfactory, 2019).

Witness

This standard interactive simulation software (figure 6) is often used to plan and optimize production, logistics and services. It is used in universities and also provides wide use in practice. The witness is mainly used in (Witness, 2019):

- implementation of modern management methods,
- optimization of capital investment,
- capacity planning,
- identification of bottlenecks in production,
- optimization of production batches,
- verification of manufacturing processes,
- distribution of production units
- reduction of work in progress
- quality monitoring
- optimization of logistics processes and services

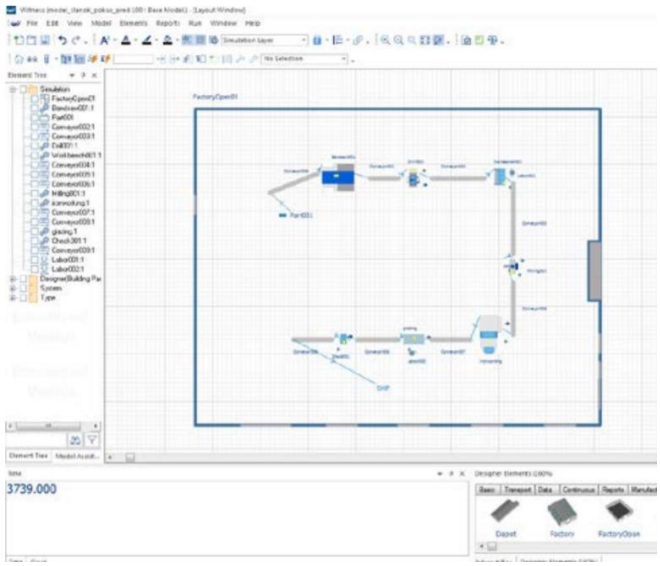

Figure 6. Working environment – Witness (Witness, 2019).

CONCLUSIONS

The manufacturing process currently uses a large number of support tools that work in conjunction with the concept of creating a digital enterprise. These tools allow each manufacturing company to complete an overview of the current state of production, but can also predict future developments. The simulation has been a part of almost all manufacturing companies that implement it in various production parts for several years. One of them is the transfer of material flow in production. The present paper gave an insight into approaches to material flows in the production process using simulations. He created a comprehensive overview of the issues raised and created the basis for future solutions to research tasks, as the simulation is a daily part of the life of a manufacturing company.

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MORINGA OLEIFERA SEEDS AS A LOW-COST BIOSORBENT FOR REMOVING HEAVY METALS FROM WASTEWATER

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ABSTRACT

Heavy metals are considered to be one of the major contaminants of water in recent years due to their non-biodegradable property; hence making them toxic and bioaccumulate to living organisms. Conventional methods such us chemical precipitation, physical treatment through ion exchange are used for removing heavy metal ions from water. These methods are expensive and attributed to incomplete metals removal and high cost of treatment. In recent years, researchers have found alternative low cost and effective method for removal of toxic metals through biosorption process using biological materials. Moringa oleifera seeds is one of the biological materials which has effective adsorption capacity for removal of heavy metals from water and wastewater. In this article, the seeds of Moringa oleifera seeds as a low-cost biosorbent for removal of heavy metals is presented. Moringa oleifera seeds is inexpensive material that contains amino acids. The amino acid is a major constituent of the functional groups that aids in greater ability of heavy metals removal through metal ion exchange or complexation, which is mainly affected by pH, biosorbent dosage, and contact time. *Moringa oleifera* seeds residues have a greater capacity to absorb heavy metals in a single solution compared to multi ion solution.

Keywords: *Moringa oleifera* seeds, biosorbent, heavy metals, amino acids, waste water.

INTRODUCTION

Heavy metals constitute a major group of contaminants of water. They arise from different sources such as natural geochemical and anthropogenic activities (Kumari, Sharma, Srivastava, & Srivastava, 2006). Heavy metals are defined as metallic substances that have a relatively high density (at least 5 gcm^{-3}) compared to water (Tchounwou, Yedjou, Patlolla, Sutton, & Luch, 2012). The bases of anthropogenic activities originate from agricultural activities, atmospheric deposition, road run off, discharges from industrial plants and sewage works, acidic mine effluents and building of reservoirs (Sajidu, Henry,

Kwamdera, & Mataka, 2005). Heavy metals are a danger to human life and the environment due to its non-biodegradability compare to organic pollutants making them toxic and persistent in the environment and increasing their concentrations in living systems-bioaccumulation (Adhiambo, Lusweti, & Morang'a, 2015). Metals such as cadmium (Cd), arsenic (As), chromium (Cr), manganese (Mn), copper (Cu), mercury (Hg), nickel (Ni), iron (Fe), zinc (Zn) and lead (Pb) (Jarup, 2003) are found to be toxic to humans and ecological environments even in low concentrations. Table 1 shows some heavy metals and their maximum acceptable concentrations in drinking water set by the Environmental Protection Agency (EPA). Some of these heavy metals have the potential of being assimilated, stored and concentrated in the human body, resulting in several diseases to the human body. (E.g. central nervous system impairment, kidneys failure, liver disorder) (Verbost, Flik, Pang, Lock, & Bonga, 1989). Therefore, it is of extreme importance to prevent heavy metals from entering drinking water sources by ensuring their removal from wastewater before it is disposed of into the environment. This is a crucial step towards meeting the acceptable concentrations of metals in drinking water such as those set by the EPA and, hence, prevent any potential adverse effects on human health and aquatic life. Over the years, many treatment options like physical, chemical, and biological were implied to remediate heavy metal contaminated soil, water, and sediments. Such methods include thermal treatment, adsorption, chlorination, chemical extraction, ion-exchange, membrane separation, electro kinetics, bioleaching etc. (Aruliah et al., 2019). Moringa Oleifera is increasingly becoming a biosorbent in the removal of heavy metal from waste and polluted water. However, some key findings such as dosage, pH and time kinetics have not been explicit. Therefore, this review is to elucidate on these key gaps identified in the literature in order to provide clear and unambiguous end to these issues.

Table 1. Maximum acceptable concentrations of some heavy metals in drinking water

Element	EPA Limit (mgL^{-1})
Antimony	0.006
Arsenic	0.010
Beryllium	0.004
Chromium (total)	0.100
Cadmium	0.005
Cupper	1.300
Lead	0.015
Mercury	0.002
Selenium	0.050
Silver	0.100

BIOSORPTION-PREFERRED METHOD FOR HEAVY METALS REMEDIATION OF WASTEWATER

Many methods for heavy metals removal from water and wastewater including chemical precipitation and physical treatment (Singh, Rupainwar, Prasad, & Jayaprakas, 1998) have been studied. These methods are costly and have disadvantages such as incomplete removal of heavy metals, high treatment cost, and generation of secondary waste which are very toxic hence, requiring cautious disposal (Congeevaram, Dhanarani, Park, Dexilin, & Thamaraiselvi, 2007; Apori, Hanyabui, & Asiamah, 2018). Researchers have found an alternative method which is very cheap and efficient in removal of toxic metals through biosorption. Biosorption, which is the removal of heavy metals from water and waste water using biological materials are less costly compared to chemical and physical treatments methods. The Biosorption method depends on the capability of biological materials to remove heavy metals through metal binding by multiple mechanisms such as ion exchange, electrostatic forces and precipitation. Some of the biological methods used for the removal of heavy metals includes trickling filter, biosorption, activated sludge process, and various anaerobic methods. Studies have indicated that *Moringa oleifera* seed used as a biological material for heavy metals removal from water and waste water has a potent adsorption capacity (Kumari et al., 2006). This review looks at the

botanical classification, morphological, geographical distribution and climatic conditions favoring growth and performance of moringa. Further, mechanisms and models explaining the sorption properties of moringa seeds as biosorbent are discussed in this review.

MORINGA OLEIFERA

Moringa oleifera is one of the 14 species of *Moringa* which is the sole genus of the plant family *Moringaceae*. *Moringa oleifera* is originated from western and sub-Himalayan tracts, India, Pakistan, Asia Minor, Africa and Arabia (Mughal, Ali, Srivastava, & Iqbal, 1999) and is a fast-growing shrub or small tree, attaining a height of 12 meters. It consists of a crown and trunk which is always single. It is well adapted to the semi-arid tropics and subtropics conditions and are highly tolerant to poor soils (da Silva & Kerr, 1999). It is drought tolerant and has nutritional and water purification attributes (Muyibi, Noor, Ong, & Kai, 2001). *Moringa oleifera* seeds (Figure 1) have been used as adsorbents for removing metal ions due to their good adsorption capacity. Moringa has a wide range of uses including as food, traditional medicine, fodder, and as a living fence (Morton, 1991; Coote, Stewart, & Bonongwe, 1997; Pratt, Henry, Mbeza, Mlaka, & Satali, 2002). *Moringa oleifera* is an important food which is now considered to be a 'natural' nutrition of the tropics. It is highly nutritive and used as vegetable in many countries, particularly in India, Pakistan, Philippines, Hawaii and many parts of Africa (Anwar, & Bhanger, 2003; Anwar, Ashraf, & Bhanger, 2005). The roots are used as a horseradish substitute and the young green pods are a delicacy in India. The leaves are edible and good sources of Vitamins A and C, and protein concentrate. The tree appears in the pharmacopoeia of Africa, Asia, South America and the Caribbean for the traditional treatment of many illnesses including asthma, diarrhea, fever, cough, stomach pains, blood pressure, heart problems, epilepsy and joint diseases (Sajidu et al., 2005).

Moringa oleifera Seed

The seeds of *Moringa oleifera* can be considered as a lignocellulosic adsorbent due to their cellulose; hemicellulose and lignin constituent. Seeds which contain 30 % and 30 % lipids are made up of functional groups such as O–H, C=O, C–N, which comprise macromolecules (Pagnanelli, Mainelli, Vegliò, & Toro, 2003). Amino acids are a major constituent of the functional groups (Araújo et al., 2010). The proteinases amino acids have diverse structure in relation to pH dependent properties and consist of physiological groupings of varying binding agents. The binding agents have great ability to interact with a metal either by metal ion exchange or complexation to form organo-metallic complex. *Moringa oleifera* seed (MOS)-metal ion binding appears to be an ion exchange process involving electrostatic attraction between negatively charged groups of amino acids and metallic cations (Kumari et al., 2006).

Fig. 1: Seeds of Moringa oleifera

FACTORS INFLUENCING HEAVY METAL SORPTION OF UNMODIFIED *MORINGA OLEIFERA* SEEDS IN WASTEWATER TREATMENT

Phenomenon of adsorption is widely used because of its relatively high performance, environmental friendliness and less operational difficulty. A number of researchers have used various adsorbent systems for the removal of heavy metals from waste water, produced from various industrial waste materials. Many of these low-cost sorbents include bark, lignin, farm waste, fly ash and clay minerals (Kalavathy, & Miranda, 2010; Galiatsatou, Metaxas, & Kasselouri-Rigopoulou, 2002). Among the many variables that affect metal adsorption process is pH. pH is the most critical parameter that affecting any adsorption studies (Araújo et al., 2010) due to their interference in the solid–solution interface, effecting the charges of the active sites of the MOS and the metal behavior in the solution (Gao, & Wang, 2007).

Table 2. Heavy metals removal in waste water using unmodified *Moringa Oleifera* seed (LM-Langmuir model, Q_{max}- Adsorption capacity, FM-Freundlich mode NR-Not reported)

Heavy metals	pH	Biomass Dosage (g)	Contact time (min)	Q_{max} (mg g^{-1})	Types of Metal solution	Model	% Removal	Mechanism	Sources
Cd^{2+}	6.5	4.0	40	1.06	Ternary	LM	NR	Amino acid-metal interaction	(Sharma, Kumari, Srivastava, & Srivastava, 2007)
Cr^{3+}	6.5	4.0	40	1.01		LM	NR		
Ni^{2+}	7.5	4.0	40	0.94		LM	NR		
Ag	6.5	2.0	20	NR	single	NR	100	Electrostatic attraction	(Araújo et al., 2010)
Cd^{2+}	6.5	2.0	20	NR		NR	70		
Co^{2+}	6.5	2.0	20	NR		NR	28		
Cu^{2+}	6.5	2.0	20	NR		NR	82		
Pb^{2+}	6.5	2.0	20	NR		NR	98		
Cd^{2+}	7	0.4	160	7.864	Single	FM	NR	Ion exchange	(Meneghel et al., 2013)
Cd^{2+}	6.5	4	40	-	Single	NR	85.10		Kumari, et al., 2006
Cd^{2+}	NR	0.5-1.5	60	0.168	single	LM	NR	Ion exchange	(Madzvamuse, Kugara, Shumba, 2015)
Cr^{3+}	NR	0.5-1.5	60	-		NR	NR		
Pb^{2+}	NR	0.5-1.5	60	1.281		LM	NR		
Cd^{2+}	NR	0.2	30	93.30	single	FM	97	Ion exchange	(Aziz, Jayasuriya, & Fan, 2015)
Pb^{2+}	NR	0.2	30	59.63		LM	81		
Ni^{2+} d	NR	0.2	30	101.83		LM	74		
Pb^{2+}	NR	0.2	NR	NR		NR	90	Amino acid-metal interaction	(Ali, 2017)
Ni^{2+}	NR	0.2	NR	NR		NR	85		
Cd^{2+}	NR	0.2	NR	NR		NR	99		
Mg^{2+}	4.0-6.4	0.5	5	5.61	Single	LM	100	Ion exchange	(Marques, Alves, Coelho, & Coelho, 2013)
Cd^{2+}	NR	2	NR	NR	single	NR	89	Ion exchange	(Sajidu et al., 2005)
Pb^{2}	NR	2	NR	NR		NR	92		
Ni^{2+}	NR	2	NR	NR		NR	48		
Cu^{2+}	6.5	2	30	3.83	single	FM	NR	Amino acid-metal interaction	(Kowanga, Mauti, & Mbaka, 2016)
Pb^{2+}	5.5	2	40	1.50		FM	NR		
Cr^{3+}	7	1	60	12.6	single	FM	97.94	Amino acid-metal interaction	(Ghebremichael, Gebremedhin, & Amy, 2010)
Cr^{4+}	2	2	60	-		NR	99.9		

The next parameter is the dosage or quantities of adsorbing material. Increase in the dosage of adsorbent increases the amount of metal ions adsorbed onto the surface of the adsorbent (Adelaja, Amoo, & Aderibigbe, 2011). The increase is

attributed to the fact that more adsorption sites will be available when the mass of the adsorbent is increased. The period in which the adsorbate and absorbent are in contact with each other influences the efficiency of heavy metal removal. The efficacy is attributed to the rapid uptake of heavy metals onto the surface of the biosorbent in a shorter time followed by slow release of the ions back in the solution with time until an equilibrium is attained. This is due to the saturation of the available adsorption sites present on the MOS (Table 2).

ADSORPTION CAPACITY AND MECHANISM FOR REMOVAL OF HEAVY METAL IONS USING UNMODIFIED MORINGA SEED AS BIOSORBENT

Many studies have reported that metal sequestration occurs through complex mechanisms, including ion-exchange and complexation depending on several factors including biomass dosage, type of metal ion and contact time (Araújo, Melo, Alves, & Coelho, 2010). Seeds of *Moringa oleifera* have a great sorption capacity for heavy metal removal. The seeds consist of many forms of functional group such as O–H, C=O, C–N, and others physiological diverse group of binding agents. The binding agents consist mainly of negative charges, coming from their surface functional groups, which exchanges with the positive charge of the heavy metal ion through ion-exchange mechanism. Kumari et al. has reported on significant Cd (II) removal from aqueous solution by *Moringa oleifera* seed (Kumari, et al., 2006). In their study it was shown that the biosorption of Cd by MOS is attributed to the availability of carboxyl groups especially of amino acids functionality interacting with Cd (II) ions to form ligands. According to Kalavathy and Miranda, arsenic, copper, cadmium, lead, nickel and zinc are the most significant contaminants (Kalavathy, & Miranda, 2010). It is well known that the presence of heavy metals in the atmosphere is responsible for a number of diseases associated with the risk of dermal injury, respiratory problems and various forms of cancer, even in moderate concentrations.

The most commonly used isotherm models for adsorption study are Langmuir, Freundlich, Dubinin-Radushkevich and Temkin. It can be clearly observed in Table 2 that metal ions removal has been shown to both fit Langmuir and Freundlich model but majority they are best fitted to Langmuir model (e.g. Cd^{2+}, Cr^{3+} and Ni^{2+}) which is based on the assumption that adsorption is limited to monolayer coverage, all surface adsorption sites are the same with each site accommodating one adsorbed particle and there is no interaction between neighboring adsorbed molecules or atoms; and there are no phase transition (Ghebremichael et al., 2010). Madzvamuse et al. (2015), compared adsorption properties of MOS and activated MOS as low- cost adsorbent for the uptake of lead, chromium, mercury and Cadmium as mono component system. They found that the data for *Moringa oleifera* seeds fit well with Langmuir isotherm model for lead and cadmium ion removal. Also, increase in the dosage of Moringa *oleifera* seed from 86.0 % to 99.38 % increases the amount of metal ion adsorbed onto the surface of the adsorbent (Adelaja et al., 2011; Madzvamuse et al., 2015; Shama et al., 2007). Araújo et al. (2010b) recorded 98% removal of lead using 2.0 grams dosage of *Moringa oleifera* compared to 81% of lead removal with same dosage of MOS (Aziz et al., 2015), the differences are as a result of the environment in which the experiment were conducted. The mechanism underlying increased sorption of these heavy metals was attributed to in increased amount of adsorption site for greater removal of the heavy metals (Koetlisi and Mucgaonyerwa, 2019).

Moringa oleifera seeds residues have a greater capacity to absorb heavy metals in a single solution compared to multi ion solution. However, in single metal solutions, ions with larger ionic radii are better adsorbed than those with less ionic radii (Igwe and Abia, 2007). Sharma et al., conducted biosorption of multi-solution composed of Cd (II), Cr (III), and Ni (II) on

unmodified shelled *Moringa Oleifera* seed in ternary mixture and compared it to a single metal ion solution (Sharma et al., 2007). The results of the study suggest that sorption capacity for each of the metal ions present in the multi metal ion solution was less compared to the ions in the single metal solution which was attributed to reduction in the availability of the binding sites (Igberase, Osifo, & Ofomaja, 2017). Also, seeds of plant species like *Moringa oleifera* (MO) contain natural polyelectrolyte mainly of potential nitrogen and oxygen ligands that are known to have an affinity for coordinating to heavy metals. Sajidu et al., studied the removal of lead, iron and cadmium ions by polyelectrolytes of the Moringa Oleifera whole seed kernel and results indicated that, Moringa Oleifera seed polyelectrolytes showed considerable lead, cadmium and iron removal property with percentage reduction in solutions of 89%, 48% and 92%, respectively (Sajidu et al., 2005).

CONCLUSION

The present articles reviews Moringa Oleifera Seeds as a Low-Cost Biosorbent for removing heavy metals from wastewater. Waterbodies are polluted with heavy metals through various activities, the various technologies used to treat wastewater is very expensive and resource demanding. The seeds of Moringa oleifera has been proved and established as a cost-effective process for the treatment of wastewater. *Moringa oleifera* seed residue is an inexpensive material that contains amino acid which is a major constituent of the functional groups that aids in heavy metal removal in waste or contaminated water. The binding agents have great ability to interact with the metal either by metal ion exchange or complexation to form organo-metallic complex. *Moringa oleifera* seed - metal ion binding seems to be an ion exchange mechanism involving electrostatic attraction between negatively charged groups of amino acids and metallic cations. *Moringa oleifera* seed have the potential to remove heavy metals in single solution than multi ions solution and is mainly affected by pH “between” 5-8, biosorbent dosage, and contact time.

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PESTICIDES; A NECESSARY EVIL IN THE AGRICULTURAL VALUE CHAIN- A REVIEW

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ABSTRACT

Even though pesticides constitute a very essential component of improved and modern agriculture, the abuse of pesticides has brought substantial poisoning worldwide, especially in developing countries. This review investigates the possible sources by which people are exposed to pesticides worldwide and the impact on their livelihood. The group who often are exposed to these chemicals includes, farm workers, children, farmers, and family members who have direct link to the pesticide application sites as well as persons who are exposed to these pesticides through the domestic use of waterbodies and consumption of foodstuff or crops sprayed with these pesticides. Central to this review is the critical discussions of the different scientific research findings on health effects and risks related to pesticides usage. Again, organophosphates and organochlorines pesticides are found in most of the pesticide contaminated sites and can remain in soil and waterbodies for a longtime. This work has also provided cases of incidence of carcinogenicity in humans, as a result of pesticides use. We concluded that, breeding or developing insect tolerant or resistant crops may curb the profuse use of pesticides in agriculture.

Keywords: Pesticides, carcinogenic, pesticides production and exposure, pesticides use.

INTRODUCTION

There are a wide range of pesticides used all over the world. Synthetic pesticides introduction between the 1960s and 1980s contributed immensely to pest control in agriculture and as a result, improved agricultural productivity. Preferably, a pesticide should be toxic to the targeted organism, but not to untargeted environment, organisms or species, including humans (Zahm & Ward, 1998).

Pesticides are commonly used in agriculture. They destroy undesirable agents such as weeds, insects and fungi that destroy particular crops and reduce their multiplication. It is also used on water bodies to kill bellicose to plants and control growth algae. Common pesticides used in

the world are grouped according to the organisms used on and chemical composition. Their groupings include insecticides, rodenticides, fungicides, herbicides and avicides. They are chemically classified as pyrethrin, organochlorines, organophosphates, pyrethroids, carbamates and arsenals compounds (Kariathi, Kassim, & Kimanya, 2016). A research by Zhang (2018), show that globally, the use of other pesticides accounted for the most proportion of total pesticides (53.84%), seconded by herbicides (25.10%), and followed by fungicides & bactericides (12.06%), insecticides (7.50%), plant growth regulators (1.24%) (Figure 1). Farmers are able to ensure good returns on their investment by using pesticides. Korir, reported that farmers gain four-time return in crop production on pesticide investments (Korir, 2011). However, the negative aftermath of pesticides usage is numerous. About 98% of pesticides sprayed reach destinations other than their intended target (Sharma, Thapa, Manandhar, Shrestha, & Pradhan, 2012). Consequently, it has become toxins of water, air, soil and human health. Indeed, many are found to be highly carcinogenic in animals and humans bio-assays. In a study by the National Toxicology Program and the National Cancer Institute, in the USA, on fifty-one pesticides showed that twenty-four were carcinogenic in bioassays (Blair, Dosemeci, & Heineman, 1990). Again, the International Agency for Research on Cancer (IARC) of the World Health Organization recorded twenty-six pesticides as possessing enough evidence of carcinogenicity in animals and nineteen as having partial proof in animals (International Agency for Research on Cancer [IARC], 1999). People living, working or attending school around or closer to larger farms are at very high risk to pesticide drift, especially those who use raised equipment for spraying or crop duster planes to spray pesticides on crops. The most vulnerable actors to these airborne pesticides are children, because their bodies and organs are still under development. Sprayed pesticides drift and settle on toys, laundry, play areas, porches, pools, furniture and many more where people easily get in contact with.

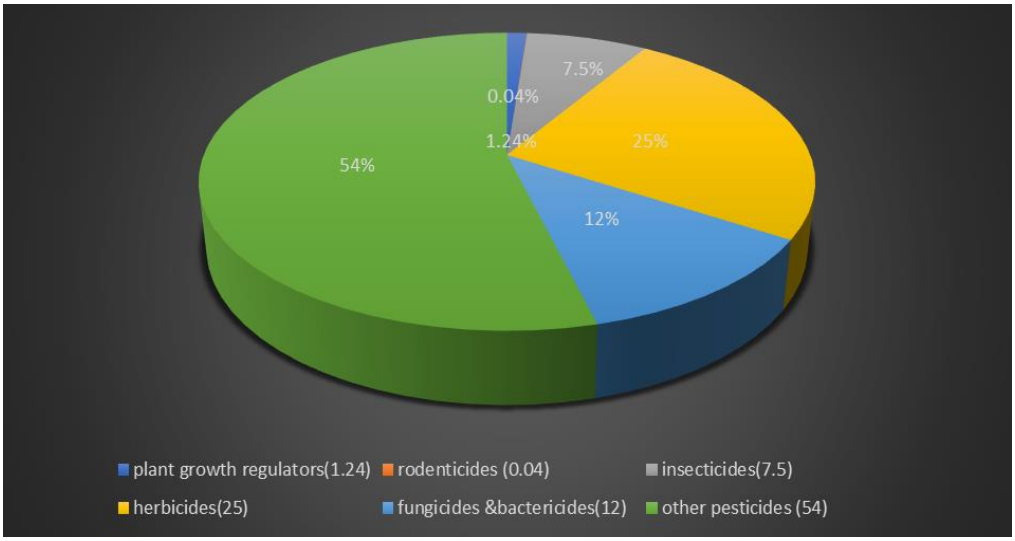

Figure 1: Proportion of Global pesticide use profile (Zhang, 2018; Gunnell, Eddleston, Phillips, & Konradsen, 2007; Liu, Pan, & Li, 2015).

PESTICIDE AND CROP PRODUCTION

There are approximately nine thousand species of insects and mites, about fifty thousand species of pathogens associated with plant, and eight thousand species of weeds that harms crop worldwide (Zhang, Jiang, & Ou, 2011); Pimentel, Lach, Zuniga, & Morrison, 2002). Pesticide has become very important to farm productivity and is estimated that about one-third of products from agriculture are produced using pesticides (Zhang et al., 2011; Liu et al., 2015). Cai et al., reported that without the use of pesticides the damage of fruits, vegetables and cereal would have increase by 54%, 32% and 78% respectively (Cai, Mo, Wu, Katsoyiannis, & Zeng, 2008). In the U.S, fungicides are used to produce about 80% of their fruit and vegetables. Again, crop loss caused by pest invasion declined from 35% - 42%. In 2007 alone, the global production value of apple increases by One thousand two hundred and twenty-three million US dollars by using fungicides (Guo, Schnieder, & Verreet, 2007). Zhang et al., confirmed that without pesticide use, cotton, soybean and wheat export would have decrease in the United States by about 27% (Zhang et al., 2011). However, there are record of high rate of pesticide overuse and pollution as well (Liu, et al., 2017; Liu et al., 2008). In Africa, agrochemical such as pesticides are subsidized or provided freely by the government to farmers, especially those producing cash crops to help crops at high quantity and good state to help boast the country economy. In Côte d'Ivoire, for instance, insecticides were given to cotton farmers free at critical times of the country economy (1966-1994) (Ajayi, 2000). In most countries in the sub Saharan Africa, pesticides are sometimes provided freely to farmers for use on cereal and legume staples to control of pests and disease outbreak such as locusts, armyworm, quelea birds and many more (Williamson, 2003).

WORLDWIDE PESTICIDE PRODUCTION AND USE

Technical grade pesticides production had grown steadily worldwide, especially in the China, Germany, USA, France and India (Table 1). Globally, about £5billion of pesticides are used per annum, among which organophosphate and carbamate insecticides (34%), phenoxyl herbicides (12%) and dithiocarbonate fungicides (18%) are the most frequently applied (Ye et al., 2013). China is known to be the top producer and consumers of pesticides in the world (Table 1 and 2). Greenpeace in 2013, reported that in China about 70% of pesticide sprayed to maintain plants, leach into the soil and groundwater. Recently, the government reported that pesticide use by farmers in China had thrice the universal average (Liu et al., 2017). Zhang et al., reported that insecticides, rodenticides, and herbicides usage in the country accounted for 17.05% of pesticide poisoning (Zhang et al., 2011). In India, pesticides demand in relations to price was estimated to be around 0.5 billion dollars (2% of the total world market). The form of pesticide usage has taken a different trend in India. Even though India is among the leading pesticides producers in the world, herbicides and fungicides are not often used as much as insecticides (Aktar, Senguptam, & Chowdhury, 2009). About 45% pesticides use in India is for production of cotton, then wheat and paddy (Aktar et al., 2009). Globally, pesticides consumption has increased significantly, in the United States for example, the pesticides usage doubled from 1960 to 1980, but overall use has remained stable since then (United State Environmental Protection Agency [USEPA], 2001). This is because of the institution that has been set up to check it production and consumption. In the United States, most pesticides used aim to enhance agriculture productivity, but in 1999 a lot of households (about 74%) were reported to use at least one or more pesticide in the home (USEPA, 2001).

The use of pesticide has increased in most low- and middle-income countries. Some of the wildest growing markets

includes South and Central America, Asia, Africa. Pesticide use on crops grown for export are used highly in some countries in this continent. Thailand and Bangladesh have quadrupled their pesticide use since the 90s, whereas Burkina Faso, Ghana and Ethiopia have recorded a tenfold increase over the same period, even though new to the game. Most pesticides are imported by developing countries from developed countries where they arrive somethings pre-formulated or formulated locally from their raw forms (Mrema, Ngowi, & Kishinhi, 2017). The annual imports of pesticides in African countries like Sudan is approximately 5000 metric tons, of which 88% are used in agriculture (cotton, vegetables and sugarcane), 7% in pests' control and 2% in the public health sector per annum (Abdelbagi et al., 2018).

Table 1: Global production and export of pesticide in 2017. (Zhang, 2018; Jin, Wang, He, & Gong, 2017; Ives, 2017)

Country	Production and export of pesticides
China	$4.8 billion (14% of total export)
Germany	$4.2 billion (12.4% of total export)
United States	$3.9 billion (11.5% of total export)
France	$3.5 billion (10.4% of total export)
Belgium	$2 billion (6% of total export)
India	$1.8 billion (5.3% of total export)
Israel	$1.31 billion (3.9% of total export)
Spain	$1.3 billion (3.8% of total export)
United Kingdom	$1.28 billion (3.8% of total export)
Italy	$756.6 million (2.2% of total export)
Netherlands	$722.5 million (2.1% of total export)
Hungary	$622 million (1.8% of total export)
Japan	$517 million (1.5% of total export)
Singapore	$483.9 million (1.4% of total export)
South Korea	$421.4 million (1.2% of total export)

Table 2: Global Pesticide Consumption (Pretty & Bharucha, 2015; Zhang et al., 2011; Liu et al., 2015)

Top Rank	Country	Pesticide Consumption per year (millions of kilograms)
1st	China	1,806
2nd	United States	386
3rd	Argentina	265
4th	Thailand	87
5th	Brazil	76
6th	Italy	63
7th	France	62
8th	Canada	54
9th	Japan	52
10th	India	40

SOURCES OF PESTICIDE EXPOSURE

Pesticides exposure happens in numerous ways. It may occur in farming, through the spraying of crops or treatment of harvested grain for storage. Pesticides exposure also occur in gardening, forestry, professional and domestic pest control of facilities such as playgrounds, our parks and around our buildings. Exposure also ensue through woods and boat hull treatment with preservative and livestock (example Sheep dip) treatment with anti-fouling and anti-parasitic agents. Also, pesticide residues in or on our food

also puts us at very high risk. Humans and animals living close or around pesticide sprayed croplands can be highly exposed through application drift, over- spray, or off-grassing. Shoes, clothes and even pets which traps a lot of dusts loaded with pesticides are major source of exposure at homes (Simcox, Fenske, Wolz, Lee, & Kalman, 1995; Carnann, 1995; Nigg et al., 1990). Farmers often brings pesticides into the house on their dress and even equipment. Children, who are found often playing on the ground and always putting objects and hands in their mouths (Carnann, 1995), may be at very high risk of exposure. Contaminated surface and ground water from agricultural runoff are also source of exposure. It is reported that, about 50 million people in the United States of America obtain their drinking water from groundwater that is possibly polluted by pesticides and other chemicals used in agricultural (Nielsen & Lee 1987). Moreover, a national pesticide survey of drinking water by the United State Environmental Protection Agency (USEPA), found one or more pesticides in 4.2% of domestic wells in rural areas and 10.4% of water systems in the communities (Ministries, Bullard, Mohai, Saha, & Wright, 2007). Conventional techniques of treating drinking water are normally not aimed at removing the pesticide contaminants. For instance, a study in 1994 to examine five herbicides in two thousand samples from tap water and other sources of drinking water found that, about 14.1 million people in America regularly drink water contaminated with chemicals like metazachlor, simazine, atrazine, cyanazine, and alachlor (Wiles, Cohen, Campbell, & Elderkin, 1994). Another survey done in 1995 by the same organization also found an extensive herbicides contaminated tap waters, at levels beyond the USEPA lifetime health advisory levels (Cohen, Wiles, Bondoc, 1995). Research shows that pesticides are able to remain in the groundwater for a very longtime (Fenner, Canonica, Wackett, & Elsner, 2013). For example, it was reported that dibromochloropropane, was a fumigant which was banned for use since 1977 in California, is still reported to be found in significant concentrations in the ground-water of the country after more than 19 years (Kloos 1996). Goolsby et al., reported high concentrations of acetanilide and triazine herbicides in rainfall during summer in America (Goolsby, Thurman, Pomes, Meyer, & Battaglin, 1997).

Although diet is known not to be a key route of exposure for most pesticides, occasionally some food items are recorded to have some residues. Hamilton & Crossley, reported in a research that some potatoes had lethal levels of aldicarb (Hamilton & Crossley, 2004). National Research Council in 2003, reported that there is high exposure of pesticide to children, who mostly consume more fruits than adults, because their immature metabolism and other factors makes them sensitive to the toxic effects (National Research Council [RNC], 2003). Another report by Willes et al., showed that in every four times a 5-year-old child or less consumes a peach, in one of the times he or she is likely to be exposed to organophosphate insecticide at a hazardous level (Wiles, Davis, & Campbell, 1998). Again, in a survey of 76 jars of baby food from some grocery stores found about 16 pesticides in eight samples.

There are many reports indicating the pesticides use in many countries in African, which includes Tanzania, Ghana, Niger Algeria, Kenya, Ethiopia, Uganda, Malawi, South Africa and Morocco (World Health Organization, [WHO], 2010). In these countries' pesticide use is not only for cash crops, they are used a lot during the cultivation of non-cash crops like fruits, tubers, grains, vegetables, and other staple foods (Sheahan & Barrett, 2014)

In 1958, Nigeria reported the first event of human exposure to pesticides, where the family of a prominent cocoa farmer in a town called Okebode, (in western Nigeria) were hospitalized after consuming leaves which where earlier in the week sprayed with Lindane (Erhunmwunse, Dirisu, & Olomukoro, 2012). Again in 2004, twenty-

three cases of vomiting and death were recorded among people who ate noodles mass-produced in Nigeria, found to have residues of carbofuran pesticides (Erhunmwunse et al., 2012).

Contamination of lands, wildlife, aquatic bodies, blood, mother's breast milk and foodstuff by organochlorines pesticides in Nigeria and other countries in Africa has been proven (Osibanjo & Adeyeye, 1995; Erhunmwunse et al., 2012). There are also serious concerns about chemicals or pesticides used in storing grains in West Africa. Farmers and food companies are found of using pesticides to store foodstuffs to prevent destruction by insects. In Nigeria, there are several reports by the media of the use dichlorvos (well known as sniper), cyhalothrin, trichlorphon, chlorpyrifos, omethoate and dimethoate sprayed over grains (e.g. beans and maize) to preserve them from insects for 6 months or more. This is twice a burden of pesticide poisoning crops.

In Ghana, agriculture contributing to over 50% of the country's GDP (Breisinger, Diao, & Thurlow, 2008; Aryee, 2001). A research conducted in some farming areas in the Eastern region of the country showed that, 71% (1040 out of 1455) of heads of household reported to have used pesticides on either on their farms or in their homes, most commonly for control of weeds (1003/1040) or insects (888/1040). A lot of households (721 out of 1040) reported women helped in the spraying pesticides. Of these women, 366 out of 721 did so with their babies on their back. Only a few 301/1040 of those who sprayed worn protective devices when applying the pesticides. Regular symptoms that were reported after spraying, included difficulty in breathing (278 out of 1040), cough (336 out of 1040), and skin irritation (406 out of 1040).

CARCINOGENIC IMPACT OF PESTICIDES ON HEALTH

Although pesticides actually help farmers boost productivity significantly, it negatively affects human health and surrounding environment. Millions of instances of pesticide poisonings are reported annually worldwide (Table 3). Pesticides are often able to make their way into pond, rivers or even oceans when sprayed on land. Water bodies polluted with pesticides, kills fishes and other animals. Hence, can toss the whole ecosystem off stability. Groundwater are also be affected by pesticides by a process known as seeping. Humans depend on groundwater and other water bodies for domestic activities such as drinking. Yet, if these water bodies are contaminated with pesticides, it is unhygienic and detrimental for the people to drink (Johnson, Domagalski, & Saleh. 2011). Moreover, pesticides are not only perilous to the environment, but they are also carcinogenic to a person's health. Studies had made us understand that pesticides have substantial long-lasting effects on health, such as neurological effects, cancer, respiratory diseases and even diabetes, fetal diseases and genetic disorders. There have been numerous reported cases of the impact of pesticides on livelihood all over the world (Table 3). Although developing countries are reported to use less than 30% of the pesticides in the world, they experience almost 99% of pesticides caused deaths. This is because there is more intense usage of pesticides in an unsafe manner and there are no structured regulatory and educational systems to check the use of these pesticides in these countries. Several instances of misuse and over-use on food crops have been reported with the associated negative effects on human health and productivity, (Amoako, Kumah, & Appiah, 2012). According to UN report 2017, it is reported that the cost of pesticides carcinogenicity in Africa is about $90bn.

There are several reports of pesticide associated ill- health among actors in the agriculture value chain. For instance, Williamson et al., in a study, described endosulfan, cyhalothrin, chlorpyrifos and lambda being associated with cases of ill-health among farmers in Ghana (Williamson, Ball, & Pretty, 2008). Ntow also detected lindane and endosulfan in

water bodies in the area of rigorous tomato farming, while in other farms organochlorine residues were also found in sediment of streams (Ntow, 2001). A very similar outcomes were reported in a study at the Volta Lake of Ghana (Ntow, 2001). A study to evaluate the remains of pesticide in some foods collected from twelve states in India, 82% of DDT residues were found in two thousand two hundred and five samples of bovine milk collected from twelve states. Thus, about 37% of the samples had DDT remains above the tolerance levels of 0.05 mg/kg. The study by Zhang et al., found organophosphorus pesticides as highly carcinogenic to human health, and accounted for about 86% of the whole cases studied (Zhang et al., 2011). Another study in Eastern China found about three thousand children poisoned by pesticides in the farming seasons between 2006 and 2015 (Fan, 2017). Ferreira et al., reported a five-year study on indirect pesticide exposure and cancer risks on farmers' family members or people living in rural areas where there is an intensive use of pesticides, showed evidence with increased risk of leukemia in childhood in five studies (Ferreira et al., 2013) (Table 3).

Table 3: Cases of carcinogenic impact of pesticides on livelihood of some actors in the agriculture value chain

Cases	Findings	Reference
01	The reports showed a very substantial role of the nucleotide excision repair in the high risk of prostate cancer due to exposure to fonofos and carbofuran pesticide among male who apply white pesticide on farms.	(Barry, & Edgman-Levitan, 2012)
02	Pesticide use and obesity were reported to be linked with high risk of cancer. A research conducted among 67, 947 men and women in North Carolina and Iowa suggested that certain pesticides may alter obesity effects on the risks of lung and colon cancer.	(Lerro et al., 2015)
03	The report of a research conducted in thirteen Brazilian states suggested that, exposure to pesticide during pregnancy may cause the etiology of acute lymphoid and myeloid leukemia in children under 1 years of age.	(Ferreira et al., 2013)
04	A research conducted among children of pesticides applicators showed high risk of cancers including all lymphomas and Hodgkin's lymphoma. Increased risk of cancer is detected among 17, 357 children whose fathers do not use chemically resistant gloves	(Flower et al., 2004)
05	This research reported that small scale female farmers in West Sumatran apply pesticides without protection in a highly insecure way. They reported symptoms of burning nose, sore throat, muscle cramps, nausea, and constipation eye burning dizziness, blurred vision and shortness of breath. They realized that these were as a result of the number of hazardous pesticide products that are handled on a weekly basis, especially during continuous growing seasons.	(Murphy, Cuneo, & Bedford, 2004)

CONCLUSION

Indeed, pesticides potentially help boost agriculture productivity significantly worldwide. But its health implication is absurd. The way of the usage of these chemicals, especially in Africa, negatively incur risks on the health of humans and their environment. Hence, diminishing net growth in productivity and well-being in the long run. We found that commercial pesticide formulations also may pose a carcinogenic risk to human health. Overuse,

misuse and lack of appropriate precaution and protection during the application of this pesticides account for high health risk. In Africa, the lack of proper regulation and checks on imports of these chemicals have caused a high impact on ill-health. Our review has also proved that many carcinogenic ill-health results are ambiguous; some research reports also show that many of the health outcomes results on the carcinogenicity of pesticides are uncertain; some studies find exposure to pesticides leading to cancer, whereas others do not. Others even report its causing diabetes and many more. Yet, on the bases of our review, we will conclude that even though much research has not proven the carcinogenicity of pesticide in Africa, the few reports should make us very aware, cautious and careful in taking precaution when dealing with these chemicals. Again, breeding or developing pest-resistant or tolerant crops may curb the profuse use of pesticides in agriculture.

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ACTION-COLLABORATIVE NETWORKS OF THE REGIONAL GOVERNMENT ON LAND AND FOREST FIRE RESTRAINT IN PELALAWAN DISTRICT, RIAU PROVINCE

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ABSTRACT

The problems of forest and land fires continue to overshadow in Riau Province and Pelalawan District including the contributors of fire spots of forest and land fires. The handling and control of forest and land fires run during this time tend to be incidental and focus on the aspect of fire suppression only. The extinguishing and controlling of forest and land fires fire has been undertaken by several agencies in the local government organization of Pelalawan District. While the relationship between the agencies is more information share and informational relationship and the deployment of resource assistance is limited to the capacity of each organization during the occurrence of forest and land fires only, not led to a collaborative multi-disciplinary working approach (inter-organizational collaborative network) in the area of local government. This research aims to Described the management situation of forest and land fires that took place in Pelalawan District, conducting analysis and academic studies on the practice of Network Inter-Organization by controlling forest and land fires *(Karhutla)* in Pelalawan District, and formulating model Inter-organizational network-based organizations that can be applied to regional government of Pelalawan District in every bureaucracy organizations. The study used a qualitative descriptive approach with reference to literature studies and interview reluct collection by (Agranoff & McGuire, 2003).

Keywords: Land and Forest Fires, Action Collaborative Networks, Inter Organization Networks, Local Government, Pelalawan District.

INTRODUCTION

Forest and land fires continue to overshadow the areas of Riau Province. Forest and land fire insecurity in Riau Province. Pelalawan District is also one of the areas in Riau Province that is vulnerable

to forest and land fires. The distribution of fire in Riau Province from 2017 to 2019 can be seen in figure 1 (Sipongi, Forest and land fire system of State Minister for the Environment in 2017 – 2019).

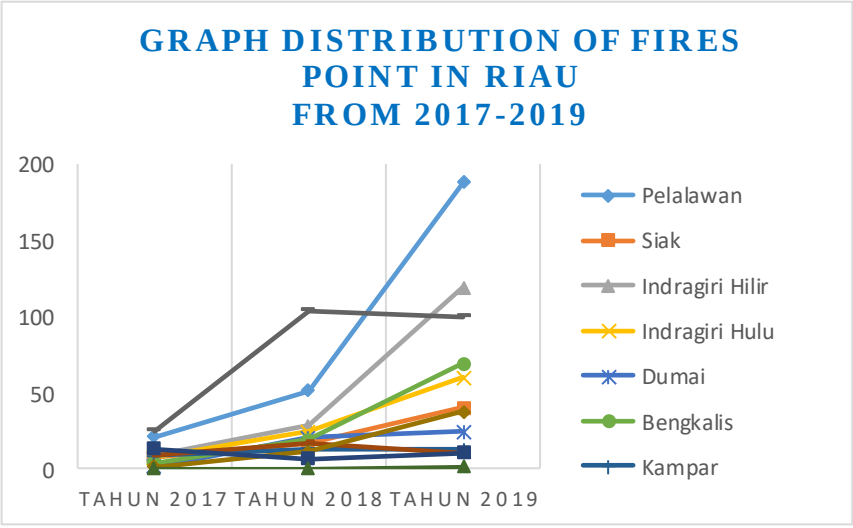

Figure 1. Graph Distribution of Fires Point in Riau

Forest and land fires in Pelalawan District, taking into consideration the characteristics of the land and its peat-containing forests, are viewed as potential and long-term risks. Therefore, the handling cannot be incidental and partial. If not, then the events of forest and land fires for the fire of forest and land will continue to be repeated.

The issue of forest and land fires in Pelalawan District is not merely a local issue, but has become a national, even international matter. This is because the issue of forest fires and land has a wide impact, both in local, regional and cross-country areas. The catastrophic haze incident caused by forest fires and land in Riau Province has affected the country to Malaysia and Singapore.

The negative impacts caused by forest and land fires are very complex. The negative impacts of forest and land fires are very tangible in the health aspects. The Hazard can cause allergic reactions, inflammation, up to Acute Respiratory Tract Infections (ISPA).

Bases on the data of Health Agency of Pelalawan District in October 2019 showed that it had reach 21.381 inhabitants. From January to June showed that decreasing condition of Acute Respiratory Tract Infections (ISPA) Health Affection. Contrary the advantage condition starts from July to October 2019. This advantaging also occurs in coincide time with the amount of fires affecting in Riau Province. The data can be shown in the table 1 and figure 2 (Department of Health of Pelalawan District, 2019).

Table 5. The Data of ISPA Disease Total Patient in Pelalawan District 2019

Month	ISPA Infants	ISPA Non- Infants
January	1011	1360
February	739	1213
March	744	930
April	605	1075
Mei	755	974
June	528	922
July	742	1038
Augustus	840	1796
September	1197	2885
October	853	1174
Total	8014	13367

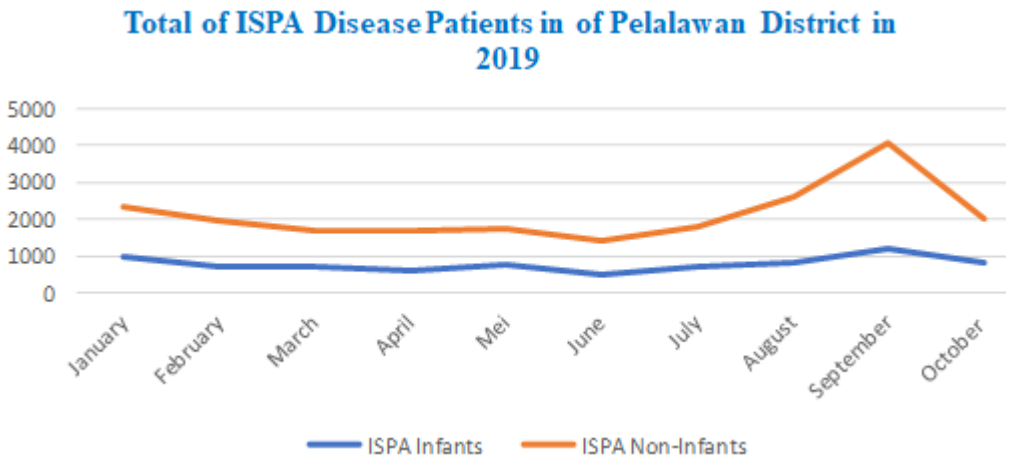

Figure 2. Total of ISPA Disease Patients in of Pelalawan District in 2019

From the data above it can be seen that for toddlers and non-toddlers, people with ISPAS in September 2019 reached its peak. For children with toddlers' of 1197 patients, while non-toddlers reach 2885 sufferers. The pattern of increasing the number of visitors both toddlers and non-toddlers is also similar, starting from June to September. Moreover, back down in October 2019, because the fires are diminishing.

It is not only on the disease problem that is immediately felt when inhaling smoke pollution due to forest and land fires as illustrated in the table above, there is a study that connects the impact of exposure to smoke pollution by calculating ex-ante deaths, with the mortality unit of the World Health Organization (WHO), the term *Quality-Adjusted Life-Year* (QALY). That when the pollution index reaches 2.314 (660 percent) of the pollution Index tolerance limit (PSI 350) with a daily exposure of up to yearly, the average life of a person can be reduced to 5 percent-15 percent (Lassa, in Compass 09/10/2015).

In addition to health problems that are not less important is the disruption of ecosystems for protected wildlife, eliminating biodiversity, and the most feared is the increasing poverty rate and the disruption of the economy in the country.

Indonesian National Board for Disaster Management abbreviated as BNPB (2016) stated that the impact of forest and land fires on the economic sector such as the loss of haze in two years ago – which was calculated for three months from February to April 2016 – in Riau Province reached 20 trillion rupiah. The calculation

of the economy is based on Provincial Monthly Gross Regional Product (PDRB) number, and compares the number of regulars to the provincial entry in the months of haze, depending on the months in which the number of *hotspots* (point the fire) was detected the most, so do the smoke. Gross regional domestic product, will record the turnover of money; the number of flights that failed to fly, hotels, and food industry, canceled business contracts, or reduced tourists will be reflected in the data of Gross Regional Domestic Product (PDRB).

The involvement of several parties in the handling of land and forest fires has not been seen as a network pattern integrated between organizations. Pasco team, which has been formed based on decree of Regent only, works during dry season/forest and land fires only, and even at fire suppression level only. From initial observation, researchers have not seen any unity of planning, program target consistency, and budget independence in the Pasco team.

It should be a Forest and Land Fires *(Karhutla)* issue involving many actors and interests, requiring the cooperation of various stakeholders or stakeholder organizations as well as networks *(inter-organizational network)*. Network theory is based on relationships between actors that are interdependent with each other *(interdependence*). It is understandable that the actors will not be able to achieve their goals without using resources owned by other actors. Based on theory from (Pratikno, 2015; Rhodes, 2007) stated that this interdependent mechanism runs through the exchange of resources between actors. The Inter-organizational network asserts that the interdependent nature of one organization and the other organization is unavoidable.

According to (Cohen, 2006) stated that the network working Model, tends to be more agile and flexible than a hierarchical model. The integration of the network between organizations is important in preventing forest and land fires that often occur in Riau Province, as well as in Pelalawan District in particular. Therefore, network work between organizations involved in the control and handling of Forest and Land Fires *(Karhutla)* need to have a joint framework agreement, such as concerning the perception and policy aspect to risk, technical operational aspects of handling and funding aspects. At this time, at the very least, is useful for avoiding *overlapping* authorities, tasks, roles, and responsibilities and avoiding *gaps* between working networks.

The formation of an inter-organizational network is assessed as having a natural cycle like an automatic evolution of organizational development. To recognize the evolution of the inter-organizational network, various studies were conducted by tracing the development of the network over time such as (Hansen, 1999) on the network's role in increasing the research impact; (Berry et al., 2004) The agenda of the Learning of public management research by learning from other research communities, (Scott & Hofmeyer, 2007) about network use for increased delivery of healthcare services; (Isett, Mergel, Leroux, Mischen, & Rethemeyer, 2011) about Understanding the purpose of public Administration scholarship network; (Raab, Lemaire, & Provan, 2013) about network between organizations at the network level; (Diefenbach, 2009) about Network of public sector organizations in informing scholarships and practices.

At the stage of development and network development, is balancing the needs of organizations and networks. The network Manager is required to be aware of the role to facilitate as an essential management task and encourage leadership distribution. Other views according to (Harmon, 2014) stated that A number of public administrator roles could be analytically visualized to the easiest as a merger in three general arenas: *inter-organizational, intra-organizational, and Organizations with individuals.*

In the context of *inter-organizational*, public administrators acted as representatives and agents for an organization when they met, spoke, argued,

and dealt with similar agents from other organizations. Furthermore, the second is *intra-organizational*. Here the language is often the language of the organizational chart, about who reports to whom. The third Arena is an *organization among individuals,* in which public Administrators act again as agents; to confront, direct, persuade, and interact with individuals.

Cohen had also intensively developed this Network Model in their book entitled *"Governing by Network: The New Shape of The Public Sector"* (Cohen, 2006). They see that with the current bureaucracy barriers, with the growing private and non-governmental sectors, rapid technological developments, and increasingly complex demands of society, the provision of public services and utilizing existing networks can do problem solving, both horizontally and vertically. It will certainly drive flexibility, decentralization and innovation through the involvement of many parties, while the government can concentrate on the development of its main mission.

Based on a study of several theoretical references regarding *network* and *Inter-Organizational Network*, such as (Agranoff, 2007; Baker, 2015; Goldsmith & Eggers, 2004; Ulrich, 1997). Based on some theories it is known that experts have given a broad picture of what is meant by the "scope/condition" of the *network*, but (presumably), have a distinct practical operational conception of the networking concept. Therefore, there is often a difference "meaning" to the term *network* and *Inter-Organizational Network*. Some are interpreting the term *network* as a network and some are the ones that interpret it as a *networking*. Meanwhile, the term of *Inter-Organizational* Network is a network that defines the *inter-organization*, some of which interpret as an *inter-organization network*.

The difference in paradigm/conception eventually separated the "usage" of the operations and management/form of the working-network-based Practice (*network*). Presumably, it is necessary to set and or be defined operatively as the *network* and *Inter-Organizational Network* in its operational concrete practices. Does network mean "*working with networked systems"* or *"working in networks"* or *"working on a network"*? Thus, in the context of the *Inter-Organizational Network* It is necessary to affirm whether the organizations engaged in the working relationship *"working in* (a) model/network system," or *"working together as a network*," or does *"work together in a network* (in connection)," or does "*work in a network alignment*," or does *"work in* and ALA (*a model/system) networked"*?

RESEARCH METHOD

This research is a qualitative descriptive study based on consideration; because researchers intend to get a deep picture of the Government's efforts in the control of forest and land fires in Riau Province. This research is also holistic (thorough, not split up), because this research sees the overall activity that has been done by the organization of fire control of forest and land in Pelalawan District, which is Relies heavily on the overall synergistically interconnected social situation.

To obtain the data, researchers go directly to the field to see the efforts undertaken by the Government to conduct forest and land fires in the context of the network between organizations in response to Forest and land fires. The Data collected using methods of observation, documentation and interviews to the informant taken from; Regional Disaster Management Agency (BPBD)in Pelalawan District, Department of Plantation and Livestock of Pelalawan District, and Environmental Agency of Pelalawan District.

The process of data analysis in this study adopted based on theory from (Miles, Huberman, & Saldana, 2014) which classified includes 3 (three) components of analysis, namely: data reduction, data feeds and conclusion withdrawal. Further analysis is done by synergistically integrating of the three components. Data reduction, used as a form of analysis that sharpen, classifies,

directs, and organizes the data in such a way, so that it can be concluded. Data presentation, intended to display various data that has been obtained as information related to land and forests fires. Research restricts a presentation as a collection of structured information that allows the withdrawal of conclusions or taking action. Withdrawal of conclusions, researchers attempted to analyses and search for the meaning of the data collected through the process of continuous verification, then the newly drawn conclusions.

RESULT AND DISCUSSION

Governance Networks in Handling Forest and Land Fires (Karhutla)

The term *Governance network* or *network Governance* used to describe the creation of public policy, implementation, and *delivery service* through the inter-relation network among actors in both autonomy capacity and Interdependence among government organizations, and or companies, and the community (Klijn & Koppenjan, 2015). Although the definition of *governance network* is revealed in various ways, but when examined by almost all definitions it covers five (5) characteristics as expressed by (Klijn & Koppenjan, 2015). which was stated that:

Governance network definitions have certain common characteristics; (1) Networks are characterized by complex policy problems that cannot be solved by one actor alone, but require the collective actions of several actors (Agranoff & McGuire, 2003; Keast, Mandell, & Brown, 2006; Koppenjan, Koppenjan & Klijn, 2004). (2)Networks have relatively high interdependencies between actors because different actors (Klijn, 2007) had their own resources necessary to solve problems. (3)These interdependencies cause a high degree of strategic complexity and an unpredictable course of (inter)actions (Klijn, 2007; Mandell, 1999; Sørensen & Torfing, 2007) as actions of one actor affect the interests and strategies of other actors. (4)Networks have complex interactions because each of the actors is autonomous and has its own perception of problems, solutions, and strategies (Agranoff & McGuire, 2003; Klijn, 2007; Mcguire & Agranoff, 2011).This leads to substantial differences in perceptions, value conflicts, and disagreement about policies to be implemented and services to be delivered. (5)Network interactions show some durability over time (Agranoff & McGuire, 2003; Burstein, 1990).”

The practice handling of Forest and Land Fires *(Karhutla)*, which is fulfills the five characteristics namely as follows. (1) Karhutla handling cannot be handled by one party or actors only, but requires complex collective action (collaboration and Synergy/*network*) of many Parties that actually have the specification of their own capabilities. (2) The Working Network (*network*) in Karhutla is involving a number of *interdependence* actors/parties, both from the Expertise or resources as well as *resources* owned, (3) the interdependency or any interdependence requires complex strategic governance in the interaction between the Organization and its operations. (4) The fact that each organization involved in the control of Karhutla (in this case government and private and public agencies) is actually an organization that has a level of autonomy according to their respective field of work (sectorial) with Perception and strategy based on the perspective of their respective fields. (5) Collaborative cooperation of the actors was tied by the same problem challenges (Karhutla in one area) for a span of time (in this case during Karhutla control period: Standby status/Emergency response status).

Network between Inter-Organization for Organization in Handling Forest and Land Fires (*Karhutla*)

In order to build the inter-organization network and the determination of the role are the function of each member of the network, mapping about position, role, function, and tasks between organizations in the *network*. This will further influence the sustainability and governance of the inter-organizational network established.

Among the ways that have been carried out in this process, both in the public and private sectors is by mapping the capacity specifications and capabilities of each actors based on *stakeholder's theory*.

The successful brings together perceptions and understandings between organizations to bring up an inter-organizational networking that is well defined by the stakeholder's communication strategy.

Promoters:

Stakeholders on the category of Promoters Group have a great interest and influence on the program to make success or even vice versa. Therefore, it is necessary that the right strategy is to always consult and coordinate to equate understanding, perception, and commitment to get support in the form of active participation in accordance with the basic tasks and functions of each promoter.

Stakeholders Lateens:

Lateens Category Stakeholder Group is stakeholders who have strong influence, but do not have special interest directly to the success of this network initiative so it is encouraged by as follows:

- Being always provide an importance understanding of working innovation of the Inter-organization network model in the control of forest and land fires.
- To provide understanding that by implementing a good work of network model between organizations will provide assurance of regional stability, better public services and ongoing programs.

Stakeholders Defenders:

The effect is small or low, but it has a big or high interest to the success of this network so that it needs an effort strategy, namely as follows:

- To give confidence to the stakeholders that the implementation of the network working model of inter-organization in the handling of forest and land fires will have a wide impact to the good of society, and especially to improve the economic community.
- Inter-organization network working Model will give the program certainty and implement operational in the field, so that the performance of forest fire control and land can be handled better and continuously.

Stakeholders Apathetic:

These stakeholders have less influence and importance so that the communication strategy to be built by:

- Involving stakeholders Group ' apathetic actively know more deeply the urgency of inter-organization cooperation in the overthrow of forest and land fires in Pelalawan District.
- To provide understanding of inter-organization cooperation in the transfer of forest and land fires in Pelalawan District will positively affect the acceleration of regional development and have positive implications for all stakeholders.

The Restricting Factors in Solving Problems of Forest and Land Fires in Pelalawan District

In this study, researchers identified a number of restricting factors in the handling of forest and land fires in Pelalawan District. The inhibiting factors can be broadly divided into two categories, namely first, the geographic and technical inhibitory factors, and second is inhibiting factors relating to the working network conditions of organizations (work/inter-organizational policies) involved in the handling of forest and land fires problems.

In the first category of geographical and technical, based on the observation and field studies, the restricting problems to handle of forest and land fires in Pelalawan District are as follows:

1) The existence of peat-land areas, in certain times and conditions such as in the dry season of peat lands are prone to forest and land fires. The presence of dry organic matter on

surfaces causes a rapid spread of fire fires with the support of wind blowing. Surface fire suppression challenging may be overcome, but peat land characteristics trigger a fire beneath the surface. In addition, the subsurface fire is harder to detect and extinguished. Often only high rainfall can ensure that the bottom flame is completely extinguished. Pelalawan District has potential of forest fires and fixed land due to the existence of peat areas in its region.

2) Entrances to the location of forest and land fires are difficult to be accessed in addition to carrying large and heavy extinguishing equipment.
3) Shortage of supporting personnel resources and qualified that trained personnel.
4) Often the water source for blackout is far from the fire location.
5) Funding and quality of equipment, and infrastructure for forest and land fires suppression, bases on the results of interviews and the recognition of personnel involved in handling work of forest and land fires is known that the condition of equipment owned by the company HPH plantation is better than those owned by local government agencies. Procurement of new firefighter of facility and infrastructures requires a process that cannot be fast.

In relation to the problem of financing disaster, Local Government has not addressed prevention seriously. In fact, there is not a single region in Indonesia that is assured of disaster free. Based on the records of the National Disaster Management Agency (BNPB), the magnitude of financing in the region averages only 0.02% of the Regional Budget Income and Expenditure (APBD). In fact, the ideal figures should be good budget for the prevention, socialization, and development of community resilience at least 1% of local APBD.

6) Maintenance and repair of fire extinguisher infrastructure, It is still related to funding. Routine maintenance is required such as to maintain and repair the fire extinguisher equipment and maintenance infrastructure supporting fire suppression that are in the location-prone locations of forest and land fires, such as the bubbly, trench-trenches/fire separator (*canal blocking*), pump wells, and watch posts.

Meanwhile, the second category of organizational barriers (networking and policies) includes as follows:

1) There is not system of inter-organizational governance that unites or binds actors. The pattern/model of inter-agency relations involved in the control of forest and land fires are still limited to inter-agency relations that are coordinating relationship and service assistance. Results of this research show that strengthening the results of the study of (Sukrismanto, Alikodra, Saharjo, & Kardono, 2011) which concluded that the work of organizations involved in the control of forest and land fires at the level of Riau province and Regency/City. It showed in practice new coordination and service assistance between institutions, although the exchange of ideas about the handling of forest and land fires better in the leadership level.
2) Functions, roles, duties, and authorities in the coordination of government agencies involved in the handling of forest and land fires have not been clearly defined.
3) Policy handling of forest and land fires oriented concept of integration (*integrative*) is not yet a central discourse. As a result, overcoming forest and land fires is still reactive-incidental-partial by emphasizing

focus on the work of forest and land fire of suppression operations, and has not touched other aspects seriously. Such as early prevention, impact repatriation, risk reduction, land recovery, area preservation, protection and utilization of forest areas potential.

4) Barriers to administrative innovations and bureaucracy, Government agencies have a tendency to inert response of situations and less daring to take the initiative of change. This is given the strict government agencies in adhering to bureaucratize and administrative rules as well as "hesitate" to act if there is no umbrella law/rule that obviously – expressly allow it to take action/policy. The existence of Disaster Control and Operation Center of forest and land fired as well as Disaster Management and Evacuation Unit of forest and land fires for example, both organizations are strategic, but constrained and restricted in motion because it is not included (categorized) on Regional Device Work Unit (SKPD). As a result, from the funding side, refers to (Undang-Undang No. 33 Tahun 2004, 2004) Both, units of this task are not allocated and cannot manage the budget, and cannot take employees. As a result, both organizations "to be safe" are simply *ex-officio* only.
5) Barriers to administration of disaster financing rules, the allocation of funding is also calculated based on the amount of budget given to the Regional Disaster Management Agency (BPBD), not a ready-made fund allocated specifically.
6) Not in all agencies have a section structure or sub-section that specifically oversees/has a fire-handling program of forests and land fires. Another impact show that there is no permanent personnel (permanent and special officers) who are administratively bureaucratize responsible for handling areas of forest and land fires. From interviews and observation, it is known that the procurement of new parts/subsections and personnel who will fill positions in the new section requires a lengthy bureaucracy process and will overhaul the organizational/personnel structure. Consequently, in some of the appointed officers who participated in the field work handling of forest and land fires are the honorary officers who are equipped with Decree appointment (from the Regent) per three (3) months of tasks that can be updated/extended according to the conditions and consideration of the head of the service of each institution. These honorable personnel are generally not personnel who have been specifically trained for the task of handling forest and land fires, usually deployed as field surveyors.
7) Spatial arrangement of Riau Province should be in the control of licensing and governance of natural resources. The impact, environmental-based control that has been programmatic by Environmental Agency *(BLH)* of Riau Province has not been applied in its District/City. Government Regulation (PP) No. 57 in 2016 on amendment of PP No. 71 in 2014 on protection and management of peat ecosystem prohibits clearing of new land or land clearing in peat areas.

Therefore, through this research researchers offer a model of inter-Organization network for local government with the expectation of this initial review into input and get the attention of stakeholders as an initiative that allows *policy window (entrance/possibility; entrance)*. For the discourse of the network working model is inter-organization in

management of forest area and directly linked Forest and land fires.

In this research, the inter-organizational network model manifested in a systematic-structural alliance between the agencies in areas of forest and land fires can improve the operational performance of problem handling of Forest and land fires. By improving public services in the field of environment and disaster, ensuring the position of forest and land fires control organizations. In bureaucratize-Administrative, function, role, and the duties of each agencies involved, programs and more integrated environmental governance planning, ensure the effectiveness and efficiency of funding, and ensure protection for personnel involved in the handling operations of forest and land fires.

Taking Consideration Into The Types And Models For Inter-Network Of Forest And Land Fires In Pelalawan District

From the results study of theoretical sources that researchers illustrate, can be known type *(typology)* and model of *network* that the primarily is valid in cooperation between the organizations in the field of public management governance *(public service/governance)*. The types of networks (types of networks) based on (Agranoff, 2007) stated as follows:

"(1) ***Informational***: *where partners come together exclusively to exchange agency policies and programs, technologies, and potential solution. Taking any action is entirely up to agencies on a voluntary basis, (2)****Developmental***: *where partners information and technical exchange are combined with education and member service that increase member capacity in order to implement solution within home agencies or organization.* (3) ***Outreach****: where partners come together to exchange information and technologies, sequence programming, exchange resource opportunities that lead to new programming avenues. Implementation of designed programs takes place within an array of public and private agencies, (4)* ***Action****: where partners come together to make interagency adjustment, formally adopt collaborative courses of action, and/or deliver service along with exchanges of information and technologies."*

The type of *action networks* referred is a type of network cooperation inter-organization/agency that moves practically in the handling of concrete problems, namely the problem of environmental conservation and the handling of forest and land fires peat in the region. Furthermore, the coordinating and coordination cooperation that has been run among government agencies dealing with forest and land fires is enhanced to the level of collaboration in the Network *(collaborative networks)*.

The collaboration within the network allows for a more coordinated, effective-efficient form of cooperation, integration of interagency programs, resource exchanges, open solutions that cover multiple and ongoing aspects, shifting from program orientation and partial work to integrated team work patterns. In the future, the form of *Action-Collaborative Networks* could be a joint organization structured in the administrative entity of local government; Whether it is a coordinating body or a Special Committee/Commission in the field of environmental issues management.

In the form of diagrams, the conceptual framework of network organization/institution bureaucracy in controlling Forest and Land Fires known as *karhutla* based on the analysis of Karhutla problems in Pelalawan District can be described as on figure 3.

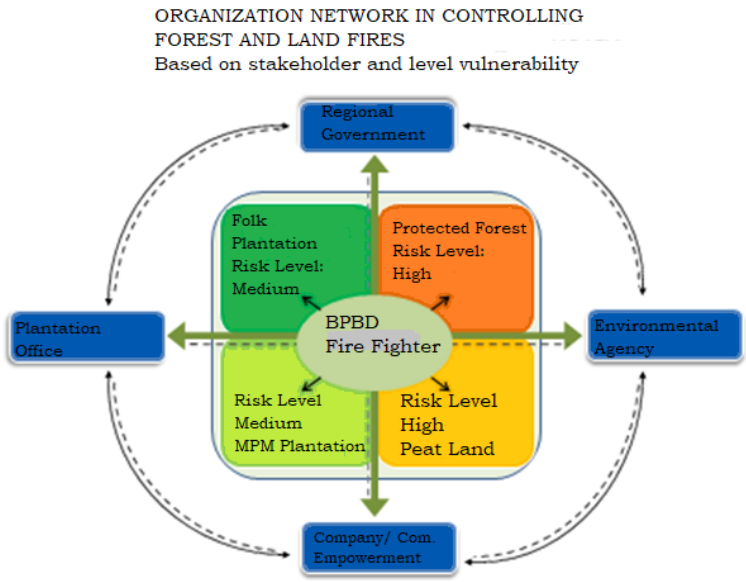

Figure 3. Conceptual Framework of Network Organization Bureaucracy in Controlling Forest and Land Fires

Meanwhile, the network of stakeholder's analysis-based cooperation/ key actors that take place in the work against Forest and Land Fires *(Karhutla)* in Pelalawan District has a pattern of cooperation in information exchange and resource assistance and firefighting equipment with a management pattern and or triadic that can be described in the diagram as on figure 4.

In fact, based on observations and interviews, the responsibility of the area-over the handling of Forest and Land Fires *(Karhutla)*, and the authority of the local government's hand-extending coordinator, which in this case is the implementing unit of forest and land fires control has not run optimally. This is due to some things, such as (1) the agency's entity is weak legal-formal. Status of the Implementing unit of forest and land fires control and regional tends to be *ex officio* in accordance with Regent DECREE, which is renewed per six months. The implementing unit of forest and land fires control tends to position itself as a "shadow secretariat" that facilitates annual coordination meetings or coordinating meetings in order to follow up special events concerning of Forest and Land Fires *(Karhutla)*.

(2) The Status of the offsetting, which is none (permanent/permanently, or not a DECREE-based regent per six months, causes it to "dare not" to make a strategic, political, or policy-set decision. Technically, the implementation of fire suppression technical and operatives based on the mandate of the disaster law is in the BPBD-command emergency response. (3) because not the legal entity in the structure of the local government bureaucracy, the implementation unit of forest and land fires control is not able to manage the budget, either for the operation of its agency, or to implement Forest and Land Fires *(KARHUTLA)* control programs. Their companions although there is a regulation of the governor (struggle) of Riau Province No. 91/2009 which became a reference of cooperation between institutions at the provincial and district level in the handling of Forest and Land Fires *(KARHUTLA)*. This struggle to be "floating" and never implemented, because there is no setting

(breakthrough) about funding for the inter-Agency network that is hosted by the implementation of forest and land fires control.

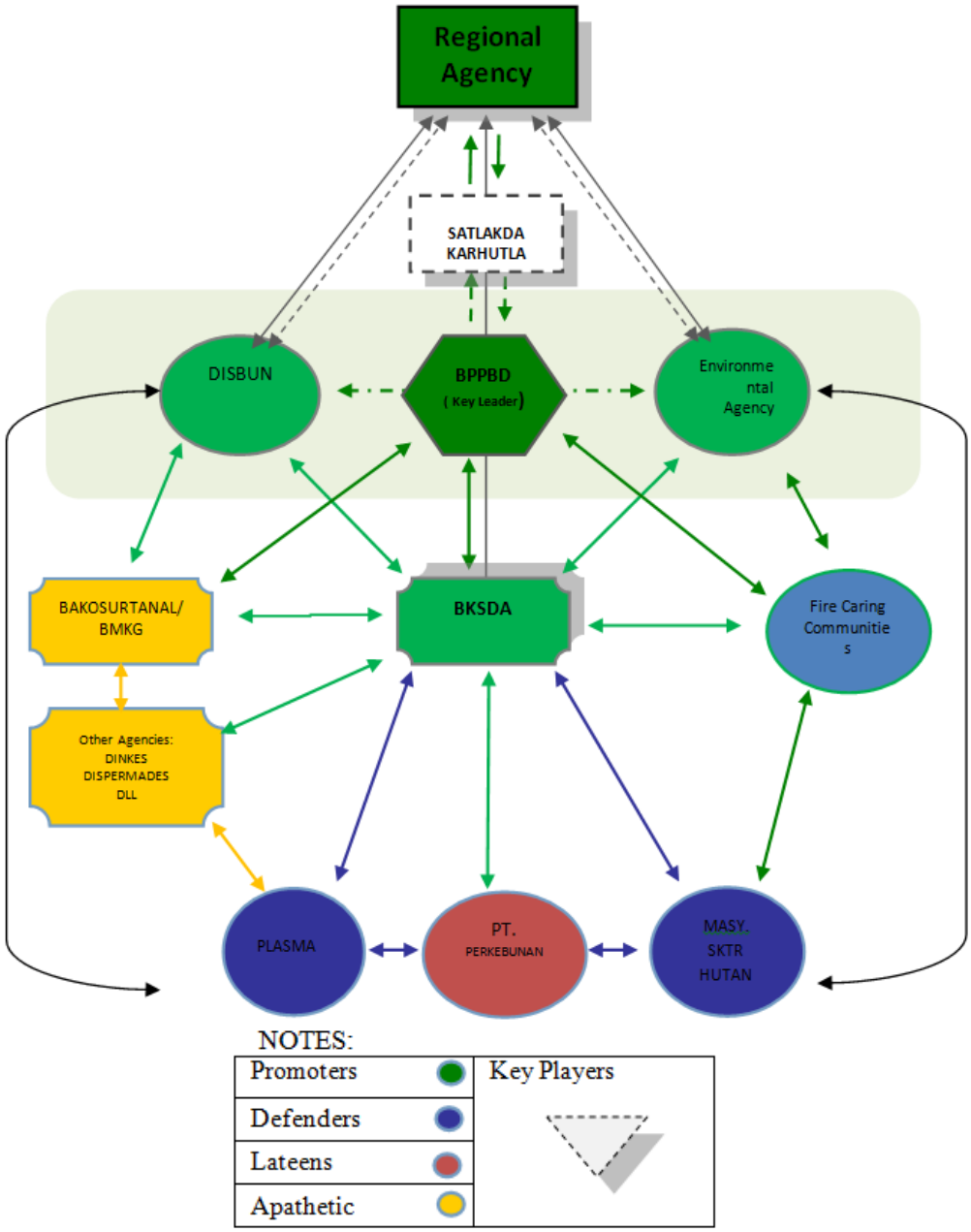

Figure 7. Network Cooperation Basically on Stakeholder's/ Key Actors Analysis against Forest and Land Fires (Karhutla) in Pelalawan District

***Action-Collaborative Networks* Model for Local Governments in The Control of Forest and Land Fires in Pelalawan District**

The *Action-Collaborative Networks* model of inter-organizational model for the local bureaucracy of researchers proposed to improve the quality of forest and land fire handling, is a prototype/model review inspired and modified by the idea of PMNs from (Agranoff & McGuire, 2004) (*Collaboration/Collaborative structure).*

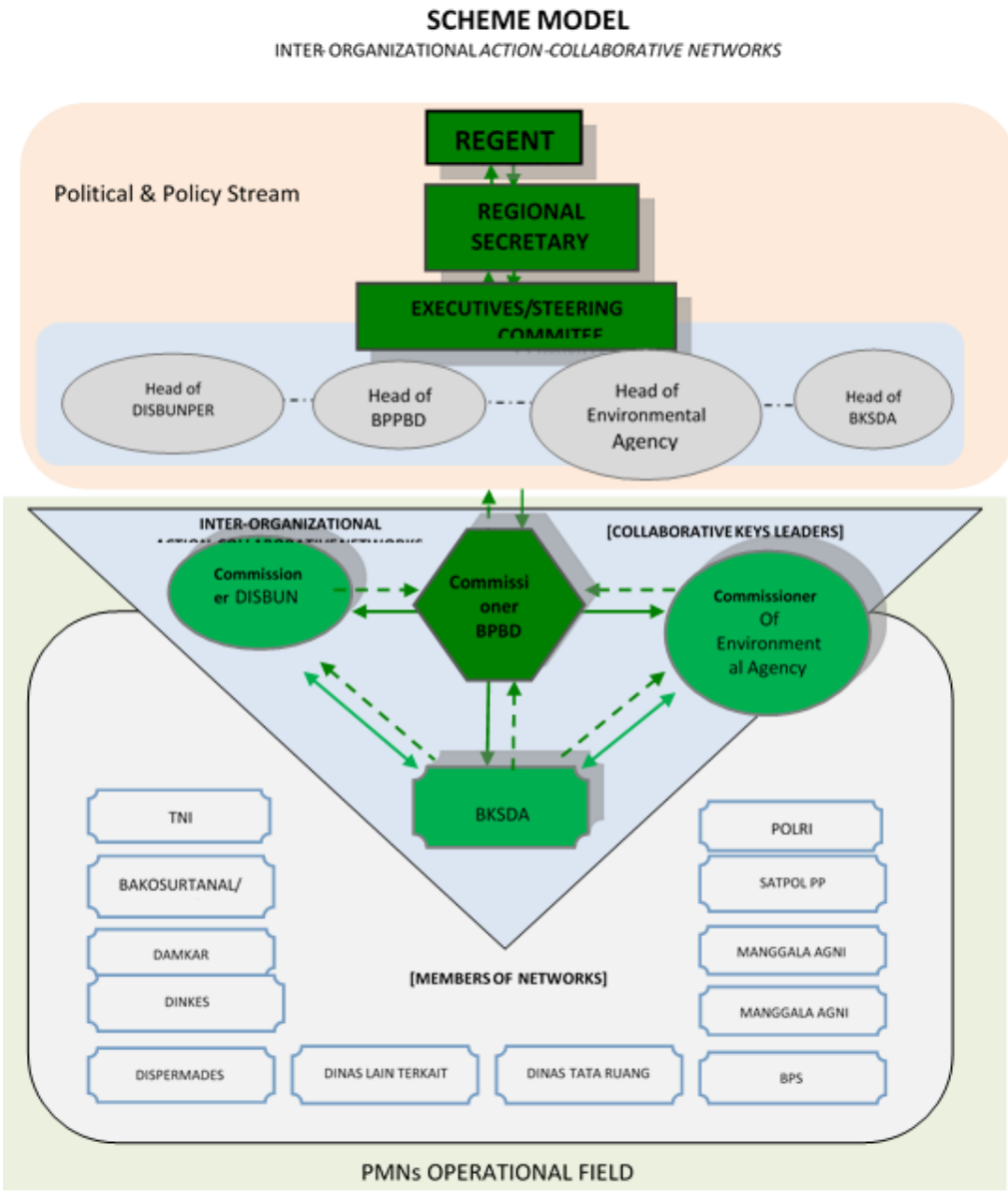

Figure 5. Scheme Model of Inter-Organizational Action- Collaborative Networks

In *Action-Collaborative Networks* (ACNs) models Apply network governance (*networks*) of mixed-type. This means that all three types of network governance are enforced, but with adjustments. Here is the explanation:

Table 2: Governance, Status and Position of Actors/Agencies in The Network Inter-Organization Model ACNs

Management Types	Descriptions	Sources
Shared governance, consensual	All participants collectively-collaboratively contribute to the management of environmental issues based on consensus and agreement. Shared governance includes *crossing-program adjustment, sharing resources and information, developing networks values*. The development of networks and *rules of the games* are inductive.	(Agranoff, 2007; Kenis & Provan, 2009; Milward & Provan, 2003)
Lead agency	Leadership in the network is collective--soft-leadership, with flexible exchanges. Network managers and administrative entities are one of the primary network members based on focusing programs and events as well as the realm of their respective fields and authorities. Decision-making is collective-collegial.	(Goldsmith & Eggers, 2004; Kenis & Provan, 2009; Milward & Provan, 2003)
Network Administrative Organization (NAO)	Each lead-agency puts a representative/Commissioner. Shared administrative entities can (probably) be formed towards new structural institutions in the local governance structure. It Will be named boards/commissions/agency, according to the agreement and inductive processes in the dynamics networks. A commissioner of each of the main agency representatives are appointed as a field manager.	(Agranoff, 2007; Kenis & Provan, 2009; Milward & Provan, 2003)

The Regent, Regional Secretary, and Chiefs of the Offices in the scheme of Action-Collaborative Networks (ACNs) model in addition to the role of the Steering Committee directing policies and strategic decisions, as well as executives' officers and political resources (network's defender) that will serve to ensure the continuity of the inter-Organization network. They are among the important actors in the agenda setting and the windowing policy relating to the innovation of policy issues of forest and land fires. In the initiation phase of the inter-Organization network, this boards/Steering Committee is a strategic stakeholder of model initiative and consensus builder of other stakeholders.

Keys Agencies consisting of **BPBD**, **Department of Plantation and Livestoc**k, **Environmental Agency**, and **BKSDA** domiciled as network's central actors, which carry out managerial and operative functions of forest fire handling and control Land, and environmental issues. While the members of the Inter-organization network are strategic partners who commit and contribute are actively in the collaborative cooperation of the handling and control of forest and land fires as well as environmental issues.

The Division of Authority, field, authority, and task area of keys agencies are schematic as follows:

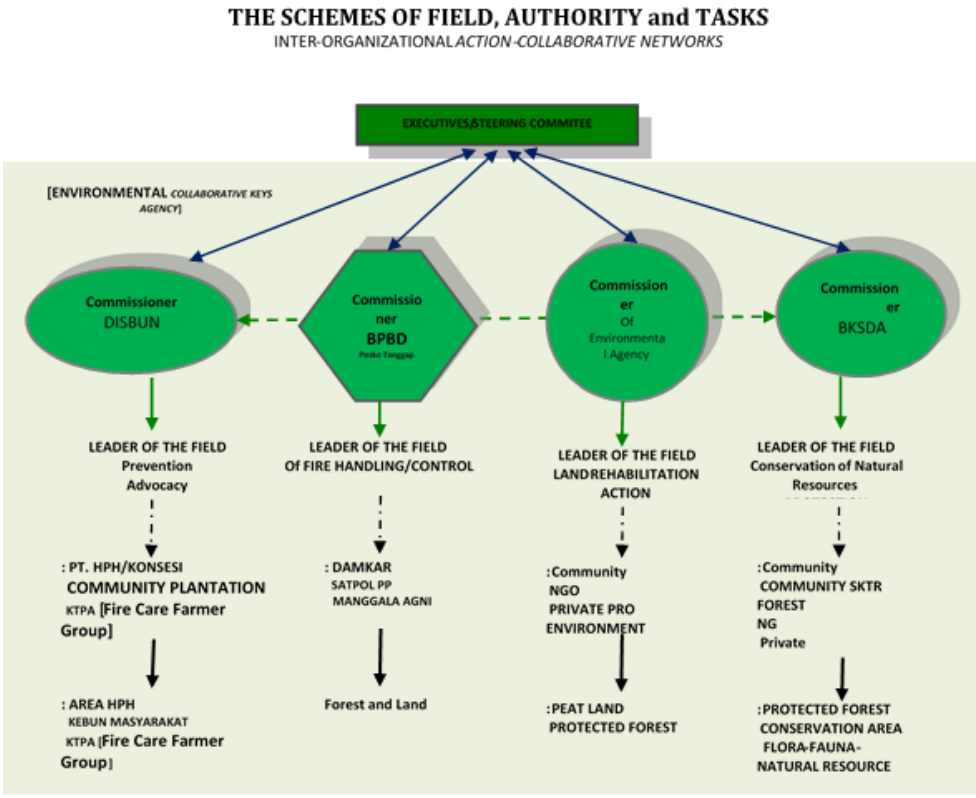

Figure 6. The Division of Authority, Field, Authority, and Task Area of Keys Agencies Are

Agenda Setting of the Inter-organization of forest and land fires control organizations in Pelalawan District can consider an agenda process of model multiple streams as proposed by (Kingdon, 1993). At the very least, (Kingdon, 1993) model can give important inputs to the initiative of Network model inter-organization of forest and land fires control on points considering and determine the parties who have a strategic role, i.e. the actors policy Entrepreneur in Agenda setting network Inter-organization of forest and land fire controllers in Pelalawan District.

CONCLUSION AND SUGGESTION

Based on the study of inter-Organization relations involved in the control of forest/land fires, in general concluded: The low level of networking and resources (human, facilities and infrastructure, as well as budgets) in each organization involved in the control of forest /land fire has a major implications on the handling of forest /land fires is less optimal. In effect, work in the field of environmental protection is still too focused on the sphere of handling and controlling (fire suppression) of forest and land fires, not to mention the wider aspects and far from the concept of sustainable environmental governance.

The Action-Collaborative Networks Model for the Inter-organization of local bureaucracy is more likely to have the support of stakeholders. The modality of problem recognition, consensus, and trust as in the concept of PMNs, already exists in the practice between local government agencies in the field of forest and land fires that are characterized by the existence of information exchanges, coordination, resource assistance, and joint operative

activities. The main actors in networks (such as: BPBD, plantation and Livestock office, and Environmental Agency) have been acquainted with each other in a long period and have cooperated in a sister/Triadic. Thus, this model is small structural gap and its culture.

Thus, the next step towards implementing the Action-Collaborative Networks model for the inter-organization of local bureaucracy is becoming easier. That is, through an inductive consensus pattern of unstructured cooperation form to the Action-Collaborative Networks (: governing boards/committee) alliance into a form of public service implemented collectively-collaboratively. The Division of Tasks, authority, adjustment of the program between the institutions (cross-programs adjustments) so that the integrated (complementary and complementary) becomes possible. Important modalities, namely consensus, trust, and synergy become of key to Action-Collaborative Networks successful**.**

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PERSONAL INVESTMENTS IN INVESTMENT FUNDS LISTED ON BANJA LUKA STOCK EXCHANGE

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ABSTRACT

The goal of this research is to determine possibility of investing individual personal financial assets in investments funds in Republic of Srpska and does households have financial assets that can be invested. In this research capital market of Republic of Srpska is represented, the structure and organization of Banja Luka Stock Exchange, and legal framework for investment fund management companies. The volume of activity in investment funds is shown in presentation of activity Banja Luka Stock Exchange, following with the assumed reasons of current status.

Keywords: Banja Luka Stock Exchange, investment funds, Republic of Srpska, personal investments, personal finance, savings, capital markets

INTRODUCTION

Personal finance is of great importance for the life of each individual. Decisions on personal finance are those about acquiring (earning), spending, and investing money for personal and family needs. Decisions are important because they affect the quality and security of the present and future life. This research will give an answer to a question: Does individuals have enough financial assets that can be invested in investment funds?

Investment funds are considered to be important form of collecting fragmented retail savings. They should be more liquid than other savings organizations and bear higher interest rates. They are closely related to personal finance, since they are greatly dependent on the individual investment. Saving is the basis of any investment, although the investment can also be made with borrowed funds (if we invest borrowed funds in capital that will bring us higher interest than the one, we pay on borrowed funds, we will achieve positive cash flow and income). On the other hand, the development of investment funds increases the level of savings, and it further affects the increase in gross domestic product. With the increase of the gross domestic product, the market economy and the standard of living also increase.

Another advantage of investing or saving in investment funds is that the individual does not need to have any special financial knowledge and skills, the individual should only decide in which type of investment fund to invest. The regulation governing the operations of funds and the capital market protects an individual from the potential misuse of his or her invested capital. However, an individual bears risks

because of this type of investment, and it is reflected in the probability that the return on investment will be insufficient or even negative. The primary risks are:

- market risk reflected in the probability that changes will happen in the market which will result in the decrease in value of the fund's assets (change in interest rate, change in the price of securities, etc.),
- credit risk of this investment is a probability that the issuer of securities will not be able to settle its contractual obligations at maturity, which negatively affects both the liquidity and the value of the fund's assets, and
- operational risk that is always present due to the possibility that an error will be made by an employee, during inadequate internal procedures, etc.

CAPITAL MARKET IN REPUBLIC OF SRPSKA

Capital market is an institutionally organized space in which the supply and demand of long-term securities are connected. In this area, trade is done according to the rules established by law which aim to protect all participants. The market in which capital is issued for the first time is called the primary capital market, while the market in which long-term securities have been already issued is called the secondary capital market.

The capital market in Republic of Srpska is organized on one stock market – Banja Luka Stock Exchange (BLSE). There is an official stock market (OM) and a free stock market (FM) in Republic of Srpska. Participants can trade with shares, bonds, funds, T-bills and other securities. Participants in the capital market are the following: investors - owners of capital, companies, investment funds or entrepreneurs - users of capital, brokers - banks, other specialized brokers and state - as regulator and controller.

Investors are owners of capital that want to invest their capital by purchasing a particular financial instrument. An investor can be an individual investor (natural person - the individual, company or someone outside the economy) or an institutional investor (investment companies, pension funds, insurance companies, banks, etc.). In personal finance, an investor is an individual (natural person) who wants to invest his/her own or loaned money in long-term securities. The user of capital is the buyer of the offered capital by the investor. The user of capital is the entity that issues and sells securities.

Brokers are entities that take funds from the investors and further invest them according to instruction of the individuals. On capital market they participate in the name of the individual and for its profit, and brokers profit they earn based on provisions. Brokers can also be banks, savings banks, savings and loan associations, investment funds, pension funds, insurance companies, etc.

The state has a special place in the capital market because it is the market regulator and controller and provides protection for the interests of both investors and users of capital. The state adopts legislation and establishes appropriate commissions and bodies that supervise the capital market. This is especially important for young markets where it is necessary to gain the confidence of participants.

If we review the volume of securities trade for the 2019 on BLSE, we will notice that investors trade more with bonds than the other securities listed (Figure 1).

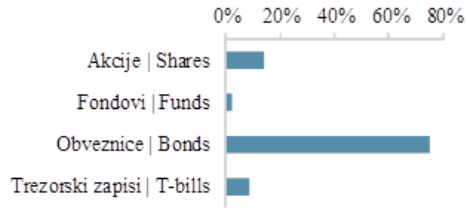

Figure 1. Total turnover structure BLSE for 2019

Bonds are securities with lower risk than other compared and this reflect that investors are not likely to accept risks. Reasons of poor equity trade are lack of

implementation of Standards of corporate governance and low liquidity of companies that are listed. It can be concluded that without the issue and trade of government bonds and T-bills, BLSE would not be able to functionate normally (Žiravac-Mladenović & Đurica, 2018).

Investment fund management companies

The investment fund management company is established in accordance with the Law on Investment Funds - Official Gazette of the Republic of Srpska No. 92/2006 and 82/2015 as a limited liability company or a joint stock company. The subject of business activities is exclusively the establishment and management of investment funds, that is, the investment of funds on its own behalf and on behalf of the owners of shares of open-end investment funds, and on behalf of and on behalf of shareholders of closed-end investment funds, as well as performance other activities in accordance with the mentioned Law. They manage the investment fund by making investment decisions and performing administrative and marketing operations and activities. Currently, in Republic of Srpska, there are 6 investment fund management companies that manage 18 open-end investment funds and one close-end investment fund (Table 1).

When establishing an investment fund management company, the founder is required to provide share capital which may not be less than BAM 200.000,00 or, if the company manages a fund of net worth exceeding BAM 450 million, the share capital must be 0.02% of the net assets of the fund. The maximum amount of capital of a company may be BAM 15 million.

A fund management company may establish and manage several investment funds, without acquiring investment units or shares of an investment fund it manages, and it is also required to engage a sufficient number of persons with professional knowledge and experience in managing the company's affairs to manage the affairs of the company. The work permit is issued by the Republic of Srpska Securities Commission.

Table 1. List of open-end investment funds in Republic of Srpska, February 2020

No.	Fund	Management company	Type of fund
1.	Opportunity fund	Kristal Invest	open-end equity
2.	Maximus fund	Kristal Invest	open-end mutual
3.	Future fund	Kristal Invest	open-end mutual
4.	Invest nova Bijeljina	Invest nova	open-end mutual
5.	Adriatic Balanced	Polara Invest	open-end equity
6.	Profit Plus	Management Solutions	open-end equity
7.	VB Fond	Management Solutions	open-end mutual
8.	Euroinv.fond	Euroinvest	open-end equity
9.	Balkan Investment	Management Solutions	open-end mutual
10.	Bors Invest	Management Solutions	open-end equity
11.	VIB fond	Management Solutions	open-end equity
12.	Polara Adriatic	Polara Invest	open-end equity
13.	Privrednik Invest	Polara Invest	open-end mutual
14.	Jahorina Koin	Polara Invest	open-end equity
15.	Aktiva Invest	Management Solutions	open-end equity
16.	Kristal Cash Plus Fund	Kristal Invest	open-end cash
17.	Cash Fund	Kristal Invest	open-end cash
18.	WVPPremium	WVP Fund Management	open-end equity

Investment funds in Republic of Srpska

Investment funds in the Republic of Srpska are joint stock companies headquartered in the Republic of Srpska, which, with the approval of the Securities Commission, are established and managed by investment fund management companies. They, as brokers, allow investors to place the surplus of funds in the capital market, in a way that investors do not have to have any special specialist knowledge in investment and effort in analysing investment opportunities, such as previous activities usually carried out while making investment decisions (The Republic of Srpska Securities Commission [SCRS], 2018). Due to this fact, investment funds are a suitable form of investment for natural persons - individuals who manage personal finances. Investment funds collect monetary funds through the sale of their unrestrictedly transferable shares and then invest those funds further, while respecting the principle of risk spreading (Law on Investment Funds [LIF], Official Gazette of the Republic of Srpska No. 92/2006, 2006).

The basic characteristics of the operation of investment funds could be summarized as follows the following (Pušara, 2012):

- funds are not obtained by collecting deposits, signing contracts, but by issuing and selling own securities,
- collected capital is invested in many financial market segments in diversified placements of a large number of different instruments,
- the owners of shares actually own one part of the fund's portfolio,
- they are characterized by a high level of liquidity,
- the portfolio is managed by professional managers with a high level of knowledge and expertise,
- the ability to use advantages of economies of scale and therefore lower transaction costs,
- high level of liquidity and possibility of quick return of funds,
- provision of additional services to shareholders,
- enabled access to the international market, especially to small investors, who without the existence of these investment mechanism, would not have been financially strong.

The Republic of Srpska finished the process of mandatory transformation of closed-end investment funds into open-ended investment funds in 2018, in accordance with the deadline set by law. Out of the total of 13 closed-end funds that had to be transformed, 17 open-end investment funds were formed, and there are still 1 closed-end investment fund. Today we have 18 open-end funds.

Each individual can invest monetary funds in any of these funds. An individual cannot influence a fund's investment decisions, but by choosing the type of fund to invest in, he/she decides on the strategy of his/her investment. Fund's investment decisions are made by its portfolio managers who are highly skilled analysts educated for usage of many financial tools. Cooperation with experts from different sciences is necessary, because any decision previously requires neutral and independent valuation of potential investment (Žiravac-Mladenović & Galić, 2018). Each portfolio must be well diversificated. All this is managed by investment fund, so that the individual does not need to have any special financial knowledge and skills, but still can invest.

Article 14 of the Law on Investment Funds stipulates that there are the following types of funds:

- equity fund (share fund or stock fund), which invests funds mainly in shares or interests of targeted share funds,
- bond fund, which invests funds mainly in bonds or, in bonds and interests of targeted bond funds or other forms of listed debt,
- cash fund (money market fund), which invests funds mainly in money market instruments, cash deposits and interests of targeted money market fund

- mutual fund (mixed fund or balanced fund), which has the invested funds in various securities, money market instruments, cash deposits and shares of the targeted money market fund.

Majority investment is that at least 70% of the fund's funds are invested in a particular type of asset. The investment structure of investment funds in Republic of Srpska shows that there is a significant share of equity securities in their portfolios, for which they are predominantly equity funds. Also, the share of bonds, deposits and placements as highly liquid assets is not negligible. Every investment fund is required to prepare a prospectus detailing its portfolio and securities in which it invests. Before making an investment decision, an individual should study the fund's prospectus for which he/she is choosing. Prospectus must include enough information about investment principals, type of property included in portfolio, risks, valuation and type of assets, financial reports.

In order that an individual decides to invest in a certain investment fund, he/she should determine the liquidity of a certain fond. Fund's liquidity is one of the most important characteristics making it attractive for saving (investing) compared to savings and deposit institutions. One of the liquidity indicators is the frequency of trading in shares, expressed by the number of trading days in relation to the total number of possible trading days.

In 2019, the investment funds had turnover in the amount of BAM 9.932.974 (Table 2), which was only 2,10% of the total turnover of Banja Luka Stock Exchange for 2019, amount BAM 472.133.341 (Banja Luka Stock Exchange, 2020). The fact that only 2,10% of the total turnover of the stock exchange for 2019 is invested in investment funds show that that the interest is extremely low. The reason could be available financial assets, lack of attractive funds, liquidity of securities, macroeconomic and microeconomic environment, personal affinities and many other.

Table 2 - Comparative overview of investment funds turnover and total turnover on BLSE for 2019

Monthly overview	Funds Turnover	Total Turnover BLSE	Share of funds turnover in total turnover (in %)
2019 Dec	214.046	61.276.177	0,35
2019 Nov	712.154	18.506.532	3,85
2019 Oct	1.005.013	51.554.841	1,95
2019 Sep	2.995.917	10.283.202	29,13
2019 Aug	652.266	45.277.279	1,44
2019 Jul	352.785	17.793.840	1,98
2019 Jun	471.258	50.032.559	0,94
2019 May	776.776	42.328.670	1,84
2019 Apr	271.508	54.297.700	0,50
2019 Mar	829.414	43.166.870	1,92
2019 Feb	1.013.939	49.872.960	2,03
2019 Jan	637.898	27.742.711	2,30
Total:	**9.932.974**	**472.133.341**	**2,10**

According to the Central bank of Bosnia and Hercegovina Statistic report, total household deposits are BAM 13,4 milliards (February, 2020). Money on transaction accounts and deposits on demand are 57,19% of total amount, and short-term and long-term deposits are 42,81%. In structure, deposits in BAM are 44,02%, and deposits in foreign currencies are 55,98% (The Central Bank of Bosnia and Herzegovina, 2020). This represents that households and its individuals have financial assets that partly can be invested in investment funds. With these investments many parties would have benefits, not only individuals. It would deepen capital market and activate companies that are listed on stock (Miletić & Simić, 2018).

To define what investment funds (from Table1) are attractive, share in total turnover can be used. Four funds participate 65,98% in total turnover: Euro-investment Fund (13,94%), Future Fund (30,22%), Kristal Cash Plus Fund (10,53%) and Maximus Fund (11,29). Revising the type of the funds, it can be seen that they are equity, cash and mutual funds.

Market analysts show a lack of concrete supply and demand for a large number of securities on BLSE. The most of listed shares are not interesting to investors (offer), and there is a lack of investors (demand). Without intending to go deeper and explain the already known reasons, we will consider that the market is characterized by a small number of quality stocks and its illiquidity. Insolvency is reflected in number of days without trade, and it was very high for most stocks (Radivojac & Grujić, 2016). Capital market in Republic of Srpska remains the same even today.

Poor macroeconomic indicators and poor credit ratings are also a cause. According to the ratings of two international credit rating agencies Moody's Investors Service and Standard & Poor's, Bosnia and Herzegovina has a credit rating of B3 with a stable outlook (rating confirmed on 16 February 2018, Central Bank of Bosnia and Herzegovina, 2019) and B with a positive outlook (rating confirmed on 28 February 2020, Central Bank of Bosnia and Herzegovina, 2019). Ratings B3 and B are in the non-investment (speculative) group with high credit risk. With these ratings, Bosnia and Herzegovina has the worst credit rating compared to other countries in the region. Therefore, the Republic of Srpska's financial system is extremely bank-based type (SCRS, 2018).

Mentality and personal affinities have effects on investment decisions, especially at those that individuals make. Looking back in time, capital market in Republic of Srpska is established in 2002 as a ground for privatization process. Bosnia and Herzegovina decided that privatization of government capital will be done by voucher privatization model. The model implied that the value of government capital was divided into vouchers and vouchers were given to individuals. After that, the individuals were selling vouchers, mostly under the price and didn't have any benefit of it. Many analysts find this as crucial reason that individuals don't „believe" in capital market (Bojat & Rebić, 2018).

CONCLUSION

Personal finances concern every individual regardles of its source of income, personal and family expenses. They also include investments in order to secure a better future. As Bosnia and Herzegovina is rated as a country exposed to high credit risk with speculative creditworthiness, the decision on selection of savings and investment of individual has special weight. In such conditions, investment funds are imposed as one of the suitable solutions since they are considered the safest form of investment. Through the diversification of its portfolio, each investment fund creates the optimum between risk and return and provides the investor with the opportunity to invest at lower risk. Also, it does not require any specific knowledge of the capital market business and its tools, which greatly simplifies the investment. In addition, with the proper application of

legal regulations, it provides the individual with security against misuse of his/ her money.

Although household deposits are high enough that can aggregate investment of individuals in investment funds, guided by the bad experience during privatization process, they simply do not decide for this type of savings. Still, I would conclude that there is possibillity to motivate potential investors to invest its financial assets in investment funds what will multipy long-term benefits from many aspects.

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MARKETING IN TOURISM - DIRECT MARKETING AS MARKETING COMMUNICATIONS TECHNOLOGY

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ABSTRACT

Marketing in tourism is a systematic adjustment of tourism company policy and political policy at the local, regional, national and international levels in order to meet the needs of tourists and make a profit. The purpose of the paper is to explain how direct marketing, especially as part of a marketing mix, can help facilitate the exchange process in the international and domestic tourism markets. The aim of studying marketing in tourism is to make this concept available in this activity in theoretical, methodological and application terms. Marketing in the tourism industry is in a phase of maturity and is becoming sophisticated, which leads to the fact that the entire industry increasingly accepts the basic principles of marketing: The concept of marketing; Marketing orientation; Meeting the wishes and needs of consumers; Market segmentation; Value ; Product life cycle and Marketing mix (the principle on which the essence of the work is based). Direct marketing activities are based on databases and interactive communication media. Databases enable the selection of the target market (customer), which is acted upon by selecting the appropriate advertising/sales medium. The most famous media of direct marketing are certainly catalogs, direct mail and telephone (telemarketing), while in practice many others are used such as: television, radio, Internet, mobile phones, print, inserts.

Keywords: direct marketing, databased marketing, marketing mix, marketing segmentation

INTRODUCTION

Tourism marketing is the systematic adaptation of tourism business policies and tourism policies at local, regional, national and international levels to meet the needs of tourists and generate profits. The purpose of scientific work is to explain how by using direct marketing techniques we increase the competitiveness of the subject. Direct marketing involves the distribution of products, information and promotional benefits to customers through interactive communication, in a way that measures their response. It is a relatively new method of direct communication with consumers. The reason for the popularity of direct marketing can be found in technological advances such as customer relationship management and Internet marketing, which allow direct contact with target consumers. Direct marketing is characterized by a high degree of precision in targeting, getting a quick and direct

response from consumers, and easy measurement of marketing results. Direct marketing is based on databases, and lists of potential customers and service users are increasingly available to marketers. The subject of research in direct marketing is constantly expanding, given the fact that rapid development influences the creation of new ones and the modernization of existing direct marketing techniques. The degree of exploration of direct marketing issues is relatively high, given the fact that the topic is related to hotel, tourism, e-commerce, and that many papers have been written on the topic, as well as easy measurement of marketing results. Direct marketing is based on databases, and lists of potential customers and service users are increasingly available to marketers. . The level of research on the issue of direct marketing is relatively high, given the fact that the topic is related to the hotel industry, tourism, e-business, and that many papers have been written on this topic.

MARKETING IN TOURISM

Futurologist Herman Khan defined tertiary activities as service activities in which he classified: transportation, communications, insurance, finance, management, engineering, commerce, aesthetic design, advertising and education. The expansion of the tertiary sector of the economy, consisting of service activities, is a phenomenon that characterizes post-industrial society. In a manufacturing company, it is necessary to first produce the product and only then contact the consumer and be with him in social and economic interaction, while in a service company, it is necessary to manage consumers as part of the production process. Consumers are not looking for a product/service but for appropriate benefits. Hannagan puts it vividly: “When consumers buy a loaf of bread, the basic need is not for bread, but to satisfy hunger” (Kotler & Keller, 2006). The special place of marketing in tourism in relation to the marketing system in other service activities arises from the specifics of the tourist market and business within it. In this particular case, for example, when selling a hotel service, there is always the influence of the tourist destination in terms of the availability of natural, cultural-historical and anthropogenic factors. These factors are a driving force for many tourist trips and a reason to get involved in these movements. Therefore, in tourism it is necessary to ensure the coordination of actions of all economic and other entities at the level of the tourist place, region, or country as a whole : "achieve completion of the offer in terms of the desired scope and range and a certain quality of service." (Kotler & Keller, 2006).

Marketing in tourism at the macro and micro level

The distinction between these two approaches is very important, because the goals can not be achieved without connecting and permeating marketing at both the "micro" and "macro" levels. One of the better known definitions of marketing in tourism is that of J. Kripendorf, who is also considered the progenitor of this concept in tourism: "Marketing in tourism is a systematic and coordinated adjustment of business policy of tourism companies and tourism policy of the state at local, regional, national and internationally, in order to achieve optimal satisfaction of the needs of certain consumer groups and thus achieve adequate profits.” (Kotler & Keller, 2006). Marketing management at the micro level is management at the level of a tourist company and practically consists in the implementation of various strategies related to marketing mix instruments (product, price, promotion, distribution) and finding their optimal combination (Čerović, 2009). In contemporary literature, the interaction between the public sector and tourism has become increasingly important. It is about the need for serious management of tourism development at the "macro" level, where the development involves state government bodies at the highest, and then at other levels.

Table 1. Marketing in tourism at the "micro" and "macro" levels (in theoretical and practical terms)

	THEORETICAL	PRACTICAL
Micro	1. The theory explains how to manage the marketing process in a tourism company.	2. Constituting micromarketing models based on the use of marketing in order to better reach the goals of the tourism company.
Macro	3. The theory emphasizes explaining the functioning of the composite tourism marketing mechanism	4. Construction of macromarketing model of general marketing process of tourism that should lead to the best fulfillment of the interests of society

DIRECT MARKETING AS A MARKETING COMMUNICATIONS TECHNOLOGY

Marketing is an organizational function and a set of processes of creating, communicating and delivering value to consumers and managing customer relationships, in a way that benefits the organization (Kotler & Keller, 2006). The most important components of this definition in the context of modern marketing are: delivering value to consumers and managing customer relationships. Kotler defines marketing as follows: "Marketing is the analysis, organization, planning and control of potential sources of customers, policies and activities of the company, from the point of view of meeting the needs and requirements of selected customer groups and making a profit." (Unković & Zečević, 2009). The goal of the modern conception of marketing is to satisfy consumers while optimizing income as a prerequisite for continued growth of the company (Babić, 2009). Many definitions of the direct marketing concept argue its role in creating and maintaining the relationships with the clients. Direct marketing is considerd to be a manner of communication that allows "creating a personal, customized and interactive connection with potential customers" (Hermel & Quioc, 1994), "establishing a direct dialogue with a certain receiver, specially selected, in order to make him to act or to respond" (Desjardins, 1995). Direct marketing is an activity that "creates and exploits a direct relationship between the company and its actual or potential clients (Bird, 2000). The goal of marketing is to attract new customers, but also to keep old ones. Efforts are therefore being made to deliver value to customers that will ensure their satisfaction and then loyalty, which will lead to profitability.

A wider view of the concept consider that the purpose of direct marketing is to gain new clients but also to build loyalty on the long term „in order to maintain a permanent development of the business" (Stone, Bond & Blake, 2004). One of the most popular definitions of direct marketing is offered by Direct Marketing Association that characterizes this concept as "an interactive system that uses one or more types of media to obtain a measurable answer and/or to conclude the deal in any location" (Lee & Johnson, 2005).

Advantages of direct marketing

There are many kinds of direct marketing which are used nowadays, and they include the internet based initiatives such as the direct E-mail. However, direct marketing can also include many traditional types like the advertising direct mail and telemarketing.There are many advantages for the usage of direct marketing in reaching the customer directly. Some of the advantages are the following: Narrowing the target audience: it is the most noticed benefit for the direct mail because of its ability to target only the consumers who are most likely to buy the products or services. Companies can narrow the potential market and to find the potential customers and send flyers directly to them with direct

marketing, but first they have to determine its customers by answering the questions about their generation, sex, ethnicity needed, hobbies and interests, location, and willing to travel for their offers. Since the company sends information directly to the individuals, they can specify the target on demographic that have interest in such product. This enhances the response rates as they receive the information directly, in addition this gives the chance to personalize the relationship between the consumer and producer such as the email addresses and names of consumers. Direct measurements: direct marketing is an easier way to track because it is compared with sayings, advertising, and word-of-mouth. People can calculate directly the percentage of responses due to the amount of responses to the campaign. The company can monitor the rates and find out the amount of responses due to basic send-out programs such as the MailChimp or Campaign Monitor.

Cheap and quick production: all the forms of direct marketing that the company may choose to use are cheap and cost little budgets and are quick to produce, such as the email campaigns which have little cost and don't take much time to be created and reaches people's inboxes directly.Potential to build list of potential or existing customers: the company can build a database of contacts and consumers for future use by engaging repeatedly the potential or existing customers. This process makes the targeting much easier for future marketing campaigns.

Refining the initiatives: direct marketing has a great advantage which is having exact numbers of individuals reached. Thus instead of depending on approximations, the company campaigns can determine the exact ratios, as the conversion rates.

If the company campaign didn't receive the willing turn-around after the advertisement, they can treat the tactic used and repeat the advertisement all over again. Therefore the advertising direct mail can be used for many purposes because the company has to deal with easy management and they can test new markets, study the response of customers towards the new products or services, manage the pricing, and use small runs to examine the marketing field before exhibiting the products in the market and before big launches.

Due to the spread of web usage, selling process to the future clients and consumers became very simple and have distributed in huge way. Therefore direct marketing is an interactive system of marketing in which it uses advertising Medias to affect consumer's response toward the product and deal with them at any location. Direct marketing allows the postcard printing pieces to create awareness of the business among the targeted consumers. It allows the company to build a qualified and probable database for the business. It also allows the company to develop an effective and responsive feedback system (Cooper, Fletcher, Fyall, Gilbert & Wanhill, 2008).

Through direct marketing it became easy to measure the results because it is accurate and the company can know exactly how many people have been contacted. When the company runs a direct marketing campaign and knows the exchanges rates that occurred in it and how many products got sold, it can work on refining and improving the success rates. Buying direct means the dealing directly with the manufacturer without involvement of the third retailer or distributor. And this saves money and time for the consumer.

Marketing mix

The marketing mix is a continuation of the marketing strategy, that means after the company defines its strategic objectives relating to market, must further develop detailed strategies on product, price, place, promotion (Felicia, 2014).

The marketing mix was created by Neil Borden in 1964, meaning the idea of proper allocation and use of key marketing variables, which the company is active on the market. At the beginning Neil Borden identified 12 variables: product, price, brand, distribution, personal selling,

advertisement, sales promotion, packaging, the display of products, after sales services, logistics and marketing research.

In order to deliver value for customers that will provide a competitive edge, companies need to tailor the marketing mix to the needs of end consumers. The marketing mix is a key component of marketing management and the most significant aspect of the marketing concept (Jobber & Fahy, 2006), because combining elements of the marketing mix is done based on market requirements and adapted to the needs of consumers.The four basic elements of a marketing mix are: product, price, promotion, distribution. When it comes to managing marketing services, there are three other elements to the marketing mix: people, the physical environment, and the process, making the 7P mix. The application of the marketing concept and market orientation imply adapting the marketing mix to meet the needs of the consumers, so there is also an approach in which elements of the marketing mix 4P have been renamed in synchronous SIVA (solution, Information, Value, Acces) in order to emphasize consumer-focused marketing.

Promotion - element of the marketing

Although not the only aspect of marketing, promotion is a key marketing activity. The goal of any promotion policy, regardless od the nature of industry in wich company operates, is to influence directly or indirectly the purchasing attitude od the target market. Or, as understood by (Munteanu, 2016), the role of promotion is to“stimulate, develop and guide the potential customer needs. The basic elements of the promotional mix available to marketers can be divided into techniques of mass and direct communication. In mass communication techniques, marketing activities are intended for the market as a whole. However, in recent years there has been an increasing use of promotion targeting individuals, which is called direct communication (Jobber & Fahy, 2006).

Mass communication techniques include: propaganda, public relations and publicity, sales improvement and sponsorship .

Direct communication techniques include: personal sale, Internet marketing and direct marketing (Popesku, 2009).

Propaganda is the oldest promotion tool and consists of informing the public about a product or service through mainstream media, paying for media space. Depending on the method of placement and reception of the propaganda message, propaganda means can be divided into three groups:

- graphic means (printed text, printed image)
- audio visual aids (TV, radio, ads, Internet)
- plastic products (souvenirs, business and emblems) (Čerović, 2009).

Public relations is about communicating with journalists, influential figures and organizations. Publicity involves the placement of information in the media whereby media space is not paid directly, but the publication of information in the media is considered part of the regular activities of the media themselves. Both public relations and publicity strengthen the brand image and create prestige. **Public relations** "tell the story of a product", while publicity "creates a story for a product" (Popesku, 2009). **Sales promotion** is made by strategic marketing moves that most often have a short-term character. The goal is to increase sales in a short period of time through discounts, bonuses, free samples, rewards, loyalty cards, coupons, premiums, etc. **Sponsorships** mean a business relationship between one who provides funds, resources, or services and an individual, event or organization that in turn offers certain rights or associations that may be used for commercial purposes (Popesku, 2009). Sponsorship also enhances the brand image and creates publicity. **Personal selling** is a direct communication technique because of the direct relationship between the seller and the buyer. Direct selling, as a form of relational marketing, creates a customized relationship between

the parties involved in the transaction, ensuring its long-term maintenance. From a consumer perspective, personal relationship, face to face with the seller, offers the opportunity of social interaction. **Internet marketing** represents a significant transformation in the conduct of promotional marketing activities, especially the use of e-mail and website. Internet marketing has significantly eliminated mediation.

The main benefits that users have from the internet are:

- permanent availability under affordable conditions,
- global character,
- providing special value by enabling price and product comparisons,
- facilitating the purchasing decision-making process by evaluating alternative products and the offerings of service organizations (Popesku, 2009).

Direct marketing involves the distribution of products, information and promotional benefits to target customers through interactive communication, in a way that measures their response (Jobber & Fahy, 2006). It is a relatively new model of direct communication with consumers. The reason for the popularity of direct marketing can be found in technical advances such as customer relationship management and Internet marketing, which allow direct contact with customers. In addition, direct marketing is characterized by a high degree of precision in targeting, receiving a quick and direct response from consumers, as well as easy measurement of marketing results. Direct marketing is database-driven, and lists of leads are increasingly available to marketers.The basic forms of direct marketing are:

- direct mail (sending material by mail to your home or work address, with particular importance to the quality of the so-called. Mailing lists, or lists of potential customers to whom material is sent);
- telemarketing (use of tele-communications and information technologies, first of all telephones);
- mobile marketing (sending short text messages directly to mobile phones);
- direct response propaganda (requires direct response - order, inquiry or visit request - interactive television, home shopping);
- electronic media (Internet, email, interactive cable television);
- accessories (leaflets in magazines);
- Door-to-door leaflet distribution. (Popesku, 2009).

DIRECT MARKETING IN HOTELS

Direct marketing is direct communication with previously defined target groups in order to get immediate feedback on marketing incentives and build a more solid relationship. Direct marketing has evolved into database-based marketing and customer relationship marketing (Cooper et al., 2008). As services imply interactions, and transaction products, the interaction and transaction processes create an overall experience of the hotel's content and services by the guest. A positive guest experience makes the guest return to the hotel and become a regular guest. The marketing process involves a marketing mix that consists of: **product, price, promotion, distribution.** The guest pays the price for a specific product, all done at a specific location. Promotion is a marketing activity that encourages and encourages a potential guest to decide to try a particular product or service. E-commerce systems have a huge impact on marketing because they provide users with direct insight into products, prices, location, through electronic media. Technology creates an environment where guests have access to all the 4P information of a particular hotel. On this basis, direct or interactive marketing is built. Interactive marketing involves the processes that take place before, during and after the decision to purchase a product or service. Before making a decision, potential guests search the Internet to collect hotel information. The decision itself results in the hotel reservation, after

which the guests participate in the processes of interactions and transactions and on that basis form their experience of the hotel (Tesone, 2005).

Development of direct marketing

Today, marketing communications are increasingly viewed as an interactive business-to-consumer dialogue. Thanks to technological innovation, people can now communicate through traditional media (newspapers, magazines, radio, telephone, television, billboards) but also through computers, faxes, mobile phones, pagers and wireless devices.. As communication costs have decreased, new technologies have encouraged an increasing number of businesses to turn from mass communications to increasingly targeted communications as well as one-on-one dialogue (Kotler & Keller, 2006).The term direct marketing has taken on a new meaning in relation to what it originally had. Previously, this term simply referred to a form of marketing that involved the transfer of products or services from manufacturers to consumers without intermediaries. However, the development of telephone and other interactive communication media has influenced the redefinition of the term direct marketing. Direct marketing is an interactive marketing system that uses one or more media to get consumer feedback. Today, the term direct marketing is referred to as direct relationship marketing. Marketers are learning about consumers using databases, so an increasingly solid relationship is being built (Reid & Bojanić, 2006). Direct marketing is not aimed at the mass market, but individuals can be targeted too, without intermediaries. Consumers are expected to respond immediately, which means that direct marketing results can be measured quantitative. Direct marketing, Internet marketing and database-based marketing, are in practice a whole, because with the help of the Internet, data becomes the base for consumer lists with which direct contact is established (Kotler & Keller, 2006). Due to the increasing fragmentation of the market, as well as accelerated technological development, the application of direct marketing is necessary, especially in the field of tourism and hotel industry. In all service companies, including hotels, there is often no choice when it comes to promotion and sales channels because the service is produced and consumed at the same time. Direct channels allow close contact between business and consumers, creating the ability to respond quickly to any changes in the market. Hotels use call center central reservation systems and Web sites to provide consumers with direct contact (Reid & Bojanić, 2006). This is how interactive communication evolves, increasingly initiated and controlled by consumers themselves. They determine when and how they will start communication with the hotel company, but also how the interactive relationship will continue, what information and offers they need, and how much they want to pay for certain services and products (Kotler & Keller, 2006). Direct sales are primarily related to the goals of a particular hotel company.

Importance of Internet for direct marketing development

The modern way of life and doing business is hard to imagine without using the Internet. Its presence and use in the developed countries of the world has long ceased to be a luxury, and has become an indispensable element of daily business and communication. The evolution of the Internet from a simple way of transmitting messages to the main mode of communication has had a major influence on the way in which the brands were created and promoted, as well as on the way in which the organization's marketing activity was structured (Tanase, 2019). he Internet, as a worldwide information and business network, influences the exchange of participants in the world market more easily and faster, while reducing the space and time barrier. The Internet is a fundamental factor in the development of e-commerce, but also in raising the speed and efficiency of traditional, physical business.

Internet and modern technology also transformed the way people behave, interact, communicate and purchase. Big data has become not only the business reality, but also the reality of each consumer, that has to adopt to the informational age and develop new patterns of behaviour. Entering the Internet market companies are actually taking the veil of a massive market and new age audience that cannot be ignored (Grubor i Jakša, 2018).

E-commerce and the use of the Internet provide the collection and systematization of detailed information on the needs and requirements of individual consumers. Based on this, companies create their offer according to the needs of individual consumers. The Internet has relatively recently emerged on the marketing scene, but Web sites have quickly become the most powerful form of direct communication with individuals in the market. The Internet is used in the hotel industry to fulfill different goals and tasks, such as: direct email marketing, advertising, customer service, relationship marketing, database information collection, distribution, sales. A huge number of consumers use the Internet to gather information and even book hotel accommodation, which implies that the Internet will continue to grow rapidly as a marketing tool (Goeldner & Ritchie, 2006). A growing number of hotel companies are moving from mass communication techniques to communications that are more tailored to specific segments as well as individuals. Due to the heterogeneity of tourism demand, it is difficult for marketers to promote mass market supply. Internet development enables a high degree of adaptation of the marketing mix to consumers, their individual needs, as well as changes in the market itself. In today's market, it is essential to use the Internet as a direct distribution channel. It makes direct sale of hotel services easier than ever.There has always been a direct sale by phone or mail, and the introduction of toll free 800 numbers is especially important. The development of computers, central reservation systems, faxes, videos cannot be ignored. However, the emergence and development of the Internet has attracted the most attention and the Internet has become more powerful than its predecessors, as a medium of communication, reservations and transactions (Goeldner & Ritchie, 2006). It can be said that the Internet is a revolution in the way we do business. A hotel company cannot survive in the market without the Internet and technologies based on Internet usage. The use and impact of the Internet on society and the economy can be considered one of the key factors for global transformation in the late XX and early XXI century (Popesku, 2009).

The expansion of the Internet has also influenced the formation of companies operating exclusively over the Internet ("dot-com companies"), such as Expedia, Hotels. com, Travelocity. These kinds of companies have completely changed the way hotel businesses operate because they represent intermediaries between hotels and consumers, which reduces the competitiveness of hotels. Therefore, it is imperative that hotel companies review the way they provide services and adapt to new electronic streams to establish direct communication with consumers (Kotler & Keller, 2006). Many hotel companies combine direct and indirect channels to achieve optimal results. Hotels use global distribution systems - GDS (Global Distribution Systems), which connect hotels and intermediaries (agencies, tour operators, Internet companies). This makes it easy for consumers to browse through various hotel services and complete transactions on their own (Reid & Bojanić, 2006). Major channels of Internet marketing are the following :Web Site, Search Engine Marketing, Social Media Marketing, Content Marketing, E-mail Marketing, Mobile Marketing, Banner Advertising.

Web site

Web site is a starting point in Internet marketing campaign and communication with customers (Grubor i Jakša, 2018). It is a “place” in digital space “owned” by a

company, where all information about the company and its products can be found. This is also the final destination of all banners, social media profiles, texts and similar content that exist across the Internet about the company. Specific and very popular type of web site is blog, which generates its power to make an influence on consumers by providing information about particular subject (usually about products) in a form of personal opinion, usually given by an expert or just an ordinary consumer that is expressing his first impressions about the subject in a form of personal diary. The idea that stands behind blogging is electronic word-of-mouth and encouraging communication about the product between consumers that has experience with it.

Search Engine Marketing (SEM)

Search Engine Marketing (SEM) is a tool for increasing visibility of a company's website and making online promotion of a company more effective. It uses paid advertisements links (pay per click platforms – e.g. Google Adwords) and Search Engine Optimization (e.g. Google, Bing, Yahoo) for acceleration of website traffic – specifically, the aim is to attract as many targeted users as possible and to increase visits to a website and awareness of company's brands (Dawson & Dawson, 2007). In this process, special attention should be put on the process of designing unique and attractive content for the targeted audience.

Social media marketing

Social media marketing is "an innovative tool that organizations use for creating a very strong public relation with the customers on the virtual networks" (Jan & Khan, 2014). Social media platforms (e.g. Facebook, Twitter, Instagram, LinkedIn etc.) consist of large and various communities of customers that are not that easily available and visible in traditional channels. Those groups have a great power in sharing information about the company and its products, expressing personal opinion, rating their experience that can be both positive and negative (Balteanu, 2019). Social media web sites help in enhancing the communication with all users, and each social media site demands different approaches, techniques and strategies of marketing. Conducting marketing through social media networks is not about you getting your story out; it's about your customers; it's about being more transparent, earning trust, and building credibility. Social networks provide great opportunity for reaching maximum results with minimum investment (Ilić, Ostojić i Damnjanović, 2015).

Content marketing

Content marketing is a strategic marketing approach focused on creating and distributing valuable, relevant, and consistent content to attract and retain a clearly defined audience and, ultimately, to drive profitable customer action. It is a "good story about the company that is described in hundred words, without mentioning company's references, brands and all other superlatives, and that, even without these components, carry attributes authentic, focused, and relevant" (Jan & Khan, 2014). The aim is driving and retaining customer action and interaction with company and its brands with authentic, original and inspiring content.

E-mail marketing

E-mail Marketing is the direct way for personal and customized communication with new and old customers. It helps in reaching more customers and conveying a wide variety of messages in creative forms with the possibility of getting direct feedback from customers' and measuring its effectiveness easily (Atshaya and Rungta, 2016). E-mail marketing campaigns are cost effective, personalised, fast, massive but targeted, approved by consumers that are usually consciously registered on the companies e-mail list, easily tracked etc. However, it is very important to Internet marketing as a business necessity avoid spamming consumers with lot of information that are not relevant but rather sent just to remember the consumers about the company's presence.

Mobile marketing

Mobile marketing is about creating content or ads that is viewable and suitable for a mobile device (Grubor i Jakša, 2018). It implies "any marketing activity conducted through a ubiquitous network to which consumers are constantly connected using a personal mobile device" (Kaplan, 2012). Mobile marketing has become business necessity in the last few years, given that "the extent of mobile engagement by consumers is so pervasive that it can't be ignored by any business", and implying that "all marketing must be optimized for mobile, first" (Grubor i Jakša, 2018). Smart phones are devices that are always "in the pocket" of its users, with constant connection to the Internet, so the opportunity mobile marketing provides for a company is creating fully customised information to customers, depending of their location, time, activities and other data about the person that could be tracked through mobile device and application installed on it.

Banner advertising

Display Advertising is focused on the usage of visual elements like images, videos, animations, rather than test, in creating brand awareness and image, and finally sales. Internet marketing channels, together with all possibilities and opportunities they give for growing business online, can also be presented as "The Internet marketing tree". The main parts of the tree – deep roots, sturdy trunk and branches – demonstrate priority and order in conducting Internet marketing strategy.

Databased marketing

Due to the absence of a database, direct marketing campaigns may not be carried out, direct marketing terms and database were often used as synonyms. Many direct marketing communication techniques rely on a customer database (Prihoanca, 2011). The use of the Internet as an interactive medium, and the development of information technology in the hotel industry, influence the transition from mass marketing to database-based marketing. Database-based marketing has enormous potential, especially in the hospitality industry. Specifically, all hotel staff in contact with guests should have instant access to the same information, as well as regularly update the information and add new ones.Computer technology provides the ability to store and analyze large amounts of data from a variety of sources, as well as the ability to present information in a convenient, accessible and useful format (Jobber & Fahy, 2006). Web content is created based on tracking user behavior and their preferences. Hotel companies are constantly gathering significant consumer information. Additional value is formed by collecting, analyzing and distributing information. This way it is easy to determine what consumers like and want and respond to market incentive (Reid & Bojanić, 2006). The database is a list of current and potential consumers in electronic form, containing various information about them, such as names, addresses, phone numbers, lifestyle, social class, geographical location to which they belong, frequency and frequency of visits, preferences, transaction data , responding to promotional activities, etc. The use of databases is essential in direct marketing. Direct marketing campaigns most often target recent visitors, who are invited to re-visit the hotel, or are encouraged by loyal guests to visit the hotel at a lower hotel visit time. Databases are also used to form adequate lists that are critical to a direct marketing campaign (Kotler & Keller, 2006). Marketing must use database technology to more precisely target promotional activities to priority market segments, especially tailoring messages to the needs of the target audience.

Relationship marketing

Database-based marketing helps strengthen relationships with individual consumers. Through precise targeting, hotel companies can reach the most profitable consumers and then strive to retain them by

delivering value based on individual needs and interacting effectively with them. When target market segments are determined, efforts are made to individualize. This creates one-on-one marketing, ie marketing dialogue, which is the highest level in the development of direct marketing. Direct marketing is a significant tool in Customer Relationship Management (CRM). Access to and use of consumer information to tailor the marketing mix to individual consumers can create a competitive advantage. Hotel relationship marketing involves the special treatment of each guest by all employees who are in contact with them. Interactions between the hotel and the clients can take place by phone, mail, email, sales force, site, as well as on site (via reception). This makes it easy to keep track of all your customer contacts and calculate their value to the business. That is why it is important for the hotel company at all levels to understand the needs and requirements of the guests, to encourage feedback and thus create value for the guests, ensure their satisfaction and loyalty. The emphasis is more on retaining existing than on gaining new clients. Fornell and Wernerfelt use the terms offensive and defensive marketing, where defensive marketing is identified with relationship marketing. Namely, defensive marketing is focused on reducing the dissatisfaction of already existing customers, while the goal of offensive marketing is to "release" dissatisfied consumers from competition and win them over (Kozak, 2011).

The goal of marketing, in addition, should be to make the hotel lose as few potential guests as possible due to the bad experience of current guests. Relationship marketing adds a new dimension to the essence of marketing - the goal is not just to encourage guests to return to the hotel, but to do everything they can to convey to their friends the enthusiasm for the hotel. Relationship marketing implies attachment and trust, and a good relationship is characterized by mutual giving. while the goal of offensive marketing is to "free" dissatisfied consumers from competition and win them over (Kozak, 2011). The function of relationship marketing in the hotel industry is to attract and retain guests, but also to strengthen the connection with them.

Relationship marketing gives a new dimension to the essence of marketing - the goal is not just to encourage guests to come back to the hotel, but to do their best to convey to their friends their enthusiasm for the hotel. Relationship marketing involves attachment and trust, and a good relationship is characterized by mutual giving. It should also be that the hotel loses as few potential guests as possible due to the poor experience of current guests. Relationship marketing adds a new dimension to the essence of marketing - the goal is not just to encourage guests to return to the hotel, but to do everything they can to convey to their friends the enthusiasm for the hotel. Relationship marketing implies attachment and trust, and a good relationship is characterized by mutual giving. it should also be that the hotel loses as few potential guests as possible due to the bad experience of current guests. Relationship marketing adds a new dimension to the essence of marketing - the goal is not just to encourage guests to return to the hotel, but to do everything they can to convey to their friends the enthusiasm for the hotel. Relationship marketing implies attachment and trust, and a good relationship is characterized by mutual giving.

Loyalty Marketing

Loyalty marketing refers to building relationships with consumers based on mutual trust, whereby consumers receive loyalty rewards. The first loyalty program was launched by American Airlines in 1981, and today many airlines as well as hotels and other companies offer similar programs. Hotel companies offer different loyalty programs because they see the multiple benefits they have from loyal consumers. All major hotel chains have programs like this, and the goal is to provide customer loyalty so they can choose the same brand over and over again. With each retained consumer, the

company's profit increases. Loyal consumers are less likely to compete; can initiate free word of mouth promotion; less financial and human resources need to be allocated to serve them, because they are already familiar with all the procedures; and they also affect the satisfaction of the employees themselves, because it is easy to cooperate with them. According to some estimates, the cost of attracting new consumers is five times higher than the cost of retaining existing ones. The loyalty program can be improved by having a dialogue with the guests. Hotel staff should monitor guest behavior and record all observations. Loyalty programs should be different from the competition, and offer personalized rewards, that is, rewards tailored to the needs of different guests. Repeated visits may be due to the programs themselves and the expected rewards, but there is a much stronger connection between guests and hotels if they are repeated due to genuine brand loyalty. Loyalty programs usually target regular guests by encouraging them to take action-booking hotels, by offering special programs and rewards tailored to their individual needs. Regular guest programs require significant financial investment in this area of marketing, but they should ensure guest loyalty and thus become profitable. In addition, an opportunity is created to gather more relevant information about guests (Barrows, 2009).

CRS (computer reservation system) and its basic functions

The computer reservation system is a central system in the hotel business that provides reservations and tools to increase overall booking and revenue. The basic functions of this system are:

- Reservations - handling all types of reservations (individual, group, business), review of available rooms, prices, deposit handling, room blocking, change of reservations, cancellation of reservations, possibility of booking restaurants, transport, activities, etc.
- E-commerce - provides the ability to book at any time during the day and night, seven days a week and pay electronically.
- CRM (Costumer Relationship Management) - involves the collection and management of information about guests (email, mobile, information about previous stays, needs, etc.), pairing services, use of mini-bars, Web services, etc.
- GDS (Global Distribution Systems) - provides the ability to link hotel databases and GDS systems and Web booking (allows Internet users, travel agencies, tour operators to make, modify, or cancel reservations) (Wymbs, 2011).

Central reservation systems use airline companies, hotels, and tour operators. Used nationally or globally. Since the 1980s, they have experienced a major expansion, affecting almost all tourism businesses. The biggest advantages of central reservation systems are that the information is updated at any time, they are constantly available and the possibility of obtaining a reservation confirmation immediately after its completion. Central reservation systems appeared on the road in the early 1960s, with the aim of offering the most efficient way to manage inventory / information. However, the very rapid development of tourism supply and demand in recent decades has indicated that powerful computerized systems are required to manage the tourism industry. Airlines were the first to start using these systems and replaced manual booking systems with electronic databases. In addition to controlling internal databases, the systems provided distributors and business partners with access to information on occupancy, pricing, and schedules. In this way, they were able to adjust their prices and schedules to tourism demand. Shortly thereafter, hotel chains and tour operators realized the potential of these systems and developed their own information and reservation systems. Agents receive information about current occupancy and prices electronically. The

system often provides information about the location of the hotel, as well as the facilities that the hotel offers. The agent can directly book a hotel room and receive an automatic booking confirmation.

Some of the most famous reservation systems used in large hotel chains are: HOLIDEX (Holiday Inn), MARSHA (Marriot), RENOIR (Remada), GLOBAL II (Intercontinenal), HILTON (Hilton), RESERVATOR (Sheraton), TRAVELODGE (Forte), (Buhalis, 2003, 233). Global distribution systems have, as already mentioned, been used to sell airline tickets, and today they are used to sell a variety of tourist services. The four key GDSs in the world are:

- AMADEUS- This system is used by airlines: Air France, Iberia, Lufthansa, SAS, TAM; online travel agencies (Anyfares, CheapOair, Ebookers, Expedia, Flights, Opodo, Jetabroad); over 500 individual airlines, over 90,000 travel agencies, over 76,000 hotels.
- GALILEO- Used by airlines: Aer Lingus, Sabena, Alitalia, British Airweys, Swissair, TAP, United Airlines, KLM, Olympic Airlines, Austrian Airlines; online agencies: CheapOair, CheapTickets, Orbitz, Ebookers; hotels.
- SABER- A system used by American Airlines; online agencies: Travelocity, Lastminute.com, Travel Guru, Priceline; then 88,000 hotels, 180 tour operators, 55,000 travel agencies in over 100 countries; as well as many car rental agencies.
- WORLDSPAN-Airlines that use this GDS are: Delta, Northwest, TWA; and is also used by online agencies: Expedia, Hotwire, Priceline, Orbitz, BookIt.com; as well as by numerous hotels.

GDS have significant advantages in the form of: Possibilities of interconnection in the network, connecting multiple users, ability to connect to computers of different manufacturers or different data networks; variety of available data, simultaneous use of resources for multiple purposes. As most large hotel chains have developed their own central reservation systems, so the problem of interconnection of different systems has arisen. The solution to this problem is the so-called "switch" companies, such as TSISCO, WIZCOM, PEGESUS and others, which represent the interface between different systems and allow a greater degree of transparency.

Online reservations

Online reservations are becoming a popular method of booking hotel rooms. Through on-line booking systems, consumers have become very powerful and more able to determine the elements of tourist products especially students who are tourists of lower budget. Also, they have become more sophisticated and experienced, and thus have become harder to satisfy (Nair & George, 2016). Guests can book rooms from their homes while protecting privacy and financial information.

The advantage of this method of booking is that Internet users have the opportunity to search the sites of several online agencies and thus compare prices and services of different hotels. Web-based agencies have pictures of the hotel on their sites, information on amenities and events, and often comments from other guests who have already visited the hotel. Several major online travel sites are actually agencies. These sites send hotel information to thousands of online sites that serve as agents. They usually get a commission from the hotel if the hotel receives a reservation through their site. Large hotel chains are usually directly connected to global distribution systems and thus networked with thousands of agents. What is important is that there is a unique database from which precise data on room occupancy and prices can be obtained at any time, regardless of which source of reservation is used. The Holiday Inn hotel chain example is the perfect example of a hotel that has a comparative advantage due to its distribution systems and Holidex internal reservation system. An increasing number

of hotels recognize the importance of creating their own site through which guests can make a reservation directly. In this way, guests are allowed to book at the lowest possible price, as well as last minute reservations (last minute reservation). Both hotel and guest costs are reduced by the availability of the Internet and the easier distribution of information. It is estimated that in the near future, one third of all hotel reservations will be made directly via the Internet, and the other third will be encouraged by online searches. Therefore, marketers are intensively exploring online marketing opportunities to strengthen brand awareness in the marketplace, attract as many guests as possible, and increase profits (Cooper et al., 2008). Based on the research I conducted with employees in the reception and reservation sectors in Sarajevo high category hotels (Holiday, Radon Plaza, Europe), it is concluded that the hotel system in the capital of BiH is not sufficiently developed. The most online bookings were made by the Holiday Hotel, as much as 40% of the total bookings, happened online. The Holiday Hotel has its own reservation system and in this hotel reservations can be made by agents who are also part of the GDS, as well as Internet users directly through the Web site. Reservations are made in real-time, which means that receipts are automatically received.

RESULTS OF RESEARCH

The survey was conducted at the hotel Holiday, on a sample of 50 respondents. Based on the analysis of the answers received in the survey, it can be concluded that: 48% of the respondents come to the hotel 3 or more times a year, 21% come twice a year, 25% come once a year, and 6% come to the hotel for the first time (Figure 1). 53% of them planned to visit the hotel in advance, 30% decided during the trip, and 17% stopped by chance to see the hotel. 32% of respondents found out about the hotel via the Internet, 25% from promotional materials, 21% by a friend's recommendation, 19% by accident, and 3% by some other means (Figure 2). 43% of them had problems due to traffic density, 57% of them easily found a hotel (Figure 3). 69% of respondents had the opportunity to book accommodation online via/have done so this or previous times (Figure 4). What is easily noticeable is that a large percentage of clients have made an online reservation, which confirmed the thesis that the reservation system is the main advantage of this hotel. Hotel management relies on customer loyalty, which is confirmed by this survey, and many guests are returning. A large percentage of clients learned about the hotel via the Internet, which confirms the thesis that direct marketing provides a comparative advantage to hotels.

Figure 1. Results of research: How often do you use hotel services?

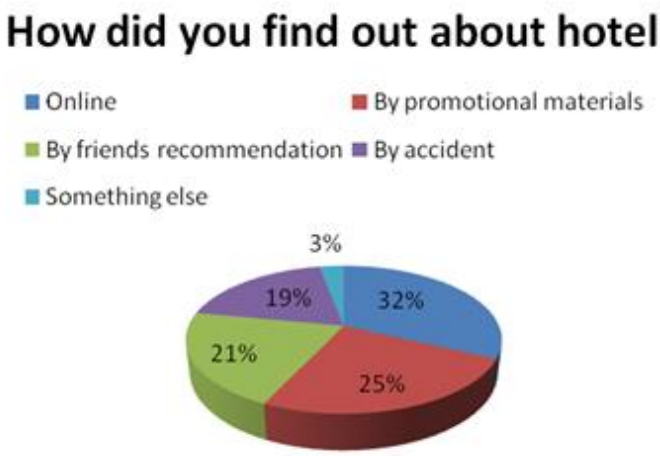

Figure 2. Results of research: How did you find out about hotel?

Figure 3. Results of research : Did you have any problems finding hotel?

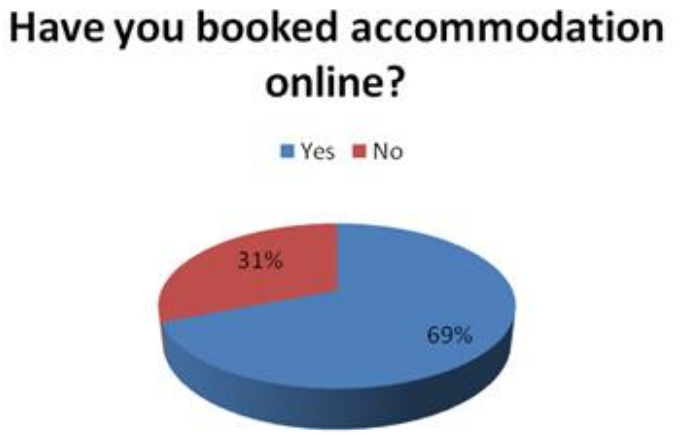

Figure 4. Results of research: Booking accommodation

CONCLUSION

Marketing research is market oriented, to different consumer requirements. Research results in a huge amount of marketing information that would not be used properly without a marketing information system. The use of the Internet in marketing activities has led to a shift to digital marketing. Direct marketing techniques have evolved thanks to information technology. Electronic data-bases create an opportunity for direct communication with target consumer groups, as well as with everyone individually. The use of the Internet enables the collection and systematization of detailed information on the needs and requirements of individual consumers. Interactive communication is of great importance for adapting services and products to certain market segments, especially in service industries where direct marketing is of great importance due to the specific type of services, which involves simultaneous processes of production and consumption of services. Marketing is applied during the course of service delivery. Direct marketing has become the optimal way of communication. Tourism companies have multiple benefits from the use of direct marketing. Lowering costs by eliminating middleman costs and developing an interactive relationship with guests and clients are just some of the benefits of direct marketing. The advantage of direct marketing is the presentation of hotels through their websites. The Internet is available to users as a source of information and interactions and reservations are made through it. Databases are the basis on which direct marketing rests. Targeted marketing is conducted on the basis of databases, and loyalty marketing is based on databases.

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GUIDELINES TO AUTHORS FOR WRITING PAPERS

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ABSTRACT

Guidelines to authors on preparing articles is formed pursuant to the world's best publishing practice and the Rulebook on publication of scientific publications (Official Gazette of the Republic of Srpska, No. 77/16). Guidelines are issued to ensure a uniform style of publication of articles in all issues of the scientific and professional journal of "STED JOURNAL". The Journal is published half-yearly (May- November) in print, with a circulation of 200 copies, and an electronic version of the edition is published on the site of https://stedj-univerzitetpim.com/. All articles must be designed in accordance with these Guidelines and sent to the email address of the editor in chief, and then they go into the process of anonymous review by two reviewers. Only papers that have at least two positive reviews shall be published in the Journal. The Editorial Board has adopted the List of reviewers that has been confirmed by the Senate of the University. The identity of reviewers is not revealed to the authors, and vice versa.

Keywords: STED Journal, review, publishing, scientific publications.

GUIDELINES TO AUTHORS FOR WRITING PAPERS

When preparing these guidelines, the editorial board of the journal places an emphasis on the APA standards of the academic writing. It means that applying them consistently we also bring the papers of our authors closer to the global audience, that is, to readers. The guidelines to authors consist of two parts. The first part is related to the content aspect of the paper, that is, its necessary basic elements, based on which the reviewers evaluate the content adequacy of the paper. The second part of the guidelines is related to the technical aspect of formatting the paper based on which the editorial board, after receiving the paper, decides whether to send the paper to be reviewed or return it to the author to be finished before reviewing.

STED JOURNAL, the journal of the PIM University on social and technological development publishes the papers which are subject to review and which are classified into the following categories:

- Original scientific article,
- Review scientific article,
- Short or preliminary communication,
- Scientific critique,
- Professional article,
- Presentations at scientific meetings.

Authors suggest the category of their papers, but the final decision is made by the Editorial Board and reviewers.

Original scientific paper is a paper which is basically organized according to the IMRAD scheme (Introduction, Methods, Results And Discussion) for experimental research or in a descriptive way for descriptive scientific fields, in which one for the first time publishes the text on results of their own research carried out applying the scientific methods,

which are described textually and which enable that the research is repeated in case of need, and the established facts are checked.

Review scientific article represents a review of the latest papers of a certain subject field, with the aim to summaries, analyses, synthesize and evaluate the information already published, and moreover it brings new syntheses which also necessarily include the results of the author's own research.

Short or preliminary communication is an original scientific paper, but of a less extent or preliminary character, in which some elements of the IMRAD can be omitted, and it is about summarized presenting the results of a finished original research paper or article which is still in development (Working Paper).

Scientific critique, that is, a polemic or overview is a discussion to a certain scientific topic based specifically on scientific argumentation, in which the author proves the correctness of a certain criterion of their opinion, that is, they confirm or reject other authors' findings.

Professional paper is a contribution in which experience useful for improving the professional practice is offered, but which is not necessarily based on a scientific method, that is, the emphasis is on the usability of the results of original research and on spreading knowledge, and the text has to be adjusted to the professional and scientific level of the professional community for who the paper is intended.

The papers classified into these categories are subject to review by two reviewers. Reviews are double-blind, the authors' identity is not revealed to the reviewers and vice versa. The paper shall be published only based on positive reviews about which the Editorial Board shall inform the author. The reviewers are selected among experts in the direct field of research to which the paper submitted for publication is related.

The STED JOURNAL can include contributions from conferences, congresses, consultations and symposia.

The author is fully responsible for the content of the paper. The Editorial Board assumes that before submitting the paper the authors regulated the issue of publishing the content of the paper pursuant to the rules of the institution or company where they work.

The speed of publishing the paper will depend on how much the manuscript (text) complies with the guidelines. The papers requiring major modifications and amendments shall be returned to the author to be revised before reviewing.

TECHNICAL GUIDELINES

The paper shall be sent to the Editorial Board of the journal by e-mail in the form of a text prepared specifically using the text processing program of Microsoft Word. The paper should include maximum 10 A4 pages and consist of the following elements in one of the official languages of Bosnia and Herzegovina or in English:

- Title of the paper;
- List of the authors and institutions;
- Abstract;
- Key words;
- Introduction;
- Theoretical framework;
- Experimental part;
- Results and discussion;
- Conclusion;
- Literature overview;
- Title in English, list of authors and summary in English.

The title of the paper should be centered and written in upper case, Times New Roman, 14 pt, bold, Caps Lock;

The authors should be written in the center, without titles, Times New Roman, 12pt, normal, and the names of institutions centered, Times New Roman, 10 pt, normal.

The titles of a part of the paper– of the first level, left alignment, Times New Roman, normal, 12 pt, bold, Caps Lock;

The subheading – of the second level, left alignment, lower case, Times New Roman, 12 pt, bold;

The subheading – of the third level, left alignment, lower case, Times New Roman, 12 pt, italic.

Other parts of the paper should be written using the alignment on both sides (Times New Roman, 12 pt), one-sided spacing with one empty row above, between the subheadings and paragraphs, with margins of 2.54 cm (1"). The beginning of the paragraph should be typed at the beginning of the row.

The abstract should have 100-250 words, and it is positioned between the paper heading (consisting of the paper title and information on authors) and key words, which are followed by the text of the paper.

If the paper is written in one of the official languages of Bosnia and Herzegovina, the summary in English is given in an extended form, as a so-called resume and it should consist of up to 500 words.

Tables and charts

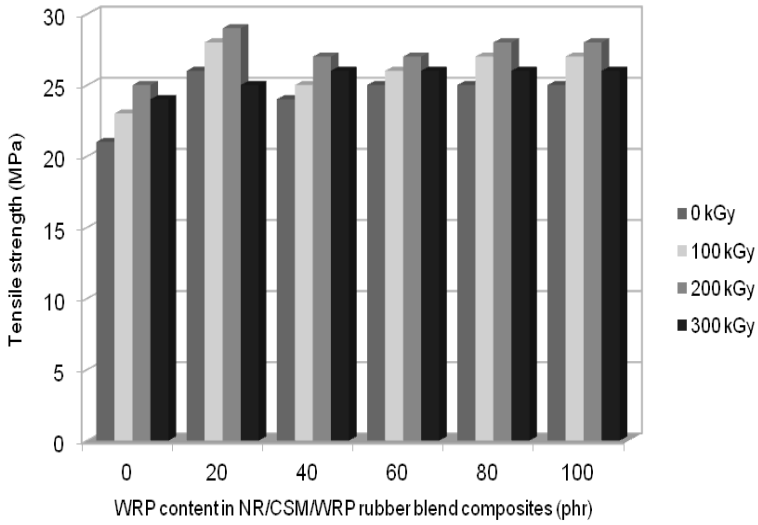
Tables should be prepared in the WORD, graphics in the EXCEL, except for some special cases when it is not possible technically. Tables and graphics should be clear, as simple as possible and transparent. The title, heading (text) and subtext in tables and graphics should be written in Times New Roman – normal, Font Size 10 pt. Tables should be placed at a certain place in the text. Tables should not include more than ten columns and more than fifteen rows. If the author assumes that data should be presented in a larger number of columns and rows, it is necessary to split the content of the table into two or more smaller tables or deliver it as a special attachment. They have to be drawn according to the computer template (Insert Table), and not using the spacing, dots and tabs. When citing tables and graphics, we write the title of the table or graphic in the initial capital letter and then we specify its ordinal number (e.g. as it is shown in Table 9 and Figure 6, the lowest value was...).

A table examples

Tabela 1. Karakteristike umrežavanja NR/CSM blendi sa različitim sadržajem recikliranog gumenog praha.
Table 1. The curing data for NR/CSM rubber blend compounds with different content of waste rubber powder

Sadržaj recikliranog gumenog praha WRP content (phr)	**Karakteristike umrežavanja/Curing characteristics**					
	M_l, **dNm**	M_h, **dNm**	ΔM, **dNm**	t_{s2}, **min**	t_{c90}, **min**	***CRI***
0	4	40	36	6	15	11.0
20	5	42	37	8	16	12.5
40	5	45	40	9	16	14.3
60	7	46	39	9	17	12.5
80	7	47	40	10	17	14.3
100	7	47	40	10	17	14.3

A chart examples



Slika 1. Uticaj različitog udjela recikliranog gumenog praha na prekidnu čvrstoću NR/CSM/WRP kompozita pod uticajem različitih doza zračenja
Figure 1 The effect of waste rubber powder content on tensile strength for the NR/CSM/WRP composites irradiated with different doses.

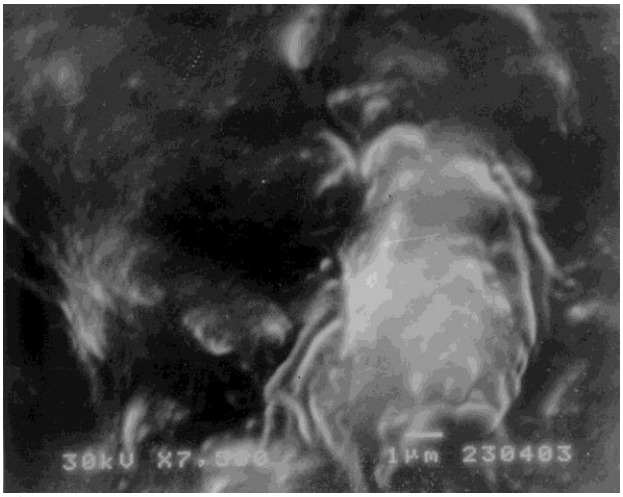
Equation

Equations should be written in the graphic editor for equations, specifically in the Microsoft Equation and they should be placed at the beginning of the text. On the right edge of the text in the row in which the equation is written one should indicate its number in parentheses beginning with number 1.

$$m_r = m_s\left(1 - e^{k_s t_{maks}}\right) - m_d\left(1 - e^{-k_d (t - t_{maks})}\right) \; za \quad t > t_{maks} \tag{1}$$

Figures

Figures have to be prepared for black-and-white printing, that is, if the original figure is in colors which cannot be distinguished in black-and-white printing, the colors have to be replaced by "raster", that is, different graphic signs which need to be explained in the legend. We insert in figures only the most essential text necessary for understanding, such as measure variables with their dimensions, short explanation on curves and similar. The rest is stated in the legend under the figure. The maximum size of a figure is 13 cm x 17 cm.



Slika 2. SEM mikrograf NR/CSM/ERP kompozita sa dodatkom 20 phr recikliranog gumenog praha pri uvećanju od 7500 puta

Figure 2. The SEM micrograph of NR/CSM/WRP composites filled with 20 phr waste rubber powder at 7500X magnification.

Other notes

In order to include successfully the papers published in one of the official languages of Bosnia and Herzegovina into international information flows, parts of the manuscript should be written both in the author's language and in English, including: text in tables, figures, diagrams and drawings, their titles and symbols.

About authors

When sending the paper one should give their full official address, telephone number and email of all authors and emphasize the author with who the Editorial Board shall cooperate. These notifications should be submitted on a separate sheet.

Experimental technique, symbols and units

Experimental technique and devices are described in detail only if they deviate significantly from the descriptions already published in the literature. If techniques and devices are familiar, only the source of necessary notifications is stated.

Symbols of the physical quantities should be written in Italic (Times New Roman, 12 pt. – italic), and units of measurement in upright letters, e.g. V, m, p, t, T, but m3 , kg, Pa, °C, K. Quantities and units of measurement have to be used pursuant to the International System of Units (SI).

REFERENCES

The reference list at the end of the article has to include only the sources which the author referred to in the article text. The used literature items are listed in alphabetical order.

Examples of citing

An example of citing a scientific journal in the text:

- one author: (Avramović, 2011);
- two authors: (Žiravac-Mladenović i Đurica, 2018);
- three to five authors: first citing in text: (Mitić, Nikolić, Cakić, Nikolić, & Ilić, 2007); second and every next citing in text: (Mitić et al., 2007);
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In the reference list:

Avramović, D. (2011). Metode i okviri rasta vrijednosti banke. Anali poslovne ekonomije, 5(1), 28-37.

Žiravac-Mladenović, M. i Đurica, F. (2018). Komparativna analiza trgovanja na Banjalučkoj i Sarajevskoj berzi. Anali poslovne ekonomije, 10(1), 25-35.

Mitić, Ž., Nikolić, G., Cakić, M, Nikolić, R., & Ilić, LJ. (2007). The investigation of Co (II)-dextran complexes. Hemijska industrija, 61(5), 257-262.

Špírková, M., Strachota, A., Urbanová, M., Baldrian, J., Brus, J., Šlouf, M., Kuta, A. & Hrdlička, Z. (2009). Structural and surface properties of novel polyurethane films. Materials and Manufacturing Processes, 24(10-11), 1185-1189.

An example of citing a book in the text:

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- six and more authors : (Stefanović et al., 2008).

In the reference list:

Suzić, N. (2010). Prvila pisanja naučnog rada: APA i drugi standardi. Banja Luka: XBS. Peterlin, J. i Mladenović, M. (2007). Finansijski instrumenti i menadžment finansijskih rizika. Banja Luka: Univerzitet za poslovni inženjering i menadžment.

Đuranović, D., Todorović, S. i Tešić, R. (2016). Strategijski menadžment. Banja Luka: Univerzitet za poslovni inženjering i menadžment.

Stefanović et al. (2008). Kretanje šinskih vozila. Banja Luka: Društvo za energetsku efikasnost.

An example of citing a chapter of a book in the text:

- (Harly, 1981)

In the reference list:

Harley, N. (1981). Radon risk models. U A. Knight, & B. Harrad (Eds.), Indoor air and human health (str. 69–78). Amsterdam: Elsavier.

An example of citing a paper published in the Scientific Conference Proceedings in the text:

- one author: (Grgurević, 2014);
- two authors: (Medić i Živadinović, 2014);
- three to five authors: first citing in text: (Krstić, Skorup, Skorup, 2014); second and every next citing in text: (Krstić et al., 2014);
- six and more authors : (Kojić et al., 2019).

In the reference list:

Grgurević, N. (2014). Kuba i Nikaragva (Revolucija i postrevolucionarni period). U M. Žiravac-Mladenović (Eds.), Conference proceedings, International Scientific Conference on Social and Technological Development (pp. 124-131). Banja Luka, B&H: University of Business Engineering and Management.

Medić, Z. i Živadinović, J. (2014). Neravnoteže i krize savremenog doba i ekonoska politika. U M. Žiravac-Mladenović (Eds.), Conference proceedings, International Scientific Conference on Social and Technological Development (pp. 102-1112). Banja Luka, B&H: University of Business Engineering and Management.

Krstić, M., Skorup, A. i Skorup, S. (2014). Inovativnost – ključni element preduzetničke strategije rasta i razvoja privrednog subjekta. U M. Žiravac-Mladenović (Eds.), Conference proceedings, International Scientific Conference on Social and Technological Development (pp. 51-58). Banja Luka, B&H: University of Business Engineering and Management.

Kojić, D., Pavličević, J., Špírková, M., Aroguz, A., Jovičić, M., Bera, O., MarinovićCincović, M. (2019). THE IFLUENCE OF SILICA ON THE SOLVENT RESISTANCE OF POLYURETHANE HYBRIDE MATERIALS. In M. Gligorić, A. Došić, D. Vujadinović (Eds.), Proceedings VI International Congress "Engineering, Environment and Materials in Processing Industry" (pp. 568-572). Jahorina, BiH: University of East Sarajevo, Faculty of Technology.

An example of citing a master thesis or PhD thesis in the text:

- (Petrović, 2001)
- (Žiravac-Mladenović, 2009)

In the reference list:

Petrović, R. (2001). Dehidratacija etera na mordenitnim katalizatorima. Magistarski rad. Univerzitet u Banjoj Luci, Tehnološki fakultet, Banja Luka, BiH.

Žiravac-Mladenović M. (2009). Bankarski nadzor i regulative zemalja u tranziciji na Balkanu – globalizacija bankarskog sektora. Alfa Univerzitet, Beograd, Srbija.

An example of citing a publication of an institution as the author, downloaded from the Internet and citing a text from the web site

Citing internet sites should be avoided, but if it is necessary, then they should include names of the authors, if they are available, the title, internet site and access date.

In the text:

- institution: first citing in text (Zavod za statistiku Republike Srpske [ZSRS], 2009); second and every next citing (ZSRS, 2009);
- call to authors: (Degelman, 2000); - unknown author: (Compiere, 2017) (Purdue University, n.d)

In the reference list:

Zavod za statistiku Republike Srpske. (2009). Saopštenja. Preuzeto 10.02.2009. sa http://www.rzs.rs.ba/SaopstenjaRadLAT.htm

Degelman, D. (2000). APA Style Essentials. Retrieved May 18, 2000 from: http://www.vanguard.edu/psychology/apa.pdf

Compiere, (2017). Products. Preuzeto 11.10.2018. sa http://www.compiere.com/products/

Purdue University Writing Lab [Facebook page]. (n.d). Retrieved January 22, 2019, from https://www.facebook.com/PurdueUniversityWritingLab/

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Zakonik o krivičnom postupku, Službeni glasnik RS, 72/2011, 101/2011, 121/2012, 32/2013, 45/2013, i 55/2014; Regulation (EU) No. 1052/2013 establishing the European Border Surveillance System (Eurosur), OJ L 295 of 6/11/2013, 1; Directive 2013/32/EU on common procedures for granting and withdrawing international protection (recast), OJ L 180 of 29/6/2013, 60.

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CONCLUSION

The papers not written strictly according to these guidelines shall not be accepted.

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