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Prof. Romulus Gruia Ph. D.

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**TAX RELIEF IN FRAGILE AREAS:
A REAL FACTOR OF ATTRACTIVENESS**

Legitimate question: How to attract young people, or the least young, to fragile areas where from the start life is more difficult?

Natural and pragmatic answer: First of all through salaries and tax "encouragements".

In fragile areas, such as mountainous areas, wetlands and those with high desertification potential (such as those south of the Carpathians along the lower Danube to the Danube Delta) are already major problems with human resources in general and, especially, with highly trained specialists: in the fields of agriculture, in the medical field or in the field of education.

In order to attract engineers, doctors and teachers, as main factors for the existence and development of these areas, a practical and efficient attractor is, of course, represented by certain material advantages (housing, land, existence of the internet signal, etc.) and, especially, financial advantages. Without going into details, which require debates, we mention the monetary measures to attract young people: motivating salaries and tax relief.

It is also important to create a system of **partnerships** through mechanisms and organizations of professional associations and local authorities. The idea is not new, but it is not widely applied in fragile areas. Under administrative regulations, medical regulations, etc., the tax exemption will have to be applicable even if a single municipality or area of the territory is classified as an area of fragility.

In CONCLUSION, we consider it useful to sound the alarm for the rapid creation of "**attractors**" to attract highly qualified human resources in fragile areas and especially in mountainous areas. In this way, investments can be generated with special agro-zoo-food technologies and the support of the permanent health care system of the inhabitants of the respective local community, as well as optimal schooling conditions for students in these areas.

Director of the publication,
Prof. Romulus GRUIA, PhD,
PhD supervisor, Scientific Leader

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RESEARCH REGARDING THE IGNITION CHARACTERISTICS OF THE WOOD BIOMASS FROM THE HARDWOOD TREES

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Abstract: *The production of the bioenergy raw materials may from additional income sources and help the regulation of the prices for the agrarian and sylvan products, the generation of new opportunities for the farmers in terms of investing in the production.*

The heat generated by the biomass might currently be an option of competitive pricing, in terms of the raw matter, the functioning scale and the fuel source. It is recommended that the carbon quantity stored in the biomass to be approximately 50% from the biomass weight and through the thermal treatment processes, the carbon quantity increases and the content of mineral substances decreases.

The physical characteristics and the chemical composition of the biomass acts on the quality of the wood material used as solid fuel. The characteristics of the biomass are different from a species used as fuel to the other. The qualities of the fuel can be improved by the wood material pre-treatment technologies. These treatments might have a series of benefic effects.

Keywords: *ash content, calorimetric bomb, calorific value, hardwood.*

1. Introduction

The pace of using the renewable sources will continue to increase even after the year 2020 so that the production of electricity from these sources will represent in 2025, 40% of the gross power use and in the year 2030, will represent 60% of it.

Romania has a biomass potential evaluated at approximately 3.3 PJ (7594 mii tep) per year, representing 19% of the total primary resources used at the level of the year 2018. In order to achieve a significant fuel production, it is necessary the use of the green fields as well as the use of the fields that are lied fallow.

The wood from the temperature zones has a lower degree of ash content, about 0.2-1% in comparison to the trees from the tropical areas that have an ash content of about 4%. Within the context in the burning of the conventional fuels represents one of the major pollution sources, the amplification process in terms of renewable power sources usage represents one of the main items of the European Union energy policy. During the ignition processes, it is produced the ash under a meal from, which is an organic with fine particles, that represents the quantity of

carbon which comes of the incomplete ignition of the carbon. The carbon content, depending on the used wood species in the ratio of 40.5% (dry matter), hydrogen and nitrogen in the ratio of 5.25% (dry matter) and 0.44% (dry matter).

The moisture content from the wood biomass has an influence upon the caloric power of the fuel, the ignition temperature and efficiency. From the scientific literature, it is known that the moisture content for the fuels from the biomass must not exceed 4-10% (in connection to the wet matter) for pellets, 20% for chopped wood and wood chips and 50% for the fresh fire wood. The biomass is a primary carbon source next to the other renewable energy sources.

The exploitation of the energetic potential from the biomass is a method successfully applied in some of the Asian large population countries. In China, there are more than 10 million equipments, which means that in the rural areas, these equipments ensure more than 80% of the necessary energy production. In Germany, in 2017, the acquisition of biomass based thermal power stations was of about 25000 pieces, in the year 2018, 27000 pieces were bought, in the year 2019, 40000 pieces were bought. Many states laid the ground works for the development of the

biomass renewable energy sources (Finland, Sweden) which, on the power market, shows a rate of 30% in terms of the potential to generate energy from biomass.

The emissions from the carbon dioxide generated from the ignition of 1 kg of biomass replace the use of 0.33 m³ methane gas, 0.74 kg of coal, 0.43 kg of petroleum fuel, according to the scientific data. The estimated annual quantity of wood biomass that might be produced by the introduction of the energy crops would be of about 72000-320000 tons/year for a surface under crop of 21000 ha.

2. Materials and Methods

The ascertainment of the caloric power for wood and ligno-cellulosic materials is almost similar to the one for the coal (as solid fuel) and with a few distinct features than the fuels under liquid state (gas, diesel fuel) or the ones under gas state (methane, biogas).

Generally, the method to find out the caloric power is made separately for the fuels under solid (ASTM D3286-96), liquid or gas state.

The equipment used to find out the caloric power of the wood biomass from the coniferous trees is the explosive burning XRY-1C type calorimeter, manufactured by Shanghai Changji Geological Institute from China (fig.1).



Fig.1. Calorimetric bomb

Before performing the proper essay, the calibration of the calorimetric bomb is made with benzoic acid (with a known caloric power of 26463 KJ/kg), in order to determine the caloric coefficient of the calorimeter.

The procedure to determine the caloric power of wood refers firstly to preparing the raw material (briquettes and pellets) and the installation, then the proper determination of the caloric power, and finally obtaining the results. The preparation of the wooden material for the testing consists in processing a small part of approximately 0.6-0.8 grams of briquettes and pellets, samples weighted with a precision of 0,001 grams.

This sample is put in a metallic pot and is introduced in a laboratory stove, in order to be dried at a temperature of $103 \pm 2^{\circ}\text{C}$. The final result of burning the ligno-cellulose briquettes and pellets is expressed by the caloric power, notion through which one understands the heat quantity obtained by burning a mass unit. The proper test contains 3 distinct periods, respectively (Fig. 2).

The initial period ("fore") which has as purpose the determination of the temperature variations of water in the calorimetric basin due to the heat exchange with the exterior before burning. In this period, usually 5 minutes, the temperature is read once at 1 minute with a precision thermocouple.

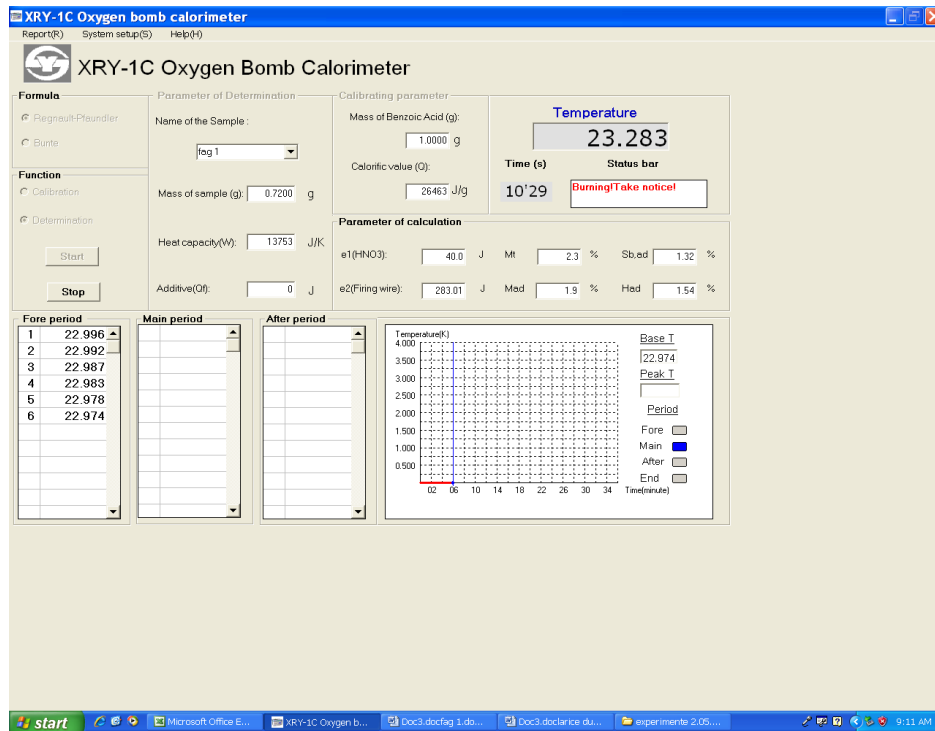


Fig. 2. Description of the process to assess the caloric power

The last temperature in the initial period is the first temperature in the main period. The registered values in this period are generally six and are registered once every 1 minute. After registering, the sixth value the ignition of the material takes place and indicating it in the menu bar under the name (Burning time).

The main period ("main"), starts by igniting the sample and has as consequence the raise of water temperature in the calorimetric basin due to the burning of the briquette and pellets particle and heat releasing.

The final temperature is given by the maximum value of the temperature, because after it's decreasing, that means that the calorimetric basin does not receive heat from the bomb. The values number may vary between 19-42 values of the registered temperature in this period.

The final period ("after") has as purpose the determination of the average water temperature variation in the calorimetric basin, due to the heat exchange from the bomb with its exterior (water in the calorimetric basin) after burning.

In order to determine the ash content of briquettes and pellets, the general method of standardized determination (ASTM D2866-11, 2012) was used.

According to this method, the ground and dried material to 0% moisture content is calcined at a temperature of 650 °C in a lab stove, for at least 3 hours.

When determining the ash content, it will be taken into consideration that the ash content is completely dried and the pot is clean and empty:

$$A_c = \frac{m_f - m_c}{m_i - m_c} \cdot 100 [\%] \quad (1)$$

Where:

A_c - ash content, in %

m_i - initial mass of the pot with the work ground sample, in g;

m_f - final mass of the pot with ash, in g;

m_c - empty pot weight, in g.

In fig.3 the calcination stove to determine the ash content of *Prunus Avium* biomass is presented.



Fig. 3. Calcination stove to determine the ash content

For the *Prunus Avium*, at U= 0%, m= 0.5900 g, higher caloric power= 19968 kJ/kg, lower caloric power= 19499 kJ/kg, energy density= 16.398 kJ/cm³, burning speed= 433 kJ/min, at U= 10%, m= 0.9130 g, higher caloric power= 17855 kJ/kg, lower caloric power= 17665 kJ/kg, energy density= 14.627 kJ/kg, burning speed= 407 kJ/min, at U= 20%, m= 1.0330 g, higher caloric

power= 15973 kJ/kg, lower caloric power= 15598 kJ/kg, energy density= 14.647 kJ/cm³, burning speed= 395 kJ/min, at U=50%, m= 1.700, higher caloric power= 10333 kJ/kg, lower caloric power= 9395 kJ/kg, energy density= 12.256 kJ/cm³, burning speed= 229 kJ/min.

The variation of the energy efficiency for the *Prunus Avium* is shown in fig.4.

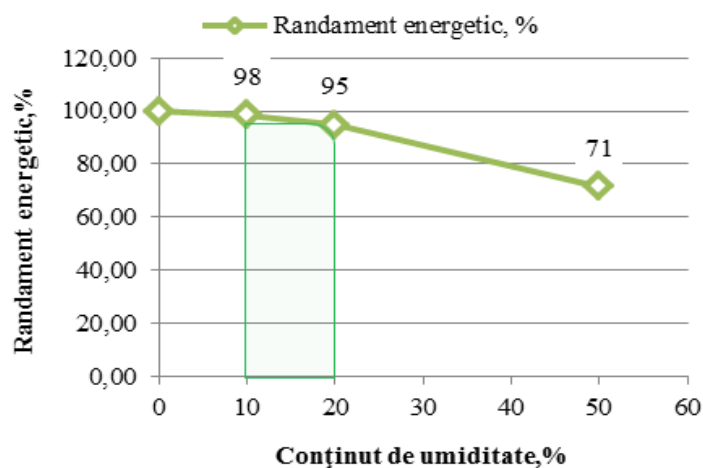


Fig. 4. The variation of the energy efficiency for the *Prunus Avium*

The ash content for *Prunus Avium* was 3.6%.

3. Conclusions

Among the disadvantages of the wood biomass in comparison to the fossil fuels, one may found that:

- The density of the biomass and the caloric power of the wood species is smaller in comparison to the one of the fossil fuels;
- Some biomass sources are mainly generated only during certain seasons, in the harvesting period;
- The biomass which isn't treated has usually a higher degree of moisture content,

which is the main factor that determines a low degree of heat achieved from the material following the ignition processes.

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ENDEMIC TAXA AND THEIR VULNERABILITY STATUS IN NORTH - EASTERN ALGERIA: CONSERVATION AND PROTECTION

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Abstract: Our study aims to develop the first list of taxa endemic to the Sétif region. In this research, we mainly relied on floristic work carried out on a North-South transect covering two types of bioclimate and including forest and steppe massifs. Thus, we have counted 148 endemic taxa including 25 subspecies. Belonging to 33 botanical families and dominated by Asteraceae with 15.54%. The endemics of North Africa are the most representative with 62 taxa. The region of Sétif is very impacted; its plant cover is subject to climatic and anthropogenic constraints, which would certainly contribute to more scarcity or even to the gradual disappearance of endemic and rare species very soon.

Keywords: Endemic taxa, Degradation, Rarefaction, Preservation, Sétif

1. Introduction

The flora of a geographic area is the most important biotic component. It is clear that for flora, endemic taxa arise from a botanical curiosity, biogeographical importance, and rather specific ecological places. They reflect quite remarkable conditions of the type of environment in which they meet. Endemism is most often due to very old isolation of a given region, the rate of which increases with this age. Endemic species are not distributed at random, but are found in regions whose flora has been relatively isolated for geographic reasons, current or past [1].

The Mediterranean region is one of the world's major centers of plant diversity where 10% of higher plants can be found in an area which represents only 1.6% of the earth's surface [2,3]. This flora is currently undergoing a regressive evolution resulting in the destruction of the plant cover for which man is indisputably responsible for the unprecedented erosion that biological diversity is currently experiencing [4,5].

The mechanisms by which human activities cause the disappearance of animal or plant species are very diverse: modification, fragmentation or direct destruction of their

habitats, the introduction of invasive species, pollution, or even overexploitation.

in Algeria the phenomenon of degradation is already perceived particularly in the Setifen high plains where the plant formations were currently entering a phase of intense and continuous degradation, leading to a great disturbance of the plant cover with the regression and disappearance of endemic and vulnerable species [6].

Endemic species occupying small habitats, and limited areas remain the most vulnerable to extinction [7]. The conservation and enhancement of the diversity of the genetic resources of plants in a country first require precise knowledge of this heritage. Starting from the complexity of constantly evolving flora, the definition of an optimal strategy giving all the means to the operators constitutes the guarantee to achieve this objective.

Most of the work carried out on flora and vegetation in the Sétif region has focused on two lines of research involving phytosociological and phytodynamic studies. According to a North-South transect, we quote the stations explored in the Setif region : the Babors mountains, djebel Megress, djebel Yousse ,djebel, Zdim et djebel Boutaleb [8,9,10,11,12].

Currently, one of the priorities in terms of floristic and ecological diversity, but also

preservation and conservation is to diagnose the composition of the endemic flora of the Sétif region by determining the threats exerted on it by developing a most exhaustive inventory as possible to develop a monitoring strategy for their monitoring and conservation as well as their integration into and into the list of protected non-cultivated plant species.

2. Materials and Methods

2.1. Study area

The wilaya of Sétif is located in eastern Algeria (fig. 1), in the region of the highlands of Constantine, it occupies an area of 6504 km² between a longitude of 5 ° 24 '34' East and a latitude of 36 ° 11 '29' North. It is bounded to the north by the wilayas of Bejaia and Jijel, to the south by the wilayas of Batna and M'Sila, to the east by the wilaya of Mila and to the west, we find the wilaya of Bordj Bou Arreridj. The relief of the Sétif region is distinguished by two main areas:

-The mountainous area extends over a hundred kilometers practically covering the north of the

wilaya where the Babors mountains located in the eastern part of the Tellien Atlas meet and follows, to the east, the Djurdjura chain with the highest point of 2004 m altitude.

-The area of the high Setifian plains corresponding to the central and southern part of the wilaya, is characterized by isolated mountain ranges with the presence of chotts and Sebchas: Djebel Megriss is located in the northern part of the high Sétifian plains with the highest point of 1737 m altitude.

Djebel Youssef stretches from East to West for about 10 km. It rises to 1442 m with foothills around 910 m altitudes.

Djebel Zdimm is located about twenty km west of djebel Youssef. It rises to an altitude of 1,258 m and foothills of 900 m.

Djebel Boutaleb is an important and well-individualized link in the southern part of the Sétif region with an area of 28427h. It has relatively high altitudes, varying between 980 m and 1886 m of which the Afghan djebel constitutes the highest point.

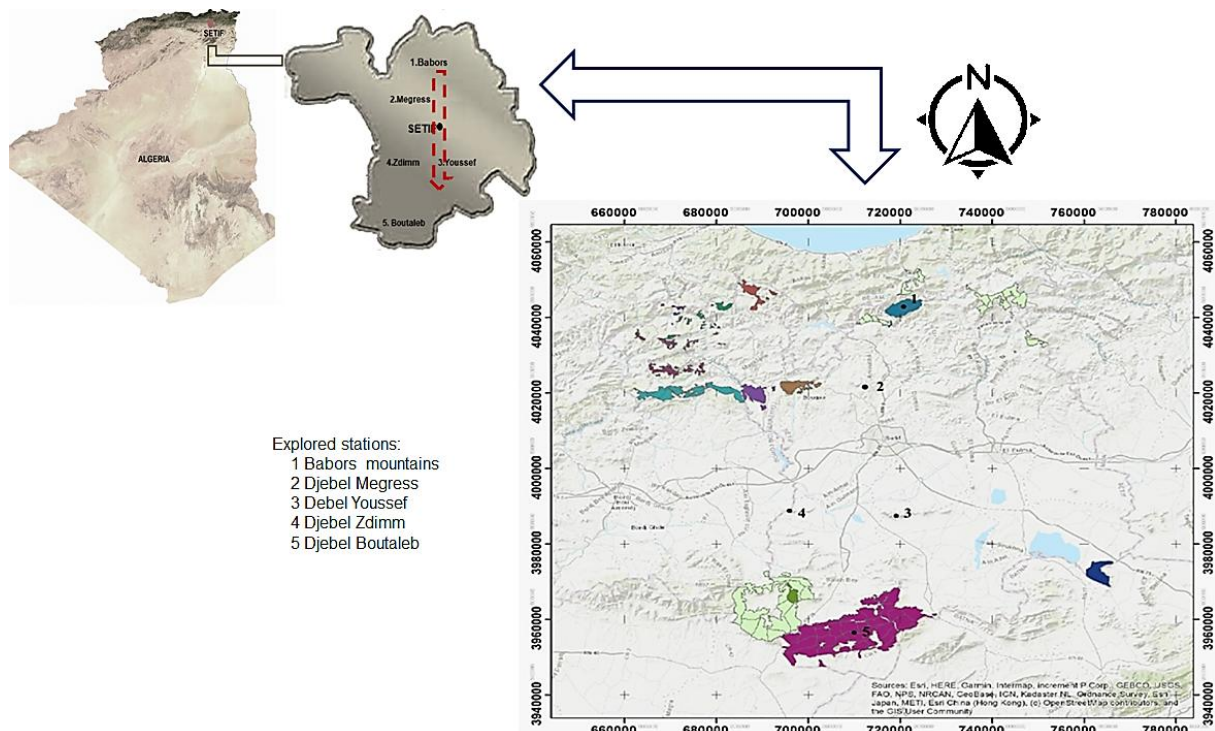


Fig 1. The location of the study area-Setif (Algeria)

In the Sétif region, the rainfall regime is characterized by annual and inter-annual variability. Generally, the rains are insufficient and irregular both in time and in space, the lengthening of the mountainous masses

perpendicular to the direction of the humid winds favors the condensation of the clouds on the northern slopes of Babors and on djebel Megriss where they receive most of the precipitation on average 500 mm / year, unlike on the southern

platform where djebel Youssef, Jebel Zdimm and djebel Boutaleb receive only 200 to 300mm / year. Thus there are two bioclimatic fringes, humid in the north and semi-arid lower in the south. From the point of view of plant formation, the Sétifienne region is characterized by a mosaic ranging from forest formation (djebel Babor and Boutaleb); lawns (djebel Megress), low matorrals, and chamaephytic steppes (djebel Youssef and Zdimm).

2.2. Methodology

Establishing such a study involves taking into account the data selected on the basis of purely phytosociological and phytoecological criteria in the Sétif region. Our choice fell on a North-South transect, going from the humid bioclimatic stage to the lower semi-arid stage, thus passing through various regions with specific ecological characteristics. The stations exploited concern the work carried out in the Babors [8,12], in djebel Megress [9], in djebels Zdimm and djebel Youssef [11,6] and in djebel Boutaleb [10].

The methodology adopted here is based on the exploitation and phytoecological surveys carried out in the various sites by the examination of endemic taxa appearing in the floristic lists taking into account their ecological coordinates, taxonomy, chorology, biological type, and vulnerability status. The initial data set was supplemented by follow-up surveys using other phytoecological surveys, carried out over two campaigns (2017, 2018). In total, we carried out a

batch of 88 readings on the various stations including 10 at Babors, 18 at Megress, 12 at djebel Youssef, 25 at Zdimm, and 23 at Boutaleb. For the determination and the nomenclature of the taxa we used the flora of Algeria and the southern desert regions [13] and flora practice in Morocco [14]. The biological types were determined with reference to the work of Raunkiaer [15] and the phytogeographic elements grouping together taxa with the same geographical distribution are described according to Ozenda and Bonnier [16,17].

The updating of nomenclature and chorology data was carried out following the use of the synonymic index of the flora of North Africa [18].

Subsequently, we carried out statistical analyzes to establish a list of endemic species typical of the Sétif region. The specimens were carefully stored in a herbarium in the city and territory urban project laboratory (LPUVT) at Ferhat Abbas University in Sétif 1.

3. Results

The research carried out through this study allowed us to count 148 taxa including endemic species and subspecies for the Sétif region. The highest rate of endemism is recorded at the Babors level with 80 taxa followed by djebel Megress with 42 taxa and djebel Youssef with 40 taxa. Djebel Zdimm and djebel Boutaleb are less represented by this element, they successively record 34 and 31 taxa (Table 1).

Table 1. Endemic taxa identified in the Sétif region
(1) Babors, (2) Megriss, (3) Youssef, (4) Zdimm, (5) Boutaleb

Botanical family	Taxon	Chorology	Bio-T	Station
Abietaceae	<i>Abies numidica</i> De Lanno	End	Ph	1
	<i>Cedrus atlantica</i> Manetti	End N. A	Ph	1 - 5
Anacardiaceae	<i>Pistacia atlantica</i> Desf.	End N. A	Ph	3 - 4 - 5
	<i>Ammoides atlantica</i> (Coss. et Dur.) Wolf.	End	He	1 - 2 - 5
	<i>Balansaea glaberrima</i> (Desf.) Lange	End N. A	Geo	1 - 5
	<i>Bunium elatum</i> Batt.	End	Geo	3 - 4
	<i>Bunium Fontanesii</i> (Pers.) Maire	End N. A	Geo	3 - 4
	<i>Bunium mauritanicum</i> Batt.	End N. A	Geo	5
	<i>Bupleurum Chouletti</i> Pomel.	End N. A	He	3 - 4
	<i>Bupleurum montanum</i> Coss.	End N. A	He	1 - 2
	<i>Carum foetidum</i> (Coss. et Dur) Benth. et Hook.	End Alg - Tun	He	2
	<i>Carum montanum</i> (Coss. et Dur.) Benth. Et Hook	End	Geo	1 - 2 - 3 - 5
	<i>Daucus biseriatus</i> .Murb	End	He	3 - 4
	<i>Daucus crinitus</i> Desf.	End Alg - Tun	He	2
	<i>Eryngium triquetrum</i>	End N. A	He	3
	<i>Ferula cossoniana</i> Batt. et Trab.	End N. A	He	4
<i>Oenanthe virgata</i> Poiret	End .N. A	He	2	
Apiaceae	<i>Pimpinella battandieri</i> Chabert	End	He	1 - 2

	<i>Pituranthos chloranthus</i> (Coss. et Dur.) Benth. et Hook. subsp. Cossonianus Maire	End N. A	Ch	4
	<i>Pituranthos scoparius</i> (Coss. et Dur.) B. Hook.	End N. A	Ch	3 - 4 - 5
	<i>Anacyclus cyrtolepidioides</i> Pomel.	End N. A	He	3 - 4
	<i>Anthemis monilicostata</i> Pomel	End Alg - Tun	He	2
	<i>Atractylis polycephala</i> Coss.	End N. A	Ch	3 - 4
	<i>Carduncellus ilicifolius</i> Pomel	End	He	3 - 4
	<i>Carthamus multifidus</i> Desf.	End N. A	Ch.	1
	<i>Catananche arenaria</i> Coss. et Dur.	End	The	4
	<i>Catananche montana</i> Coss	End Alg - Mar	He	1
	<i>Centaurea amara</i> L. subsp. <i>rapalon</i> (Pomel) A.	End Alg - Tun	He	2
	<i>Centaurea parviflora</i> Desf.	End Alg - Tun	Ch.	1 - 5
	<i>Chrysanthemum fontanesii</i> (B. et R.) Q. et S.	End N. A	Ch	1
	<i>Doronicum atlanticum</i> (Chabert) Rouy	End N. A.	Ch	1
	<i>Filago exigua</i> Sibth	End	He	3
	<i>Galactites mutabilis</i> spach.	End Alg - Tun	Ch	1-5
Asteraceae	<i>Helichrysum lacteum</i> Coss. et Dur.	End N. A	He	1
	<i>Hertia cheirifolia</i> (L.) O.K.	End Alg - Tun	Ch	2 - 4 - 3
	<i>Leontodon balansae</i> Boiss.	End Alg - Mar	He	5
	<i>Ormenis africana</i> (Jord. et F.) Lit. et M.	End N. A	Ch.	1 - 3 - 4 - 5
	<i>Picris duriaei</i> Sch. Bip.	End	He	2
	<i>Rhanterium suaveolens</i> Desf.	End. N.A	N.Ph	4
	<i>Senecio gallerandianus</i> Coss. et Dur	End	He	1 - 5
	<i>Senecio giganteus</i> Desf.	End N. A	He	1
	<i>Senecio perralderianus</i> Coss. et Dur.	End Alg - Mar	He	1
	<i>Taraxacum megalorrhizon</i> (Forsk.) Hand. Mazz.	End N. A	He	1
Berberidaceae	<i>Epimedium perralderianum</i> Coss.	End	He	1
Boraginaceae	<i>Echium suffruticosum</i> Baratte	End Alg - Tun	He	2
	<i>Onosma fastigiata</i> (Br. Bl.) Lacaita subsp. <i>mauretanica</i> Maire	End Alg - Mar	He	1 - 3
	<i>Arabis doumetii</i> Coss	End	He	1
	<i>Arabis pubescens</i> (Desf.) Poir.	End N. A	The	1 - 2 - 3 - 4 - 5
	<i>Biscutella raphanifolia</i> Poiret	End N. A	He	5
Brassicaceae	<i>Brassica dimorpha</i> Coss. et Dur.	End	Ch	3 - 4
	<i>Iberis atlantica</i> (Litard. et Maire) G.B.	End Alg - Mar	He	1
	<i>Isatis djurdjurae</i> Coss. Durieu.	End Alg - Mar	He	1
	<i>Lonchophora capiomontana</i> Dur.	End. N.A	The	3 - 4
	<i>Rhaponticum acaule</i> (L.) D.C	End N. A	He	1
	<i>Rhaponticum acaule</i> (L.) D.C.	End N. A	He	1 - 2
Campanulaceae	<i>Campanula alata</i> Desf.	End Alg - Tun	Ch	1
	<i>Campanula trachelium</i> L. subsp. <i>mauritanica</i> PQ.	End N. A	He	1
Caprifoliaceae	<i>Knautia mauritanica</i> Pomel	End Alg - Mar	He	1
	<i>Lonicera kabylica</i> (Batt.) Rehder	End	Nph	1
	<i>Cerastium atlanticum</i> Dur	End N. A	He	2
	<i>Moehringia stellarioides</i> Coss.	End	He	1
	<i>Paronychia arabica</i> (L.) DC subsp. <i>aurasiaca</i> W.	End. A. N	He	1 - 3 - 4
Caryophyllaceae	<i>Silene andryalifolia</i> Pomel	End N. A	He	1
	<i>Silene atlantica</i> Coss.	End Alg - Tun	He	1 - 2 - 5
	<i>Silene choulettii</i> Coss.	End	He	1 - 5 - 3
	<i>Silene cirstensis</i> Pomel	End	He	2
	<i>Silene oropediorum</i> Coss.	End	He	3
	<i>Silene patula</i> Desf.	End N. A	He	1
Cistaceae	<i>Helianthemum apertum</i> Pomel.	End N. A	Ch	3 - 4
	<i>Helianthemum helianthemoides</i> (Desf.) Grosser	End N. A	Ch	1 - 2
	<i>Helianthemum salicifolium</i> (L.) Mill. subsp. <i>brevipes</i> Coss.	End N. A	Ch	3
Convolvulaceae	<i>Convolvulus dryadum</i> Maire	End. Rif. Babors	He	1
Crassulaceae	<i>Sedum multiceps</i> Coss. et Dur	End	He	1
	<i>Sedum pubescens</i> Vahl	End Alg - Tun	The	1 - 2 - 3 - 4

Dipsaceae	<i>Cephalaria mauritanica</i> Pomel	End N. A	Geo.	1
	<i>Argyrolobium saharae</i> Pomel	End. N. Sah	Ch	4
	<i>Astragalus falciformis</i> Desf.	End N. A	Ch	3 - 4
	<i>Astragalus armatus</i> Willd. subsp. <i>tragacanthoides</i> (Desf.)Maire.	End N. A	Ch	3 - 4 - 5
Fabaceae	<i>Astragalus armatus</i> Willd. subsp. <i>numidicus</i> (Murb.) Emberger et Maire	End N. A	Ch	1 - 2
	<i>Coronilla valentina</i> L. subsp. <i>speciosa</i> (Uhrova) Greuter et Burdet	End	Ch	1
	<i>Ebenus pinnata</i> L.	End N. A.	The	3 - 4 - 5
	<i>Genista microcephala</i> subsp. <i>genuina</i> M.	End N. A	Nph	5
	<i>Genista tricuspidata</i> Desf. subsp. <i>tricuspidata</i> M.	End N. A	Nph	1 - 5
	<i>Hedysarum carnosum</i> Desf.	End Alg - Tun	Ch	3 - 4
	<i>Hedysarum naudinianum</i> Coss.	End	He	3
	<i>Hedysarum perraldrianum</i> Coss.	End	He	5
	<i>Hippocrepis atlantica</i> Ball.	End Alg - Mar	He	1 - 3 - 5
	<i>Ononis incisa</i> Coss. et Dur.	End	He	3 - 4
	<i>Trifolium juliani</i> Batt.	End N. A	The	2
	<i>Vicia ochroleuca</i> Ten. subsp. <i>baborensis</i> (Batt et Trabut) Greuter et Burdet	End	He	1
	Geraniaceae	<i>Erodium battandieranum</i> Rouy	End	He
<i>Geranium atlanticum</i> B. et R.		End N. A	He	1- 2
Iridaceae	<i>Iris unguicularis</i> Poiret	End Alg-Tun	Geo	2
	<i>Lamium mauritanicum</i> Gandoger	End N. A	The	5
	<i>Origanum glandulosum</i> Desf.	End Alg - Tun	He	2
	<i>Origanum vulgare</i> L. subsp. <i>glandulosum</i> (Desf.) Letswaart	End Alg -Tun	He	1
	<i>Phlomis bovei</i> De Noe	End. A. N	He	1 - 2
	<i>Rosmarinus tournefortii</i> de Noé	End	N.Ph	5
Lamiaceae	<i>Satureja grandiflora</i> subsp. <i>baborensis</i> (Batt.) M.	End. Rif. Babors	He	1
	<i>Stachys guyoniana</i> De Noé	End N. A	He	2
	<i>Stachys officinalis</i> (L.) Trevisan subsp. <i>algeriensis</i> (De Noé) Franco.	End	He	1
	<i>Teucrium atratum</i> Pomel	End Alg - Tun	He	1
	<i>Teucrium kabylicum</i> Batt.	End	He	1
	<i>Teucrium pseudo-scorodonia</i> Desf.	End N. A	He	1
	<i>Thymus algeriensis</i> Boiss et Reut.	End. N.A	Ch	3 - 4
	<i>Thymus munbyanus</i> Bois et Reut. subsp. <i>coloratus</i> (Boiss. et Reuter) Greuter et Burdet	End Alg- Mar	Ch	1
	<i>Thymus numidicus</i> Poiret	End	Ch	2
	<i>Thymus ciliatus</i> Desf. subsp. <i>eu-ciliatus</i> Maire	End. N.A	Ch	2- 3 - 4 - 5
Liliaceae	<i>Allium trichocnemis</i> J. Gay	End	He	2
	<i>Asparagus altissimus</i> Munby	End.Alg.Mar	He	5
	<i>Gagea granatellii</i> Parl. subsp. <i>eu- granatellii</i> M.	End N. A	Geo	3 - 4 - 5
	<i>Gagea granatelli</i> Parl. subsp. <i>chaberti</i> terrace	End Alg	Geo	2
Linaceae	<i>Scilla lingulata</i> Poiret.	End N. A	Geo	3 - 4
	<i>Linum aristidis</i> Batt.	End N. A	He	5
	<i>Linum numidicum</i> Murbeck	End N. A	He	1
Onograceae	<i>Linum tenue</i> Desf. subsp. <i>tenue</i> Martinez	End N. A	He	1 - 2
	<i>Epilobium numidicum</i> Batt.	End	He	2
Orchidaceae	<i>Dactylorhiza maculata</i> L. subsp. <i>baborica</i> M.W.	End	Geo	2
Paeoniaceae	<i>Paeonia mascula</i> (L.) Miller subsp. <i>atlantica</i> (Cosson) Greuter et Burdet	End	Geo	1
Plantaginaceae	<i>Plantago mauritanica</i> Boiss. et Reut.	End N. A	He	1
Poaceae	<i>Cynosorus cristatus</i> Poiret.	End Alg -Tun	He	2
	<i>Cynosurus balansae</i> Coss. et Dur.	End Alg -Mar	He	1
	<i>Festuca algeriensis</i> Trab.	End	He	1
	<i>Festuca atlantica</i> Duv. Jouve	End Alg - Mar	He	1-2 - 3- 5
	<i>Festuca deserti</i> (Coss. et Dur) Trab.	End Alg - Mar	He	1
	<i>Festuca triflora</i> Desf.	End Alg - Mar	He	1

	<i>Vulpia obtusa</i> Trab.	End	The	2
Polygonaceae	<i>Rumex algeriensis</i> Barr. et Murb.	End	He	2
Primulaceae	<i>Cyclamen africanum</i> Boiss. et Reut.	End N. A	Geo	1 - 2
	<i>Primula acaulis</i> (L.) L. subsp. <i>atlantica</i> (Maire & Wilczek) Greuter et Burdet	End Alg - Mar	He	1
	<i>Aquilegia vulgaris</i> L. subsp. <i>cossoniana</i> (Maire et Sennen) Dobignard	End Alg -Mar	Geo	1
Ranunculaceae	<i>Delphinium balansae</i> Boiss. et Reut.	End N. A	He	1 - 5
	<i>Delphinium sylvaticum</i> Pomel	End Alg - Tun	He	1- 2
	<i>Ranunculus spicatus</i> Desf. subsp. <i>maroccanus</i> (Cosson) Greuter et Burdet	End. A. N	Geo	1
Rubiaceae	<i>Crucianella patula</i> L.	End. N.A	The	3 - 4
	<i>Galim tunetanum</i> Lam.	End N. A	He	3
	<i>Galium petraeum</i> Coss	End Alg - Tun	He	3
	<i>Galium brunnaeum</i> Munby	End N. A	He	1
	<i>Galium tunetanum</i> Poiret	End N. A	He	1 - 2 - 5
Saxifragaceae	<i>Saxifraga numidica</i> Maire	End	He	1 - 2
	<i>Anarrhinum pedatum</i> Desf.	End N. A	The	1
	<i>Linaria pinnifolia</i> (Poiret) Maire	End N. A	He	1
Scrofulariaceae	<i>Scrofularia tenuipes</i> Coss. et Dur.	End	He	2
	<i>Scrophularia laevigata</i> Vahl	End N. A	He	1
	<i>Linaria virgata</i> Desf.	End N. A	The	1
Thymelaeaeceae	<i>Thymelaea microphylla</i> Coss. et Dur.	End. N.A	N.Ph	3 - 4
	<i>Thymelaea virescens</i> Coss. et Dur	End. N.A	N.Ph	4
Valerianaceae	<i>Fedia sulcata</i> Pomel	End	The	1

Abbreviations : End : Endemic, A : Africa, Alg : Algeria, Tunisia, M : Morocco, N : North, Bio-T : Biological type, Ch : Chamephyte, Geo : Geophyte, He : Hemicryptophyte, Ph : Pherophyte, The :Therophyte

From a biodiversity point of view, the families represented by these endemics are among the most representative of the flora of Algeria, the largest number of endemic taxa is found in the Asteraceae family with 19 genus and 23 taxa, i.e. a rate of 15, 54% followed by the Apiaceae 11 genera with 17 taxa. The Fabaceae 10 genera and the Lamiaceae 8 genera are

manifested by a similar number of 15 taxa. Caryophyllaceae and Brassicaceae with 9 taxa each followed by Poaceae with 7 taxa, Scrofulariaceae, Liliaceae, and Rubiaceae with the same number of 5 taxa. The rest of the families include between 2 and 4 taxa. It should be noted that 12 families are monospecific (fig.2).

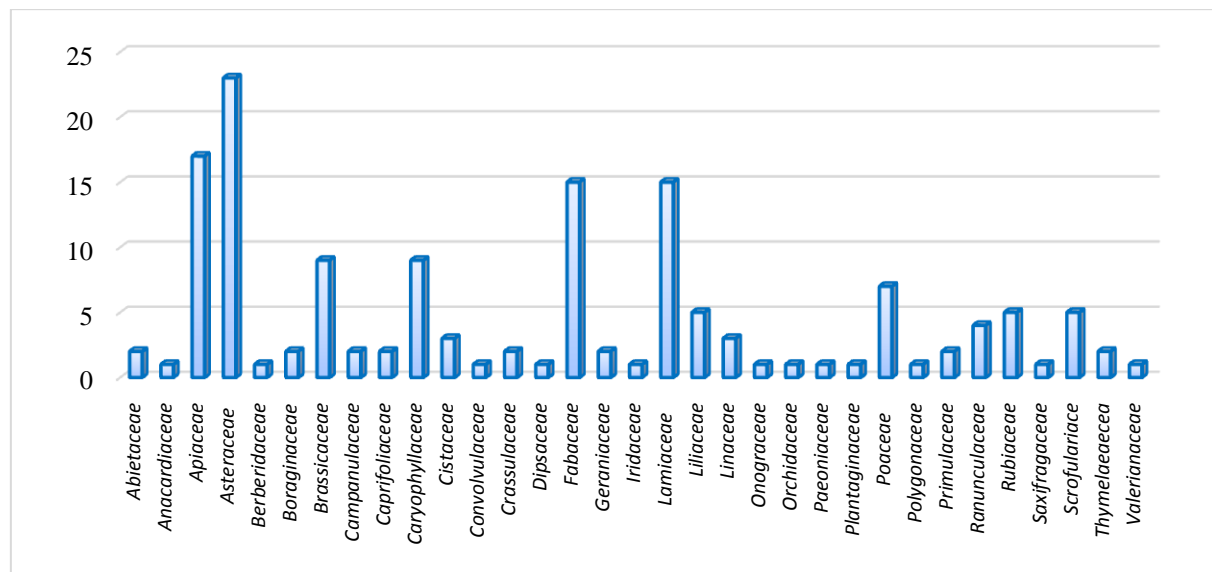


Fig.2. Distribution of endemic taxa by botanical family

According to phytochoric elements, the endemic flora of the Sétif region is distributed as

follows (fig. 3): the strict endemics of Algeria represent 42 taxa (6.75%). The other taxa

consider as regional endemics including 69 North Africans, 19 Algerian-Tunisians and 18 Algerian-Moroccan with a single species endemic to the North of the Sahara distinguished in the semi-arid steppe in djebel Zdim. However, among the 148 taxa inventoried, 25 subspecies are reported

at the five stations. The Babors mountains individualize with 16 subspecies, djebel Megress with 7 subspecies, djebel Zdim and Youssef with a similar number of 5 subspecies, and djebel Boutaleb with 3 subspecies.

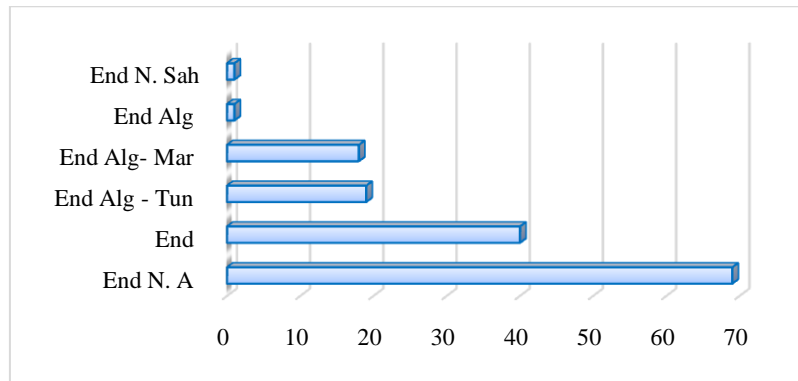


Fig. 3. *Phytochoric distribution of endemic taxa in the Setif region*

Morphologically, we found that the majority of species inventoried are perennials with predominant hemicryptophytes with 58.78% (87 taxa), followed by chamaephytes with 24 taxa (16.22%) and geophytes with 15 taxa (10.13%). The therophytes are manifested by 12 taxa (8%). The phanerophytes are represented by 10 taxa. So

we can adopt this classification of biological types : He > Ch > Geo > Th > N.ph > Ph (fig. 4).

Analysis of this structure revealed the existence of two lasting components representative of the resilience of endemic taxa in the Sétif region, the hemicryptophytes in the North and the chamaephytes in the South.

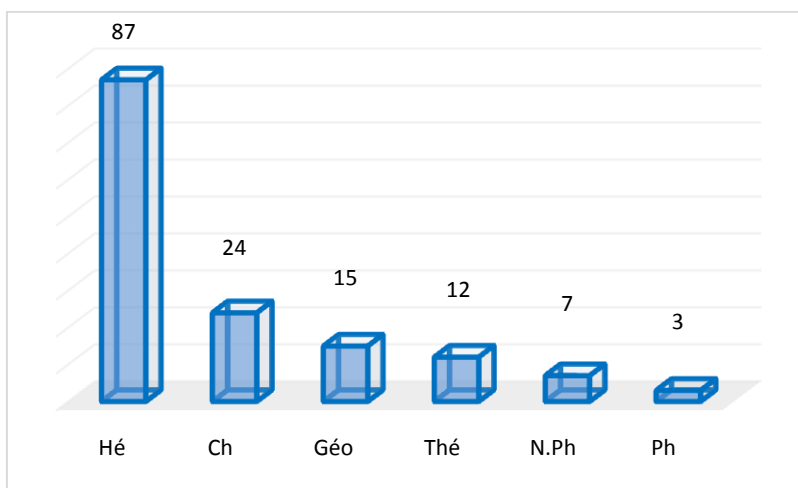


Fig.4. *Different biological forms characterizing the endemic flora of Setif*

4. Discussion

Knowledge of Algerian flora remains rather fragmentary and incomplete. Quézel (1964) [19] gives, for Algeria, 247 endemic species of Algeria, 126 endemic North African species, 117 West North Africa and 59 East North Africa. Enriquez-Barroso and Gomez-Campo (1991) [20] put forward a figure of 176 species and 80

endemic subspecies, with 256 taxa specific to Algeria and 521 taxa (including species and subspecies) common with Tunisia and Morocco (endemic to North Africa in the broad sense). By updating this list, we note a higher figure of 320 endemic species for Algeria, without referring to the subspecies, and 1038 endemic species for all 3 countries of the Maghreb [21] (fig. 5).

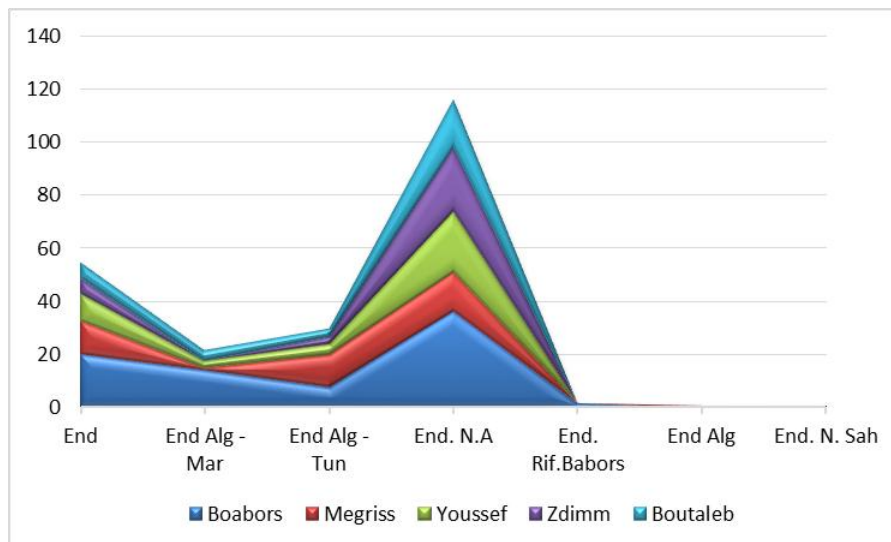


Fig.5. Frequency of endemic elements according to the ecosystems selected

The endemic taxa clearly mark the study region with 148 taxa including 25 subspecies with individualization of Babors by two endemic species of the Rif-Babors (*Satureja grandiflora* Maire, *Convolvulus dryadum* Maire), djebel Megriss by a species endemic to Algeria (*Gagea granatelli* Parl.) and djebel Zdimm by a strict endemic species of the North of the Sahara (*Argyrolobium saharae* Pomel). The relative importance of these species denotes the richness in endemic taxa of this region and thus makes it possible to reconstitute the history and the causes of endemism and the speciation of certain stations and to clarify the relationships and the evolution between the phenomena regional geological, pedological and climatic conditions in eastern Algeria.

It is in this sense that several authors have insisted on the importance of endemic species of well-defined regions in reconstructing the history of biogeographical zones [22, 23].

The distribution of the biological types of the species listed is highly variable within the ecosystems selected. Knowing that in forest and pre-forest ecosystems (Babors, Boutaleb and Megriss) the dominant biological type is represented by the hemicryptophyte where there are a total of 74 taxa unlike the steppe ecosystems (Zdimm and Youssef) which are distinguished by the predominance of Chamaephyte with 14 taxa.

According to the results obtained several endemic species are common between the different stations despite their difference in their climatic nuances (humid, semi-arid cool and semi-arid lower (fig. 4). The greatest correspondences in endemic taxa are

distinguished in steppe ecosystems in djebel Youssef and Zdimm where we find 28 taxa are common for the two massifs including 23 species and 5 subspecies: *Paronychia arabica* (L.) DC subsp. *aurasiaca* (Webb.) Maire and Weiller, *Astragalus armatus* Willd. subsp. *tragacanthoides* (Desf.) Maire. *Thymus ciliatus* Desf. subsp. *eu-ciliatus* Mayor *Gagea granatelli* Parl. subsp. *eu-granatelli* M. *Genista microcephala* subsp. *genuina* M.

The common endemics between Babors and djebel Megriss are 18 taxa including 16 species and 2 subspecies: *Linum outfit* Desf. subsp. *outfit* Martinez, *Astragalus armatus* Willd. subsp. *numidicus* (Murb.) Emberger and Maire. Concerning common endemics for all the stations there are 5 species with only one subspecies; *Thymus ciliatus* Desf. subsp. *eu-ciliatus* Mayor. Also, it is important to note the specific uniqueness noted for each ecosystem knowing that the Babors are individualized with 50 taxa including 2 strict species from the Rif des Babors, the djebel Megriss with 18 taxa, and in djebel Youssef, Zdimm, and Boutaleb we have found 6 uni-specific taxa for each one.

Endemism and species richness represent the complexity and uniqueness of natural ecosystems and allow the identification of hotspots of biodiversity [24,25]. For the historical reconstruction of the different biomes and biogeographical zones, it is necessary to take into account the notion of the overlapping areas of distribution of endemic species belonging to different taxonomic groups [22].

A fact of field observation deserves to be reported concerning rare and protected endemic species, it is the presence of 15 rare and protected

endemic species (According to decree n ° 93-285 corresponding to November 23, 1993) are declared in the list setting out the non-cultivated

plant species protected throughout the Algerian territory (Table 2).

Table 2. *Endemic and protected species of the Sétif region*

Species	Station	Species	Station
<i>Allium trichocnemis</i> J. Gay	2	<i>Rumex algeriensis</i> Barr. et Murb.	2
<i>Arabis doumetii</i> Coss	1	<i>Saxifraga numidica</i> Maire	1 - 2
<i>Argyrolobium saharae</i> Pomel	4	<i>Scrofularia tenuipes</i> Coss. et Dur.	2
<i>Brassica dimorpha</i> Coss. et Dur.	3 - 4	<i>Senecio gallerandianus</i> Coss. et Dur	1 - 5
<i>Convolvulus dryadum</i> Maire	1	<i>Silene cirstensis</i> Pomel	2
<i>Convolvulus dryadum</i> Maire	1	<i>Stachys guyoniana</i> De Noé	2
<i>Epilobium numidicum</i> Batt.	2	<i>Teucrium atratum</i> Pomel	1
<i>Epimedium perralderianum</i> Coss.	1	<i>Teucrium kabylicum</i> Batt.	1
<i>Helianthemum helianthemoides</i> (Desf.) Gr.	1 - 2	<i>Vulpia obtusa</i> Trab.	2
<i>Pistacia atlantica</i> Desf.	3 - 4 - 5		

The steppe ecosystems of Sétif have already suffered severe degradation due to climate change and strong anthropization. This situation is detrimental to plant resources and to the loss of endemic taxa and especially those representing specific and situational uniqueness [26].

This alarming level of vulnerability prompts us to recommend the establishment of an emergency intervention plan, the main conservation strategies of which are aimed at delimiting the protected areas of endemic species.

Conclusions

Data on endemism in Algeria are scarce and fragmentary. The region of Setif by its geographical position combines pedological factors and great climatic variations allowing the development of a rich and varied endemic flora with many subspecies reported for the first time. The results obtained inform us of a worrying state of degradation and rarefaction of the Setifian endemic flora because several taxa are declared rare and protected and others encountered only once in this region.

Knowing that there is no legislation protecting regional and endemic taxa in Algeria, it is, therefore, time to think seriously about the protection of these species and to establish urgently a management strategy to conserve these habitats and their plant heritage.

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ASSESSING HR LEADERS' ATTITUDE TOWARD THE ADOPTION OF ARTIFICIAL INTELLIGENCE IN RECRUITMENT

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Abstract: This study tackles the phenomenon of the adoption and acceptance of AI and smart applications in the HR recruitment and selection process. It aims to contribute to the technology adoption research area by providing the researchers, organizations, HR leaders, service providers, and policymakers with valid inputs and further understanding about the adoption determinants of AI-based recruitment applications and examine the general attitude of HR leaders toward its adoption. Moreover, understand the relationship between the innovation characteristics and a set of predefined specific technological, organizational, and environmental factors with HR leaders' attitude toward the adoption of AI in HR recruitment. The sample consisted of 389 HR leaders drawn from the HR professionals' network in the Middle East using an online survey. The study concluded that participants possess a high positive attitude toward AI adoption. Moreover, HR leaders have a constructive perception of AI relative advantage in terms of its potential contribution to the efficiency, effectiveness, and quality of HR recruitment function. Among the two constructs, it is concluded the innovation characteristics (relative advantage and complexity) have the high predictive power of AI application adoption, while TOE factors (technological readiness and competitive pressure) show to be insignificant determinants of AI application adoption in HR recruitment.

Keywords: Artificial Intelligence, Human Resources Information systems, Human Resources Management, Recruitment and Selection

1. Background

Similar to other Human Resources Management (HRM) functions, several factors have affected recruitment and selection among which Information Technology (IT). IT has significantly altered the methods by which organizations attract, source, and acquire qualified talents to fulfil their Human Resources (HR) needs and attain their strategic goals. As early as the invention of computers, HR recruitment practices have gradually become more dependent on IT.

The IT diffusion within HRM in general and HR recruitment in specific can be categorized into three eras. The first era of IT diffusion can be traced back to the 70s when the concept of Human Resources Information systems (HRIS) has emerged representing the HRM processes computerization by electronically processing HR records and transactions. HRIS is defined as information systems that acquire, store, maintain, analyze, retrieve, distribute, and validating data about the organization's human resources (DeSanctis, 1986; Hendrickson, 2003). At first,

HRIS was directed toward personnel record keeping and compensation-related tasks such as payroll, tax, and benefits (Kovach & Cathcart, 1999). From an HR recruitment perspective, HRIS provided electronic means to store and classify applicant's data in a flat-file format and enabled its retrieval and access through keyword or unique search identifiers (Ball, 2001).

HRIS has had essential impacts on HR recruitment process efficiency especially at the administrative level tasks among which time-saving and shortens the time per hire, cutting the cost in which associated with HRM administrative staff, reducing paperwork, improved accuracy. Later, resulted from the development of IT capabilities and the decline of adoption costs, HRIS become widely recognized as an essential approach for acquiring HR and has incorporated more sophisticated tasks within the recruitment function such as manpower analysis, planning, and forecasting (Hendrickson, 2003).

The second era of IT diffusion within the recruitment function was associated with the emergence of Electronic Human Resources (e-

HR). This era has started in the early 90s with the internet invention, however, its features become clearer later after the widespread of internet service and the emergence of the e-business concept. When it comes to the term, an obvious variance is observed such as Virtual HR (Lepak & Snell, 1998), web-based HR (Ruël et al., 2004), and intranet-based HRM, thus, all refers to the same phenomenon of emphasizing the role of internet in processing HR services and tasks (Lengnick-Hall & Moritz, 2003; Ruël et al., 2004; Strohmeier, 2007).

E-HR has changed HRIS orientation from internal HRM use to external orientation by enabling the integration of various users and stakeholders and involving targeted groups from outside the HR department and the organization. From an HR recruitment perspective, e-HR entailed an outbreak of conventional talent acquisition methods by the emergence of the "e-recruitments" term which describes online job advertising, online exploration and access of vacancies, and instant online application. Online hiring platforms have become the most used methods to hire HR and the conventional methods of walk-in applications and paper printed resumes have gradually diminished.

The third era which holds the focus of this paper is the emerging reliance on Artificial Intelligence (AI) based solutions in HR recruitment. With the emergence of Industry 4.0 concepts of interconnectivity, automation, AI, machine learning, big data, and real-time data are representing the new methods of doing business. These methods are continuously advancing rapidly, and it is not expected to hold back anytime soon. According to the 2019 Artificial Intelligence Index Annual Report, private investment in AI scored \$70 billion of which 37 billion are AI-related startup investments, while academically, 3% of peer-reviewed journal publications and 9% of published conference papers are AI research (Perrault et al., 2019).

Nowadays, AI is heavily invested in engineering, customer service, telecommunication, pharmacy, medical healthcare production, and financial services, hence, reports argue that most of the organizational functions are integrating AI or considering it within its processes. From an HRM perspective, this transformation toward automation has manifested through the emergence of AI-based and machine learning HR solutions which altered the conventional methods of HRM within the organizations. It is noticeable

that among the various functions of HRM, HR recruitment has had the major and earliest focus of AI-HR developers and providers. Chatbots, intelligent search engines, smart Applicant Tracking Systems (ATS), and Candidate Relationship Management (CRM) software are among the most commonly used AI tools in which aim to improve the efficiency and effectiveness of talent acquisition methods.

These AI-based applications represent a breakthrough in the traditional role of technology within the HR recruitment function. While HRIS and e-HR have enhanced HR recruitment in terms of efficiency (time and cost) and integration, smart AI-based HR applications promote augmented intelligence which embodies a radical essential uplift for the technology role in HR recruitment and selection. Augmented intelligence exemplifies humans and software's jointly make the hiring decision where specific time-consuming tasks (e.g., candidates sourcing and screening) are handled autonomously by AI-based hiring solutions (Hmoud & Varallyai, 2019).

IT adoption within HRM such as HRIS and e-HR have received noticeable research attention (Florkowski & Olivás-Luján, 2006; Kovach et al., 2002; Kovach & Cathcart, 1999; Ngai & Wat, 2004; Strohmeier, 2007; Voermans & Van Veldhoven, 2007) from two main perspectives: the first tried to explain its impact on HRM roles, efficiency, and effectiveness of HRM; While the second aimed to define the significant determinants of its acceptance and adoption decision. Yet, there is a noticeable research gap that concerns the adoption of AI and machine learning applications in HRM. From an HR recruitment perspective, although AI applications consist of a fundamental change in HR hiring methods, research connected to its adoption factors and HR practitioners' attitude toward its use noticeably scarce.

This study tackles the phenomenon of the adoption and acceptance of AI-based applications and automation of the HR recruitment and selection process. It aims to contribute to the technology adoption research area by providing the researchers, organizations, HR leaders, service providers, and policymakers with valid inputs and further understanding about the adoption determinants of AI-based recruitment applications and examine the general attitude of HR leaders toward its adoption. Moreover, understand the relationship between the innovation characteristics and a set of predefined

specific technological, organizational, and environmental factors with HR leaders' attitude toward the adoption of AI in HR recruitment.

2. Research model and hypotheses

To attain the study objectives, a conceptual framework was developed in which n which

illustrates the hypothesized relationships between the study constructs and their underlying variables. presented in Figure 1, the proposed framework is grounded on the Diffusion of Innovation Theory (DOI) (Rogers, 2003), and Technology-Organization-Environment (TOE) framework (L. Tornatzky et al., 1990).

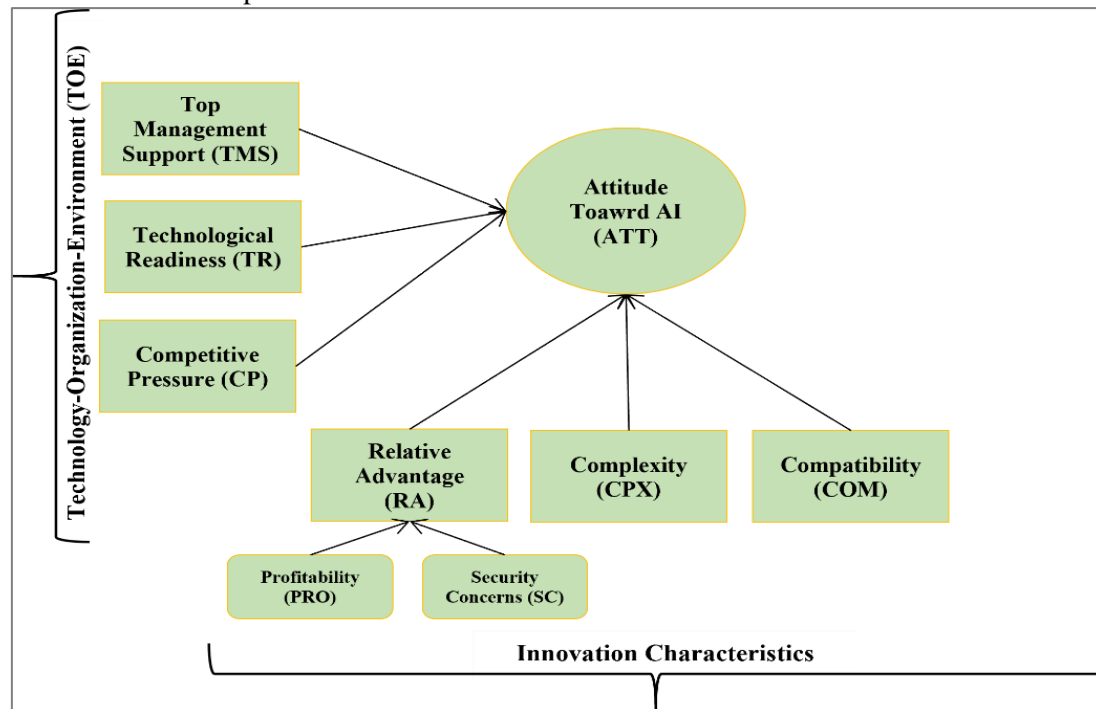


Fig. 1. Conceptual Framework (Source: Author's construction)

2.1. Innovation Characteristics

Within his DOI theory (Rogers, 2003) has highlighted five perceived innovation characteristics of which explain and affect the adoption of innovation, namely: relative advantage, compatibility, complexity, trialability, and observability. However, among Rogers' proposed characteristics, IT innovation adoption research has constantly emphasized relative advantage, compatibility, and complexity as a significant association with the adoption decision and argued that the more advancing IT innovations the less importance of trainability and observability as significant determinants.

Relative Advantage

Relative advantage is defined as "is the degree to which an innovation is perceived to be better than the idea it supersedes" (Rogers, 2003). In other words, when the potential adopter perceived the innovation as highly advantageous in terms of satisfying their needs, a higher possibility rate of their acceptance and adoption

for that particular innovation. This relative advantage is usually connected with gained social benefits, economic profitability, increased comfort and security, support decision-making process, or generally improved efficiency and effectiveness (A. Lin & Chen, 2012; Rogers, 2003). Early Research (Kendall et al., 2001; Premkumar & Roberts, 1999; Ramamurthy & Premkumar, 1995; L. Tornatzky et al., 1990) have emphasized the relative advantage has constantly shown a positive influence on innovations diffusion and argued that among other characteristics of innovation, its the strongest predictor of adoption. For instance, studies have found that relative advantage is a significant predictor of cloud computing adoption (Low et al., 2011; Martins et al., 2016; Oliveira et al., 2014; Yang et al., 2015), business intelligence (Chaveesuk & Horkondee, 2015; Puklavac et al., 2018; Zaied et al., 2018), HRIS (Ahmer, 2013; Parry & Wilson, 2009; Teo et al., 2007). Moreover, Researchers (Benlian & Hess, 2011; Martins et al., 2016; Oliveira et al., 2014) have argued that cost-saving and security

concerns are amongst the most important attributes in which determines an innovation relative advantage. Driven from the noticeable gap in AI adoption in HRM research, this study aims to examine the influence of perceived cost-saving and security concerns on HR Leaders' perception of the relative advantage of AI applications in recruitment. Also, examine the prediction relationship between HR leaders' perception of the relative advantage of AI recruitment applications and their attitude toward its adoption.

H1: Cost-saving has a significant positive influence on HR leaders' perception of AI applications relative advantage.

H2: Technical Concerns has a significant negative influence on HR leaders' perception of AI applications relative advantage.

H3: Relative Advantage has a significant positive influence on HR leaders' attitude toward the adoption of AI recruitment applications.

Complexity

Rogers, (2003) defines complexity as "the degree to which an innovation is perceived as relatively difficult to understand and use". Complexity is an innovation characteristic which consistently seen to influence the adoption rate of innovations and it represents potential adopters' negative perception of innovation under question. From the IT innovations perspective, the higher perceived complexity is associated with higher uncertainty and risk perception toward specific IT innovation.

Therefore, while other innovation characteristics are assumed to positively predict adoption behaviour, complexity is argued to negatively affect the adoption decision. Hence, higher perceived complexity may be caused by potential adopters' lack of technical knowledge, skills, or ability to understand innovation design which could lead to higher resistance. (Gopalakrishnan & Damanpour, 1994) have epitomized complexity into three notions: the extent of divisibility of innovation, the intellectual difficulty linked with understanding the innovation, and newness and originality of the innovation. Previous investigations have found a significant association between complexity and IT adoption. For instance, cloud computing (Martins et al., 2016; Palos-Sanchez et al., 2017), business intelligence (Rouhani et al., 2018), HRIS (Al-Dmour et al., 2016; Al-Dmour Rand, Masa'deh Ra'ed, 2017). This study aims to assess the HR leaders' perception of the

complexity of AI-based recruitment application and its influence on their attitude toward its adoption while assuming a negative relationship.

H4: Complexity has a significant negative influence on HR leaders' attitude toward the adoption of AI recruitment applications.

Compatibility

Compatibility is defined as "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" (Rogers, 2003). In his DOI theory, Rogers, (2003) highlighted compatibility as one of the five main innovation characteristics that influence its diffusion.

While AI applications in recruitment embody a breakthrough in traditional methods and promise significant benefits, however, its adoption might not happen if the prospective adopter perceives it as incompatible with existing practices, and work style or incompatible with socio-culture values and beliefs. It is noticeable the conception of completeness within literature can be classified into two dimensions, normative compatibility which concerns the values and norms (Louis Tornatzky & Klein, 1982) and operational compatibility in which addresses current work procedures and practices compatibility with new proposed innovation or technology (Premkumar & Ramamurthy, 1995). Also, compatibility may address the organization's technological strategic policy such as the technology cost with the AI applications in recruitment. Previous studies (Al-Dmour Rand, Masa'deh Ra'ed, 2017; Grandon & Pearson, 2004; A. Lin & Chen, 2012; Taylor & Todd, 1995; Teo et al., 2007) have shown a significant association between compatibility and IT adoption decision. Therefore, this study investigates the level of compatibility between the current practices, policies, and values with AI-based recruitment applications and HR leaders' attitude toward its adoption.

H5: Compatibility has a significant positive influence on HR leaders' attitude toward the adoption of AI recruitment applications.

2.2. Technology-organization-environment (toe)

Top Management Support

Top management support has been identified by the literature as a significant determinant of IT adoption and success (Sharma & Yetton, 2003; Thong et al., 1996).

Top management represents the individuals who cognized as prospective decision-makers

and would have a direct or indirect role in shaping organization IT strategies. Therefore, it is argued that top management support would affect the technological advancement through the early adoption of IT innovation, while weak management support would hinder the adoption of IT innovation (Al-Dmour et al., 2016; Chan & Mills, 2002).

Newly introduced IT innovation adoption require major resources allocation, change, and user support at all levels, therefore, management support facilitates providing adequate resources, foster a supportive climate and smooth out the transition and adoption of the new IT innovation (Premkumar & Roberts, 1999; Sharma & Yetton, 2003). Empirically, studies (Bhatiasevi & Naglis, 2018; Low et al., 2011; Martins et al., 2016; Oliveira et al., 2014; Puklavec et al., 2018; Ramdani et al., 2009; Sun et al., 2018; Yang et al., 2015) have found top management support as a significant determinant of IT adoption and implementation. Therefore, this study aims to investigate the association between top management support and HR leaders' attitude toward the adoption of AI applications in HR recruitment and selection.

H6: Top Management Support has a significant positive influence on HR leaders' attitude toward the adoption of AI recruitment applications.

Technological Readiness

While the previously discussed compatibility factor represented the normative aspect of organization compatibility, technological readiness represents technical compatibility. It symbolizes the available organization's technological characteristics and its role in facilitating the adoption of the introduced new technology (Oliveira et al., 2014; To & Ngai, 2006). Among these technological characteristics are the IT infrastructure, the level of technological sophistication, and HR expertise, (Low et al., 2011; Zhu et al., 2006). It is noticeable that technological readiness has been found significant determinant for IT innovation adoption (Chan & Mills, 2002; Oliveira & Martins, 2010; Yang et al., 2015; Zhu et al., 2006). Other studies argued that (Low et al., 2011; Wu et al., 2013) technology readiness underemphasized its influence on IT adoption. The reason behind this attitude is the fact that emerging AI-based applications imply a decrease in IT complexity and less demand in terms of

hardware and IT infrastructure through cloud-based and Software-as-a-Service (SaaS).

The service provider manages the administration and maintenance of data with minimum technological infrastructure hardship imposed on the user. Therefore, this study aims to investigate the firm technological readiness association on HR Leaders' attitude toward the adoption of AI recruitment applications while hypothesizing that technological readiness is not a significant determinant.

H7: Technological readiness has no significant influence on HR leaders' attitude toward the adoption of AI recruitment applications.

Competitive pressure

Competitive pressure refers to the level of pressure perceived by the organization from its competitors (Oliveira & Martins, 2010). Consistently, competitive pressure has been perceived as a strong influence on the decision-making process in every modern organization and a significant predictor of IT innovation adoption. The rapid movement toward a knowledge-based and free-market economy resulted in a consistent increase in competitiveness. Nowadays, IT is considered one of the most influential factors of which boosted the pressure of competitiveness by its radical interference in shaping businesses and economical practices.

Besides, its impact on improving efficiency and quality. Premkumar & Ramamurthy (1995) argued that during the intense competition, new IT adoption becomes a strategic necessity (Ramdani et al., 2009). It is noticeable that previous research have considered competitive pressure as a significant determinant of IT adoption, however, the empirical investigation did not always support this premise. For instance, (Bhatiasevi & Naglis, 2018; Chiu et al., 2017; H. F. Lin, 2013; H. F. Lin & Lin, 2008; Oliveira & Martins, 2010; To & Ngai, 2006) have found that competitive pressure is a significant predictor of e-business, mobile application, and business intelligence adoption. However, other empirical investigations (Al-Dmour Rand, Masa'deh Ra'ed, 2017; Oliveira et al., 2014; Teo et al., 2007; Wang et al., 2016) contrarily found no significant influence. This study aims to investigate the relationship between competitive pressure and HR leader' attitude toward AI applications in recruitment.

H8: Competitive pressure has a significant positive influence on HR leaders' attitude toward the adoption of AI recruitment applications.

3. Methods

3.1. Participants and Procedures

To empirically examine the proposed framework relationships, an electronic survey methodology was used. Attaining the research objectives is highly dependent on collected data representativeness and validity, therefore, this study targeted HR Leaders who hold a senior

position and considered to be HR policymakers within the organization.

The targeted population of this study from which the sample was drawn consisted of the HR Leaders in Middle East HR professionals' network at the LinkedIn professional network platform. Specific titles were adopted as an identifier for HR leadership positions.

The set of criteria in which were employed to define the target population are exhibited in following Table 1.

Table 1. Criteria for Defining the Targeted Population

Countries	Jordan, Kuwait, Qatar, Saudi Arabia
Position Title	HR Manager, Senior HR Manager, HR Director, Chief Human Resources Officer (CHRO)
Profile language	English
Other Criteria	Defined employer (unambiguous employment status)

Source: Authors' Construction

The sample frame represented a complete list of the population of identified HR leaders through the mentioned filtering criteria. The total population size was 8200 in which stratified into four stratum based on the country of employment.

According to (Sekaran & Bougie, 2016) scientific guideline for minimum sample size table, the population size of 8000 to 9000 elements requires a minimum sample of 368, hence, Sekaran & Bougie, (2016) highlighted that sample sizes of more than 30 respondents and less than 500 are appropriate for most research. The questionnaire was sent during the month of Jul-2020 to one thousand HR Leaders drawn from the defined population stratum using a systematic disproportionate stratified random sampling, a total of 389 valid responses received.

3.2. Instrument

The instrument was developed based on preceding studies of IT innovations adoption where the validity and reliability have been consistently demonstrated (see Table. 2). Measurement items are based on (Rogers, 2003) DOI model and (L. Tornatzky et al., 1990) (TOE) framework, however, were slightly modified to fit the research context. Innovation characteristics construct factors namely: Cost-Saving (CS), Security Concerns (SC), Relative Advantage (RA), Complexity (CPX), Compatibility (COM). TOE construct factors namely: Top Management Support (TMS), Technological Readiness (TR), Competitive Pressure (CP).

Table 2. Instrument Measures

Construct	Variables	Items	Scale of Measurement	Based on (References)
Innovation Characteristics	Compatibility (COM)	4	Likert Scale (1= Strongly disagree; 5= strongly agree)	(Oliveira et al., 2014)
	Relative Advantage (RA)	5		(Martins et al., 2016; Teo et al., 2007)
	Complexity (CPX)	4		(Martins et al., 2016; Wang et al., 2016)
	Cost-Saving (CS)	3		(Martins et al., 2016; Oliveira et al., 2014)
	Security Concerns (SC)	3		
Total		19		

Technological Organizational Environmental (TOE)	Top Management Support (TMS)	4	(Palos-Sanchez et al., 2017; Wang et al., 2016)	
	Technological Readiness (TR)	4		(Martins et al., 2016; Oliveira et al., 2014)
	Competitive Pressure (CP)	4		(Oliveira et al., 2014; Teo et al., 2007)
Total		14		
Attitude Toward AI adoption	Attitude (ATT)	6	(Venkatesh et al., 2003; Voermans & Van Veldhoven, 2007)	

Source: Authors' Construction

4. Analysis and Results

A Covariance-Based Structural Equation Modeling (CB-SEM) technique was used to empirically investigate the study proposed framework. SEM has become a popular and commonly used method for estimating relationships among complex path models and it offers the possibility to perform path-analytic modelling with multiple constructs (Hair et al., 2014). Among SEM advantages are that while it is an effective technique in examining relationships between multiple variables, it enables eliminating weak measurement to reduce the level of errors within the model (Hair et al., 2014).

The analysis of the structural framework had two stages. First, confirmatory factor analysis was conducted to assess the validity and reliability of the theoretical constructs and to validate the scales of measurements. Second, analyzing the structural equation model and testing the hypothesized relationships between the study variables.

4.1. Measurement of Reliability and Validity

A confirmatory factor analysis (CFA) was performed to assess the reliability and validity of the study instrument measures. At First, to check the internal consistency, the loading of each

observed indicator on their underlying observed constructs was examined against the threshold value of 0.6, according to (Chin, 1998; Hair et al., 2014) actor loadings higher than 0.5 are considered acceptable. Items factors standard loadings were found higher than 0.6 except for one indicator (see Table. 2), TR2 had a loading value of 0.495 therefore, the item was eliminated.

All other loadings are above the threshold of 0.6 and at significant at $p < 0.001$ level. Items Loading have ranged from the lower value of 0.62 for CPX1 to 0.932 for ATT6. Further, Composite Reliability (CR) Coefficient, Cronbach's α , and Average Variance Extracted (AVE) were calculated. Researchers suggest that the confirmatory value of CR is higher than 0.8, Cronbach's α is 0. threshold and 0.5 for AVE (Bagozzi & Yi, 1988; Hair et al., 2014). As shown in Table 2. all variables Cronbach's α indicators exceeded the 0.7 threshold and the overall α value for the study instrument is 0.886.

Also, the AVE values for the study variables have met the 0.5 threshold. Lastly, the CR indicator for the study constructs has met the recommended value of 0.8 except the Technological Readiness (TR) construct with a CR value of 0.768, hence it was assumed adequate to retain. Consequently, these outcomes confirm the study constructs internal consistency, reliability, and convergent validity.

Table 3. Validity and Reliability Measures

Factor	Item	loadings	Cronbach's (α)	AVE	CR
Attitude Toward AI Adoption (ATT)	ATT1	0.682	0.944	0.732	0.942
	ATT2	0.911			
	ATT3	0.908			
	ATT4	0.889			
	ATT5	0.784			
	ATT6	0.932			
Compatibility (COM)	COM1	0.776	0.859	0.609	0.861
	COM2	0.67			
	COM3	0.872			
	COM4	0.791			
Competitive Pressure (CP)	CP1	0.801	0.839	0.573	0.842

	CP2	0.687			
	CP3	0.721			
	CP4	0.812			
Complexity (CPX)	CPX1	0.621	0.763	0.505	0.802
	CPX2	0.737			
	CPX3	0.692			
	CPX4	0.783			
Cost Saving (CS)	CS1	0.812	0.894	0.666	0.857
	CS2	0.861			
	CS3	0.773			
Relative Advantage (RA)	RA1	0.863	0.908	0.639	0.898
	RA2	0.845			
	RA3	0.812			
	RA4	0.729			
	RA5	0.739			
Security Concerns (SC)	SEC1	0.811	0.881	0.712	0.881
	SEC2	0.828			
	SEC3	0.89			
Top Management Support (TMS)	TMS1	0.86	0.917	0.738	0.918
	TMS2	0.801			
	TMS3	0.903			
	TMS4	0.868			
Technological Readiness (TR)	TR1	0.766	0.767	0.525	0.768
	TR3	0.673			
	TR4	0.732			
Overall Alpha (α)			0.886		

Source: Authors' Construction

To evaluate discriminant validity, the square root of each construct's AVEs was compared against its correlation with other constructs (Fornell & Larcker, 1981). Results show (Table. 4) that all correlations between the study

constructs are lower than the square root of the AVEs deemed an adequate meeting Fornell & Larcker's validity test and proving discriminant validity.

Table 4. Discriminant Validity Correlations

Construct	COM	RA	CPX	CS	SEC	TMS	TR	CP
Compatibility (COM)	0.781							
Relative Advantage (RA)	.391**	0.799						
Complexity (CPX)	-.174**	-.186**	0.711					
Cost Saving (CS)	.316**	.799**	-0.088	0.816				
Security Concerns (SC)	-0.090	-.189**	.531**	-0.092	0.844			
Management Support (TMS)	.382**	.217**	-0.054	.210**	0.092	0.859		
Technological Readiness (TR)	.416**	.209**	-.121*	.149**	-0.069	.409**	0.725	
Competitive Pressure (CP)	.362**	.337**	-.138**	.282**	-0.068	.261**	.266**	0.757
Attitude Toward AI adoption (ATT)	.248**	.564**	-.238**	.515**	-.135**	.181**	.125*	.264**

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed)

Source: Authors' Construction

4.2. Relationships and Hypothesis Testing

To test the hypothesized relationships between the study constructs, AMOS. 21 SEM was used. A bootstrap with 500 samples was implemented and the study framework hypothesized relationships were empirically tested by

measuring the Standardized regression weight (β), standardized error; (SE), critical ratio (CR), and their significance levels (p). As shown in Table 4, The standardized path coefficients range from -0.106 for the significant negative association between employee Security Concerns (SC) and Relative Advantage (RA), while the

higher coefficient is 1.063 for the significant positive association between Cost Saving (CS) and Relative Advantage (RA). Among the eighth

study hypotheses, H1, H2, H3, H4, H6, and H7 are supported, while H5 and H8 are rejected.

Table 4. Estimates and Hypothesis Testing

Predictors of Relative Advantage (RA)						
Hypotheses	Construct	Estimate	S.E.	C.R.	P	Result
H1	Cost Saving (CS)	1.063	0.052	20.315	**	Supported
H2	Security Concerns (SC)	-0.106	0.022	-4.851	**	Supported
Predictors of Attitude Toward AI adoption (ATT)						
H3	Relative Advantage (RA)	0.447	0.047	9.608	**	Supported
H4	Complexity (CPX)	-0.189	0.053	-3.543	**	Supported
H5	Compatibility (COM)	-0.024	0.037	-0.664	0.507	Rejected
H6	Management Support (TMS)	0.059	0.03	1.972	0.049*	Supported
H7	Technological Readiness (TR)	-0.035	0.038	-0.925	0.355	Supported
H8	Competitive Pressure (CP)	0.048	0.037	1.311	0.190	Rejected

* $p < 0.05$, ** $p < 0.001$.

Source: Authors' Construction

4.3. Discussion

The purpose of this study is to enrich the current understanding of IT adoption in HRM by investigating the phenomenon of adopting the emerging AI applications in HR recruitment from HR leaders' perspective.

A conceptual framework has been developed in which reflected the study proposed relationships. The investigated adoption predictors were classified into two main constructs. The first construct is Innovation Characteristics with five variables: cost-saving, security concerns, relative advantage, compatibility, and complexity. The second construct is TOE represented with three variables top management support, technological readiness, and competitive pressure as predictors of HR leaders' attitude toward adopting AI applications in HR recruitment.

For the Innovation Characteristics construct, the responses' mean value of relative advantage factor (4.01 out of 5) reveals that the participants have perceived AI applications as highly advantageous for the recruitment process. Likewise, the cost-saving factor had a mean value of 3.99 which also indicates participants are highly positive about the gained value in terms of saving cost from AI recruitment tools. However, the mean value for complexity and security concerns (3.25, 3.31 respectively) reveals that the average participants moderately believe that it is a complex process to understand how AI operates the recruitment process and it has some associated security concerns.

The first two hypotheses aimed to examine cost-saving and security concerns prediction of relative advantage. The result shows that the cost-saving factor is a positive predictor ($\beta=1.063$, $p=0.000$) of HR leaders' perception of AI recruitment applications relative advantage.

This result reveals that when HR leaders believe that AI recruitment tools helps to avoid unnecessary cost and raises the cost-saving of the company is a positive predictor in which explains the relative advantage. This result is congruent with previous investigations (Benlian & Hess, 2011; Martins et al., 2016; Oliveira et al., 2014) in which have found cost-saving has a strong association with IT innovation relative advantage and adoption.

Further, the results verify the hypothesized negative influence ($\beta=-0.106$, $p=0.000$) of HR leaders' security and privacy concerns with their perception of AI recruitment applications relative advantage. It is noticeable that the trending IT solutions are shifting toward on-demand Software-as-a-service (SaaS) and cloud-based services among which recruitment AI solutions (e.g., chatbots, ATS), however, it is argued (Benlian & Hess, 2011) and supported by this study results that this form of IT service providing method increases the data security and privacy concerns which impact the degree of its perceived advantage.

Hypotheses H3, H4, H5 represented the study objectives to investigate the prediction relationship between innovation characteristics variables (relative advantage, complexity, compatibility) HR leaders' attitude toward the

adoption of AI applications in recruitment. Confirming H4 and H5, relative advantage and complexity found to be strong predictors ($\beta=0.447$, $\beta=-0.189$ respectively) of HR leaders' attitude toward the adoption of AI recruitment applications at $p=0.000$. While the relative advantage is a positive predictor, complexity is a negative predictor of adoption.

This result confirms (Al-Dmour et al., 2016; Al-Dmour Rand, Masa'deh Ra'ed, 2017; Low et al., 2011; Martins et al., 2016; Oliveira et al., 2014; Palos-Sanchez et al., 2017; Yang et al., 2015) results about the role of relative advantage and complexity in predicting IT adoption. The third innovation characteristic factor is compatibility which was hypothesized to predict the attitude toward the adoption of AI applications in recruitment. Compatibility signified the degree to which AI recruitment applications are perceived as harmonious with the current policies, values, practices of the organization, and HRM.

Contrary to the hypothesized relationship, empirical results showed that compatibility is not a significant predictor ($p=0.507$) of HR leaders' attitude toward the adoption of AI applications in recruitment, hence rejecting H5. In other words, HR leaders' perception about the extent to which AI application is compatible with current human resources practices, organization culture, values, company work style, and the IT policies is not a significant predictor of their attitude toward it. While this result contradicts several previous IT innovation and HRIS studies (Al-Dmour Rand, Masa'deh Ra'ed, 2017; Grandon & Pearson, 2004; A. Lin & Chen, 2012; Taylor & Todd, 1995; Teo et al., 2007), among other innovation characteristics, compatibility has the most disagreement about its predictive power.

Therefore, some of the previous investigations are consistent with this study result in terms of the insignificance of compatibility factors, such as cloud computing and SaaS (Low et al., 2011; Martins et al., 2016; Oliveira et al., 2014).

From the TOE factors, HR leaders' perception about the top management mindsets toward IT innovations, their understanding of its benefits, and the likelihood of investing in AI applications are a significant predictor of HR leaders' attitude toward the adoption of AI recruitment applications. These findings confirm H6 and consistent with previous studies (Bhatiasevi & Naglis, 2018; Martins et al., 2016; Oliveira et al., 2014; Puklavec et al., 2018; Sun et al., 2018; Yang et al., 2015) findings.

Technological readiness aimed to investigate the relationship between HR leaders' perception of the organization's technical capability and their attitude toward the adoption of AI recruitment applications while hypothesizing the absence of a significant effect. The result confirms H7 where technological readiness found to be not a significant predictor of attitude toward AI. This result is congruent with some studies (Hmoud & Várallyai, 2020; Low et al., 2011; Wu et al., 2013), which claimed that technological readiness importance as a determinant for the newly emerging IT innovations is declining.

Lastly, competitive pressure represented one of the environmental factors of which claimed to consistently appears to predict IT innovation adoption. However, rejecting H8 the result found no significant association at the $p=0.05$ level between HR leaders' perception about the pressure from competitors and their attitude toward the adoption of AI applications in recruitment.

This result contradicts with (Bhatiasevi & Naglis, 2018; Chiu et al., 2017; H. F. Lin, 2013; H. F. Lin & Lin, 2008; Oliveira & Martins, 2010; To & Ngai, 2006) studies which have found competitive pressure as a significant predictor of IT innovations adoption. One of the possible explanations for this absence is that AI diffusion in HRM, in general, is still at its early diffusion phase, therefore, the competitive pressure did not materialize enough yet to a level in which becomes tangible by HR leaders.

This result can be explained from two perspectives, the first is the argument that specific industry characteristics may intervene by altering the strength of competitive pressure where the competition level varies within the different industries. Another possible explanation is the variation of IT competitiveness between various industries where some industries heavily rely on IT innovation more than other industries.

Moreover, several studies have also revealed that competitive pressure lacks empirical evidence as a significant determinant of IT adoption, for instance, in cloud computing (Oliveira et al., 2014), HRIS (Al-Dmour Rand, Masa'deh Ra'ed, 2017; Teo et al., 2007).

5. Conclusions

This study tackled the phenomenon of HR leaders' attitude toward the emerging AI applications in HR recruitment. The result of this study result adds an empirical contributes to the

theory development of IT innovations adoption research. The study concluded that participants possess a high positive attitude toward AI adoption.

Moreover, HR leaders have a constructive perception of AI relative advantage in terms of its potential contribution to the efficiency, effectiveness, and quality of HR recruitment function. Among the two constructs, it is concluded the innovation characteristics (relative advantage and complexity) have the high predictive power of AI application adoption, while TOE factors (technological readiness and competitive pressure) show to be insignificant determinants of AI application adoption in HR recruitment.

This study results anticipates the distinctive transformation in IT role within HRM and support the premise of continuance increased reliance over AI and augmented intelligence in proceeding with HR recruitment time-consuming tasks.

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APPROACH REGARDING FUNCTIONAL BAKERY PRODUCTS CONSUMPTION IN ROMANIA

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Abstract: Romania is, along with Bulgaria and Turkey, one of the largest consumers of bread in Europe. Gluten intolerance, the incidence of type 2 diabetes and the low consumption of dietary fiber with all its implications raise, in these conditions, the problem of improving the sanogenic characteristics of bakery products in Romania. The paper presents a study on the supply of bakery products on the Romanian market in the last decade evolution of annual consumption of bakery products taking into account consumer preferences, social origin, age, selection criteria, sources of supply, frequency of consumption and value assigned. The results show a surprising awareness of the benefits of bakery products rich in fiber and minerals from the young generation. The conclusions drawn from this study are useful for designing a new type of functional bakery products taking into account the profile of the consumer (target group) to whom it is addressed.

Keywords: functional food, sanogenesis, target group, consumer;

1. Introduction

Functional food is defined as a food that beneficially affects one or more target functions in the body, beyond the proper nutritional effects, in a way that is relevant to either improved health, well-being and / or reduced risk of disease. It is consumed as part of a normal diet. It is not a pill, a capsule or any form of dietary supplement. (EC, 2010).

In recent decades, consumer habits have undergone major changes in the consumption of bakery products, with preferences focusing on increasingly refined products, to doughs with increasingly high bakery properties, but which have a low content of fibers and minerals.

The emergence of diseases related to these eating habits has led to the reorientation of the consumer to nutritionally balanced bakery products, the demand bringing to market various products both in terms of composition and raw materials and manufacturing technologies.

Being an important consumer of bakery products, with values of 90-100kg products / year and consumer, Romania has demonstrated special concerns in the development of bread varieties with functional potential.

The studies carried out in the paper were carried out on the statistics regarding the consumption of

bakery products from the last decade in Romania. Criteria related to: consumer preferences, social origin, age, selection criteria, sources of supply, frequency of consumption and assigned value were taken into account.

2. Materials and Methods

The study assumes to apply specific methods to food policy (statistics, comparative analysis, etc.), technical-biologic methods, nutrigenomic principles and observations, methods of psycho-sensorial analysis regarding validity periods of bakery products.

3. Results

Being an important consumer of bakery products, with values of 90-100 kg products / year and consumer, Romania has demonstrated special concerns in the development of bread varieties with functional potential.

Table 1 presents a selection of the main bakery products in Romania, with nutritional mentions.

Table 1. *Examples of bakery products from Romania with nutritional mentions (selection)*

No.crt.	Product name	Producer
1.	White "pave" bread with leaven and seed mix	Auchan
2.	"Pave" bread with black flour	Auchan
3.	"Pave" bread with black flour and leaven	Auchan
4.	Toast bread with graham	Bongrana
5.	Rye flour toast bread	Bongrana
6.	Black flour "Franzela" 300g	Carrefour Romania
7.	White bread with corn flour	Carrefour Romania
8.	Bread with boiled potatoes 500g	Carrefour Romania
9.	Organic cereal bread 300 g	Carrefour Romania
10.	Oat bread 500 g	Carrefour Romania
11.	Black flour rustic bread 500 gr	Carrefour Romania
12.	Bavarian bread with rye	Dioszegi (Biopan)
13.	Cumin bread	Dioszegi (Biopan)
14.	Whole-meal bread	Dioszegi (Biopan)
15.	Black bread with potato flakes	Dioszegi (Biopan)
16.	Rustic bread with rye	Dioszegi (Biopan)
17.	The bread of youth with grape seeds	Dioszegi (Biopan)
18.	Peasant bread with potatoes	Dioszegi (Biopan)
19.	Benecol-rye bread with plant stanol esters	Dobrogea Grup
20.	Bonpana Multicereal	Dobrogea Grup
21.	Sliced bread with wholemeal ground flour	Dobrogea Grup
22.	Vita Silhouette sprouted wheat bread	Dobrudjanski hliab SA
23.	Wholemeal bread rich in vegetable fiber	Karamolegos Bakery Romania
24.	Ciabatta with olives	Lidl
25.	Bread of Champions (with seeds)	Lidl
26.	Multigrain bread	Lidl
27.	Diet bread	Titan
28.	Chef Gourmand 7 seeds	Vel Pitar
29.	Classe Noire rye 100%	Vel Pitar
30.	French toast nutritia (with cereal mix)	Vel Pitar
31.	Bran bread	Vel Pitar
32.	Whole wheat bread	Vel Pitar
33.	Transylvanian bread with potatoes	Vel Pitar
34.	Bread with rye and flax seeds	Vel Pitar
35.	Bread with millet	Vel Pitar
36.	Sesame bread	Vel Pitar
37.	Bread made from whole wheat dietary flour	Vel Pitar
38.	Specialty bread with black flour and bran	Vel Pitar
39.	Specialty bread with graham and rye	Vel Pitar

According to statistics released by the National Institute of Statistics, average bread consumption in Romania decreased from 9.2 kg /

month per capita in 2008 to about 8 kg / month per capita in 2018.

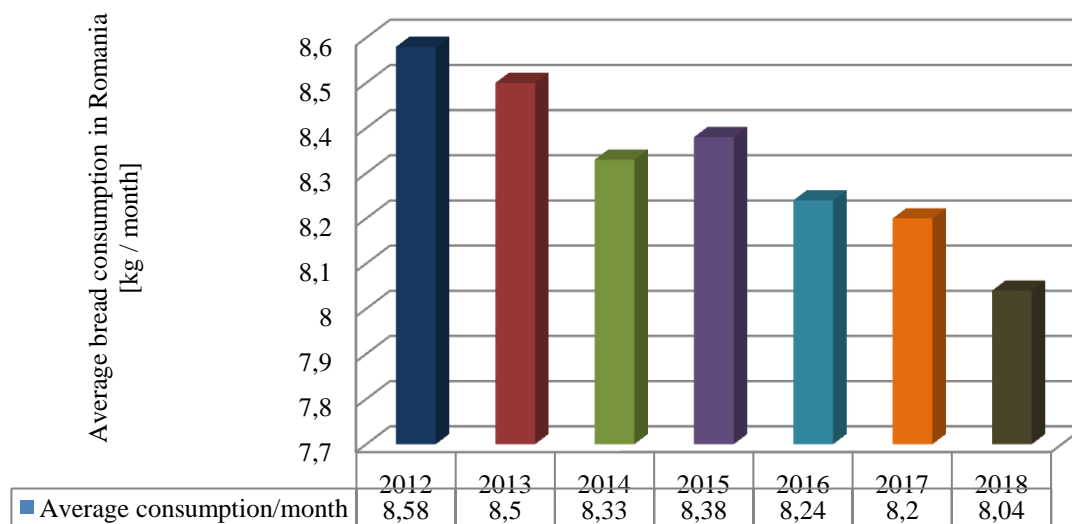


Fig.2. Average monthly bread consumption in Romania (<https://artaalba.ro/piata-painii-intre-traditie-si-inovatie/>)

The quantity of bread and bakery products consumed annually in Romania is about 96 kg / inhabitant, above the European average, which amounts to 78 kg / inhabitant per year. The annual bread production in Romania is 1.5 million tons “the milling and bakery market standing at 3 billion euros, on the first place in the local food industry.

According to data provided by the National Institute of Statistics, there are significant differences in consumer behavior between

different social categories or from one region to another. Thus, among the unemployed there is a sharp increase in bread consumption, reaching even monthly quantities / person of 9 kg (fig.3.). The analysis according to the territorial structure shows that in the regions with a lower standard of living, such as Oltenia, Muntenia or the North-East Region (Moldova), there was an increase in the consumption of bakery products in 2018 compared to the previous year.

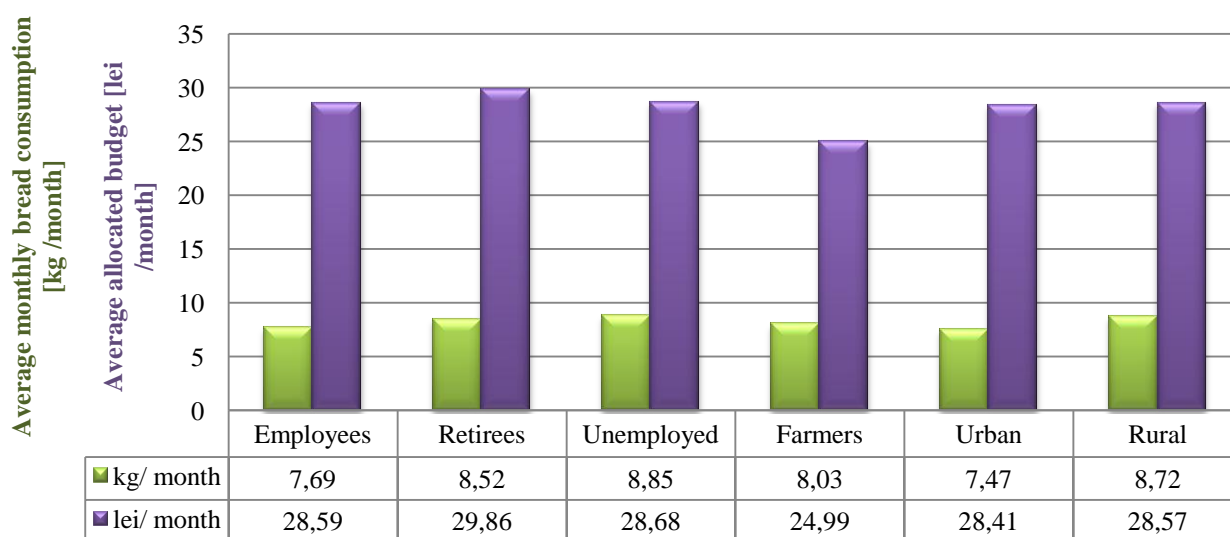


Fig. 3. Average monthly bread consumption and allocated value, by social category and residence, in 2018

In 2018, 82% of Romanians consume bread daily, 7 percent less than in 2009 when this

category of frequent consumers of bread was 89% (fig. 4.)

In contrast, the number of sporadic consumers of bread increased to 17% from 7% in 2009. Confectionery and pretzels are products

consumed mainly in large cities, being a habit of consumption "on the go".

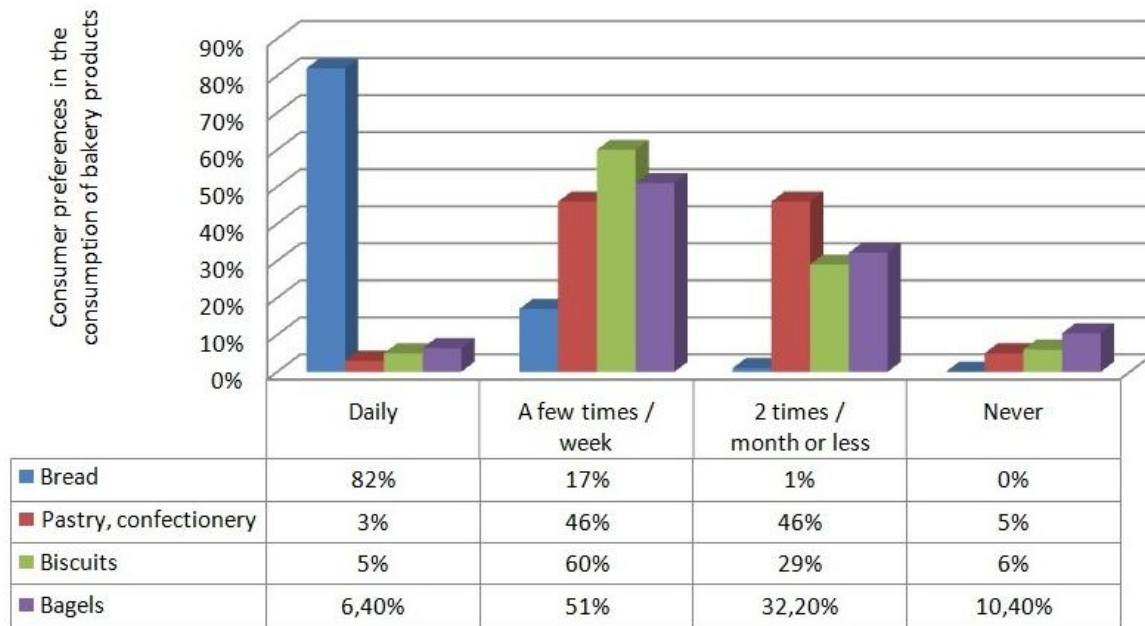


Fig. 4. Consumption frequency of bakery products

White bread remains the most popular assortment. Over 50% of Romanians consume white flour bread daily, while only 4% of

respondents stated that they never consume this product.

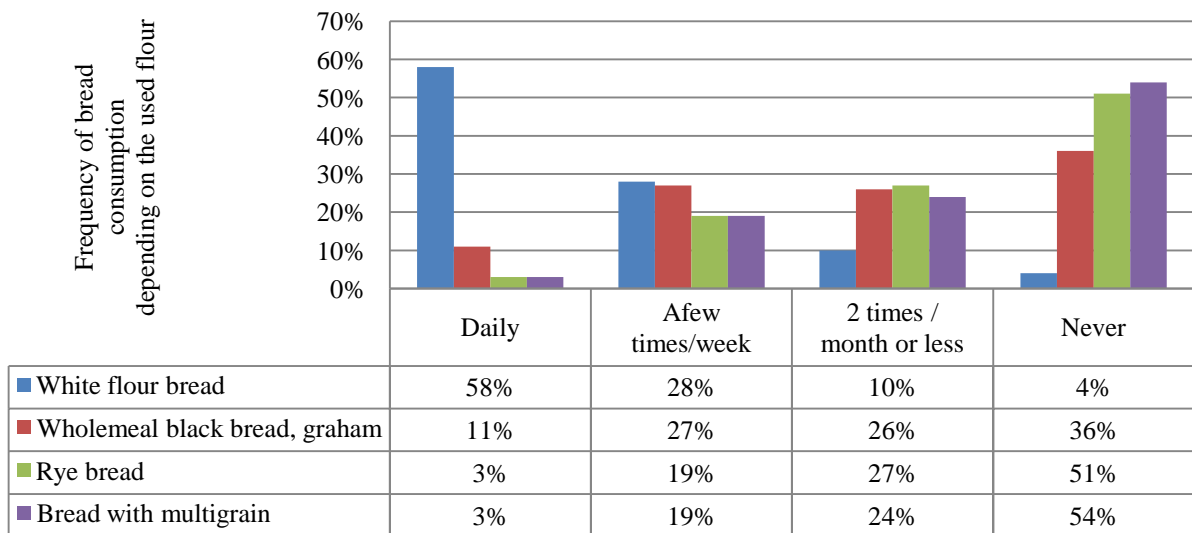


Fig. 5. Frequency of bread consumption depending on the type used of flour

White flour bread can be considered the bread of the traditional consumer, it is a product consumed by habit and tradition and is more common food for rural citizens and people over 40 years of age (fig. 6).

According to the market study ("Understanding the flour products market" Rompan and GfK

Romania) white bread is consumed for the following reasons: "It is softer and fluffier", "It is cheaper", "It is the local tradition", "It eats this way for a long time", "It is more attractive", "It is available in the store where they shop", "It is tastier", "It stays fresh longer".

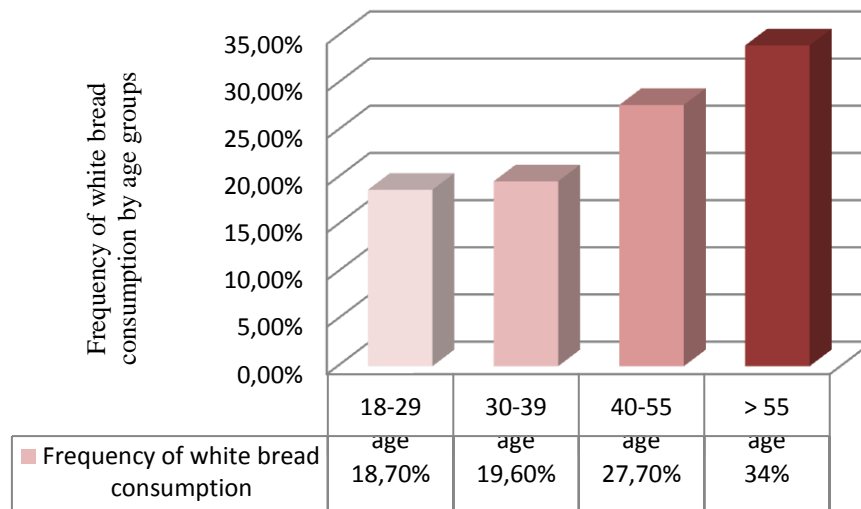


Fig. 6. White bread consumer profile

Black flour bread and rye flour bread have increased in consumer preferences by 14% in the last decade. If ten years ago only half of the respondents preferred black bread, wholemeal and graham, in 2018 the percentage of

respondents rises to 64%, and one in 10 people consume these assortments daily. The distribution of consumers by age categories is approximately equal, around 25% (fig. 7.)

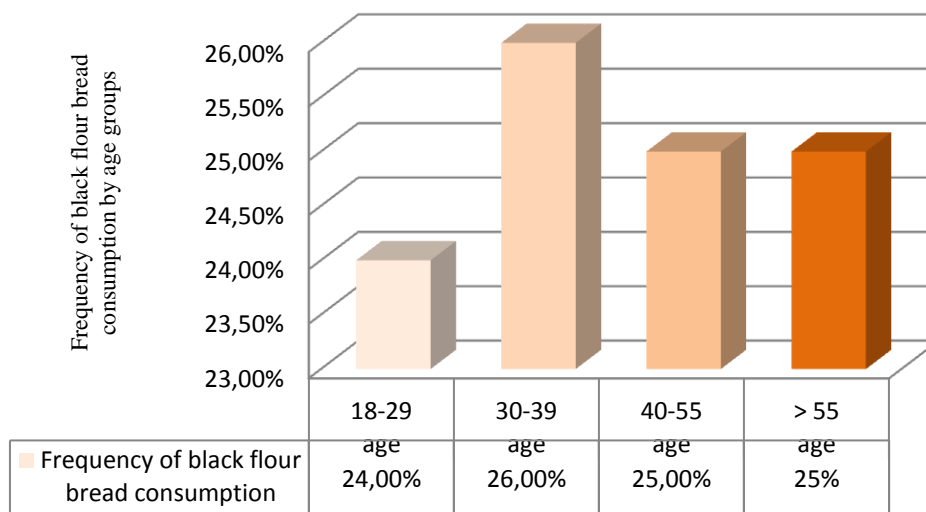


Fig. 7. Profile of the consumer of black flour bread

In 2009 only 12% of respondents said they choose rye flour bread, while in 2018 the percentage of consumers is 49%. Most consumers come from urban areas and consume the product only a few times a month. The profile of the consumer of bread with rye flour and that of bread with multigrain are similar (fig. 8, 9).

Black flour bread is consumed for the following reasons: "low in calories", "healthy", "high in fiber".

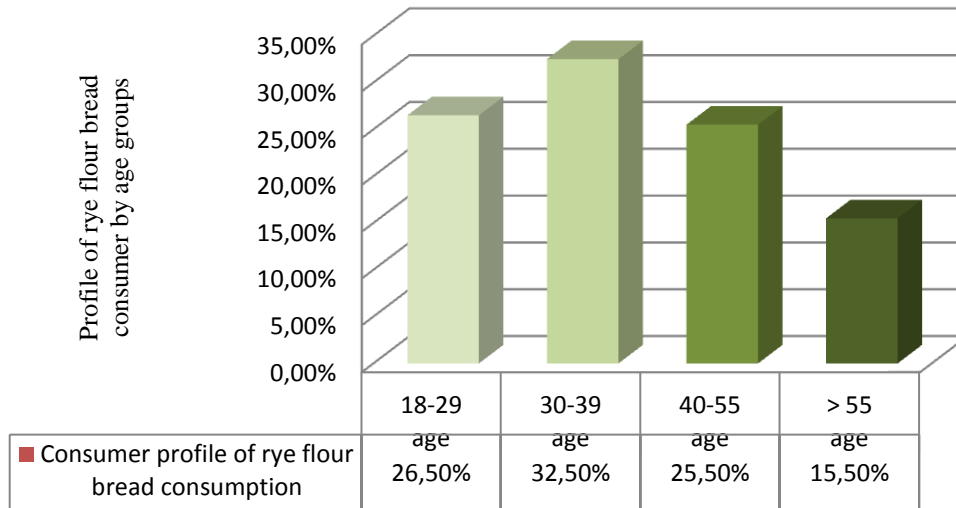


Fig. 8. Consumer profile of rye flour bread

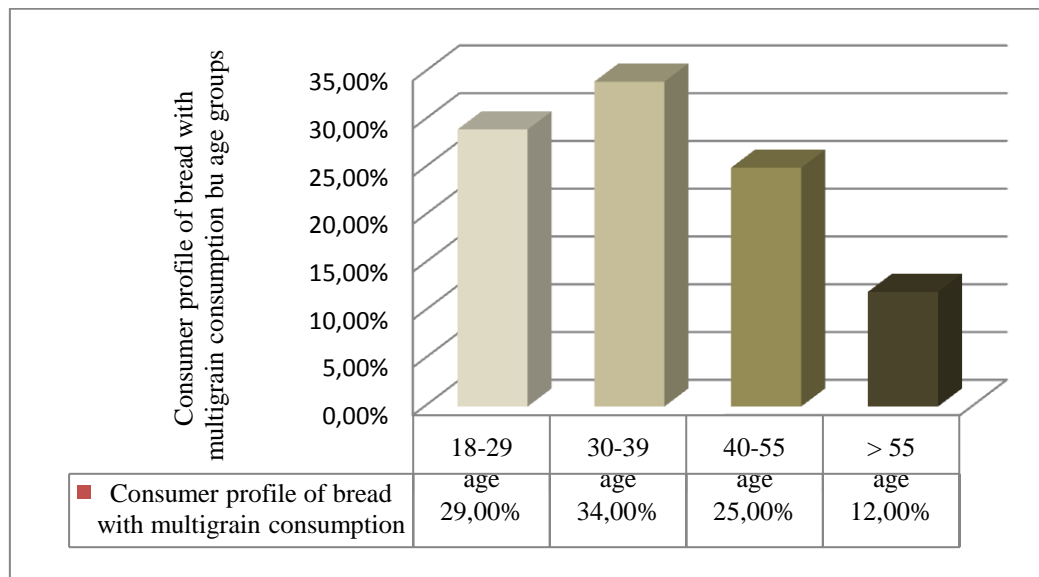


Fig. 9. Consumer profile of multigrain bread

The consumption of rye bread and multigrain is currently sporadic, found mainly in urban areas, in Bucharest and western Romania. These specialties are especially appreciated by young people and people with higher education, because: "It is recommended by doctors in diets", "Contains fiber", "It is healthy", "It has few calories (in the case of rye bread)".

The same study shows that the first 10 criteria in choosing bread by consumers are, in order: quality, freshness, ingredients, appearance, content of food additives, type of flour used, price, shelf life, habit, packaging. Advertising is the last factor in the decision to buy a certain range of bread (fig. 10).

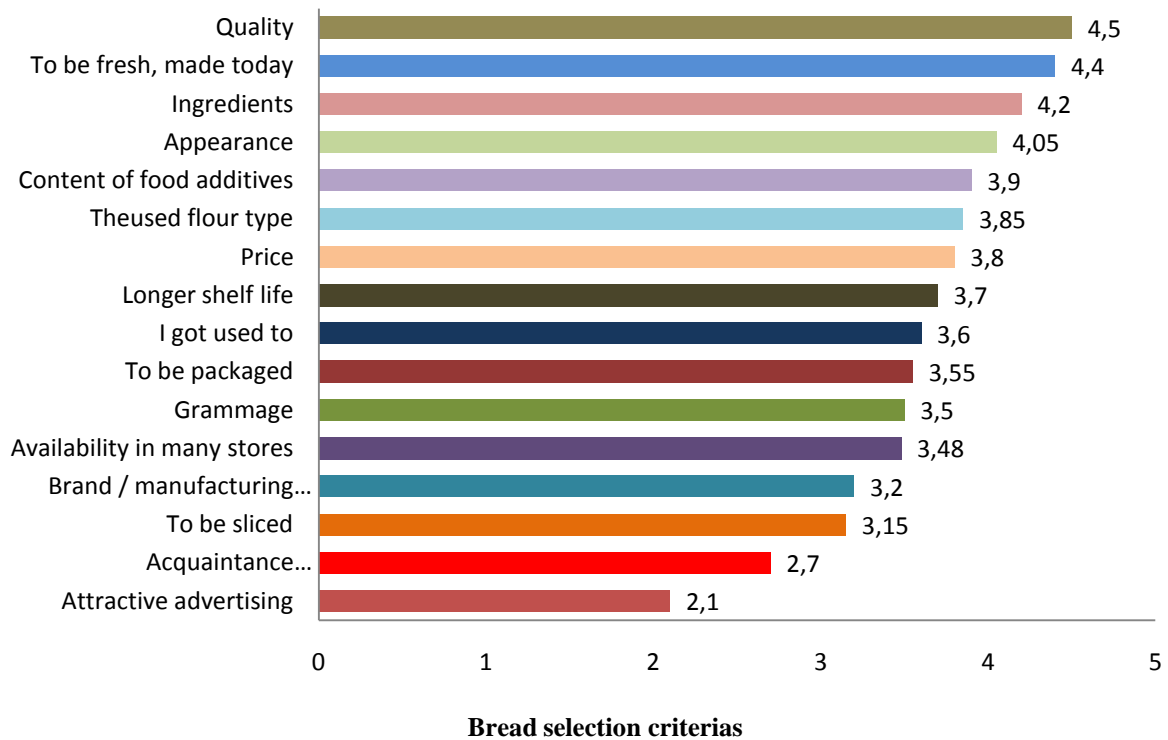


Fig. 10. Bread selection criterias

Functional bakery products have become increasingly sought after by consumers, with producers increasing their supply in recent years mainly through the use of cereals and other seeds as functional ingredients rich in dietary fiber, antioxidants and other valuable nutrients.

There are special concerns for the introduction in the bread recipe of other types of ingredients such as (vegetables, fruits, insects, etc.), the specialized technological engineers therefore having the huge challenge of incorporating these ingredients with as little impact as possible on the organoleptic and structural properties as of the bread.

Conclusions

The study presented in the paper shows that although the consumption of bread in Romania decreased by approx. 10% it ranks first in Europe along with Bulgaria and Turkey. It can be seen that the price of bread in Romania is the lowest in whole Europe, which can be explained by the favorable pedo-climatic conditions for wheat cultivation and the infrastructure of cultivation, processing, storage and sale of cereals and derivatives.

Statistics show surprisingly that bakery products with nutritional mentions regarding the content of fiber and / or mineral substances are more popular among young people under 45 (approx. 50%), while the age segment over 45 prefers bakery products made exclusively from white wheat flour.

The offer of producers of functional bakery products, with ingredients other than wheat bran, oats, rye, is relatively low, lacking the applications of research on ingredients such as grape seed and epicarp flour, quinoa, Jerusalem artichoke tubers, hemp seeds, seabuckthorn fruits, etc.

Therefore, there is a huge potential in Romania for innovation in the field of functional bakery products using "non-classical" ingredients that bring benefits from the category of antioxidants, minerals, inulin, unsaturated fatty acids, etc.

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HAZARD IN FOOD PROCESSING. STUDY CASE OF ROMANIAN AGRICULTURAL MOUNTAIN FARMS

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Abstract: The paper approach the problems of hazard in hygienic processing in Romanian agri-touristic farms, taking in consideration the main food contaminants that can occur during regular activity. There are presented pathogens associated with animals that can present food-borne health risks to human and HACCP system recommended. At the end of the paper, some consideration about food security and food safety during COVID 19 context are presented. Conclusions signified that there are specific conditions for applying HACCP in agricultural mountain farms and specific pandemic situation need special attention on storage facilities.

Keywords: food safety, mountain farms

1. Introduction

Food safety is the responsibility of producers, processors, distributors and consumers. However, the farm environment and livestock are the primary source of many food associated pathogens and farmers have a key role in ensuring that only safe food is placed on the market. The continued success of the Romanian food industry is therefore dependent on the active pursuit of the highest standards of safety and quality on Romanian farms.

The basic general food law is formulated in the Framework Regulation (EC) 178/2002 for foodstuffs. This regulation also regulated the establishment and functions of the European Food Safety Authority [4, 6, 7].

This EU agency cooperates with national authorities to ensure food safety, to ensure that unsafe food is not placed on the market, to ensure traceability and to achieve long-term cumulative effects.

The problem of food safety has many aspects regarding equipments, technology, food plant design etc

Food contamination is the introduction or occurrence of any biological or chemical agent foreign matter or other substance not intentionally added to product which may compromise product safety or suitability. Due to globalization and media availability food

contamination scares become more and more recognized worldwide.

The types of contamination are: Foreign bodies, Chemicals, (Micro) biological and Allergenic substances.

The paper present the main hazard in hygienic processing of food in agri-touristic mountain farms, and HACCP management, with referring at the study case of mountain farms from Romania.

2. Food contamination in mountain farms

The fundamental reason for applying hygienic design principles is to prevent contamination of food products. The types of contamination are: **Foreign bodies, Chemicals, (Micro)biological and Allergenic substances** [5].

Foreign bodies are a potential sources of contamination. Raw materials can contain stones, sand, leaves, pest and can be contaminated by already contaminated good of its surroundings.

Small equipment and replacement parts like washers, seals, screws can fall into the product.

Packaging materials like film, containers, board, trimmings from packaging film can contaminate the product.

Chemical contamination arise from lubricants and additives, cleaning and disinfection residues and packaging material.

Due to incorrect process management it could be possible that CIP liquid will enter the product.

As human beings are the major contamination source microbial toxins like *staphylococcus aureus* which many people carry on their skin can easily contaminate the product. Approximately 20 to 50 percent of all healthy adults carry *Staphylococcus aureus* permanently or temporarily [10]. Any containment without labels are a potential contamination source and can have residues on the bottom of container [11].

All pests are a potential source of **(Micro)biological contamination**.

To avoid the entrance of any pests we have to keep the plant as close as possible and shall make prevention of hiding places for animals.

We shall install self closing openings/ doors/ windows/ apertures protected by fine screens if open or pest-tight openings.

All opening screened with stainless steel mesh < 1mm x 1 mm.

External lights not at buildings. No light sources above entrances. Microorganisms like yeasts, moulds, algae; bacteria and viruses are different in size and can be avoided by different filter protections, but not all of them are pathogenic. Disease pathogens are organisms or subcellular pathogens that cause harmful effects in other organisms. Disease pathogens can be algae, bacteria, parasites, fungi, prions, protists, viruses or viroids.

The term pathogen is often used identically, but has a more general meaning, similar to the adjective pathogen.

Harmful substances (poisons) and ionizing radiation can also be referred to as pathogens in the sense of "disease triggers". There are microorganisms they spoil food like alter food, showing undesirable effects and can change the organoleptic characteristics, and the pathogenic microorganisms which affect individuals causing food borne illness.

Pathogenic microorganisms do not necessarily change the organoleptic characteristics of the food.

Pathogenic microorganisms are one of the most important biological food-borne hazards,

95%, and are reported in more cases of food-borne illness than any other hazard

The named species named on this slide are usually described as "true pathogens". Of course, infection and illness do not follow automatically the ingestion of pathogens, only a fraction of the exposed consumers falls ill. That fraction depends on the virulence of the pathogens.

This is reflected by the dose-response relationships: for example the DI_x (the dose that causes the illness in x% of consumers) is one million times higher for *Listeria monocytogenes* than for *E. coli* when considering the healthy adult population.

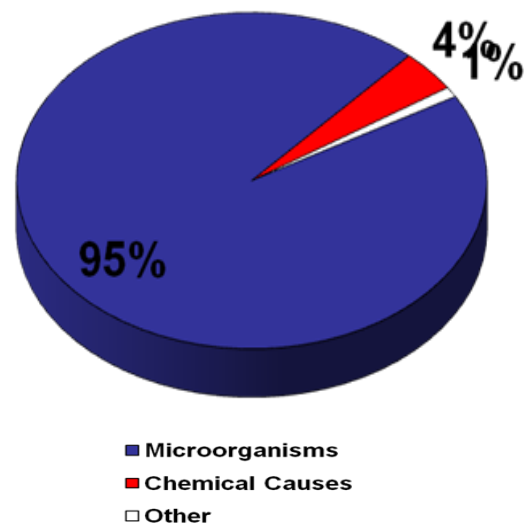


Fig. 1. The most important biological foodborne hazards

Microorganisms are one of the most important biological foodborne hazards, and are reported in more cases of foodborne illness than any other hazard

Other food-borne hazards are chemical contaminations, 4% and foreign bodies 1% (as can be seen in figure 1).

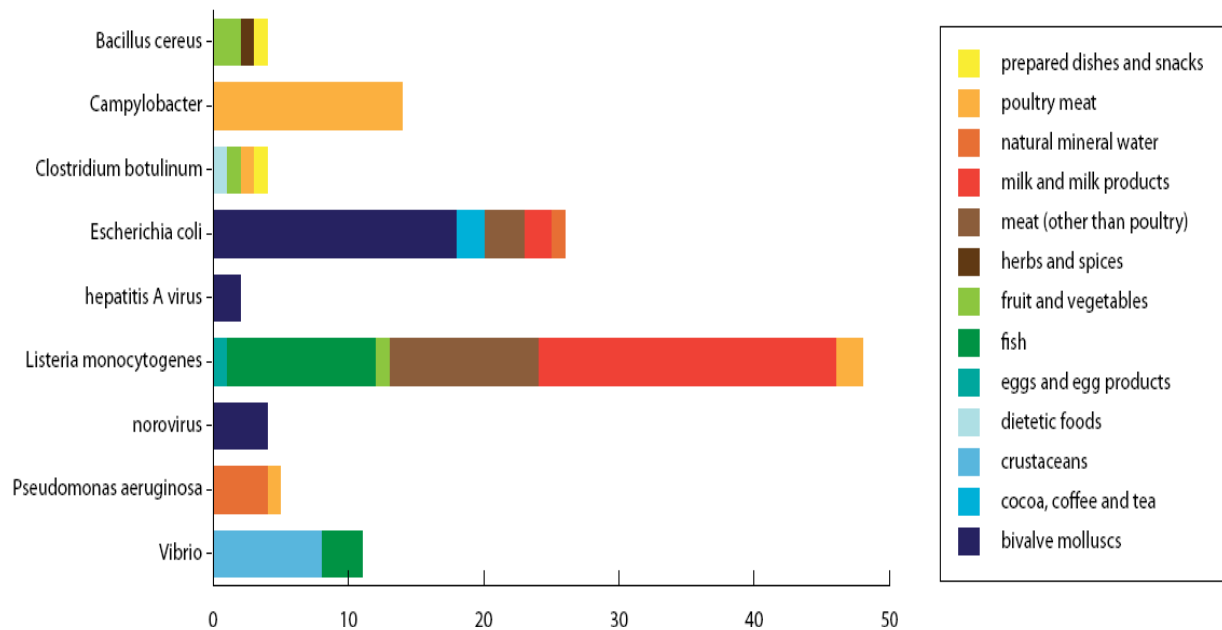


Fig. 2. Number of notifications of pathogenic microorganisms

Figure 2 shows the number of notifications of pathogenic microorganisms

The highest number of *Listeria monocytogenes* is recorded in dairy products but also in meat and fish.

The highest number of *E. coli* is recorded in bivalve molluscs/oyster much less in meat and dairy products, and *Campylobacter* mostly in poultry meat. *Campylobacter* are the most common bacterial pathogens of diarrhea and sickness. They occur mainly in the warm season.

Microbial toxins are toxins produced by micro-organisms, including bacteria and fungi. Microbial toxins promote infection and disease by directly damaging host tissues and by disabling the immune system.

Bacteria generate toxins which can be classified as either *exotoxins* or *endotoxins*. *Exotoxins* are generated and actively secreted; endotoxins remain part of the bacteria. Usually, an endotoxin is part of the bacterial outer membrane, and it is not released until the bacterium is killed by the immune system. The body's response to an endotoxin can involve severe inflammation.

Toxinosis is pathogenesis caused by the bacterial toxin alone, not necessarily involving bacterial infection (e.g. when the bacteria have died, but have already produced toxin, which are ingested). It can be caused by *Staphylococcus aureus* toxins, for example.

Immune evasion proteins from *Staphylococcus aureus* have a significant

conservation of protein structures and a range of activities that are all directed at the two key elements of host immunity, complement and neutrophils. These secreted virulence factors assist the bacterium in surviving immune response mechanisms.

Molds are ubiquitous, and mold spores are a common component of household and workplace dust; however, when mold spores are present in large quantities, they can present a health hazard to humans, potentially causing allergic reactions and respiratory problems.

Some molds also produce mycotoxins that can pose serious health risks to humans and animals. Some studies claim that exposure to high levels of mycotoxins can lead to neurological problems and in some cases, death. Prolonged exposure, e.g. daily home exposure, may be particularly harmful.

An enterotoxin is a protein exotoxin released by a microorganism that targets the intestines. Enterotoxins have a particularly marked effect upon the gastrointestinal tract, causing vomiting, diarrhea, and abdominal pain.

Enterotoxins are chromosomally encoded or plasmid encoded exotoxins that are produced and secreted from several bacterial organisms.

They are often heat-stable, and are of low molecular weight and water-soluble. Enterotoxins are frequently cytotoxic and kill cells by altering the apical membrane permeability of the mucosal (epithelial) cells of the intestinal wall.

They are mostly pore-forming toxins (mostly chloride pores), secreted by bacteria, that assemble to form pores in cell membranes. This causes the cells to die. As we'll discuss further,

some of microbial toxins plays risk during COVID 19 pandemic, due to the lack of storage facility for vegetables.

Table 1. Pathogens associated with animals that can present food-borne health risks to humans [1, 8]

Organism	Associated animals	Associated foods	Disease in humans
Bacteria			
<i>Salmonella</i>	Pigs Cattle Poultry	<ul style="list-style-type: none"> • Poultry • Lower prevalence in pork, beef, raw eggs & dairy products 	Gastroenteritis Complications: invasive disease, persistent abdominal symptoms, reactive arthritis
<i>Campylobacter</i>	Poultry Cattle Pigs Sheep	<ul style="list-style-type: none"> • Poultry (most commonly) • Beef • Pork • Lamb • Raw milk & raw milk products 	Gastroenteritis Rare serious sequelae: reactive arthritis, Guillain Barre syndrome
<i>Listeria monocytogenes</i>	Widespread in nature: found in soil, foilage, animal and human faeces	<ul style="list-style-type: none"> • Ready-to-eat (R-T-E) foods, including poultry and meat R-T-E products • Raw vegetables • Raw milk • Soft cheese 	Less serious cases: gastroenteritis and flu like symptoms Serious cases (Listeriosis): meningitis (brain lining infection), septicemia (blood infection), abortion or still birth in pregnant women
<i>Yersinia enterocolita</i>	Pigs	<ul style="list-style-type: none"> • Pork 	Gastroenteritis Rarely: postenteritis arthritis
<i>Escherichia coli O157:H7</i>	Cattle Sheep	<ul style="list-style-type: none"> • Beef, especially ground beef (mince) • Lamb • Raw milk • Raw vegetables fertilized with animal manure • Contaminated water 	Hemorrhagic colitis (bloody diarrhea) Hemolytic uremic syndrome (kidney failure)
<i>Mycobacterium tuberculosis</i>	Cattle	<ul style="list-style-type: none"> • Raw milk & raw milk products 	Tuberculosis
<i>Brucella abortus</i>	Cattle	<ul style="list-style-type: none"> • Raw milk & raw milk products 	Brucellosis
Parasites			
<i>Cryptosporidium parvum</i>	Cattle	<ul style="list-style-type: none"> • Contaminated water 	Gastroenteritis type symptoms
<i>Giardia</i>	Cattle	<ul style="list-style-type: none"> • Contaminated water 	Gastroenteritis type symptoms
Viruses	All species	<ul style="list-style-type: none"> • Various 	Various

3. HACCP in mountain farm

All 7 principles of HACCP each of which must be addressed when a HACCP plan is being developed and implemented:

(1) Conduct a hazard analysis, i.e. prepare a list of steps in the process where significant

hazards may occur and describe the control measures.

(2) Determine the critical control points (CCPs) or steps at which control can be applied and is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

(3) Establish critical limits, which are the maximum or minimum value(s) to which a

hazard must be controlled at a CCP to prevent, eliminate or reduce to an acceptable level the occurrence of the identified food safety hazard.

(4) Establish monitoring procedures to assess whether a CCP is under control and to produce an accurate record for future use in verification.

(5) Establish corrective actions to be followed when a deviation occurs, which is a failure to meet a critical limit.

(6) Establish verification procedures to determine if the HACCP plan is operating as intended.

(7) Establish record keeping and documentation procedures [9] propose specific guidelines for food safety control that describes hazard analysis at the farm level and various on-farm measures that can positively impact on food safety [2, 3]. These guidelines are divided as follows:

- Animal traceability
- Feed / fodder
- Water
- Animal housing / living conditions
- Clean livestock
- Animal health and disease prevention
- Detergents, disinfectants and agro-chemicals
- Milk quality
- Animal waste
- Bio-security
- Egg fumigation in poultry production.

A specific attention should be done on feed. Guidelines to prevent food safety problems due to feed include [9]:

- Purchase of feed from a reputable supplier with a feed safety system in operation.
- Use of feed according to manufacturers' recommendations (e.g. feed for animal species intended).
 - Particular care must be taken with medicated feed (see Animal health and disease prevention.
 - Feed must never contain prohibited ingredients (e.g. meat and bone meal).
 - Proper feed storage facilities (clean, dry and bird / vermin proof).
 - Produce silage to the highest quality possible. Assessment of grass sugar levels can help establish if additives (i.e. acids, sugars, enzymes or bacterial inoculants) will improve silage fermentation. Wilting of grass can also help the fermentation process. Furthermore, attention to cleanliness (i.e. avoiding soil contamination), covering and sealing are important for proper fermentation.
 - If cereal crops grown on the farm are fed to animals, the withdrawal dates for pesticides

should be adhered to in order to prevent chemical residue contamination.

4. Consideration about food security and food safety during COVID 19 context

Romania registered in the first 8 months of 2019 a deficit of 1.14 billion euros in trade with agri-food products, which is increasing by over 8% compared to 2018, according to the most recent data published by the Ministry of Agriculture and Rural Development. Similar to 2018, they were registered trade deficits in meat and edible offal, milk and milk products, vegetables and fruits, prepared based on cereals, but having trade surpluses on exports of cereals, live animals, seeds and oily fruits.

Generally, we export raw March and import processed / value products added. The value of exports increased by almost 11% in 2019, while imports increased by 10.3% compared to the previous year [12, 14].

In the context of the outbreak of the pandemic, the authorities with competences in the field of food security¹¹ claim that the situation is under control. National Sanitary Veterinary and Safety Authority Food (ANSVSA) transmitted that there are sufficient food stocks to meet the requirements population.

Romania has decided to block exports of cereals. Military Ordinance no. 8/2020 on measures to prevent the spread of COVID-19¹³ provides at art. 7, - 1 prohibition / suspension of export for agri-food products provided in the annex no. 2 of the ordinance, during the state of emergency.

The Minister of Agriculture stated¹⁴ that this decision was taken as a result of monitoring stocks and exports compared to March of the year in the past, with an increase in exports of 300,000 tons of grain more than the year previous for the same period [14].

The Minister added that in Romania, on average, 170,000 are consumed tons of cereals per month, reserves being sufficient until the end of July. The biggest problems of farmers at the moment are linked to stocks - both to producers and processors, generated by the closure of the industry HORECA, procurement of inputs as well as imports, which arrive late through the green corridors (priority routes for the transport of goods during a pandemic).

To these is added the need for force to ensure the continuity of activities in animal husbandry, as well as cultivation, harvesting, etc. in

vegetable growing. In fact, the most affected at this time are vegetable growers: many of them do not they manage to sell only a small part of the production.

Since the beginning of the COVID-19 crisis, part of society, but also consumers have become aware of the need support for small farmers and local agriculture - social networks promote consumption from nearby farms, online aggregators of farms that deliver in the area of large cities have appeared.

Online product sales have accelerated, farmers have already been digitized (not many, unfortunately) and more chosen their forms of association intensified home deliveries. The new model of selling food has become a *business to consumer*.

5. Lack of storage space, food safety issue for Romanian farmers

For those farmers who could not / did not know how to move online, did not have storage space and were not associated, the situation quickly became dramatic, with many small vegetable growers having to throw away most of it from production.

Even if the agri-food markets remained open during the state of emergency for farmers presenting certificates of agricultural producers, the rules of social distance in this period have caused the number of consumers in the markets to decrease drastically.

The problem of lack of deposits and of a vegetable collection infrastructure is fully felt: according to the Romanian Farmers Association (AFR), they are insufficient and cover a maximum of 10% of Romania's vegetable production.

A more important initiative of MADR was the creation of the online platform www.rndr.ro/vegetables, where vegetable producers can display the quantities available for sale, facilitating them thus dialogue with retailers. Even though so far a few hundred manufacturers have promoted their offer on the platform, its usefulness proves to be reduced in relation to large commercial chains, from due to the procurement procedures of the latter, which involves a standardization of production.

The goods must be sorted, calibrated, packaged. In addition, the costs of taking over small quantities of vegetables from a large number of producers are high, so all their association is considered to be a solution.

Conclusions

Hazard analysis can certainly be applied to the mountain farm situation. This should involve consulting with farm staff and, if necessary, external advisers (e.g. the farm's veterinarian and agricultural adviser). Farming can be considered to be a series of inputs, processes and outputs. Farmers may find flow diagrams useful when considering the potential hazard(s) associated with each step [15, 17].

There are linkages between these different guidelines with, for example, animal housing / living conditions impacting on clean livestock. The problem of lack of deposits and of a food product collection infrastructure can cause food safety issues during pandemic situation, in connection with HORECA activity decreasing.

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ZONING FOR TOURISM AND RECREATION OF THE TÂMPA MOUNTAIN A USEFUL INSTRUMENT IN PROTECTED AREA MANAGEMENT

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Abstract: *Uncontrolled tourism and non-compliance will result a damage to the Tâmpa Mountains protected area. There are many tourists who visit this area and a zoning of the protected area would increase the satisfaction of the tourists in parallel with a better possibility of preserving the natural heritage. The purpose of this study is the zoning of the protected area in order to protect the biodiversity and increase the satisfaction of tourist considering area's characteristics, tourism potential, type of visitors, area infrastructure and methods of manage tourist activities in a way to respects nature. Also, because there are many cyclists who cross the protected area though it is forbidden[7], we created a cycling route that surrounds the protected area, so it is not lost the charm of being close to nature and to respect at the same time.*

Keywords: *visiting strategy, sustainable tourism, tourism potential, protected area*

1. Introduction

Zoning is generally used as a planning instrument to handle land use conflicts [2]. Zoning for tourism and recreation is a concept used in natural areas both in North America and Europe, to provide the best opportunities for different types of experiences and at the same time so as not to overload or to destroy the natural environment [10].

For centuries the municipality of Braşov represented one of the most important, strong and flourishing cities in Transylvania [1].

Infrastructure of the city and positioning in the center of the country represents a privilege for the development of many economic, cultural and sporting activities. Surrounded by mountains the Braşov has a high potential in terms of natural tourism and adventure tourism. Also the history and culture of the region attract many tourists interested in art, knowledge and architecture. In other words, Braşov enjoys almost all forms of tourism and continues to develop from this point of view [1].

Increasing the flow of domestic and international tourists can endanger the geographical environment [4]. Absence of a visitation strategy for protected areas can lead to a chaotic development of tourism, thus endangers animal habitats and plants species, but not least

the satisfaction of the tourists and the well-being of the citizens. There are few cities in the world to enjoy the presence of a protected area fixed in the center of the city Therefore, the purpose of the study is to propose a useful system in the management of the protected area for the conservation of species habitats and increasing the satisfaction of tourists being aware that the practice of sustainable tourism bring benefits for nature and tourists.

1.1. Objectives

The specific objectives of the research were:

- Identification of the main expectations of tourists in the protected area Tâmpa Mountain;
- Propose an interior zoning of the protected area in order to increase the tourists' satisfaction and to improve the natural environment;
- Identification of a route for cyclists outside of the protected area in such a way that they be satisfied by beauty and by the challenges of the route and at the same time to reduce the pressure exercised on Tâmpa protected area by lovers of this sport.

Study area

The Tâmpa massif with an altitude of 960 meters belongs to the Postăvaru Massif located in the south of the Eastern Carpathians more precisely

in the Carpathians of Curvature. The mountain is made up mainly of limestone formations formed by the crustal crusting process and is surrounded almost entirely by the municipality of Braşov.

From this massif, 188 ha is declared a nature reserve of flora, fauna and landscape type corresponding to the 4th category of the International Union for the Conservation of Nature. On March 6, 2000, by Law No. 5, regarding the approval of the Plan for the development of the national territory Section III - protected areas Tâmpa becomes a protected area of national interest.

In 2008 it was designated as Natura 2000 site receiving the name ROSCI0120 Tâmpa Mountain. It has dual protection status: nature reserve and protected area of Community importance as a result of the special conservative value recognized at national level and in community context.

2. Methodology

The research methodology involved a combination of techniques including the study of literature on sustainable tourism and resource management, as well as interviews with guardians of the protected area and tourists visiting the area. Also, the method of direct observation of the activity on the tourist paths that cross the protected area was used [3].

The analysis of spatial repartition of touristic areas, their correlation with natural touristic resources, the mapping using an open-source GIS soft, will highlight the proposal of touristic routes in accordance with the expectations of tourists (quiet area, quick access to point of view, safe area for large groups, etc.) and the management plan of the protected area.

3. Research Results

- Following the analysis, problems were encountered by tourists in the Tâmpa Mountain Protected Area:
- Lack of interior zoning of the protected area to meet all the tourist needs in a protected natural area;
- Insufficiency of the thematic routes correlated with the particularities of the protected area;

- Practicing cycling in the protected area, creating discomfort for pedestrian tourists and emphasizing erosion of tourist paths ;

Whether these observations will be resolved we can expect a better management of the protected area with benefits both in terms of biodiversity conservation and tourists' satisfaction. Below we make some proposals for solving these problems.

4.1. Interior zoning of the Tâmpa Mountain protected area

Zoning for tourism and recreation is an instrument of nature conservation which contributes to the achievement two objectives set by the IUCN for protected areas as Tâmpa, which belongs to IV Category like:

- to develop public education and appreciation of the species and/or habitats concerned;
- to provide a means by which the urban residents may obtain regular contact with nature [11].

Zoning for tourism and recreation is a relatively common concept, being applied in particular for nature conservation and to provide visitors with high quality experiences [10]. The management plan of the protected area provides for the strict guidance of visitors on the arranged routes and prohibiting their access to other areas of the protected area [8].

This strict guidance of tourists on the tourist routes can create frustration among tourists, they felt compelled, limit themselves in their desire to know and to discover nature. To lessen the feeling of frustration it is advisable to maximize the existing tourist routes for a good quality of the tourist experience in accordance with the protected area management plan.

The proposed zoning of the protected area takes into account the existence and characteristics of tourist routes as well as their potential to meet the expectations of tourists, this is shown in figure 1.

A. Area of research, education and sustainable promotion of cultural and natural heritage - the Belvedere area, the Tâmpa Peak and the rocks from Saddle Tâmpa

We consider that this area has the most valuable cultural and natural heritage, being the final destination of all the routes that cross different

zones of the protected area. Here we consider that it is the most suitable place for organizing various laboratories and or seminars outdoors, on various topics related to biodiversity and or cultural heritage.

With the help of methods of nature interpretation or some tour guides here can be organized various nature observation tours that can lead to a better understanding of the need to designate protected areas in general and the

Protected Area Tâmpa Mountain in particular, the area is very generous both as a view and as natural and anthropic attractions.

From the top of Tâmpa you can admire the panorama of the city, called Belvedere.

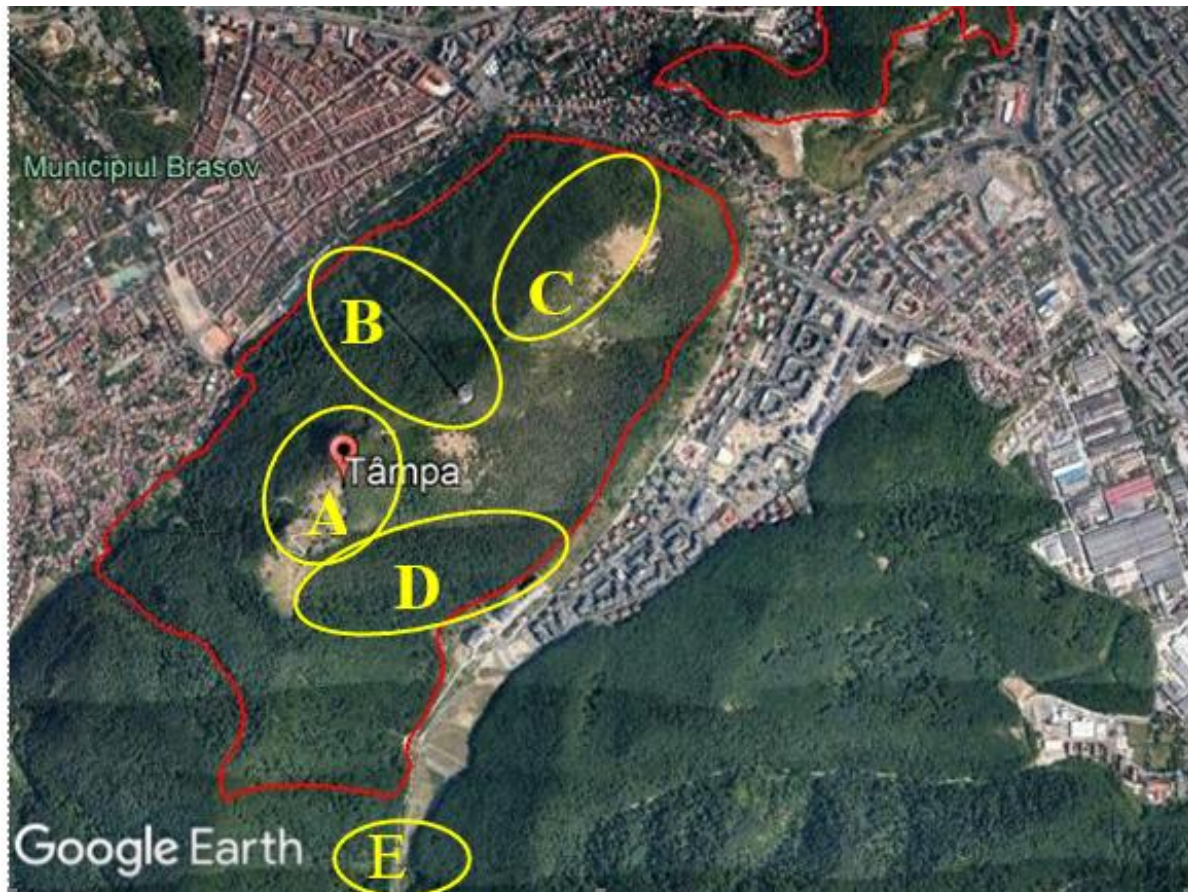


Fig. 1. Zones for tourism and recreation of the Tâmpa Mountain Nature Reserve

The steep wall from Belvedere offers good vegetation conditions for endemic rock species: *Helictotrichon decorum*, *Thymus comosus*, *Campanula carpatica*, *Dianthus spiculifolius*. On the south-south-east direction, if continue on the ridge road, the visitor will be impressed by the richness of the vegetal carpet of the spring period where the blue flowers called *Hepatica transsilvanica* și *Scilla bifolia*, which alternates with the white ones called *Anemone nemorosa* and *Isopyrum thalictroides*, the yellow ones *Anemone ranunculoides* and species of *Gagea* and purple of *Corydalis solida*, and *Pulmonaria officinalis* [8].

The rocky meadow is sprinkled in the spring with some species with spectacular flowers in different colors: *Pulsatilla montana*, *Euphorbia epithymoides*, *Potentilla cinerea*, and *Ornithogallum orthophyllum*.

The area overlaps the potential habitats of species of community and national interest *Calimorpha quadripunctaria*, *Maculinea arion*, *Parnassius mnemosyne*, *Iris aphylla*, *Dracocephalum austriacum*, *Echium russicum*, and *Cypripedium calceolus*.

B. Outdoor physical activity area - area for quick access to the Belvedere point - The

alley below Tâmpa - The Serpentine Road The Tâmpa Peak, a route marked with "red triangle", with a length of 800 m, is the most suitable route for creating such an area;

This area is for those tourists who want to do outdoor sports or those who have the main objective of visiting Belvedere point of the reservation.

In this area, at the boundary of the reservation are arranged sports routes, the area having many paved alleys for outdoor activities. Also in this area is the starting point of the cable car facilitating quick access to the upper areas of Mount Tâmpa for tourists who do not have enough time as well as those who do not want or cannot make physical effort. It is the most known and easy route, that's why it is preferred by citizens and tourists, fascinated by the view over the old city, amplified with each step [8]. The natural resources that can be found on this route are: *Mercurialis perennis*, *Festuca drimeja*, *Viola reichenbachiana*, *Hepatica transsilvanica*, *Aconitum lasianthum*, *Galanthus nivalis*.

The route also crosses potential habitats for *Rosalia alpina*, *Cypripedium calceolus*, species of community and national interest.

When the Serpentine is completed, you can reach the cable car station and the Panoramic restaurant, following the north-north-east direction. In the south-south-east direction you can follow, on the level curve, the path that ends in a small terrace or can continue climbing the ridge path [5]. From the middle of the Serpentine road the route can be followed on a secondary variant: the Knights' Road, which crosses a long beech tree, where some orchids with sporadic presence can be admired: *Cephalanthera damasonium*, *Epipactis atrorubens*, *Cephalanthera longifolia*, and *Neottia nidus-avis*.

C. Quiet area – Roud „Aleea de sub Tâmpa” – Gabony Steps - Panoramic - the tip of Tâmpa - the route marked with "yellow triangle", with a total length of 4.5 km, has the highest potential for creating this type of area.

In this area the feeling of tranquility predominates, being an area less frequented by tourists, being indicated to tourists who want to practice meditation, to recreate, to reconnect and not least to enjoy nature. The route being very generous from this point of view.

The trail crosses potential habitats for the following protected species at community level:

Callimorpha quadripunctaria, *Maculinea arion*, *Parnassius mnemosyne*, *Iris aphylla* ssp. *hungarica*, *Cypripedium calceolus*, *Echium russicum*, *Ursus arctos*. Other species of national and tourist interest that can be found on this route are: *Hepatica transsilvanica*, *Lunaria rediviva*, *Asplenium scolopendrium*, *Carex humilis*, *Echium maculatum*, *Delphinium fissum*, *Hyacinthella leucophaea*, *Geranium sanguineum*, *Dictamnus albus*, *Fraxinus ornus*, *Lilium martagon*, *Stellaria holostea*, *Galium schultesii*, On some of them being shown in figure 1. On this route are arranged 2 stopping places, located in belvedere areas to the Civic Center and to the Valley Fortress neighborhood.

The maximum quiet potential of this area is met on Mondays, day when the cable car does not work and thus the flow of tourists is less. This route through the quiet zone area may vary along the path that runs along the slope base, which immediately rises above the Valley Fortress neighborhood. This option is easier for people with disabilities or for people who do not make physical effort.

D. Area of larger groups, school groups and families with children - Răcădău - Epure - Tâmpa Saddle – Tâmpa Peak. Marking: blue stripe.

This area is characterized by a higher degree of safety on the route, which is largely constituted by a forest road that exits in Tampei Saddle. The area is intended for groups or families with children because there is a relatively easy parking space in the area, the members of the groups can travel the route without creating discomfort to the other tourists, children have the freedom to run or to play, without being constrained to a greater degree of attention, thus facilitating relaxation, disconnection and nature observation.

It's the easiest route, but the vegetable carpet is less interesting, consisting mainly of pine plantations, through which witnesses from the natural forest were kept: beech, linder, cherry. The ascent is at first very tame and crosses the base of the slope, immediately above the Valley Fortress neighborhood.

E. Camping and picnic area – the Valley Fortress neighborhood- Răcădău – La Epure This area located outside the protected area it is equipped with tables and barbecues for picnic activities and would also be suitable for camping activities. In this regard we recommend the arrangement of public toilet and showers with permanent hot water, firewood, proper waste management and a fence to protect against wild

animals especially in the camping and parking areas. A good example is the camping area near the Holy Ana Lake, Harghita County, which, although located at a greater altitude and far beyond an urban area, has managed to solve all these problems for the benefit of tourists and the protected area. This area for parking, picnic and camping is suitable for tourists who want to

experience life in nature overnight or who want to socialize with friends and or family by preparing grilled foods. This area could significantly increase the tourism potential of the city of Braşov because we believe that the campsite once arranged could be the basis for the development of concerts or festivals with a positive impact on Braşov tourism.



Callimorpha quadripunctaria [13]



Parnassius mnemosyne [18]



Iris aphylla [17]



Delphinium fissum [14]



Hyacinthella leucophaea [16]



The Valley Fortress
neighborhood



Asplenium scolopendrium [12]



Echium maculatum [15]

Fig.2. Quiet area C and some of the natural attractions of the area

4.2. Proposing a cycle tour

Even if cycling tourism is considered a sustainable form of tourism that needs to be encouraged, with a low carbon footprint [6], its

practice in protected areas such as Tâmpa is prohibited. Cycling in the protected area proves that tourists are not informed about the rules of the protected area and especially young people

eager to practice such sports and recreation in natural areas.

Practicing cycling in the protected area creates discomfort for hikers, producing a state of insecurity on the route and erosion of tourist paths, endangering the habitats of the species. The arrangement of a cycle tour near the

protected area is very important for the Tâmpa Mountain reservation, thus reducing the pressure it creates thus offering the lovers of this sport an attractive alternative. The proposal of a bicycle touring route will encourage cycling in nature and will attract more tourists who want outdoor activities.

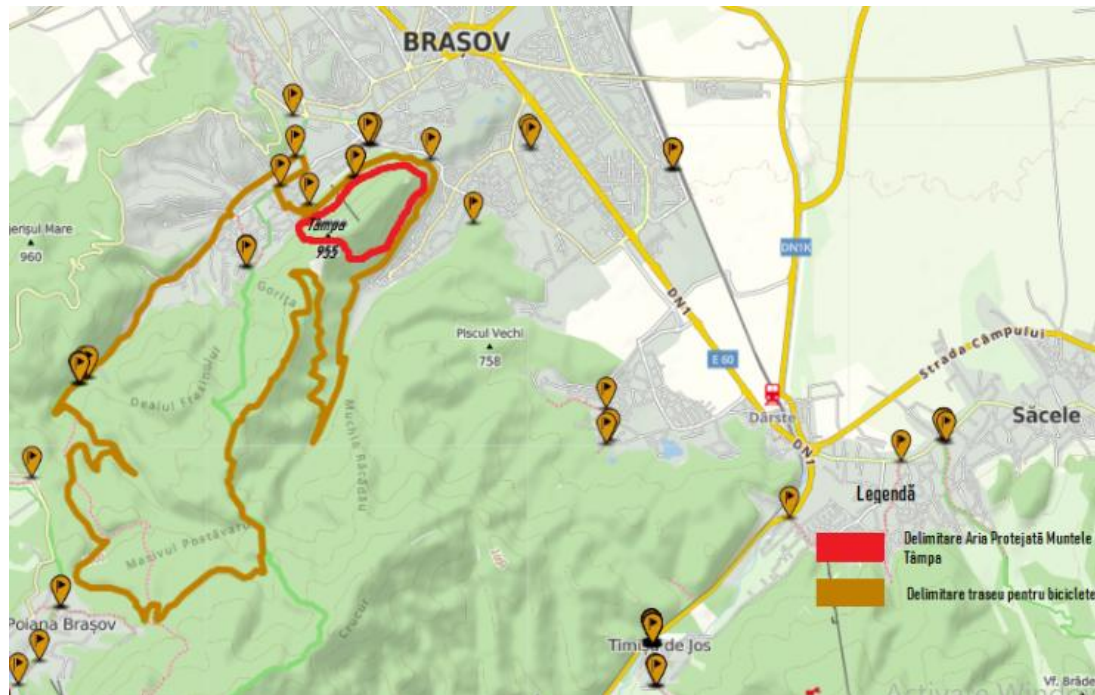


Fig.3. Proposal for planning the cycle route

The difficulty of the thought route is an average, with a distance of 24 km, with a difference of level of 603 m and a duration of three hours. There is a circuit around Mount Tâmpa that includes the following stages: Brașov - Solomon's Stones - Stechil's Glade - Tâmpa Saddle - La Epure - Brașov, circuit represented in figure 3.

Through this route we consider that we highlight the landscape potential of the surroundings of Tâmpa, offering both cyclists in Brașov and tourists visiting the city and want to discover the surroundings of the bicycle seat, a route of medium difficulty but of a particularly picturesque. We propose to change the concept of cycling on Tâmpa with that of riding around Tâmpa.

Conclusions

Zoning for tourism and recreation of protected areas is a tool in the management of protected areas meant to help conserve the species' habitats while meeting the tourist needs.

For the Tâmpa Mountain protected area was identified five zones with different characteristics which can satisfy a wide range of expectations from different categories of tourists.

The existence of specialized guides in the interpretation of nature in the valuable areas of the protected area would improve the perception of the protected area in the sense of a better awareness of the sheltered heritage and the need for its protection.

The practice of cycling in natural areas but not in protected areas, is a good option for sports and recreation, therefore the arrangement of a cycle tour near Brașov is an opportunity for tourism development of the city.

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USING ONLINE MEASURING INSTRUMENTS FOR SEGMENTING TOURISTS INTERESTED IN APARTMENTS ACCOMMODATION SERVICES

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Abstract: The paper presents the profiles of the tourists interested in hire Bucharest apartments accommodation using a website that offers this kind of services. For this aim, an online measuring instrument named Google Analytics was used and applied to the website www.eastcomfort.com. The information resulted are useful for the website improvement in order to make it more attractive for tourists.

Keywords: measuring, accommodation, apartments, tourists, Google Analytics

1. Introduction

Tourism is beyond all doubts one of the most important activities the modern person carries out, in a world that is developing faster and faster and that is generating more stress to individuals [1].

Tourist products are constantly in demand by a growing part of the population, so that all countries with tourism potential appreciate tourism as a priority for the national economy [6].

At the same time as the number of tourists increases, the number of entrepreneurs who develop a business in this field also increases, increasing the competition. In the same time, consumption is developing in the area where the tourist activity is carried out, which at the macroeconomic level can be found in the economic development. Probably the most important role in terms of the power to impose itself on the tourism market is played by management policy [1].

Tourism is, both by its content and by its role, a phenomenon characteristic of today's civilization, one of the major components of economic and social life that polarizes the interest of a growing number of countries. [8]

In the national economy of many countries, tourism is particularly important, thanks to the complexity of this process and the activities required for its emergence, maintenance and development. Tourism highlights and economically exploits the unique thesaurus made

up of the riches conceived by nature or climate, or those left by civilization, folklore and history. Without tourist mobility, the cultural, historical and natural riches of a country will never be the goal of an economic activity with the possibility of generating income [1].

E-tourism is a component of e-commerce and connects the fastest existing technologies, such as information and communication technology, the management / marketing / strategic planning industry and hospitality [1].

Information technology facilitates the speed and efficiency with which information is handled, the handling of information reduces costs, increases transfer speed and the extraction of information and transactions involving customers in control. Information transmitted in real time enables companies to anticipate the needs of their customers and global market developments, to face increased competition [3].

The processes specific to e-tourism are based on the existence of travel agencies, tour operators and other organizations with certain interests in the virtual space, using specialized portals. The phenomenon has implications both for the consumers of tourism services, and for the providers of these services. In this context the measurement of the tourist online preferences is very important. Without systems in place to measure the profile and the interest of tourists in specific services it's tough to improve performance and to adjust to the ever-changing market conditions [2].

As measuring systems, websites have a major role in study the site visitors. In the past we used to talk about “hits” to a website. The problem... this meant practically nothing. Fast forward to today and it’s amazing how useful a good web analytic system can be. One of the best in-depth traffic monitoring and analysis services is Google Analytics. This service, although very complex, is offered free of charge. This his tool is useful for analyzing complex reports of the quality elements (loyalty, efficiency of the AdWords campaign – if enabled, the most visited pages, etc.). For all the data provided, “Cross Segment” analysis can be performed, by isolating the reports on certain segments: traffic sources, keywords, visitor, country, city, new visitors and many more [1].

2. Measuring the tourist interest in apartments accommodation using Google Analytics

Apartment accommodation means offering accommodation spaces, for fixed period of time. This type of service is the accommodation of a person in a building for different periods of time, from one day, to the maximum period being set by each real estate agency or owner. In general, a space offered for rent in a apartment accommodation (called also hotel regime) has all the strictly necessary facilities: equipped kitchen, furniture, telephone, TV, etc. Most tourists prefer locations that are close to the central areas of major cities or certain areas of interest: airports, railway stations, private institutions, public institutions, important tourist attractions, etc [5].

There are two categories of accommodation available for rent: "aparthotels" meaning apartment buildings made available for rent that always have a reception, and "corporate housing" meaning hotel rentals made available of qualified companies. In "aparthotels" the offer includes studios and apartments with two or more rooms, most equipped with their own kitchen [1].

In this paper is presented the segmenting of future clients interested in apartment accommodation services in Bucharest. To achieve this goal, visitor traffic was monitored on the website www.eastcomfort.com with the help of the Google Analytic tool. The monitoring was carried out during one year between May 2019 - May 2020.

The Google Analytic is a free application provided by Google, which monitors the entire activity of the web page. In general, site owners

use this method to track traffic on the pages they own, as well as other types of data such as: number of sessions, average time visitors spend on the site, keywords that led to traffic, organic or traffic sources. Therefore, Google Analytics is considered a free service, which can generate various reports with data and information of web traffic, which refers to the site to which a tracking script is assigned. The script is generated automatically and is usually added to the site. A disadvantage, is that the data that Google Analytics can provide is not retroactive. Consequently, the script should be added to the site as soon as possible (ideally before it is published), in order to ensure that relevant information and statistics about the users of the platform are not lost. Reports can show how many unique users visited the site in a defined time period, how many times, from what type of device (desktop, mobile or tablet), from which cities or countries they accessed the page, from which browser (Opera, Firefox, Chrome, etc.).

Google Analytics offer the possibility to divide visitors into reports according to demographic criteria such as: age, sex, region or interests. In addition, Google Analytics offers the possibility to observe the route of users on the pages belonging to the site, but also the purchase channels through which visitors came to the site (organic, direct, e-mail, social media, etc.).

Once the site owner has the information about the people who visit his site, he can know his customers much better. It will have the ability to create attractive content specific to the target audience of the site and will automatically increase the conversion rate. Conversion can mean subscribing to a visitor's news on the site or, at best, purchasing a service or product from the site [1].

Google Analytics groups site information into five categories: Real Time, Audience, Acquisition, Behavior, and Conversions [6].

If the Real Time category, is accessed on the Overview area, recent complex data are observed, about the situation of the site. It shows: the areas where the active users of the site are located (location), how many people entered from the social environment or from other sources (traffic sources), the number of active users on the site constantly, the type of devices from which they accessed the site (desktop or mobile).

Another category called Audience includes: demographics (gender and age), location (geographic area where users are located),

audience interests (topic preferences), behavior (number of loyal users and only users), device used.

In the Acquisition section is analyzed the way in which traffic was obtained on the site, more precisely the way in which visitors reach the web page as well as the sources of traffic. The Overview section provides the channels that bring the most traffic over a period of time (Top Channels) and a detailed graph with the number of users and the number of conversions.

The reports from the Behavior category present data on the actions that users perform on the site. The most notable indicators are: Number of unique visitors, Number of visits per page, Rejection rate and Average time spent per page. 11 pt.

3. The visitors segmentation for the www.eatcomfort.com website

According to reports generated by Google Analytics, in one year, May 2019 - May 2020, the site [eastcomfort.com](http://www.eatcomfort.com), was accessed more by men, their percentage being around 54%. This fact is highlighted in figure 1. If we talk about business tourism, a possible explanation for the almost equal interest between men and women may be that although more men are currently in management positions, being forced to travel in the interest of the job, there is a growing trend of women starting to hold such positions.

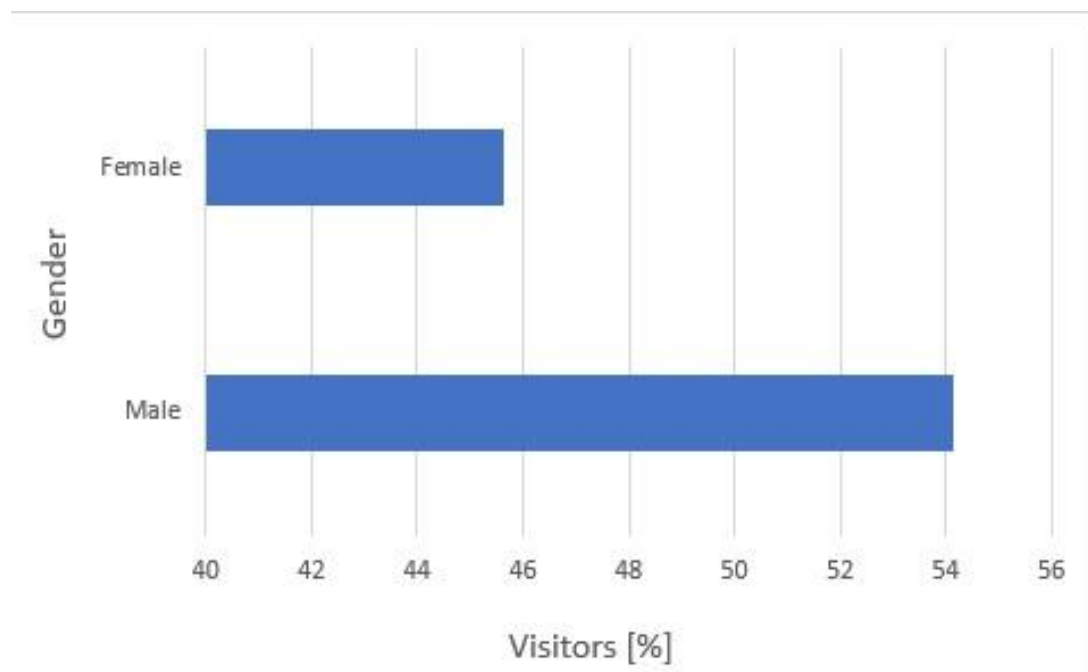


Fig 1. Type of respondents who accessed the www.eatcomfort.com website [1]

In the case of leisure tourism, the low percentage difference between men and women may be due to the fact that in many situations' women are responsible for organizing the holiday, including the choice of location [7].

Information on the higher percentage of men who access the site can be exploited by the company to generate additional revenue by adding advertising to services that target men such as casinos, barbershops, etc.

Regarding the age of those who accessed the site, according to Figure 2, the highest percentage

is visitors aged 25-34 by 34%, followed by those aged 18-24. The lowest percentage is registered by the age groups 55-64 and 65+ [1].

An explanation for the fact that the majority (62%) is made up of relatively young people (under 34 years old), is the fact that they are more prone to tourism, regardless of its nature but also that they spend more time on Internet [8].

Whether they are students (18-24 years old), who are in a university program, employees in the interest of work or people on vacation, who want a place to stay in On the other hand, the number of old visitors

may be more than 7% if an older visitor used another device to enter the site the next time. the appearance of the main page and when it is that eastcomfort.com does not offer its users a pleasant experience, both in terms of comes to the route they have to follow to complete an order. Also, even if the

conditions in the accommodation are very good, due to the rather difficult booking process and the fact that there is no way to pay directly on the site, many users do not get to make a reservation and do not return for the second time.

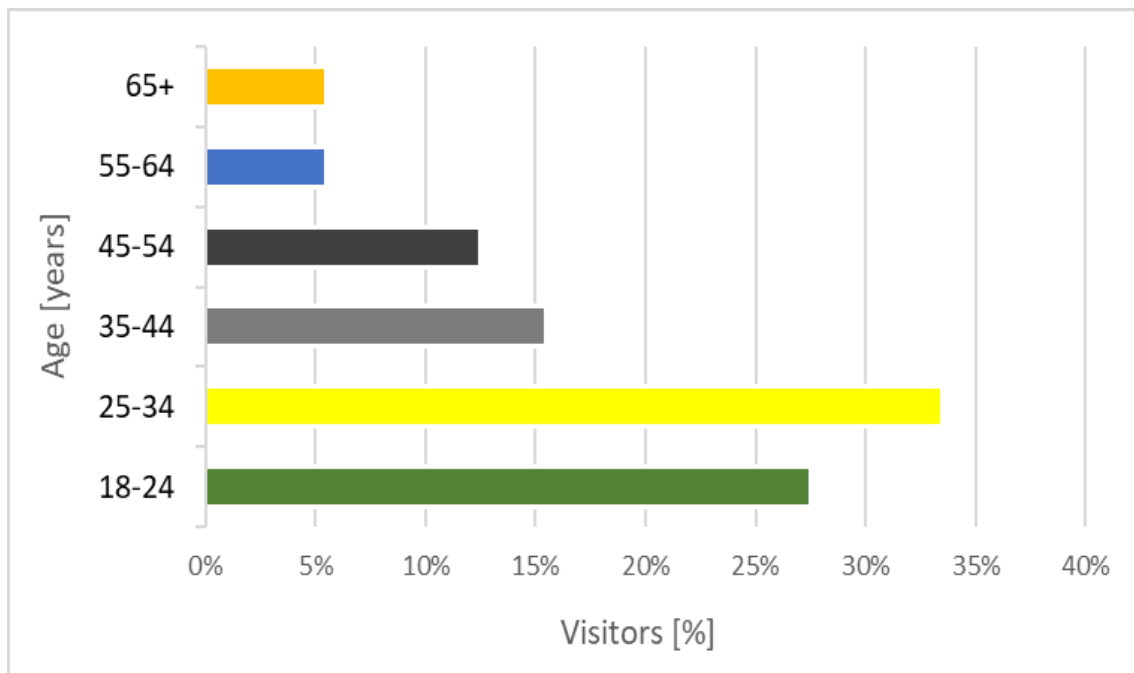


Fig 2. Distribution by age of the visitors who accessed the eastcomfort.com site [1]

The site may have important content that many people want to read, but a poor user interface means difficulties for their website navigation. It can be seen quite easily that the target audience for eastcomfort.com are young visitors. This is also due to the fact that they know and use the online much better.

To attract visitors over the age of 55, the site could include offers for seniors. From the point of view of the frequency of visitors, as shown in Figure 3, it can be seen that over 90% of those who accessed the site were new visitors. Only 7% were visitors to the previous site. A possible explanation for this situation is that eastcomfort.com does not offer its users a pleasant experience, both in terms of the appearance of the main page and when it comes to the route, they have to follow to complete an order. On the other

hand, the number of old visitors may be more than 7% if an older visitor used another device to enter the site the next time.

Also, even if the conditions in the accommodation are very good, due to the rather difficult booking process and the fact that there is no way to pay directly on the site, many users do not get to make a reservation and do not return for the second time [1].

The site may have important content that many people want to read, but a poor user interface means that visitors need to "learn" how to find the content they want.

In order to motivate old visitors to return to the site, the option to subscribe to the newsletter can be include. This way the visitors can follow various offers on the site or they can be offered a discount code to be used after the first booking.

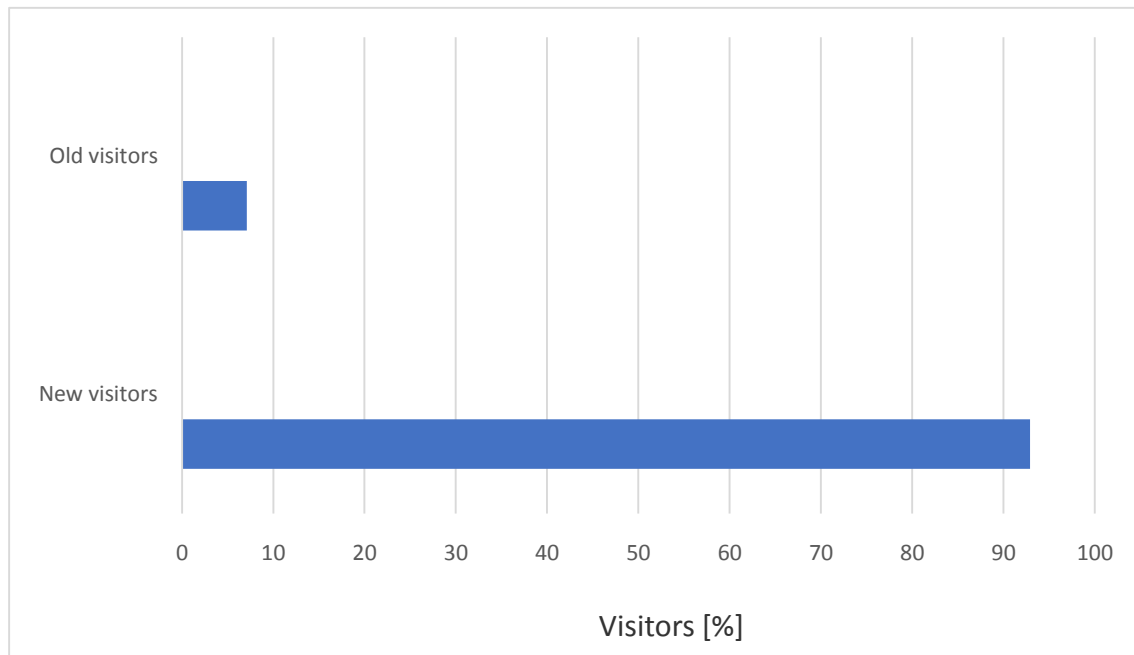


Fig 3. Percentage of people who have visited the site in the past and those who are on this platform for the first time [1]

4. Conclusions

The Google Analytics monitoring tool has proven to be a very useful tool for study the segmentation of clients interested in accommodation service in Bucharest. The information obtained by applying this tool to the website www.eastcomfort.com, can be used by the accommodation company to improve the impact of the offer on the visitors, in order to transform them in future clients. Also, the use of Google Analytics tool, was important for identification of the visitors traffic flow on the website and consequently to find the solution to improve it. Based on the results obtained with Google Analytics reports, it can be concluded that the number of users who complete an order, compared to the total number of visitors, is very small. At the same time, because there is a small number of accesses through advertising / marketing, it can be said that an investment is needed on this matter.

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POST-PANDEMIC DEVELOPMENT RENEWAL OF ROMANIAN AGRO-TOURISM

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Abstract: *In the current historical, climatic and economic conditions, it becomes more than necessary to imagine and realize new directions to adapt activity after the COVID-19 pandemic. The paper highlights the need for the production processes and the managerial approach in the agro-tourism units to be reoriented mainly in the direction of making agro-food products of special quality, in well-specified hygienic-sanitary conditions. These objectives are analyzed in the new post-pandemic context in relation to the interconnection between agriculture, food, tourism and the natural environment. In this area of interpenetration, agro-tourism emphasizes its versatility, where quality of life and health are intertwined with food quality and hygiene. The paper sorts out the ideas and concludes that following the post-pandemic changes, the combination "agriculture - tourism" requires the development of renewed policies and strategies for Romanian agro-tourism to be convergent to European, to emphasize the spirit of rural communities and give direction to village governance and Romanian agro-tourism resorts.*

Keywords: *agro-tourism, development, food, mountains, pandemic.*

1. Introduction

Starting from the premise of complexity of the agrotourism field, we will deepen the idea of special quality agro-food production in agro-tourism units, to emphasize that these products are the expression of the interconnection between agriculture, food, tourism and the natural environment. This versatility is essentially the acquisition of **responsible tourism**, meaning the branch to which the field of agrotourism belongs to. The reference area includes nature reserves, open rural areas (silvopastoral), villages and agricultural areas, but also cultural objectives, as well as customs and traditions of the rural area.

We specify that all these are typologically structured in two main directions of activity: ecotourism and agro-rural tourism, within the last one being found its basic economic component: AGRO-TOURISM. In this general context we can note that agro-rural tourism, and especially agrotourism, have the potential to become a viable, stable, well-articulated and original certainty in our country.

These areas of activity can effectively respond to legitimate economic, social, cultural

and spiritual needs, and at the same time align with the European competitive space.

Moreover, Romanian agro-rural tourism creates the conditions for conserving and preserving the structural, cultural and spiritual identity of the Romanian village, this being one of the conditions expressed in the European accession plan [1].

We mention that the situation is different at national level, in Romania there are a number of fragile areas that have special characteristics. For example, for fragile areas (mountainous, wet, desertified, etc.) policies and strategies are needed to encourage agro-zootechnical production and processing at farm level, respectively in small butchers, dairies, etc. [6,10]. Thus, a way of developing the activity is required, being necessary a more intense capitalization of local products even through tourism. We refer mainly to agro-tourism, as well as to gastrotourism, more precisely to the culinary processing and serving the tourists in the pension (meaning with their own products), but also to the sale in shops of original products from the local community [11, 12, 17, 18]. The various programs on the development of agrotourism

address the following 3 most important aspects [3, 13, 16]:

- **Increasing competitiveness** in the agricultural and forestry sectors (improving knowledge, strengthening human potential, restructuring and developing physical capital);
- **Improving the environment** and rural space (sustainable use of agricultural and forestry land);
- **Quality of life** in rural areas and diversification of the rural economy (diversification of the rural economy, especially in the direction of capitalizing on agricultural production through food processing and tourism).

The objectives of the paper are to highlight some scientific elements on the ideas of adapting the development of post-pandemic agrotourism COVID-19, necessary for the elaboration of development directions (policies and strategies) of this activity.

2. Materials and Methods

Documentary techniques, analysis of framework documents (legal and technical) of international and national organizations in the field of tourism and, implicitly, agrotourism were used. The applied methodology involves the collection of information, their systematization and processing, using statistical and managerial methods, as well as a series of comparative analyzes on the situation of Romanian agrotourism, before and after the Covid-19 pandemic.

3. Results and discussions

The new policies in tourism and even more so in agrotourism, which is so strongly anchored in economic realities, are expressed following economic and social assessments.

They highlight the effects of tourism and express future opportunities: - the type of tourism development, which may have a positive or negative character in its relationship with agriculture; / - the fact that favorable consequences do not appear automatically, but must be sought and established; / - the interest to look for an increase of the economic consequences of the tourism (agrotourism), through various actions (trade, the increase of the seasonality, the increase of the tourist

investments, the realization of complex tourist products); / - the need to accompany the development effort through an effort to organize and concentrate all local efforts.

It is desirable that institutions in the tourism industry, especially administrative ones (eg ONT, City Halls, etc.), give priority to public relations and promotional assistance to various rural associations, including in the field of agritourism. This, especially because these associations through their activities encourage a series of values of Romania's brand image.

As a concrete hypothesis, the network proposed by regional development inspectors will support individual rural providers with development guidance in a wider regional and national context (NB- it is necessary to carry out a university curriculum to have "specialists in development", compatible with the professional activity of those in advanced countries). They will also facilitate the establishment of structures, such as local promotion consortia. At the same time, the inspectors will facilitate the collection of data on events, attractions and activities through the local network of Tourist Information Centers (TIC), for the inclusion in the database of national tourism and relevant promotional activities.

The professional solution of "development", including tourism and of course agrotourism, is all the more current and necessary now, after the pandemic of COVID-19, a situation that can be considered an opportunity to modernize all structures of the tourism industry (at European and national level), making it more environmentally friendly and socially responsible.

The development of agritourism units involves, either at farm level, if production is high enough or at the level of zonal associations, increased attention to encourage processing at farm level (small butchers, dairy, etc.) and obtaining food that will serve both for the preparation of culinary preparations and serving to the tourists from the respective pension, as well as for sale in specialized shops with the sale of original products of the local community.

3.1. Policies and Forecasts in the Evolution of Agricultural Programs

It is necessary to develop several touristic products / programs that do not include accommodation, in order to improve the range of attractions and activities offered to visitors. In

particular, based on the concept of sustainable development, there are opportunities to expand visitor activities in protected areas.

These can have a significant positive impact on providers in local communities within or around protected areas. Wider publicity of traditional rural events is needed to facilitate visitor planning. On this basis, there are

practically some essential orientations in the relationship between tourism and agriculture [1], which can be the basis for the realization of a **development policy plan** in the field of agrotourism (fig.1).

OPERATIONAL REMODELING OF MONTAN AGRO-TOURISM IN THE CARPATHIANS BASED ON NEW POST-PANDEMIC RECOMMENDATIONS

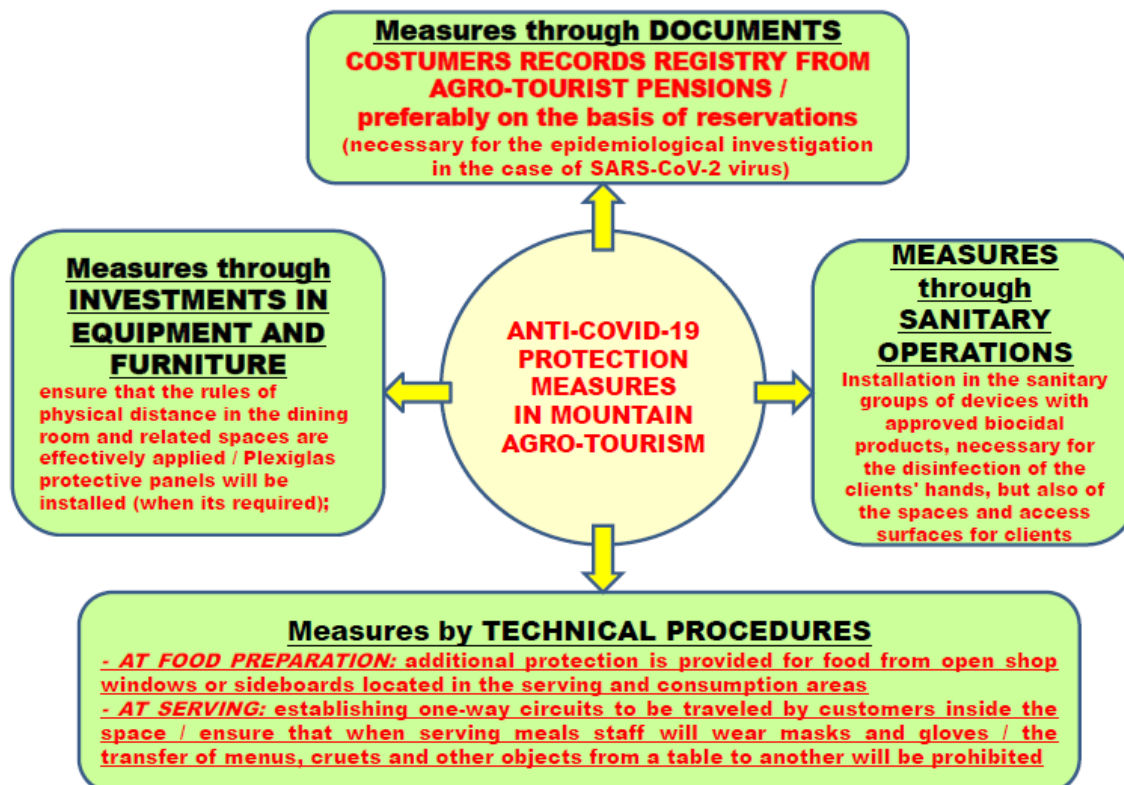


Fig. 1. Operational remodeling of agro-tourism, based on the new post-pandemic recommendations

The guidelines indicated in figure 1 induce the need for updated pragmatic strategic measures, but based on aspects previously

specified in the literature [15], elements described in summary in the box below.

ELEMENTS FOR ELABORATION OF LOCAL / COUNTY AGRICULTURAL STRATEGY

- **improvement of the general infrastructure** on which the revitalization of the entire rural economy depends on (roads, water network, sewerage, telecommunications, electricity);
- **arranging some farms, boarding houses, model tourist households (pilot)**, as endowment and organization of the activity, but with the observance of the local architecture and traditions, avoiding the kitsch, the typification or the transfer of the urban constructions in the rural environment;
- identification, inventory and capitalization of touristical and neighboring resources; development and modernization of those introduced in the touristic circuit "with special emphasis on entertainment, animation, leisure and sports;

- the realization of the **national reservation system**, in the first phase and the connection to the international reservation system of the world tourism - priority the rural one.
- organization of accommodation dispatchers and **information offices**; the location in the touristic villages and on the roads that connect them (European, national and local) of the map-panels with the positioning of the RRT landmarks (Romanian rural tourism): dispatching accommodation, information point, touristical objectives, hosts, traditional catering units, farms, boarding houses, etc.
- drawing up a **record** of: the main events in villages (cultural, religious, traditions, fairs, etc.), commemorations, artisans and local poets, in order to present authentic and valuable touristic programs (customized to the area).

3.2. Programs and Actions

Related to the agro-tourism development strategy, the various programs address the following issues:

- **Increasing competitiveness** in the agricultural and forestry sectors (improving knowledge, strengthening human potential, restructuring and developing physical capital);
- **Improving the environment** and rural space (sustainable use of agricultural and forestry land);
- **Quality of life** in rural areas and diversification of the rural economy (especially in the direction of capitalizing on agricultural production through food processing and tourism, improving the quality of life in rural areas).

In the context of those mentioned, we can list several **programs and actions** at the general level of the tourism industry, among which there are also elements related to the development of agrotourism. The idea of developing agrotourism can be complementary with improving the capitalization of agrotourism potential. For example, it will be possible to achieve by building new objectives with double functionality, such as winter sports and recreation [4].

Specifically, the actions undertaken within these programs will aim at:

- **improving the legislative system** regarding the monitoring and reporting of tourist activity, classification of tourist structures, tourist resorts and its harmonization at European level; adoption of the new tourism law.
- concentrating financial and image efforts to **promote national projects**;
- the approach in the priority programs of the **partnership system between states** - as the role of providing the infrastructure (roads, communication channels; other utilities), the local public administration (contributing with the lands necessary for the projects) and the private sector requested to finance, build and operate such projects;
- permanentization and annual improvement of **social programs** addressed to Romanian tourists such as: "Tourism for health",

"Seaside for all", "New Year's Eve in Romania", which would allow access to tourism and holidays to disadvantaged populations;

Also in the idea of developing Romanian agrotourism, we mention in summary some of the post-pandemic measures, which are recommended to be kept in the next period, having applicability in the agrotourism units:

- the existence of a register of customer reservations, so that the epidemiological investigation can be carried out (if necessary);
- ensure that at the entrance to the specially arranged space outside the building of the public catering unit (terrace) and at the bathrooms there are devices with approved biocidal products, necessary to disinfect the hands of customers, as well as informing them about how to use them;
- it is recommended to establish one-way circuits that must be used by customers inside the indoor spaces;
- the transfer of menus, cruets and other objects from one table to another will be prohibited. They will be disinfected after customers leave a table and, where possible, disposable menus will be used;
- regarding the density of tourists in agrotourism units, it is recommended to maintain a proper physical distance, especially in the dining room;
- the occupation of the places will be done with previous reservation, in order to avoid the agglomerations at the entrance of the unit and to

facilitate the epidemiological investigation in the event of an illness case between the local customers;

- informing customers about rules of hygiene, disinfection and physical distance, through posters, as well as the need to limit the serving time (where appropriate);
- ensures the cleaning and disinfection with approved biocidal substances of all spaces / surfaces where the customers have access, as well as of the tools used during meal;
- ensures that the tables are disinfected, after each client / group, with biocidal products that require a minimum contact time, approved by the National Commission for Biocidal Products;

Beyond the approach of agro-tourism at the organizational level, at the next stage (in certain situations) we can analyze the development of **agrotourism resorts**. This aspect actually becomes a promoter for the development of agrotourism in the neighboring areas. In this direction, the relatively recent existence of the **online promotion** should be noted, under the title "*Tourist pensions and agrotourism*" (iPensiuni.ro). Basically, this is a site for the presentation of pensions and agrotourism areas in Romania. It presents details about the accommodation conditions, certain facilities, the number of rooms, information about the geographical area, photos, rates, contact details, etc., regarding the pensions presented on the site as well as their reviews.

Conclusions

The convergence of Romanian and European agro-tourism implies competitiveness, protection of the environment and diversity (biological & cultural) and cooperation, respectively complementarity towards European agro-tourism.

The specificity of agro-tourism is related to the spirit of the rural community inhabitants who understand and preserve (still) the authentic local traditions, culture and natural landscapes, and more recently, taking into account the post-pandemic changes on the line of improving sanitary measures.

The renewal of the development model of agro-tourism requires the "bio-harmonization" of quality elements generated by the new post-pandemic conditions, with the style of governance of tourist villages, based on 4 basic directions: (a) the existence of specific documents in accordance with post-pandemic

recommendations; (b) the application of sanitary operations; (c) post-pandemic technological coherence on food processing and serving to consumers; (d) ensuring the requirements and recommendations for equipment and furniture in agro-tourism pensions.

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