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International Conference on Sustainable Economy and Agriculture

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Adoption of sustainable practices in agri-food chains

1.

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DECREASING THE SHRINKAGE AND SWELLING OF LONGITUDINALLY COMPRESSED WOOD

As a result of longitudinal compression of wood (aka. pleating), its radial, tangential and volumetric shrinkage and swelling slightly change, while both longitudinal shrinkage and swelling increase by orders of magnitude, by about 600-900%. This unusually high longitudinal dimension change causes the high deformation ability of pleated wood during the change of its moisture content. The explanation of this great increase in longitudinal shrinkage and swelling may be the wavy cell walls and the distortion of the microfibrils. These phenomena are the result of the treatment and ensures the required property of wood, the pliability. Thus, it is necessary to find a solution to highly improve both anti-shrinkage efficiency and anti-swelling efficiency of pleated wood. Lactic-acid treatment is a good solution. Lactic-acid treatment lowers the dimensional changes of wood through decreasing the moisture uptake of wood. But this impregnation treatment is relatively time consuming, compared for example to heat treatment, which is also an effective method to decrease the moisture uptake of wood by using mostly lower treatment temperatures to prevent the wood from becoming brittle. Microwave treatment has a positive effect on the preparation of the lactic acid. It highly fastens the oligomerization process, which is necessary before the impregnation process, to improve the polymerization ability of lactic acid molecules inside the solid wood.

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MANAGING EXTERNAL DATA AND BUILDING USER INTERFACE FOR AGRO-ENVIRONMENTAL PROCESS MODELS

Building and running various environmental models, especially a complex agro-environmental process models requires to use a big bunch of structured input data.

This dataset consist of model describing and configuration data, time independent (static) and time dependent (dynamic) data. During the running of models a new dataset is generated, namely the output dataset. The output is in relation with input, thus maintaining consistency of such type of datasets is a difficult task.

An important role of the user interfaces to decrease the complexity of input and output configuration of models and help users (and developers) to consistently describe the model structure, initial data and required output.

Our long term plan is to develop a separate full featured web and desktop application, however in short term we prefer a faster and upgradeable (sub)solution.

The model input is described with the YAML language. YAML is a human-readable (and editable) structural data serialization language. The first version is based on this editable text files. Because of availability of free open source YAML parsers, creating, processing and transforming this input files is relatively easy. This input description later can be the base of complex applications

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NDVI-BASED DOWNSCALING OF THE CREMAP ACTUAL EVAPOTRANSPIRATION MAPS

The increasingly used remote sensing-based evapotranspiration estimation techniques provide information about the spatial and temporal variability of evapotranspiration at the field and regional scales. For Hungary, the most reliable evapotranspiration mapping model is the CREMAP (Calibration-Free Evapotranspiration Mapping), which uses MODIS surface temperature data. The CREMAP evapotranspiration with its 1000*1000 m (1 km2) resolution can be used for examinations with larger scales, for example the comparison of the water balance of forests with different land cover types (agricultural areas, artificial surfaces, etc.). However, the 1 km2 spatial resolution is too coarse to be used for smaller scales like precision forest management or agroforestry systems. Therefore, a vegetation index-based (MODIS NDVI) downscaling process of the CREMAP evapotranspiration was developed, to a resolution of 250*250 m (6.25 hectares). The downscaling experiment was done for Hungary, for a drier (2003 May-October) and for a wetter (2005 May-October) period. The products were analyzed, according to forest stand types.

The vegetation index-based evapotranspiration downscaling process can be used for getting hydrological data for forest resources management, climate change impact studies on smaller scales or agroforestry systems research.

The research was supported by the EFOP-3.6.2-16-2017-00018 in the University of Sopron project.

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CONVENTIONAL AND REGENERATIVE WAY OF CULTIVATING SOIL: SIMPLE COST-BENEFIT ANALYSIS

While soil is cultivated with the common methods of the present agricultural practice, it`s organic matter content is able to decrease dramatically. To avoid this there is an emerging technology combining the positive effects of no-till cultivation, crop-covering and direct seeding.

According to the recent research this new way is able to capture CO2 from the atmosphere besides it increases the soil's organic matter content.

Because of the uncertainty of recent estimations on this phenomena (there are order of magnitude differences among different studies and reports on in situ farmland experiments) we neglect to discuss the question of CO2 capture but focus on other positive effect due to this method compared to conservative cultivating methods.

Thanks to using crop cover and leaving behind plowing the topsoil's structure will get better and will be able to conserve more moisture. With leaving behind the plowing there are other costs which are not invested in, therefore this method can be more cost-effective than conservative agriculture in certain circumstances.

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WOOD MODIFICATION RELATED RESEARCH AT THE UNIVERSITY OF SOPRON

Wood is recognized as the most important of the renewable base materials with the added advantage of being recyclable and CO2-neutral. But wood is a biodegradable material. Many traditional protection treatments currently exist to prevent these deteriorations, but often they are based on toxic materials. The aim is to get better performance from the wood, resulting in improvements in dimensional stability, decay resistance, weathering resistance, etc. Wood modification in different ways dates back from decades at the University of Sopron (Simonyi Károly Faculty of Engineering, Wood Sciences and Applied Arts, Institute of Wood Science). Wood modification processes indicate continuously new challenges. During the last years special attention was given to heat treatment processes in different media, acetylation, compression perpendicular and parallel to the grain and some impregnation processes. The application possibility of nanoscale materials in wood industry has been also investigated, using TiO2, ZnO, CeO2 and Fe3O2 nanoparticles, among others. Mechanical modifications (compression processes) affect mostly the physical-mechanical properties of wood.

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INVESTIGATION OF VOC COMPONENTS OF HONEY SAMPLES

Volatile organic compounds (VOCs) contribute to aromatic shape of honeys. These compounds are categorized into different chemical groups, like terpenes, aldehydes, alcohols, hydrocarbons, benzene derivatives, etc. They are regarded as fingerprints of honey varieties; monofloral honeys have their specific VOC composition. It is influenced by many effects, geographical origins, vintage, metabolism of bees, microbial and environmental contamination. The mixed flower honeys have the most complex VOC compositions, the main compositions can be identified by comparison of VOC caracters of monofloral honey types. The majority of analysis of VOC compound of honey samples based on SPME-GC techniques, several authors used static HS-GC analysis. Identification of high number of components is carried out by applying of MS detections; however the recognition of composition from metabolic origins besets with difficulties. The VOC components of most relevant Hungarian monofloral honeys, the effect of vintage on their compositions and comparation of VOC of honeys originated from different agroforestrial system are studied in this artical.

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ECOTOXICOLOGICAL EVALUATION OF TRACE ELEMENT SUPPLEMENTATION ON ANAEROBIC DIGESTION

The aim of this study was to evaluate the effects of trace element supplementation on semi-continuous anaerobic digestion of sugar beet pressed pulp. Furthermore we have investigated the phytotoxicity of anaerobic sludge via an ecotoxicological test for white mustard (Sinapis alba). Three parallel reactors were run in all cases of non-supplemented (without trace element supplementation), supplemented (2 μL L-1d-1 of trace element solution) and supplemented + Fe (2 μL L-1d-1 of trace element solution + 82 μLL-1d-1 of Fe(III)-chloride 40% aqueous solution – technical grade). The acute toxicity test was applied according to the Slovakian standard of STN 83 8303:1999. Three parallel tests were applied in all dilution rates (dilution of 10, 50, 100 and 200 x) of non-supplemented, supplemented and supplemented + Fe sludges, respectively. Results showed that average values of specific methane yields were 11.0 and 11.7% higher in the supplemented and supplemented plus iron trials compared to the non-supplemented trial, respectively. In the root elongation test of white mustard, the highest stimulation rate (-59.41%) was observed for the 10-fold dilution in the treatment with trace element and iron supplementation.

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ONLINE SOIL MOISTURE AND MICROCLIMATE INVESTIGATIONS ON AGROFORESTRY AND AGRICULTURAL FIELD PLOTS

Using the online measurement technologies we can follow-up detailed weather, microclimate and soil moisture changes for long periods, so we can get information even in the smallest deviations that were not detected in conventional ways. A 2 ha completely wind shielded agroforestry plot and a nearby situated natural wind-running field were investigated, using 1-1 automatic weather station as well as 5 + 1 of 90 cm soil probes which were used to measure the changes of soil moisture for 10cm layers.

In our study we examined the response to the forest belt's ability to change the parcel microclimate compared to open field conditions.

On the agroforestry plot, soil moisture probes were placed inside the forest belt (2p), at the edge of the forest belt (1 piece), and the interior of the parcel (2p). The No. 1. meteorological station was placed on the center of the plot, wherein the smallest edge effect prevailed. Measured parameters: 10meter wind speed (m/s), 10meter wind direction (degrees), 2m temperature (°C), Relative Humidity (%), the amount of rainfall (mm), intensity (mm/h), the amount of dew formation (%) and duration (s). The measured data sets were forwarded to the servers by gprs communication, where they were collected. By online access we could download them for the purpose of statistical tests.

For processing we used the statistical program R and performed a mathematical analysis of the indicators of descriptive statistics. The preliminary results showed no significant difference between the agroforestry plots and field microclimate, which is due to a long-term process and short-term periodic fluctuations and differences in each averaging mouth them.

After a detailed analysis of individual parameters revealed that agroforestry parcel of the daily range of temperature was higher than that of open ground parcel, which is due to radiation and wind conditions of the area. It was identified on the basis of a detailed analysis that the agro-forestry parcel had a greater daily fluctuation in temperature than the parcel of field, which refers to different radiation and wind conditions of test areas. On the enclosed plot the so called vertical mixing effect of the weaker air movement does not occur, until on the field plot the stronger wind creates turbulent flow. The relative humidity of the enclosed area values also show a greater daily pendulum compared to the field plot. This is partly explained by the daily changes in temperature, wind conditions, and evaporation of vegetation.

Our research invention further provides a variety of weather conditions like the effects of rain, dryness or drought on microclimate and soil moisture.

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WOOD WELDING USING WATER STEAM AND PRESSURE

Nowadays, environmentally conscious products and processes play a more and more central role. Wood industry also needs to evolve with expectations to remain a key player in the constantly changing market. Instead of some adhesives and some gluing tasks, wood constituents may be perfectly suitable. Wood is a cellulose fiber-reinforced lignin-hemicellulose matrix, where the lignin and the hemicelluloses are responsible for bonding the components. Applying lignin and hemicelluloses to bonding tasks would reduce the amount of chemicals that surround us. Lignin and hemicelluloses are thermoplastic components. The analysis of the degradation of lignin and hemicelluloses in the presence of heat and saturated / unsaturated water vapour (80-180 °C) is important as these components are not only heat-softenable but also heat-degradable. The purpose of this study is to determine whether the matrix materials of wood can be softened so that the cellulosic fibers can be "welded" to cellulosic fibers of an another softened wood surface. Then, after the matrix materials have solidified, are they able to form a proper bond between the components. Wood welding with steam and pressure seems to be a good way to solve the problem outlined above, so it is essential to study lignin and hemicelluloses to understand wood welding. If we could prove that welding is possible under industrial conditions, we could look at wood as a raw material in a quite different way, as well as wood welding technology.

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RELATIONSHIP BETWEEN WOOD PROPERTIES AND THE MICROSTRUCTURE OF CELLS

Agroforestry combines agricultural (cultivated plants) and forestry technologies (shrubs and trees) to create more diverse, productive, profitable, healthy, ecologically adequate and sustainable systems. The properties of wood are influenced by the different nutrient uptake, the different illumination and wind, etc. All these conditions can cause highly different growing of trees, that affects their microstructural and macrostructural structure as well. This study deals with control samples came from conventional forests, which is the first step to be able to make a comparison with species grown in an agroforestry system. The amount and the position of wood fibers and rays considerably influence the physical and mechanical properties of wood. These properties are primarily affected by the fibers. The walls of cells are built up of layers. The cell wall layers are characterized by the differences in the positioning of the microfibrils. The thickest and physically and mechanically mostly significant is the S2 layer. The microfibril angle in the S2 layer is an important determinant of the quality of tree, wood and fiber. Relation can be found between microfibril angle and stiffness, shrinkage, pulp and paper properties and other factors, such as hemicellulose content. All these parameters have significant effects on the macroscopical view of wood, as well.

Adoption of sustainable practices in agri-food chains

2.

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AGROFORESTRY IS THE SOLUTION? PROFITABILITY OF THE AGRICULTURAL FARMS THE HUNGARIAN CASE

Agroforestry and agricultural diversification impacts on farmer incomes and long-term economic benefits are still less explored. The essence of our article is that, when examining the profitability of Hungarian agricultural sector, it is worth focus on specific factors determining the profitability like agroforestry and diversification. On the other hand, we used hierarchical clustering with other main variables (agricultural subsidies, plant size, leverage) of agriculture profitability to find out which kind of the agricultural companies belongs to the profitable category. The clustering process was performed using the Ward method. The study analyses agricultural enterprises based on the farm database of the Hungarian Farming Information System operated by the Agricultural Research Institute. The analysis was performed statistically closed 2013-2015 data. Based on our research, the farmers should invest in agroforestry and agricultural diversification because it is a perspective to secure the income generation and to improve resilience.

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INVESTIGATION OF CHANGING THE LAND COVER IN THE GAME MANAGEMENT LANDSCAPE CENTER OF KAPOSVÁR UNIVERSITY USING A DRONE

Nowadays the use of drones in the civil sphere is spreading. Technology can play a particularly important role in agriculture.

Wild ruminant species are dominated by red deer and fallow deer, but there is also a flock of mouflon in the Game Management Landscape Center of Kaposvár University. It is well known that the best habitat for these species a variety of woody shrub pastures. Their main food is provided by monocotyledons, leguminous plants, shrub shoots and leaves, and fruits of woody plants.

The Game Management Landscape Center participates in the Agroforest project. The Wildlife Landscape Center participates in the Agroforest project. As part of this, efforts have been made to develop an area that is suitable for herbaceous plants in addition to woody plants. The associations that have at least 30% of the woody plants are the ablest to withstand the increasing summer heat and the periodic rainfall missing. The diverse species composition, microclimate and dynamically changing phenological phases of grove communities provide food and habitat for many species.

Before the establishment of the wooded grove area, there was only grassland covered around the roads only, and a closed canopy was formed in the bushy wooded area. Some of the vegetation had to be removed using a special forestry mulcher machine (FAE UMM HP 250). Subsequently, it was a drone surveying and changes in surface coverage were detected using taken images. Originally the grassland area was 15.8% which was supplemented by another 41.2% the cleaned area, which together is now suitable for the production of sufficient quantities of fodder.

In our presentation, we are going to introduce the steps of drone survey and GIS evaluation of the images.

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AGROFORESTRY SYSTEMS IN HUNGARY

In our changing world, we face a number of problems that we have not encountered before or in a more moderate form. Among these one of the most important one is climate change, whose negative effects are intensifying and adaptation to these necessitates the development of new plant strategies. One of these is the usage of agroforestry systems, the benefits of which are indisputable, but they are not widespread in domestic practice. The fields' relatively large size of the large-scale system makes it difficult to use agarforestry solutions, but the real commitment to sustainability and the smaller parcel size can facilitate the spread of such systems. Based on the results of a previous research at the Kaposvár University we have worked out a proposals for a micro-region that could be used for agroforestry solutions. Based on the terrain, the size of the field and the existing natural fauna, we propose the introduction of a system, highlighting its ecological and economic benefits

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FIELD UTILIZATION OF BIOGAS FERMENTATION RESIDUES COMBINED WITH BACTERIAL FERTILIZERS IN SUGAR BEET CULTURE

Within the framework of the research, the University of Kaposvár was conducting field experiments for two years in connection with the R&D project on the agricultural application and utilization of biogas sludge and other byproducts of Magyar Cukor Zrt. In this study, we present the yield-enhancing and quality-enhancing effects of biogas sludge in sugar beet culture. In summary, the biogas sludge + soil regenerating bacterium combination resulted in almost 20 tons of crop excess compared to the control plot. With higher yields, the sugar content decreased by 1.7%, however, this is not such a reduction that the surplus of sugar beet yield could not compensate. On the basis of yield, the soil regeneration bacterial treatment reached the second highest result, followed by the biogas sludge treatment. No pathological difference between the plots was observed.

The research was carried out in the framework of project GINOP-2.1.2-8-1-4-16-2017-00347.

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INVESTIGATION OF THE YIELD ENHANCEMENT EFFECT OF BACTERIAL FERTILIZER AND SUGAR FACTORY BIOGAS SLUDGE IN WINTER WHEAT FIELD EXPERIMENT

As part of a joint research project between Magyar Cukor Zrt. and the University of Kaposvár, it is conducting nutrient supply experiments in four arable crops in connection with its R&D project on the application and utilization of biogas sludge and Phylazonite soil-regenerating bacteria.

In order to achieve a sustainable and environmentally friendly nutrient supply, we investigated the yield-enhancing and quality-enhancing effects of Phylazonit's soil-regenerating bacterial formulation and sugar factory biogas sludge. The present study presents the results of these studies on winter wheat culture.

The winter wheat experiment was set up on October 15, 2018, in Juta. In the experiment biogas sludge + Phylazonite soil regenerating bacteria (Pseudomonas putida, Pseudomonas fluorescens, Bacillus megaterium, Bacillus subtilis), sugar factory biogas sludge, technological control treatments were applied each on 5 ha plot. During the experiment, the sugar factory biogas sludge was applied at a dose of 50 m3 / ha and the soil-regenerating bacterial fertilizer Phylazonit was applied at a dose of 20 l / ha.

There were no differences in germination and development during the initial phase of the experiment. The uniform number of plants on each plot was 380 / m3. There were significant differences in yields on the basis of preliminary bonings. The plots treated with biogas sludge and soil regenerating bacteria developed 20% more cereals, and the weight of the examined cereals was significantly different from the other treatments. The control plot had the lowest number of ears and the lowest weight of ears.

The research was carried out in the framework of project GINOP-2.1.2-8-1-4-16-2017-00347.

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ALTERNATIVE WOOD USAGE IN A POTENTIAL AGROFORESTRY AREA

When we talk about 'energy conversation' within sustainable development, renewable energy provider techniques are necessary. To understand more inhabitants' behaviour about their likelihood to choose wood above other heating techniques, is not an easy task. To research, it requires a bottom-up model, which as it can be known, is a complex examination with a great amount of data requirement. In our research, the number of respondents is 310 in the examined area, which is Koppányvölgye Naturpark, concerning the inhabitants' habit for usage and knowledge of renewable energy for heating, in the form of wood. Our variables to measure inhabitants' likelihood to choose wood for residential heating are social, demographic and economic type of variables. The social factors in our research are trust in mayor, consciousness forward environmentally friendly actions, and willingness to financially support environmentally conscious movement, such as green energy. The demographic variables in our research are age, settlement of respondent, educational level, employment status, along with number of people in respondents' household. Besides, our economic factors are year of the house, as well as the insulation level of the house. As the result, we receive which variables are significant and non-significant in case of wood, as a residential heating source.

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THE RESULTS OF SOIL MICROCLIMATE RESEARCH IN FORESTRY ALLEY CROPPING SYSTEMS IN HUNGARY

A special form of alley cropping system is the intercropping production of forests, which is traditional and still used nowadays in the afforestations, mostly on the non-protected areas of the Great Hungarian Plain. Measurements and observations have been proceeded in two trial sites: Hajdúhadház and Kapuvár, and in both cases, control areas were also designated, close to the trial site, with similar parameters. The experimental areas have different ecological features, but in both cases intermediate cultivation has been applied. The Hajdúhadház experimental area has been established in 2015 and observations and measurements were carried out until 2017, while in Kapuvár, the experiment started in 2019, therefore the data are still under evaluation. In both sites, soil temperature, conductivity and growth parameter measurements were performed. The two examined areas are different regarding to tree species and plantation structure, but the main purposes of both forestry companies were to maximize the utilization of available space, protect seedlings and ensure the success of afforestation. The research results so far show that soil microclimate is more favorable in the intercropping system, which contributes to the better development of seedlings. By using maize as an intercrop in the alleys, fodder production for animal stock and game management was also feasible. Further investigations on yield and microclimate are planned in the area of Kapuvar Forest Company in the next three years.

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WHAT MAKES „MORE THAN GOOD WINE"?

Nowadays, residents have more and more expectations of their settlement. To accomplish this, the locals need to be aware of the value of their place of residence and its potential. First of all, the awareness to the values of the city have to be raised for its residents because their positive impression of city's liveability has multiplicative impact on the image of the city.

During the last decade in Szekszárd many investments have been realized for the well-being of the locals and improving the city's liveability. Among other things these are tend to be created by the intention of the city administration to increase the number of enterprises providing decent living, formulating a well-maintained and aesthetic natural and built environment, providing quality public services that are easily accessible to everyone and to create attractive high-quality events and spaces with community functions.

This study is about to reveal the satisfaction of the locals to these aspirations with the effect to their everyday life and the city's abilities that are properly exploited.

We were also looking for an answer how these influencing the choice of the place of residence and the possible intention of resettlement.

Our empirical research – analyzing opinions of residents, students and employees in Szekszárd - is based on online questionnaires, in-depth interviews and personal experiences.

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CLIMATOLOGICALLY POTENTIAL DISTRIBUTION AREA OF PINE WOOD NEMOTADE (B. XYLOPHILUS) IN EUROPE BASED ON ECMWF ERA5 REANALYSIS DATASET

Pine wood nematode (Bursaphelenchus xylophilus) is one of the most harmful agents in coniferous forests. It is native to North America, but from the beginning of the 20th century its spreading was dinamical first in Japan, later in Asia and in Europe, where the first introduction was pronounced in the Pego˜es region (Portugal) in 1999.

The most important vectors of pine wood nematode (B. xylophilus) is considered to be some Monochamus species (Coleoptera: Cerambycidae), which had been forest insects with secondary importance before the appearance of B. xylophilus. However the continuous spreading of the nematode has changed this status and necessitated the detailed biological and climatological investigation of vectors like pine sawyer beetle (Monochamus galloprovincialis).

In this work the climatologically potential distribution area of M. galloprovincialis was studied using the threshold temperature for the development (t0 = 12.17°C) and the accumulated day-degrees (C = 370.57 DD°) based on the ECMWF ERA-Interim Global Atmospheric Reanalysis dataset. The horizontal resolution of the dataset is 55.8 km x 55.8 km, so Europe can be covered by 2437 grid points. To calculate the daily average temperature 4 temperature data were applied each day (0, 6, 12, 18 UTC) from 15 April until 30 November between 2003 and 2018.

The potential distribution area of M. galloprovincialis select those areas where the risk of the appearance of pine wood nematode (B. xylophilus) is significant. Since a 15-year long dataset was involved into the study, the interannual fluctuation of the habitat of M. galloprovincialis can be detected, and a trend-like shift in climatologically potential living area can be evinced in Europe, as well.

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GETTING STARTED WITH AGRO-FORESTRY RESEARCH AT FERTŐD - A HYDROLOGICAL APPROACH

After the last few years farmers should solve new challenge in adapting to drought. The long-lasting strong sunshine causes sunscald of agricultural berries. Because this symptom is generally present on only the side of the fruit exposed to the sun, the prevention method can be the agroforestry system.

The water is a key factor in Hungarian agriculture. This research focuses on open questions: How the trees modify the moisture pattern of the agricultural field? How can trees influence the groundwater level? Are there any differences in hydrological conditions of the individual berry species?

We installed a research plot to study the spatial and temporal variability of soil moisture and groundwater level in the agroforestry system in Fertőd (Hungary). Six monitoring points were installed in this area: three wells in the agroforestry system, and three control wells in the agricultural area without trees. The pair of wells are in blackberry (Rubus fruticosus 'Dirksen', in raspberry (Rubus idaeus 'Fertődi zamatos') and in blackcurrant (Ribes nigrum 'Otelo') plots. The species of the integrated shadowing trees is hybrid poplar (Populus x euramericana). Layering of the soil was detected on the field and soil analysis (grain-size distribution) was performed in the laboratory. The soil moisture and groundwater level are measured biweekly. The climatic parameters such as precipitation, air temperature, relative humidity are continuously recorded by a local meteorological station.

The project was supported by EFOP-3.6.2-16-2017-00018 for the University of Sopron.

Adoption of sustainable practices in agri-food chains

3.

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EXPLORING THE POTENTIALS IN LOCAL FOOD SCHEMES

A number of initiatives have been taken to solve the sales problems of local small producers in Hungary. Several shops selling local food products have been opened all over the country, many of them have specific social impacts and were established to supply food at low prices to the people in need. The system of the so-called local farmers' corners goes further than that. Their aim is not only to promote and distribute local food products but they target tourists as well. The different places of consumption can be shops, restaurants, museums, hotels, local service providers that accomodate these local farmers' corners. This system serves as a territorial/regional as well as a local tourism development tool. This study analyses the economic, social and territorial impacts of local food schemes with special regards to local farmers' corners through the study of the synergistic effects, results and difficulties of such schemes in rural Hungary.

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INTRODUCING AGROFORESTRY SYSTEMS AND AN EXPERIMENTAL SITE IN GÖDÖLLŐ, HUNGARY

Agrofororestry is a key element amongst the tools fighting today's challenges, such as environmental issues, climate change, food safety and food security. It is a common agricultural practice in many countries of the developing world, whereas it has nearly faded away in most of the world's developed countires. In the past 40 years of agroforestry research it has been clarified that the role of trees in the landscape as well as in the farm scale is essential to maintain a healthy environment and it can be an economically viable practice in the long term, given careful planning. These complex agricultural systems address several Sustainable Development Goals, offer countless ecosystem services and are expected to get more attention and role in the future of world's agriculture. Regarding Hungary – as part of the EU – the Common Agricultural Policy firtsly has played a negative effect on trees in the land, as it had encouraged farmers to eliminate them in order to qualify for subsidies, until in the last call it has been encouraging farmers by subsidizing the establishemnt of agroforetry systems. Today's task is to reserve agroforestry systems which have remained (e.g., wood pastures, shelterbelts); conduct research to answer ecological, economical and management questions; establish demonstartion sites and disseminate knowledge on traditional and innovative agroforetsry systems. One innovative alley cropping demonstartion site can be found in Gödöllő, Hungary which was established by NARIC in 2017. It also serves scientific and educational purposes where data aquisition and data processing are ongoing.

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THE JUDGEMENT OF AGRO-FORESTRY SYSTEMS FROM THE PERSPECTIVE OF FOREST OWNERS

Farmers are facing more and more challenges in agricultural production. In addition to the primary function, i.e. producing healthy foods – there are several other factors to be considered such as competitiveness, profitability as well as preserving nature and biodiversity. The development of agriculture proves that intensification results in environmental damage. There are several environmental problems worldwide which have a negative effect on production. Thus it would be necessary to find and apply practices with the potential of long-term sustainability. The development of agro-forestry systems could be a solution to these issues. This innovative approach could meet the requirements of sustainable development and competitive production at the same time (SALÁTA, 2017; KRUMMENACHER et al, 2008).

Agro-forestry used to be a widely known and preferred way of land use but it disappeared almost completely during recent decades (VITYI et al, 2017). On the basis of the above this research aims at raising awareness of agro-forestry systems and encouraging farmers in Somogy County to enter them.

In the scope of the study we conducted in-depth interviews with forestry and agro-forestry producers to examine their attitudes. In addition to the traditional questions we also used a Q-method capable of examining. The results may contribute to the inclusion of forest owners into agro-forestry production in the near future.

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EMERGING NEW FOOD NETWORKS AS AN ALTERNATIVE FOR LOCAL AGRICULTURAL PRODUCTION

Local food production has always been a part of tradition and an important component of life in rural areas in the Republic of Croatia. Recently, the great benefits of locally produced food for human health, the community and the economy have been recognized. This is one of the reasons why there is increasing interest in developing innovative food supply chains. They include locally produced agricultural products available on the local market where farmers directly sell those products to the consumer, including a maximum of one intermediary.

Locally produced food, or local food in general, is original and authentic in terms of the cultural identity of the area, traditional manufacturing practices and the origin of the ingredients of a product. The development of local food production has multiple benefits - economic, environmental, health and social. By using short supply chains, local producers are left with a greater share of product added value.

The aim of the paper is to determine how adequate cooperation between farmers and consumers, forms of marketing engagement, and possible producer association influence the development of effective short supply chains at the local level.

The purpose of the paper is to show that the organization of short supply chains at the local level is an element of encouraging stronger development of competitive and efficient local agricultural production.

A survey was conducted on a sample of farmers in the Koprivnica-Križevci and Međimurje counties in order to gain insight into the opinions and views of farmers about the agricultural production they are dealing with and the ways of distribution and marketing of their products. The target group of respondents consisted of a total of 110 farmers.

The research on the agri-food sector of the Koprivnica-Križevci and Međimurje counties, based on the obtained data, shows local peculiarities and potentials for the development of short supply chains. The opinions and views of farmers regarding the development of short supply chains show that such development is inseparable from the characteristics of local agricultural production and the capacity of the local community.

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SEPARATION OF GASES WITHOUT THEIR DECOMPOSITION, USING ELECTROSTATIC FIELD

The removal of particulate matter from flue and exhaust gases using electrostatic field is a very widely investigated and very successfully applied in daily industrial practice. However, the separation of gases without decomposition or with a minor decomposition using electrostatic field is less researched and not really applied in the industrial practice. The main difficulties are laying in the fact, that by ionization of gases the charging of gas molecules and atoms can be executed rather easily in some cases, but positive and negative charged particles are generated in the same number. To separate the particles of one gas, they must have unipolar ionization, which can be more easily reached if unipolar ionization is taking place, but to generate unipolar charged particle cloud is rather difficult process. For this research at first a mono-polarly charged gas cloud is needed. For that, a so called boxer charger equipment is developed and built using a technology similar to that developed by professor Masuda of the University of Tokyo. After that step, a gas is selected which can be mono-polarly charged, and mixed with some carbon dioxides or methane to start the separation process. At the beginning step NO and nitrogen mixture is used, but the target is to separate H_2S from methane and carbon dioxide, and finally to separate CO_2 from CH_4. The research was supported by the grant EFOP-3.6.2-16-2017-00018.

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AGROFORESTRY INNOVATIONS IN HUNGARY AND EUROPE

Based on the economic and environmental relevance of agroforestry practices, a consortium of 13 partners from 9 European countries, launched AFINET (AgroForestry Innovation NETworks), a thematic network aimed to foster the exchange and the knowledge transfer between scientists and practitioners in agroforestry. AFINET acts at EU level in order to take up research results into practice and to promote innovative ideas to face challenges and resolve problems of practitioners. To achieve this objective AFINET created a European Interregional network, composed of "Regional Agroforestry Innovation Networks (RAINs)", and a European reservoir of scientific and practical knowledge of AF with an end-user friendly access (the "Knowledge Cloud"), where all the information collected and the materials created in the project are published.

In the framework of the RAINs, different innovation materials have been developed: tutorial films and videos, factsheets, technical articles in each country, and a common handbook for agroforestry practices is under construction. The innovation materials cover almost all of the types of the agroforestry, in Hungary the main focus is on restauration and management of abandoned wood pastures, and new approaches in alley cropping and fruit producing.

Some results of the running EFOP 3.6.2-16-2017-00018 project were also presented to the stakeholders within AFINET, and building synergies between the two projects will provide opportunity to prepare for further international cooperation.

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AN OVERVIEW OF AGROFORESTRY FROM ANTIQUITY TO THE PRESENT DAY

Agroforestry is a collective name for land-use systems and technologies where woody perennials (trees, shrubs, palms, bamboos, etc.) are deliberately used on the same land-management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequence. In agroforestry systems there are both ecological and economical interactions between the different components.

The practice of maintaining or integrating trees in the agricultural landscape has existed from ancient times around the world and has constituted the default practice in terms of land use management. It was only during the last centuries that farming and trees became dissociated as monocropping became more common, in an effort to intensify food production.

In Europe, the Spanish Dehesas, a system in which pasture (cattle, swine, sheep) is covered by scattered oaks, is said to have its origins dating back 4 500 years. In Germany, until the Middle Ages, farmers would start growing crops on small pieces of land they just cleared from trees. They would then have trees grow anew on the land, parallel to the crops grown.

The creation of modern agroforestry finds its origins in the solutions to development problems, its benefits are also recognized now in developed countries, and government support has grown accordingly.

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TOOLS AND METHODS FOR LONG TERM ECONOMIC EVALUATION OF RENEWABLE ENERGY USE

Investing in renewable energy and comprehensive use of technologies based on renewable resources are key factors of sustainable growth of national economy. Decision makers have to consider long term costs and benefits of such technologies, in an extended examination framework, and make an attempt to quantify effects on the environment and the living standards. Applications and technologies can be distinguished on long term by the amount of capital and labour costs, and by the amount of revenues and produced energy. Other valuation methods can examine the effects on social justice, on participatory governance and on conservation of natural capital. Negative side-effects and externalities are important as well, mainly the use of hazardous materials, landscape destruction, pollution, contribution to the climate change and disposal requirements. This extended examination framework can be used for strategy building, by grading and weighting methods, to establish a balances scorecard, and it makes possible the economic analysis of quantified long term effects, to serve as a basis of smart and responsible investment decisions and help targeting state aid and co-funding. The paper examines the most important long term effects of the use of photovoltaic sytems on the national economy as an example.

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BRANDING OPPORTUNITIES FOR AGRO-FORESTRY PRODUCTS

There is a growing demand from consumers for forest-based products and services, however, marketing of agro-forestry (products) are rarely published. Our goal was to assess the image of agro-forestry, and the consumer perception of agro-forestry products. A survey on the possibilities of promoting agro-forestry among the population was conducted in 2019.

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ECOLOGICAL AND ECONOMIC ASPECTS OF AGROFORESTRY AS A SUSTAINABLE, ENVIRONMENTALLY FRIENDLY FARMING SYSTEM

The efficiency of agricultural production has been increasing at accelerating rate since the beginning of the Industrial Revolution. The pace of mechanization, the scale of industrial production of chemicals, has increased so much in the last 50 years that we now produce food for more than 7 billion people.

Agri-forestry systems have been established in recent years to protect the fertility of soils and their sustainable use as a natural resource. Intensive farming has increased the rate of resource exploitation beyond sustainability. There is a need for more extensive, environmentally friendly, sustainable cultivation technologies in agriculture and forestry.

Ecological advantages of agroforestry systems are following: preservation of microclimate, reduction of soil erosion, habitat preservation, connection of fragmented habitats as ecological corridor, reduction of pesticide use, high carbon storage effect, maintenance of extensive animal husbandry, to provide habitat for protected species occurring in the Carpathian Basin, such as wildlife conservation and increasing species, population and landscape diversity.

Recognizing these benefits, support for the implementation of agroforestry systems combined with arable crops, wooded pastures, wooded meadows and grassland plantations is now an integral part of the EU's Common Agricultural Policy.

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EXPLORING CONSUMER PREFERENCES FOR AGROFORESTRY PRODUCTS WITH Q-METHOD

Environmental protection is increasingly important in our world today. Responsible farmers strive to develop and use farming and production methods that are as environmentally friendly as possible. These solutions include alternative and sustainable farming, such as well-known organic farms and agroforestry systems. There is an increasing demand from the consumer society for natural lifestyle, organic products, green products (forest fruits, mushrooms, herbs, etc.). The public is also increasingly aware of the need to use environmentally friendly solutions in their daily purchases of eco-friendly farming products, which include agro-forestry products.

Agroforestry is a land-use system that integrates, in the same area, woody elements with crops and/or livestock production (Torquebiau, 2000). Based on previous research, consumers are not yet familiar with these systems and their products.

The objective of our study is to identify the consumer preferences and the image elements of agroforestry products. We use Q-method to map the subjective opinion of the agroforestry products of the consumers. Q-methodology is a research technique designed to analyze first-person perspectives about a given subject (Stephenson, 1953). This technique is a kind of combination of the quantitative and qualitative research technique, with it we can measure the subjectivity of the consumers' decisions. The result can help farmers to promote their products for customers.

ENVIRONMENTAL MANAGEMENT, CORPORATE SOCIAL RESPONSIBILITY, COMPANY SUSTAINABILITY TOOLS

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KÄRCHER AS AN EXAMPLE FOR SUSTAINABLE CORPORATE DECISIONS

"Sustainability is not a coincidence but the result of conscious decisions" Hartmut Jenner, CEO Alfred Kärcher SE& Co.KG

Alfred Kärcher SE & Co. KG (Kärcher) is a manufacturer of cleaning equipment and systems with the headquarter in Winnenden, Baden-Württemberg. The family-owned company employs more than 13,000 people worldwide and is the world market leader. in this sector. The company takes its responsibility very seriously and is committed to providing a cleaner environment with its technology expertise, donations and personal commit-ment, and supports people who need help.

As the world's leading provider of cleaning technology, Kärcher has been implementing the sustainability strategy "Sustainability Excellence" since 2014 with measures and goals in various fields of action such as nature, society, supply chain and employees. By the end of 2017, 89% of the sustainability goals have already been achieved, and they should be fully reached in the next two years. For example, within five years (2012-2017) Kärcher succeeded in increasing the utilization rate of recycled plastics by 344 percent. Sustainability-related audits in the supply chain also increased significantly in 2017 com-pared to the previous year. In order to define future fields of action and sustainability goals as the basis for the Sustainability Program 2020+, workshops were held at the be-ginning of 2019 with more than 120 employees in Germany, China and Brazil.

Not only in the selection of materials, but also across the entire value chain, a sustaina-ble strategy is applied. This alignment does not always have to be cost. Kärcher proves that innovative solutions can be used for efficiently design processes. With this Alignment, Kärcher was also able to convince the jury of the german sustaina-bility award for 2020 and is currently in the final.

In my presentation I would like to explain this strategy, the procedure, as well as the specific goals and data.

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THE JUSTIFICATION AND POSSIBLE APPROACHES TO ECONOMETRIC MODELLING OF HOUSEHOLDS' FIREWOOD USAGE

This paper is based on environmental and public health problems that make it necessary to consider firewood as a "blessing" or "curse". Deforestation, deflation and increased air pollution associated with high levels of usage are mainly characteristic of developing countries. In these regions, modeling can help to reduce firewood consumption. Then we search for the factors that can effectively head consumers for other, cleaner energy sources. In contrast, developed countries generally reduce greenhouse gas emissions and the use of import-dependent fossil fuels through an increased use of firewood. In this case, the task of the analysis is to find out the factors in which wood consumption can be expanded. Most commonly used relationship testing methods are usually based on a regression model which uses household or sector data. In order to influence consumption, we have identified 8 main areas: wood prices, substitute product prices, heating equipment, energy efficiency, existence/quality of infrastructure, awareness, income, education. These are the typical areas that come into the reach of the regulators, as they have a strong impact on wood consumption. The issue is not negligible from the Hungarian point of view: burning large amounts of firewood in obsolete appliances and low-energy buildings contributes to air pollution of particulate matters, which helps to develop many diseases. In order to optimize wood burning, it is important to analyze consumption and identify areas to be affected. This empirical analysis is carried out in a following paper, to which this study gives the basis and shows its necessity.

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MARKETING IN VETERINARY PRACTICE – ARE RURAL VETERINARIANS GOING WITH THE TREND?

The Veterinary profession in Germany has changed significantly in the past 20 years. Nowadays the veterinary profession is divided into all kinds of specializations, with a high emphasis on the individual target animal and procedures. However, not solely the specialization of species has changed. Nowadays, a veterinary practice owner/ manager is facing challenges of the fast-growing market as well as the digitalization and with it, new marketing instruments and tools. But are rural mixed animal veterinarians going with the time and invest in the marketing of their practice?

A study amongst pet owners and veterinary mixed practices was conducted regarding the usage of marketing in veterinary practice by using questionnaires in the district of Cloppenburg, Lower-Saxony, Germany between February and June 2018. The questionnaire was spread through a Facebook group for pet owners and via email to the vet practitioners. 60 answers from pet owners and 21 answers from vet practices.

The results showed that half of the pet owners (50%) changed their vet at least once. As a cause, 25% of the respondents who changed their vet did it due to communication difficulties. Concerning the promoting activities, word of mouth is still the most effective promotion way according to the questionnaire (68,3% found their vet through word of mouth). Apart from the rare social media usage of the pet owners, at least 80% of the veterinarians had a webpage but most of them did not update it regularly. When the pet owners were asked about the marketing tools their veterinarians use, the results showed that a major part of the veterinarians did not use vaccination reminders and when they did it was by phone call. Finally, pet owners were questioned about what kind of services they would like to get offered by their veterinarians and whether they were interested in lectures and workshops. 33,3% of the pet owners would like to have physiotherapy and nutritional advice, and 31,6% lectures or workshops regarding pet health.

Almost all the practice owners work with external specialists together in different fields, such as orthopedics, neurology, nutrition, and physiotherapy. Furthermore, most of them had a webpage but just a minor percentage (24%) actually used social media to promote their activities. Finally, the majority of the practice owners (100%) offered additional or special services, but mostly just pharmacy (100%), sales of feed additives and pet food (76,2%) and herd screening (61,9%), but there is a lack of homeopathy (19%), physiotherapy (9,5%), acupuncture (9,5%) as well as pet products (4,8%).

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DATA ANALYTICS AS A SUSTAINABLE CUSTOMER LOYALTY TOOL

Changed customer expectations, new competitors and a strong technological change influence the banking market in Germany. Banks have more data about their customers than other industries. The quote "Information about money is almost as important as the money itself" by Walter Wriston, former CEO of Citibank in 1984, is more relevant than ever. Innovative methods and solutions have been developed on the basis of mathematical-statistical models. This knowledge is used to focus on the customer under the term "Data Analytics" and to be able to offer products that fit exactly from the information gained. On the basis of already known customer information, Data Analytics supports banks in addressing customers at the right time, via the right channel and with the right product. The main purpose of this research is to investigate to what extent "Data Analytics" can be described and used as a sustainable customer loyalty tool. This paper summarizes the arguments and counter-arguments within the scientific discussion on company sustainability tools and Data Analytics. The examination of the topic is carried out in the following logical order: Introduction, Research question and hypotheses, Material and Methods, Discussion and Conclusion. When using Data Analytics, there are different perspectives, e.g. from the bank's point of view and from the bank client's point of view. In order to answer the question of sustainable customer loyalty from the customer perspective, the relationship between "Data Analytics" and the principles of customer consulting [a. The customer must be advised objectively. b. The customer must be advised comprehensively. c. The customer must be advised individually and d. The customer must be actively advised] investigated. The paper presents the results of an empirical analysis based on a survey in September 2019. The relevance of the findings on this scientific problem lies in the fact that the effectiveness of sustainable customer loyalty for the German banking market can be answered from a adult bank customers perspective in Germany.

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LADIBIRD FARM LEISURE CENTER

Ladybird Farm Leisure Center was established in 2002 as family business. In the past 18 years, we continuously developed our services. Now, we host 85,000 visitors yearly and realize 12,000 guest nights. We provide all three elements of fun:

1. Wide range of activities: over 100 attractions, animals, dozens of tradition preserving, handcraft and nature related programs on an edutaining manner,

2. Decent accommodation: over 200 beds in bunkhouses, bungalows and apartments, also have a campsite

3. Food and beverages: restaurant, well equipped kitchens in all accommodations, buffets

We believe in the concept of borrowing our Earth from our successors rather than inheriting it from our predecessors.

We live by a strict development policy: whatever we develop, it should not consume any energy or if it does than we must produce the required energy from renewable sources. Our strategic objective is to develop our services to a level where a visitor cause less "damage" to our environment than if they stayed at home or have gone somewhere else.

We provide 100% of the energy we use from renewable sources. We do not use gas. We have our own ecological sewage treatment plant and implemented dozens of actions to decrease our carbon footprint. Uniqually in Europe, visitors can pay with waste 10% of their entrance fee.

Whatever we do or develop, the decision making criteria are twofold: profitability since profit is required for continuous development AND social impact, in other words the consequences of the new services for nature and society. If an investment is profitable but with neutral or negative social impact than we do not implement it.

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SUSTAINABILITY IN REGIONAL UNIVERSAL BANKS: KEYWORD FOR PUBLIC RECOGNITION OR INTERNALIZED VALUE?
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EXEMPLARY CONSIDERATION BASED ON THE BANK CONTROL

The growing importance of sustainability in politics is visible in the political programmes, the electoral behaviour and the recognizable prioritization of the acting persons in the media. The business community is taking up the issue not only for reasons of public image, but also for the purposes of verifying business partners along the entire value chain, potential efficiency gains, government subsidies and the procurement of capital. In society, demonstrations, staged actionism and everyday discourse bring sustainable considerations about changed consumer behaviour into the minds of citizens. All these facets are concentrated at the level of universal banks. The in-depth analysis of well thought-out and comprehensively implemented sustainability seems to be very interesting due to the influence of politics, society and the economy in the daily banking business, due to the simultaneously high financial pressure of low interest rates, increasing regulatory requirements, digitalisation and immense competitive pressure. The research question is: Do regional universal banks as institutions in the focus of population, politics and economy implement sustainable thinking in the heart of their bank management? The examination of internal target systems and the bank's own holdings of bank deposits, aggregated, produces very different but also largely sobering results from German Volksbanks. In spite of scientific research results, the practice of public relations work has so far been implemented and the elaboration shows that a potential transformation to influence behaviour and capital is still in its beginning.

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REVERSE LOGISTICS OF AGRICULTURAL HAZARDOUS WASTE IN THE EU

We can hear everyday news about waste and irresponsible consumptions. People realized importance of waste management which is transforming all kind of sectors including agriculture. Various studies are illustrated the impact of agricultural waste and chemical mismanagement on the environment and on water resources in particular. The increased use of and disposal of pesticides, fertilizers, fuels and oils in the agricultural sector also leads to various other impacts including air pollution, declining soil health, ecosystem degradation and loss of biodiversity.

One method of treatment for the resulting waste is inversion logistics, which arrange the transportation of the waste collected from the user to the right place, because of disposed of or re-used it. The special type of waste generated is the hazardous waste, which regulated by serious law in case of stored, handled and neutralization. Industrial supply chain members increasingly use reverse logistics solutions, while the feasibility of it in agriculture supply chain obstacles due to the specificities of agricultural production.

The aim of this paper to examine the composition and variation of agriculture waste. Furthermore, other aim is to draw up a reverse logistics process suited to the specific supply chain management of agriculture and to map out the barriers to the agricultural realization of reverse logistics. The potential problem what we see in the realization of reverse logistics is that the material consumption of agricultural production is seasonal against the industrial production. The average chemical usages in Hungarian arable crop production sector is marginal in relation to the input supplier's turnover. Since the provision of the reverse logistics chain is not in order of the suppliers. At the same time the environmental policy able to make pressure on the members of agricultural supply chain to develop the inverted logistics chain considering to the specifics of agriculture.

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TOP-AND SUBSOIL MIXING DUE CULTIVATION AS DEGRADATION RISK ON CHERNOZEMIC ARABLE LANDS

Variability in depth of organic rich layer, vertical distribution of secondary carbonates, nutrient content and changes in bulk density can heavily influence topsoil fertility after long term cultivation and applying homogeneous plough depth. Increasing cultivation depth contributes also to mixing of organic- and nutrient poor subsoil to the fertile topsoil layer, which can be considered as a risk of soil degradation process. In case of erosion is associated with increasing plough depth and intensity, the natural variability and spatial pattern can disappear, and soil fertility decreases.

In our study the soil vertical variability within Chernozem covered arable parcells of Hajdúság and Mezőföld loess plateaus were investigated in microscale.

Arable parcells on homogeneous, flat loess coverd areas with low relief energy were sampled in detail (20-50 meter distances). Vertical distribution of SOC, N, P and secondary carbonates were measured. In Hajdúság, we found, that even on very flat areas, there are serious differences in vertical carbonate and humus status of the soils, and due to ongoing long time deep cultivation and mixing surficial soil layers, the topsoil quality can be degraded. In Mezőföld additional erosion contributes to decrease of topsoil fertility. The degradation influences even soil classification status, and should be minimized for sustainable use.

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SHOP IN PLACE- FOOD HUB PROJECT IN TRANSYLVANIA

A food hub serves as a coordinating intermediary between regional producers and suppliers and costumers, including institutions, food service firms, retail outlets, and end consumers. Food hubs embrace a spectrum of functions, purposes, organizational structure, and types, each of which can be tailored to achieve specific community-established objectives. Services provided by a food hub may include and are not limited to aggregation, warehousing, shared processing, coordinated distribution, wholesale and retail sales, and food waste management. Food hubes contribute to strenghtening local and regional food systems as well as to broader community goals of sustainability and health.

The purpose of a Food Hub is to increase small and midsized producers' access to wholesale market channels. The Shop in Place (Helyénvaló bolt) is a Food Hub located in Székelyudvarhely, part of a Romanian network. It integrates sustainable farming, environmental friendly and ethical trade, responsible acqisition.

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SUSTAINABLE TOUR OPERATION PRACTICES: A CASE OF „LET'S GO TRAVEL UNIGLOBE" - KENYA A POSITIVE COMPANY EXAMPLE

Let's Go Travel Uniglobe is a registered IATA travel agent and a member of the Kenya Association of Travel Agents (KATA). It is a full service global travel management company offering travel and tourism services to both corporate and leisure client. It is part of the Uniglobe Travel Franchise, the world's largest single-brand travel franchise with a presence in more than 60 countries across 6 continents. Let's Go Travel Uniglobe has two offices: in ABC Place, Westlands, and The Hub, Karen, both in Nairobi, Kenya. The Company became a member of the UNIGLOBE Travel franchise in 2004.

On sustainable practices, the company has taken a two way approach towards sustainability: classified as either internal or external practice.

1. Internal practices have led to recycling paper, banning single-use plastic, minimizing the use of water and energy and advocating for sustainable itineraries to clients through the use of eco-rated hotels and lodges or hotels that have met our internal sustainability check list.

2. External practices aim to engage with environments and communities to build future proof strategies by having sustainable initiatives in place to empower the local hosts as well as preserve the environment.

All initiatives are based on four (4) sustainability pillars: Education, Conservation, Community Tourism and Livelihood. Consequently, Uniglobe Let's Go Travel is a three time winner of The Eco-Warrior Award; a Kenyan Tourism Award that recognises and celebrates outstanding contribution to ecotourism practice in Kenya.

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SUCCESS OR FAILURE ECOLOGICALLY SUSTAINABLE SHOPPING CENTERS

Ecological sustainability is more topical than ever and current social events and clear declarations of intent in the form of protests (Thunberg), e-mobility (Tesla) but also the sustainable construction and operation of real estate (Green Building) shows the presence and importance of this. Gone are the days when investors could give their real estate a "green coat of paint" with statements that were not meant to be serious and this seemed to be enough. Sustainability has long since become one of the most important factors in the European real estate market and is relevant to competition. But how can the success or failure of so-called Green Buidlings be measured in today's environment? Is sustainable operation really a competitive advantage or do high sustainability costs even minimize success? This article uses the example of sustainable shopping centers and a survey of tenant-relevant performance assessments of the centers to provide insights into the current state of the art in the retail property segment.

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STRENGTHENING OF LINKS BETWEEN AGRICULTURE AND RESEARCH AND INNOVATION THROUGH RDP INTERVENTIONS WITH THE FOCUS ON IMPROVED ENVIRONMENTAL MANAGEMENT AND PERFORMANCE

The study is aimed at sheding light on what interventions – more specifically what EAFRD financial instruments in the 2014-2020 Rural Development Programme – can enhance the role of research and innovation in agriculture and to what extent. The focus is set on to what extent RDP interventions have supported the strengthening of links between agriculture, food production and forestry and research and innovation, including for the purpose of improved environmental management and performance in Hungary. The literature review is followed by selection of relevant RDP interventions, description of judgement criteria and analysis of indicators. Qualitative assessment is carried out through an anonymous and voluntary survey to experts in the field of rural development and potential EIP beneficiaries. Description of challenges during evaluation and proposed solutions based on the results are included, as well.

New Economic Vision

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ABSTRACT OF WACKERNAGEL'S/ REES'S CUTTING-EDGE PUBLICATION „OUR ECOLOGICAL FOOTPRINT"

Even tough the research was conducted and published in 1997 the topic is still of high relevance today. The authors develop a quantitative ecological footprint analysis and stress the severity of an ecological deficit. Additionally, the analysis determines consequences of behavior at any level of individual, household, community, nation, etc.

In our presentation at the "New Economics" session of the conference we will assess the relevance of Wackernagel's/ Rees's analysis from todays perspective and point out why it can still be considered as relevant.

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A REVIEW OF FINANCE-GROWTH NEXUS: THEORIES AND EVIDENCE

In the last three decades, the finance-growth nexus is at the center of the academic and policy debate, moreover, have been contentious both empirically and theoretically, this debate intensified in the aftermath of the 2008 global financial crisis with growing their anxiety regarding the role of financial development in growth and stability, and the possibility that some features of finance may be wasteful and crowd out the productive activity.

The main purpose of this paper is to provide a brief literature review discusses main existing theories and models of finance-growth nexus, highlighting empirical evidence. Based on the literature reviewed in this paper, we have found that, although special attention is paid to the issues of causality between finance and economic growth, it is still not clear from both theoretical and empirical point of view. Some studies showing a positive relationship; while other studies have shown a negative one. Moreover, we also found the efficacy of financial development to be dependent on the methodology used, the sample of study, and the proxy used to measure the level of the degree of financial development, for example, recent literature focuses on financial innovation and non-intermediation services as measures of financial development, while the traditional literature uses measures of size and financial intermediation.

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INTRODUCTION OF THE POSTGROWTH ECONOMISTS TIM JACKSON: PROSPERITY WITHOUT GROWTH

The paradigm underlying our economy is constant, almost exponential economic growth. This paradigm is represented both by politicians and leading economists.

Tim Jackson contrasts this with the postulate of a post-growth economy. He is very precise in his argumentation and considers not only the form of the companies but also the quality of our working life. He also discusses the role of the money supply.

He points the way for tomorrow's sustainable economy, which not only safeguards jobs but also reduces social inequalities.

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ROBERT CONSTANZA FROM 1991 „ECOLOGICAL ECONOMICS: THE SCIENCE AND MANAGEMENT OF SUSTAINABILITY" IN 2019

Until 2002, Robert Constanza was director of the Institute of Environmental Economics at the University of Maryland. He taught environmental economics in Solomons and in the biological faculty in College Park. He is a co-founder and former president of the International Society for Ecological Economics (ISEE) and was editor-in-chief of the journal Ecological Economics until September 2002.

He is also a member of the "Club of Rome".

He opposes the neoclassical way of thinking against a purely materialistic growth.

Rather, he even completely questions the legitimacy of materialistic growth.

I would like to consider how far Fern's point of view - in particular his 1991 book "Ecological Economics: The Science and Management of Sustainability" is relevant in our current global political situation and what impact, for example, which has initiated CO2 taxation in Germany through the new climate legislation.

Are we actually on the path of the "new Enlightenment" that replaces today's short-term ways of thinking and acting?

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CASE STUDY OF A POST-GROWTH ECONOMIST: DONNIE MACLURCAN AND THE POST GROWTH INSTITUTE

Mainstream economic science is based on the paradigm of growth. We know, however, that every growth has its limit, as resources are finite. The waste we produce in the economic process cannot be absorbed by nature; the Earth overshoot-day comes earlier year-to-year. This threat to the survival of mankind urges foresighted thinkers to work on what we call paradigm change in economics. Many economists are dealing with alternative theories to solve this problem, but creator(s) of a new economic paradigm are urgently wanted!

One of the candidates should be Donnie Maclurcan, an Australian born social (alternative, civil, public purpose) entrepreneur. First he was hopeless about things around the world not getting better, his attention kept returning to how our economy encourages self-interest, accumulation and growth as "the answer to everything". He didn't feel it right. At the same time, he was noticing that the not-for-profit organizations with whom he was working were increasingly selling products and services.

As a leader of the Post Growth Institute, he consults businesses and organizations about new ways of thinking in a post capitalist economic system; asset-based community development; asset mapping; not-for-profit startup; sociocracy; lean design; Twitter and Facebook; and economic analysis – the circular economy/full circle economics, postgrowth (postwachstum) and degrowth (decroissance, decrescita, decreixement) theories.

This paper will reflect the elements and good practices of post-growth-economics worldwide, through the ground-breaking work of Donnie Maclurcan, his soon-coming book (How on Earth: Flourishing in a Not-for-Profit World by 2050) and his professional and community initiatives, e.g. the Post Growth Institute.

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NEW ECONOMIC VISIONS - POSTGROWTH ECONOMISTS: CHRISTIAN FELBER

ESTABLISHES AND ADVOCATES THE ECONOMY FOR THE COMMON GOOD MOVEMENT, TRANSMITTINGPOST-GROWTH ECONOMICS TO BUSINESSES AND BANKS

As discussed with Prof. Toth, we'll make this Postgrowth Economists and his ideas and work know to the audience. Christian was born in Austria and is known for the Economy for the Common Good. The Economy for the Common Good advocates a more ethical economic model, in which the well-being of people and the environment become the ultimate goal of business. In all areas of society, the Economy for the Common Good contributes to a culture of good living in a peaceful and sustainable civilization. Living together in the common good society is characterized by human coexistence, a high degree of trust and appreciation, strong social cohesion, manageable structures and fundamental rights. Together with sovereign democracy, the common good society offers citizens the right framework to:

- interact with each other with tolerance and mutual respect for diversity and diverse lifestyles;
- define their personal values, set their individual goals, find their identity and develop their full potential;
- allow their talents and skills to evolve and, in this way, help them contribute to the common good in a meaningful and cooperative manner;
- actively engage in politics, making democratic decisions and thus helping shape their own future.

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KATE RAWORTH - DOUGHNUT ECONOMICS: SEVEN WAYS TO THINK LIKE A 21ST CENTURY ECONOMIST (2017)

What if we started economics not with established theories, but with humanity´s long-term goals and how to achieve them?

This is the question, Kate Raworth asks in her book "Doughnut Economics". She criticizes, that our economical acts and decisions are based on the economic theories of the 1960s, which are mainly focused on a continual and unlimited growth. She suggests an update to the 21st centuries economy, which accounts not just for our well- being and prosperity, but for that of our planet as well.

To make the missing factors in classic economies visible, she developed a "Doughnut Model", which includes twelve aspects of our social foundation, as well as nine planetary boundaries and explains, that the ideal space of our economy is between these two elements.

Her work is a wake-up call to transform our capitalist worldview, which is targeting to growth, into a more balanced, sustainable perspective, that allows both humans and planet to thrive.

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THE PRICE OF EFFICIENCY SCITOVSZKY TIBOR'S CRITIQUE OF UTILITY THEORY

We are witnessing a very rapid increase in the behavioural approaches in different fields of economics. Behavioural economics provides an opportunity for studying consumer decisions with regard to sustainability. This study summarises and analyses the research perspectives of Scitovsky Tibor with special regards to his critique of the utility theory in economics.

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POSTGROWTH ECONOMISTS - DREAMERS, SCIENTISTS AND IMPLEMENTERS OF THE POST-GROWTH AGE ECONOMIC PARADIGM

In human organizations growth hormones gradually become less active. This is due to what we call growth-hormone inhibiting hormones (GHIH). How can we build in such a control mechanism to our long term economic growth, which was a godsend in the last 200-2000-20000 years of human history, but seems to create very rude question marks in the very last decades? Who will be the paradigm changers, who can act as quasi EGHIHs (economic GHIHs)? Alas, the crisis cannot be solved with a simple degrowth slogan, as many national economies and billions of people have to struggle from abject poverty to acceptable minimal living standards. As ecological resources are more scare, this would probable necessitate that others stop luxury wealth accumulation. Economic science have to answer such questions as differentiating between good and bad growth, estimate the healthy limit to economic growth, or what would be the engine of a non-expansional economy designed for expansion. In addition, we would need to build the economic theory basis of a human and sustainable development based on solidarity, in a gradual and peaceful manner, instead of harshening international conflicts. In my paper and in the session "New Economic Visions" we seek answers for these questions, with the help of alternative economists, who at least gave some serious thoughts to these challenges.

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MAX ROSER: THE CHARTBOOK OF ECONOMIC INEQUALITY

200 years ago, 90 percent of the world's population living in poverty. Today, this number has decreased to about 10 percent according to Moser. Nevertheless, economic inequality has increased in the last 100 years, as the Moser's work also shows.

The presentation at the conference will introduce Max Roser and „The Chartbook Of Economic Inequality" by Tony Atkinson, Joe Hasell, Salvatore Morelli and Max Roser as a major piece of Roser's work. The chartbook is showing the long-run change of economic inequality. Also one of Moser's main objectives will be addressed: Moser pleads for a different view on the world as he criticizes the event-based short-term orientation of media converage.

REGIONAL AND RURAL DEVELOPMENT

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THE LOCAL POPULATION SURVEY REGARDING RES IN THE KOPPANY VALLEY. BACKGROUND INFORMATION RESULTS.

The main goal of the study covered investigation of the social potential regarding the local utilization of renewable energy in rural areas of Hungary. Public acceptance of various types of both renewable energy sources and technologies is significant dimension of the local social potential. The particular area of research was the Koppany Valley Natur Park 2000 development unit, the micro region located in Somogy county. The local population survey was conducted in order to collect the data describing background information of the respondents, knowledge and attitudes of the local stakeholders towards renewable energy. The questionnaires were distributed in 10 settlements of the Koppany Valley micro region. Single and multiple choice, Likert scale and open answer questions were applied in the process of the survey. The particular focus of the given report dedicated to questionnaire's part of the background (personal) information about the respondents including gender, age, education, residence, etc.. The current paper introduces the descriptive analysis results.

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PROFITABILITY AND SUSTAINABILITY? EVIDENCE FROM HUNGARY

In our study we examine the profitability of the agricultural sector. This article focuses on the specific factors determining the profitability of agriculture, as the alternative cost of equity and sustainability indicators. We examine the question, which groups of Hungarian agricultural companies belongs to the profitable category with hard budget constraint (without subsidies).

We analyze how agricultural subsidies, alternative cost of equity and sustainability impact on the agricultural profitability.

Based on our article, the reader can get a picture of whether variables are typical for profitable agribusinesses. The agricultural individual farms are a heterogeneous group, and therefore the further investigation was important. The measure of sustainability we use variables like proxy for extensive farming or presence of forest.

On the basis of the cost unit per revenue unit, only the two largest farm size groups are profitable. Based on the subsidies ratio (Cost / revS), each cluster becomes profitable. There is a positive relationship between crop production and profitability.

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THE THEORY OF „SUSTAINABLE OUTSOURCING"

Outsourcing is mostly used as a tool to reduce one company's costs. There are many areas that they work well (i.e. call centers, shared service centers), but in others there are not sustainable. Many scholars pointed out the negative consequences of outsourcing nowadays, but it has a large and well-known reputation in different companies. The result of this outsourcing was that companies lost the core competencies that originally allowed them to develop manufacturing that could supply a product capable of competing on the world market and that fueled innovation. Since strategy is a collection of interlocked activities that strengthen one another, removing one of these activities breaks the entire chain.

We can use the idea of the "industrial commons" to demonstrate. Pisano and Shih have written about it for the first time in 2012. They are a critical mass of buyers, sellers and highly educated workforce concentrated in a geographical area. Due to outsourcing, these industrial would commons collapsed and the companies would bankrupt.

In my presentation I would like to argue the probability of outsourcing and the usage of industrial commons in Hungary. Although the idea of the "industrial commons" was born in the USA, we should take a look at it from Hungarian point of view, from the Carpathian basin. If we look at the country's economic policy we would find clues of "sustainable outsourcing". It means that even though the company export its manufacturing skills, it can become an "industrial commons" itself in an other country.

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RESOURCES OF SUSTAINABLE ECONOMICS GROWTH AND DEVELOPMENT: THE CASE OF THE REPUBLIC OF SERBIA

The Sustainable Development Strategy implies a targeted long-term process that affects economic, social, environmental and institutional aspects of life. The goal is to meet the social and economic interests of citizens, reduce poverty, reduce unemployment and gender inequalities and reduce negative impacts on natural resources and the environment, resulting in long-term economic growth with economic efficiency, technology and innovation. Accordingly, in 2015, the United Nations adopted Resolution A / RES / 70/1 - Transforming ourworld: the 2030 Agenda for Sustainable Development, based on three dimensions of sustainable development: economic growth, social inclusion and environmental protection.

At the end of the XX century, parallel to the theory of development, which turned into the concept of sustainable development, there has been globalization that has integrated the entire world regions in order to gain as strong economic and financial positions as possible on the world stage. Today, Serbia is not in a position to choose whether to engage in modern globalization processes, but it must continue the initiated transitional reforms and accession to the European Union, regardless of the economic, political or environmental consequences. By implementing national policies, Serbia should aim at national and economic sovereignty, which will further influence sustainable development. Only by changing the current economic policy, by creating a national strategy based on the exploitation of domestic economic and industrial potentials, by reducing unemployment, social responsibility and individual freedom, economic growth and sustainable development can be achieved.

In addition to the introduction, this paper consists of two parts which are based on the presentation of the strategy of sustainable development of the Republic of Serbia, ie presenting the current situation with possible solutions for achieving sustainable development in the future. Finally, final ratifications were provided.

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AN EMPIRICAL ANALYSIS OF THE RELATIONSHIP BETWEEN FOREIGN DIRECT INVESTMENT AND UNEMPLOYMENT RATE REGARDING TURKEY

This paper is aimed to analyze the impact of Foreign Direct Investment inflow on the macroeconomic variable as Unemployment rate in Turkey. The time series datasets (FDI, UEMP) , those were obtained from World Bank database, which covers the time period 1980-2017 were utilized in employed statistical models as the ADF Unit Root, Philips – Perron Unit Root, VAR lag selection, Johansen co-integration, and the Granger Causality tests, to accomplish the empirical part of the paper. Based on results, it was confirmed that there was at most 1 presence of the co-integration between analyzed series. Additionally, the results of Granger causality test showed that there is unidirectional causality from FDI to UEMP. Thus, this paper can be a proof that Foreign Direct Investment inflow has a crucial impact in decreasing of Unemployment rate in Turkey.

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ANALYSIS OF THE IMPACT OF DEVELOPMENT TAX BENEFIT ON EMPLOYMENT

Increasing employment and job creation is a key area of fiscal policy, which can lead to a wide range of tax benefits. As a member of the European Union, the government can only provide tax subsidies within certain limits, so at first to review EU harmonization rules for direct taxation. The following is a description of the extent and rules for applying certain tax benefits related to developments in corporate taxation in Hungary. Based on municipal corporate tax data, we analyzing the employment impact of the development tax benefits. In our study we determined how the development tax benefits in the Hungarian corporate tax rules influence the labor market of certain regions / settlements.

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THE ANALYSIS OF THE CROSS-BORDER CORPORATE PROFIT'S TAXATION

Ensuring the same competition conditions for the companies in EU requires tax harmonization between Member States. In this paper, we review some elements of the harmonization efforts. We will discuss the OECD guidelines on direct taxation and the transfer price regulation as a way to regulate corporate tax optimization behaviour. Based on the Effective Average Tax Rate we introduce the differences in the taxation of profits between Member States. The Common Consolidated Corporate Tax Base is one of the key elements in the harmonization of cross-border corporate profit taxation, so our study has a special focus on the proposal. The undisputed advantage of the CCCTB would be the simplification of the taxation of transactions between Member States. However, it also raises the question of how does it limit the ability of each Member State to attract capital and to what extent can assign the profit tax to the given country in proportion with the operation of a company and with this how to realize that the base of the corporate tax focuses on the place of activity.

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INDIVIDUAL AND SOCIAL INTERESTS IN AGRICULTURE

One of the main objectives of the European Union, including Hungary, is to ensure environmental protection, food safety and food security, and to ensure a fair standard of living for the agricultural community. The aim of the research is to examine these agricultural interests from the perspective of society and farmers. The Common Agricultural Policy has undergone a number of reforms in recent years, but increasing productivity has always been a major objective, and nowadays the need to protect the environment, which is also required by society, is becoming more and more important. From a social point of view, employment of the rural population is of paramount importance, thus agriculture also fulfills rural policy objectives. A key element of sustainable development is the maintenance of biodiversity. Utilizing fertilizer to farmers is not a goal, but a means to replenish soil nutrients. In addition to fertilizers, the use of pesticides requires special care. Agriculture provides the basis for the production of food products, so its role is to produce products of appropriate nutritional value that are not harmful to the living organism for all actors in the food chain. The main question of the research is to examine the extent to which Hungarian agriculture can meet these objectives.

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DETERMINANTS OF GLOBAL MAIZE EXPORT: THE GRAVITY MODEL APPROACH

The maize is one of the most important agricultural export product in world. In our globalized agriculture the main maize exporters and importers are trading increasing volume between eachother. The paper investigates the trade costs and economic characteristics in the pattern of global maize exports over the period 1996-2015. We employ standard gravity model to explain the drivers of global maize exports at the world market. In the study we use two PPML model with different fixed effects and our results show the effect economic development, distance, trade costs on the global maize market.

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THE FINANCING OF THE AGRICULTURAL ENTERPRISES IN HUNGARY BETWEEN 2012 AND 2016

Many financial institutions assist the Hungarian agricultural sector with adapted financial services, but agricultural sector has many special characteristics, which the financial system does little to accommodate. Such as high transaction costs to reach remote rural populations, covariance of production, market, and price risks, and absence of adequate instruments to manage risks.

Our article's starting point: it is useful to examine specific factors determining the financing of the agricultural enterprises. In addition to the traditional sources of agricultural financing, such as bank loans; we examine usage trend of accounts payables, loans of integrators; leasing and factoring financial sector.

Our objective to take into account agricultural producers' foreign liabilities and their own capital. This helps the economic efficiency of business operations; the indebtedness of Hungarian agricultural enterprise, as well as to take a full picture of financing options.

The study analyses the domestic agricultural enterprises based on the FADN Test Farm Information System's database operated by the Hungarian Research Institute of Agricultural Economics (AKI). The analysis works with the data of the statistically closed years 2012-2016.

This case studie makes a useful contribution to the rapidly expanding literature on financial institutions in Hungary by clarifying the old and some new finance actors in agricultural finance. Which makes this paper indispensable for those involved in financing as well as policy makers.

Searching for Management and Leadership Excellence in Age of Sustainability

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„CSR LEADERSHIP"

„There is obviously already a wealth of literature on leadership, and there is a good deal of literature, both conceptual and research-based, on corporate social responsibility. But we know relatively less about the intersection of the two" (Van Velsor, 2009), CSR and Leadership differ, combine, but at the end they both pour in the same river which is the Sustainable Society and Human Wealth. In this article we will try to define their meanings, their characteristics and how do they intersect and their practices in Companies.

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ACCESSING THE CORPORATE SUSTAINABILITY WITH A REPERTORY GRID ANALYSIS

Corporate sustainability (CS) is becoming a key feature for preparing an organization for the future challenges of its competitive environment. It has expanded from corporate social responsibility (CSR) by adding the dimensions of ethical, environmental, economic and cultural responsibility whilst substituting a long-term perspective of sustainability of the aforementioned subjects. This paper summarizes the concept of corporate sustainability focussing on the most relevant topics of recent scientific literature. The findings are then compared to the findings of 61 repertory grid interviews to evaluate how far corporate sustainability is already carried into the practical notion. This type of interviews and the underlying theory or personal constructs allows to see if corporate sustainability is a topic without bringing up this point and that way evoke a response to a subject that is originally not considered on operational level.

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WASTE OF RESOURCES DUE TO FRICTIONS IN THE CASE OF RECRUITING LATERAL ENTRANTS

The shortage of skilled workers for various reasons means that more and more industries are regularly recruiting lateral entrants. Career-oriented workers are thus offered the opportunity to work in business areas for which they are not (yet) qualified and in which they have no experience. In the former research on application procedures, it is assumed that the candidate is sufficiently informed about the profession for which he is applying. Recruiting procedures are designed to learn as much as possible about the real performance of the candidate because it is assumed that the candidate will present himself better than he actually is. But what if the applicant, due to a lack of training and/or experience, is unable to assess his performance in a largely unknown profession? There has been no research on this so far. The fundamental research questions are: "Which additional information asymmetries arise when hiring lateral entrants", "Which stages in the recruiting processes have to be designed differently when hiring lateral entrants" and „What is the degree of waste of resources due to information asymmetries"?

A theoretical model and the analysis of the job advertisements for lateral entrants by the 25 largest insurance exclusive sales organisations and the 25 largest financial sales organisations gives an insight into frictions in the matching process.

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ECONOMIC RESPONSIBILITY OF EMPLOYEES AND SOCIAL RESPONSIBILITY OF EMPLOYERS – TOWARDS THE SUSTAINABLE GROWTH OF A PARTNERSHIP ORIENTED ENTERPRISE

Corporate Social Responsibility (CSR) has been very well analysed and defined in the business and the scientific literature. However, on the other side of the "responsibility" issue there is a quite different problem, dilemma – the Economic Responsibility of Employees (ERE). Adding this new perspective to our overall picture of every business performance it is possible to create more sustainable growth both for employers and employees. It is possible to achieve a "win-win" pay-off for those two key interests group, however there are several conditions that have to be met.

The research addresses the issue of sustainable growth of every business entity from different responsibility point of views. It tries to design the management model that represents key indicators for success in terms of sustainable growth, partnership, and responsibility. It also describes all mayor conditions and values that have to be supported in the purpose to ensure the effective implementation of the more balanced, sustainable model of business growth.

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LEADERSHIP IN TIMES OF MODERN BANKING

Motivated by the new contestants in the German banking sector this paper focuses on the current challenges, the development and transformation of leadership in the banking sector. The German banking sector is facing huge challenges, inter alia mergers, shrinking yield and digitalization. Leadership needs to be innovated, thereby the companies are able to adjust to the facing challenges.

This paper gives a short overview of different leadership styles. Leadership forms predominating in a company always depend on the individual people being part of the management level. The company can choose the people concerning the leadership form they want established in their company. The bigger problem is that by facing the current challenges companies may need different leadership style. But it cannot be adujsted easily because the leaders cannot change their behavior and character quickly. It is a longlasting progress. The leader needs to understand why to adjust his or her leadership style and also has to embrace the employees issues or the company has to deploy the management level anew.

Therefore this paper bases on a study of expert consultations. The consultation focuses on leadership, the most common leadership styles, the currently most dominant leadership styles and shows the development of German leadership in the German banking sector. Furthermore the paper will show the estimations, concerns and requests of the sector's experts. The paper will end by giving an outlook of leadership trend in the German banking sector and several suggestions for further research.

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PUBLIC KNOWLEDGE OF THE SMART CITY CONCEPT IN KAPOSVÁR

Smart city is an emerging concept of the 21st century, which may determine the daily life of people in the next decades. Even nowadays there are a huge number of smart devices, which have already become inevitable in the daily routines of most people, but according to the researches and forecasts the future lies in integrated smart systems managing whole settlements in a complex way. Our research group aimed to find out how much people know about smart cities and systems and which are the areas where they would be open to use them. We asked the citizens of Kaposvár - a city, where the development to become a smart city is among the long term plans of the management - about their knowledge of the smart city concept in the form of a quationnaire. We focused on the general knowlegde of the term, but also on the different areas, where the smart developments may be possible. We aimed to identify out the core areas of smart development, which the citizens regard as the most crucial, to be able to provide suggestions on the possible paths of further development.

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INDUSTRY 4.0: ECONOMICAL AND LABOUR MARKET IMPACTS IN HUNGARY: OUTLOOK

Industry 4.0 is at the doors, quite possibly bringing enormous economical and labour market related changes. Its full impact is yet to be seen, but most predictions say it will bring an upswing in production, but a huge disruption is the workforce, potentially wiping out or at least changing as much as 60% of jobs. As related technologies like Artificial Intelligence, Machine Learning, Machine to machine communication, and the Internet of Things are advancing, less and less workplaces will be safe of automation. From factory workers to office clerks, Industry 4.0 brings something new to everyone. This can mean an easier job, a less routine orientated job, or no job at all. In this publication we will build on the well-known work of Osborne and Frey, and on the recent study conducted by McKinsey & Company: "Transforming our jobs: Automation in Hungary" to present a picture of ongoing trends, where we are at right now, and where are we heading, with a focus on Hungary's case, and with taking a look at the most well-known proposal to fight the job losses of automation: Universal basic income.

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SUSTAINABLE LEADERSHIP MODELS AND LEADERSHIP STYLES AS SUCCESS-CRITICAL FACTORS IN SMALL AND MEDIUM-SIZED ENTERPRISES WITH HIGH HUMAN CAPITAL

Small and medium-sized enterprises are in a transfer process: they are regionally established and traditionally managed. At the same time, they are confronted by the challenges of global markets and by new generations of leaders.

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FAMILY BUSINESS BETWEEN CHALLENGES AND CONTINUITY

As we noticed most family owned business don't grow and they took themselves to be failed and destroyed in the field they work in (Danco, 1980). On the other hand despite many challenges family business could have the chance to expand and develop. In this article, we will study the challenges linked to a growing firm and propose solutions to overcome them. For this reason, we will search for the best management and leadership practices adopted to ensure family business growth and development. We sought to understand the intrepret of these challenges and draw out best solutions for it, through analyzing of diversed data sources, to reach at the end the factors of family business continuity.

Sustainability models (Mathematical, IT, Statistical, Technical Aspects)

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SUSTAINABLE AGRICULTURE AS A BASE OF SUCCESSFUL FOOD PRODUCTION AND EXPORT IN HUNGARY.

Hungary is a country of important areas in Eastern Europe, due to its location. Geographical as an intermediate between Eastern Europe and Western Europe and agricultural importance, whether the agricultural land in Hungary suffers from lack of exploitation despite the extension vast. Will have problems limit the sustainability of agriculture in which throughout the year, which reduces private problems related to agricultural production water, irrigation and methods of prevention and the availability of equipment and expertise of the peasants in the area of crop selection or mode of action.

This study aims in general to recognize the reality and potential of agricultural. This paper will Prepare paper questionnaire survey to collect data from farmers, experts, agricultural students in Hungary, the descriptive statics will utilize in the description of the questionnaire respondent and sample characteristics.

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THE SUSTAINABLE URBAN ENERGY SYSTEM OF KAPOSVÁR

The definition of the sustainable urban energy system is very wide as every local system utilizes the local resources, bases on the local specialties. A unique urban energy system operates in our city Kaposvár, that was built on separate developments of different stakeholders.

From the 1990s combined heat and power plant serves for the district-heating and generates electricity. From the 2000s a sugarcane-based biogas plant started to work in the local sugar factory and a company producing composite-body buses settled to Kaposvár.

The city of Kaposvár, considering the needs of the inhabitants - like district-heating, transportation, satisfactory air quality - integrated these activities, and created a special urban energy system. The locally produced public transportation buses are running on the sugarcane company produced compressed natural gas, while the filling station was placed to the district heating company.

In our publication, we want to analyze the technical, economic and environmental synergy aspects of this system and the further development possibilities.

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THE REBOUND EFFECT: A CRITICAL AND SYSTEMATIC REVIEW ON THE CURRENT STATE OF AFFAIRS

This publication is aiming to present the recent status of research on the rebound effect. Firstly, a critical systematic literature review is conducted to outline (current) scientific models and theories. Heron, the research field is critically analyzed towards gaps and limitations. To ensure quantitative and qualitative results, a review protocol is used to integrate two different stages and cover all relevant publications re-leased between 2007 and 2019. Accordingly, 392 publications were identified ad-dressing the rebound effect. These papers have been reviewed to extract relevant information regarding the two research questions. The literature review shows that research on the rebound effect is not yet comprehensive and mainly focused on the effect itself rather than solutions to avoid it.

The main gab and therefore limitations are that there hasn't been much research published on the actual avoidance of the rebound effect yet. This is a significant limitation for its practical use by decision-makers and politicians. Therefore, a theoretical analysis has been conducted to reveal potential theories and ideas to avoid the rebound effect. The closest idea to solve this problem has been identified as the theory of a steady-state economy (SSE), which has been described and critically reviewed.

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COMPARATIVE ANALYSIS OF SOMOGY COUNTRY FARMERS' DATA, BASED ON THE HUNGARIAN CENTRAL STATISTICAL OFFICE AND THE HUNGARIAN STATE TREASURY DATABASE.

This paper is presenting the number of the farming operations in Somogy County registered by Hungarian Central Statistical Office (HCSO) and by Hungarian State Treasury Database (HSTD). The the research objective was to analyse the farm specific data and show the reasons of the differences between the two database.

Cultivated land by HCSO (251 493 hectares) and by HSTD (249 963 hectares) registered arable farming land surface data shows only a minor difference. The HSCO database contains 588 hectares of land registered in the horticultural category what doesn't appear in HSTD's database Difference caused also by different year of the datasources, last available data by HSCO in 2016. and by HSTD from the year of 2018. Finally the decrease of arable land surface as a result of the afforestation intentions of the government.

In the farm sizes there was major difference between the two systems Standard Output (SO) values. Reasons of the difference were that the SO values defined by annual aspect, type of farming activities and by product coding.

In case of number of farming operations there is no significant difference in the datas by the two systems (HSCO and HSDT). The reason of the difference is that in the HSTD system there are registered operations due to the countryside development subsidy programs which are not doing real farming activities like: ecclesiastical activity, municipalities, other associations

In case of distribution of farming operations the datas in the two systems show a significant difference. The reason of the difference is the the definition of the categories in the two systems. The Primary Producer with TAX Number rgistered as a Natural Person by HSCO but HSTD register them as Entrepreneur.

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ESTONIA – THE DIGITAL PATH TOWARDS A SUSTAINABLE FUTURE

Estonia has been named as the most advanced digital society and not undeservedly. In the last two decades the smallest member of the Baltic states has led the digital curve at the regional level and hit a homerun in the global business arena thanks to its innovative mindset.

The efficiency-oriented ecosystem of Estonia covers different smart solutions such as e-identity, e-governance, mobility services and smart cities, among others.

As a result 99% of public services are available to citizens as e-services, self-driven vehicles have been allowed to drive on public roads since 2017 and e-Governance became a key to increase the well-being of its people.

Facts prove that digitalisation is not only a way of innovation but also a comprehensive approach of sustainability. While all the Baltic states are classified as high-income economies by the World Bank and maintain a very high Human Development Index, Estonia has further ambitions to thrive in smart city developments.

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SOLDERY – HR/RECRUITER ASSISTANT APPLICATION

Nowadays most of the HR Recruiters are using LinkedIn. Unfortunately, the built-in recruiter software of LinkedIn is not free, the majority of the companies cannot afford to buy it. Thus, most of the recruiters have to do lots of manual work, for finding candidates, getting new connections, collecting and managing user's data, sending messages to them, etc. Soldery (a desktop application) is created for them, to make their work easier. By the aid of it, not only keyword-based automatic user's data collection is possible, but also "click on connect" and "send messages" option are available. The program has a built-in database, where one can export/import user's data at any time and also update outdated user's data. It saves time, energy, and money for the users, and it takes the boring part of the recruiters' work, thus they can focus on more exciting/challenging tasks.

István Marits

IT IN THE FOCUS OF JUSTICE

In my presentation, I want to share some of my 20 years' experience, as the first IT security expert in Somogy county, who achieved at least 1100 reports.

To be successful in this field the expert must be not only engaged but to put him or herself into the Perpetrator's place to use only the skills, tools, he or she had. Mostly this opens the way to find the evidence.

Recently not only the data storage system has changed the smart devices spread up but the type of the criminals as well. Besides the civil litigation issues, the number of crimes related to drug distribution, consumption, sexual,- internet crimes increased in the past decades.

My aim with this presentation is not only to show the state of art of this field but also to motivate the audience to use smart devices properly, to emphasize the quote of Confucius: "Don't do unto others what you don't want done unto you."

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ASPECTS OF DATA SCIENTISTS IN THE LABOR MARKET

The three main parameter words of Big Data are the volume, the variety and the velocity. These are increasingly placing pressure on organizations that need to manage huge data and databases as well as extract value from this data quantity for analytics and decision-making. Big Data technologies, services, and tools such as for example Hadoop, SQL databases, Data Integration techniques and Cloud technologies have emerged to help meet the challenges posed by the flood of Web and/or Social Media for the organizations. These challenges generate more and more jobs in the light of ongoing changes.

At present, the Hungarian IT development areas are of high importance in the labour market. In addition to these, there are also well-known areas such as consulting positions requiring strong technical orientation, IT-business experts, cyber-security engineers, IT risk management experts and data engineers. In this study, I examine the labour market demand side of data engineers.

During the past one and a half years, I have collected hundreds of big data and data engineers job advertisements from various companies. With my data, I was looking for answers to the following questions after outlining the current situation on the labour demand side:

Where are the available jobs in the subject? What are the requirements of companies regarding the relevant competencies? What skills and abilities should be prioritized in the educational process in the given topic so that students can leave the required work areas from the school?

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ROBOT PROGRAMMING IN EDUCATION

Programming is an important question in education nowdays. We use a lot of devices in our life in which we need to do basic programming. Z and alfa generations learning habits changed. It is more enjoyable when we use mobile devices in lessons. We can use smart devices. It can be a good choice to use robots in teaching and learning process. I would like to show some possibilities how can we use ArTech and Lego robots in our lessons, in mathematics, physics, literature, grammer and languages.

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A NEW SOLUTION FOR ANALYZING THE DISTORTIONS IN PRE-PLANNED DRONE FLIGHT PATH

It is well-known that to make an orthophoto we have to have adjacent images overlapping a certain percentage. However, producing the overlap can be essentially difficult, even with a planned route, due to the fact that drones are not able to follow a pre-planned path all the time because of various factors. However, coordinates can be read from the captured images, and with the help of known camera properties the swath can be discerned. The conventional method for calculating this consists of specifying the coordinates of the intersecting sides of the area of an overlapping rectangle, which is lengthy. The method we developed is much simpler than this. One of the two overlapping rectangles was fixed to determine the curve of the center of the other rectangle such that the overlapping area was exactly equal to the required overlap. This mentioned curve became an arc of a hyperbola. This makes the calculation a lot simpler with making the original problem be comparing the lengths of two sections. The method was developed using GeoGebra software.

SUSTAINABLE CONSUMPTION BEHAVIOR

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CUSTOMER BRAND LOYALTY AS A CONSEQUENCE OF PLACE ATTACHMENT

This study examines the effects of place attachment on brand loyalty. This study further ascertains whether the effects of emotion-based attachment on brand loyalty is stronger for customers who have a positive experience with a restaurant brand. We further investigate whether emotion-based attachment mediates the relationships between identity-based attachments, place dependence, and brand loyalty in the restaurant setting. The questionnaire was administered to customers (diners) of restaurants in Ghana and they were completed. The findings show that identity-based and emotion-based attachment enhance brand loyalty within a restaurant setting. The results also show that place dependence attachment promotes emotional bonding with restaurant brands.

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SUSTAINABLE FOOD CONSUMPTION

However the public interest in sustainability increases the challenges of the next decades is how we could handle the growing food demand. The global food supply have never been so complex, and the growth of the global population will reorganise it. The food consumer behaviour determines the consumer behaviour from the view of sustainability. This study aims to contribute the debate on university students' food buying practices with regard to sustainability issues. The empirical research builds on a questionnaire survey with a sample of 500 young consumers, students of the University of Debrecen. The primary purpose of the study is to survey the daily eating habits of the Debrecenian students, to analyse what kind of special and individual's diet do they follow. We will analyse what is the reason for special diet: some kind of disease or an individual decision. We will compare the food consumer behaviour of the students with the special diets (Vegetarian, Vegan, Paleo, etc.) with the mixed diet from the aspect of sustainability.

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THE CONTRIBUTION OF THE KRISHNA CONSCIOUS COMMUNITY TO SUSTAINABLE CONSUMPTION IN HUNGARY

The Krishna Conscious community is an emerging new religious movement in Hungary. Besides being more and more important in religious life, the community puts a huge emphasis on the development and promotion of sustainable community and decreasing ecological footprint. Besides operating vegetarian and vegan restaurants in the country and organizing food distribution to the poor and in need, devotees of Krishna Consciousness in Hungary have also initiated the Eco-Valley Foundation, which aims to educate future generations how to decrease ecological footprint and live a more sustainable life. During my research I analized how a religious community may apply its own tools of promotion in order to achieve something, that is not strongly bound to religion.

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INFLUENCING FACTORS ON CONSUMERS BEHAVIOR TO PURCHASE SUSTAINABLE COSMETIC PRODUCTS: A STUDY IN THE GERMAN CONTEXT

In today's markets, corporate social responsibility is a new consumer expectation. Organizations across all industries are trying to meet these expectations in building a positive reputation and sending a signal to their stakeholders.

However, consumers' environmental behavior is not always the result of their positive attitudes towards environmental issues. Potentially, their environmentally friendly attitudes are contradicted by their actual behavior. This means that people, who have positive attitudes about sustainable products and state that they would purchase them, may not actually buy them after all. In addition, consumers often do not wish to spend more money on buying sustainably, even if they have higher expectations towards sustainable products or companies.

Further research is therefore needed to explain the gap between consumer awareness and actual purchasing behavior. In many contexts, environmentally friendly consumption, called sustainable consumption, has been explained by the theory of planned behavior (TPB), such as when buying food or apparel. Sustainable consumption often results from planned decisions rather than hedonic reasons.

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STUDENTS' PERCEPTION OF SERVICE QUALITY; A COMPARISON STUDY ON GENDER IN ETHIOPIA

This work aims at evaluating students' perception of service quality towards female and male instructors using SERVQUAL model. It explores the applicability of the model to measure a gender bias in higher education. Independent samples were taken from three Addis Ababa university campuses where students rated female and male instructors separately. The samples were taken from classes where both female and male instructors taught in the past semester. The perceived service quality was measured as the difference between perceptions and expectations known as the gap. The results indicated that students rated female instructors significantly lower than male instructors in all service dimensions. For female instructors, the biggest gap was observed in reliability followed by assurance while tangibles followed by reliability was the biggest gap score for male instructors.

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THE CITY BRAND OF KAPOSVÁR AS A TOOL OF SUSTAINABLE DEVELOPMENT

Today, a purely competitive relationship evolved not only among regions, but among the settlements of those for tourists, investors and people who look for a place to live. Competing cities appear as images formed in the minds of the target groups mentioned above – these images try to achieve dominance in the target groups' decision-making process.

In the competition of Hungarian cities Kaposvár realized quite early that it cannot do without the toolkit of settlement marketing in its developments. Making the image points for the different target groups manageable as a part of the conceptional and integrated city branding activity is a declared aim of the city administration. The most important aim of this conceptual series of activities is to guarantee an economic growth, however, it can be an effective tool as well by which social and environmental issues may be promoted.

This paper, therefore, has two main purposes. On one hand, this study is to show how place branding may try to be an effective tool of development of a relatively small town, Kaposvár, and how conceptually a city brand can be designed in order to serve the cause of economic sustainability. On the other hand, the aim of the paper is to demonstrate how a well-structured city brand can be the basis of campaigns for environmental sustainability.

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STEP BY STEP WITH THE CARBON FOOTPRINT: HOW IMPORTANT SUSTAINABILITY IS IN CATERING?

Can be a menu design employed as a customer 'nudging' tool? How environmentally conscious are the restaurateurs? We investigate carbon footprint sensitivity, and link sustainable to healthy eating via developing a signaling system.

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MARKET SEGMENTS IN ONLINE TRADE EXEMPLIFIED BY THE GERMAN PHOTO RETAILING INDUSTRY

Sales of cameras are increasingly shifting from the stationary channel to the online trade. In contrast to platforms and other online trade forms for cameras, most stationary multi brand dealers have not yet successfully entered the online trade. This is largely due to format specific challenges faced by these traders.

The present study is about to identify a market segment for the online trade of originally stationary multi-brand dealers. In particular, it will be examined whether there is actually a market segment that attaches such a great benefit to the potential added value services of these merchants, especially in relation to the other services of online shops, that these can be decisive in the choice of an online shop.

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RESPONSIBLE CUSTOMER BEHAVIOUR - THE CASE OF LOCAL FOODS

Small, medium and micro farms are in a difficult position in terms of the specific features of Hungarian agriculture. Large and multinational companies are given to meet growing food needs, thanks to their volumen-based production, thus shutting down smaller local businesses. Due to the large-scale production and the sales practices of the multinationals, the population is barely able to meet the countryside, with the primary producers and get to know ther products. The results also show that local producers and products can not remain on the market easily.

That is why it is important to pay attention to how to motivate more customer to buy local food. Numerous studies have shown that consumers consume local products for ther individual and community beliefs – fresh, tasteful, support of local producers, sustainability… (Bond et al., 2008; Guthrie et al., 2006; Morris and Buller, 2003). In order to get to know the motives and habits of the subjects of the choosing a shop, we chose consumer survey. It is clear from the store selection habits and products supply preferences that consumers are comfortable shoppers. They can not find local products or know where to get them. It is hard to find local foods in big shops, so if you like to do the weekly shopping in one shop, you will often not find local food. They also value the wide range of product offer within a given store (P=0,00). Consumers and honey consumers refuse to travel for local produce – they made it at home or purchased from a friend, family (P=0,02). When choosig a store, products selection, good location and product prices clearly prevail. This information can be used to target consumers and generate a likely demand for local food.

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DETERMINANTS OF ADOPTING A ZERO WASTE CONSUMER BEHAVIOR

For 2019 the Euromonitor International predicted, that one of the most emerging consumer trends would be aspiring and acting for a plastic-free world. The concept of zero waste has been widely discussed in production technology and waste management literature, however, in recent years environmentally conscious consumers also decided to get more involved in concrete, and sometimes radical waste reduction actions, even lifestyle changes. These initiatives were also supported by the authorities by banning certain single-use plastic items in the European Union by 2021. Media and social media personalities also have thematised the waste pollution problem and have brought closer to the population the principles of zero waste lifestyle. While the environmentally conscious consumer behavior has been researched widely before, the diffusion of zero waste principles at the household level has not been in researchers' focus.

The present study aims to conceptualize and then identify the dimensions and the determinants of zero waste consumer behavior. Questionnaire-Based research was delivered on a sample of 378 people active in zero waste social media groups in Hungary. Results reveal that the waste reduction initiatives are the most important components of the zero waste initiatives, however, dimensions of reusing and recycling products, packages or waste are also have been identified. The zero waster consumer is driven by altruistic motivations, is nonconformist, guided by his own values and convictions, shows a positive attitude toward zero wasters' efforts, follows social media influencers' videos in zero waste matters and is active in social media groups.

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OUTSOURCING MULTIMEDIA MARKETING FOR SUSTAINABLE COST MANAGEMENT IN AIR TRAVEL

Cyclical, marginal, volatile – these words characterize the air travel business and at the same time, summarize the challenges faced by industry stakeholders. Demand for air travel is prone to seasonal variations and economic cycles. It is also sensitive to changes in oil prices as well as security and safety threats. Add to these the capital intensive and high fixed cost structure tied to aircraft acquisition resulting to minimal profits and low return on investments for airline firms.

In order to survive, many firms turn to outsourcing to better manage revenues and control costs. Outsourcing of multimedia marketing to third party providers increased together with the rapid growth of low cost airlines, capitalizing on their frequent need to reach out to clients and engage potential customers using the internet and social media sites, telemarketing, radio, print media, and television to advertise seat sales and last minute discount deals, for instance.

The paper examines the rationale of outsourcing in multimedia marketing and how third party providers operate and position themselves in this business model. A mixed method dual approach is employed to better understand the situational dynamics. First, a business analysis of the case of three multimedia outsourcing firms based in Hungary is conducted. Second, a factor analysis of the determinants of income sustainability is performed. As profit-oriented entities, income sustainability is an important measure of operational viability and business continuity for outsourcing firms.

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CONSUMER PERCEPTION OF INSECT AS FOOD IN HUNGARY

In recent years there has been an increasing interest in replacing the increasingly expensive and GMO soybean meal and fishmeal with insect flour. Insect flour has a high content of protein and fat, favorable content of unsaturated fatty acids, which plays an important physiological role. In addition, its production has a small environmental footprint. Some countries (especially Asia and Africa) have a tradition of eating insect as a food commodity, but nowadays insect food is available in many European countries as well. However, the social perception of the consumption of insect as food has not yet been surveyed in Hungary.

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INVESTIGATION OF FOOD WASTE GENERATION BY MATERIAL FLOW

The reported and collected statistical data about food waste quantity are highly inconsistent. It was approved earlier yet. The possible reason is the gap in food waste definitions, and differences in data collecting and processing, as it is widely well known. The solution is the investigation of food waste on base of material flow.

POSTER SESSION

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POSSIBILITIES OF USING NANOTECHNOLOGY IN COLOUR PROTECTION OF WOOD

Colourfastness characterizes the colour-resistance of a material to fading or running. It is an important factor in the evaluation of wood, but unfortunately the colour of most wood species is not stable under outdoor conditions, it is mainly degraded by UV-radiation. The final result of outdoor weathering on unprotected wood surfaces is the well-known greying effect. To protect the colour of wood material, only surface protection is available nowadays, but in case of surface damages (scratching, cracks, etc.) this protection is not adequate. The impregnation of wood in the whole cross-section with UV-stable nanoparticles can protect the wood long lasting. Most promising results can be found in the literature about the utilization of TiO2, ZnO, CeO2 and Fe3O2 nanoparticles to protect the wood against UV-radiation. The advantage of using nanoparticles for wood protection against UV irradiation is that this treatment usually remains the initial colour of wood unchanged, or there is only a slight change in colour. This paper is a review of recent results and possibilities about the UV-protection of wood by nanoparticles.

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SOPRON AND THE LONGITUDINAL WOOD COMPRESSION

The University of Sopron is the only university in Hungary, where forestry and wood technology can be studied. Within the Simonyi Károly Faculty of Engineering, Wood Sciences and Applied Arts, at the Institute of Wood Science the examination of wood anatomy and the modification of different wood species are the main topics, besides the education. One of these studied topics is the technology of longitudinal compression (aka. pleating) of wood, which was first patented in 1917 as an alternative solution to steam bending. The most important advantage of pleating is that the wood becomes more easily bendable and can be better twisted compared to steamed wood. Pleated material can be held in stock until use. This material is used primarily in the furniture industry, interior design and arts. The equilibrium moisture content and fiber saturation point change only slightly with pleating, despite steaming at 100 °C prior to compression at a ratio of 15-23%. Pleated wood dries faster than untreated specimens under the same conditions. The new properties of wood can be explained by cell wall deformations. The technology is based on a heated press, which supports the wood. Thus, it cannot bend and break during the compression process, while at the same time the specimen does not stick to the support.

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STUDY OF TIME SERIES FINANCIAL DATA OF BIG GAME MANAGEMENT BETWEEN 1994 AND 2018 IN SOMOGY COUNTY

The financial data of Somogy County found in the game management reports were collected from the National Game Management Database's yearly mass of facts and were scheduled. The data contains incomes (paid hunting by foreigners and the related services, paid hunting by Hungarian hunters and the related services, the revenue of live game, income from the harvested game, other incomes) and costs (wages, game management, agricultural and forest game damage (caused by game), and other expenses). The data were studied by time series statistical methods.

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ANALYSIS OF A RIPARIAN ZONE GROUNDWATER SUPPLY IN KASZÓ

Riparian zone forests are very diverse ecosystems and they are a special type of the agro-forestry systems. On the other hand, the biological production of these forests is high; therefore, they are valuable from an economic viewpoint as well.

Prolonged drought periods in the changing climate will likely causes reduction of groundwater resources which at last probably degrades these ecosystems. With reasonably designed water supply systems, unfavorable processes can be stopped, and valuable ecosystems can be preserved.

The effect of a water supply was analyzed in Kaszó forest (Somogy county, Hungary). 18 experimental plots were selected for eco-hydrological monitoring in different forest ecosystems. Two own developed methods were used for analysis: a spatio-temporal difference and a double mass curve approach. Both methods revealed that the water supply interventions had a positive effect on the riparian zone groundwater.

A complex field monitoring was conducted on three representative locations (meteorological, soil, groundwater and phenological measurements). Based on the complex data a 1-D Hydrus model was successfully calibrated for alder and common oak forests.

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SPATIAL DRIVERS OF AGROFORESTRY ADOPTION IN HUNGARIAN SETTLEMENTS

Agroforestry (AF) is a sustainable form of land management that optimizes the use of natural resources. The current EU Common Agricultural Policy offers several measures to promote agroforestry activities. The aim of this paper is to identify the spatial drivers of agroforestry adoption at settlement level. We used a three-stage approach to investigate the spatial patterns of Hungarian municipalities (local administrative units), based on agroforestry potential factors, and test whether there are significant differences in the tendency to adopt agroforestry among the spatial clusters.

The factors of settlement size, biodiversity and rurality has a significant positive affect/impact on high cluster membership. So, this large rural settlements with strong agricultural character and high ecological wealth have the best conditions to run AF projects supported by CAP. The presence of extensive farming has less strong relationship with AF projects. The factor presenting forestry and large-scale farming has a significant negative affect/impact on high cluster membership. The negative effect of large-scale farming prove the theoritical hypotesis which says the small-scale farms are the primarily utilizers of AF technologies.

The structure of spatial drivers identified in this research partly differs from the farm level models Our results contribute to developing an empirical tested model explaining spatial diffusion of AF practices. According to recent studies the rural character of small scale farming and the presence of extensive farming affect AF adoptation positively The positive role of settlement size is probably ensured by the acces of markets and institutions. Based on conceptual and empirical literature we assumed that the high level of afforestation has a positive impact on AF adoption. urprisingly our results show that the presence of traditional forestry is a barrier to apply AF practices Due to this fact the role of forests should be distinguished from other areas of high biodiversity grasslands and wetlands.

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INFLUENCE OF ASPECT AND VEGETATION ON THE DIURNAL TEMPERATURE CONDITIONS

Orography and vegetation can be important climate forcings from local to regional scales. Our case study focuses on the assessment of the microclimatic processes in forestry and agroforestry systems. First, we quantified the impact of orographic aspect and vegetation on the diurnal temperature cycle of temperature. In the Harkai-hill (close to the city Sopron), mobile devices were installed on the northern and southern slope of the hill. The precipitation time series originated from the weather station in Sopron. In the dormancy season (leafless canopy), in daytime (no rain), the southern slope was up to 5 °C warmer than the northern slope. In nighttime the northern slope was characterized by higher temperatures (by up to 2 °C). In the growing season (foliated canopy) the temperature difference between the slopes was smaller than for leafless canopy, for both daytime and nighttime. The results support our hypothesis that rainfall reduces significantly the temperature differences between the slopes, independently from the leaf coverage. These measurements provide useful information to the quantification of the microclimatic conditions and potential benefits of agroforestry systems.

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RIPARIAN ZONE FOREST AS AN AGRO-FORESTRY SYSTEM AND ITS WATER SUPPLY

The word „riparian" means an ecosystems (generally forest) that are associated with bodies of water - dams, rivers, springs, streams and lakes. Among their many services, riparian zones: protect the quality of the water, stabilize stream banks and minimize erosion. Riparian zone forest is one type of ago-forestry systems. This vegetation belts have high water demand and they will likely be the most influenced by the changing climate. This study aims to describe the water balance of riparian forest especially focusing on surplus water use from groundwater. Driven by rising temperatures, increasing evapotranspiration demand in the future will probably induce enhanced groundwater uptake of those plant communities. Eventually this could lead to the lowering of the groundwater table. If this occurs, the existence of groundwater-dependent riparian zone forests will be questionable since tree roots will not be able to reach the additional groundwater source in the future. For handling the problem, the excessive water demand of that groundwater dependent forest can be supplied e.g. from the flooding waves of streams and rivers. Last, but not least a collection of studies was presented also about water supply experiments of forest in hungarian plains.

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SHRINKAGE AND SWELLING EXAMINATIONS OF PLEATED WOOD

With longitudinal wood compression (aka. pleating), a material can be produced that can be bent to a greater extent with less force compared to other common wood-bending technologies, and it has of course different properties than untreated wood. Using this technology, wood retains its pliability even at room temperature over a long time, when it is stored properly. High density hardwood species are the most suitable for pleating. The process requires high-quality, defect-free wood, otherwise the compression can not be performed properly, or problems during bending may occur. Tests were carried out on oak and beech, wood species which are frequently used both for pleating and bending, with optimal compression rate and relaxation time as defined in previous studies. Because wood can show significant differences in its mechanical and physical properties even within one species, samples were taken from the same section of a tree trunk to decrease this problem. The examination of shrinkage and swelling of the specimens was performed according to the relevant Hungarian and ISO standards. During the tests, the dimensional changes of compressed wood were compared to the dimensional changes of the untreated sample groups. In the course of wetting and drying, compressed wood has significantly greater deformation in the longitudinal direction, compared to the untreated wood. This result suggests the limits of the potential use of compressed wood, furthermore the results shows the possibilities for further researches to reduce the deformation of longitudinally compressed wood.

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CHANGES IN EGG VOLUME AND EGG WEIGHT DURING EGG PRODUCTION PERIOD BY PHEASANT AND GREY PARTRIDGE

In Hungary, hand-rearing of winged game, especially pheasant and grey partridge, is a well-known management form of small game management. In the latest decades the intensive hand-rearing methods are the domineering procedure. Well-known phenomenon that egg size varies greatly within many avian species. Many researches pointed that variation within species is greatly high but within clutches the flexibility is altered depending on species, clutch size, laying date or sequence of egg. We have only a few information about winged game species egg mass alterations. For new information we manage egg produce stock population in fenced circumstances and these stock population produce for our investigation hatching eggs. During our investigations we checked the main data of the eggs: laying data, weight, width, length and from these data we calculated the egg volume and egg shape index as well. Because of the different methods of egg producing, we have exact data from each partridge female eggs, but by pheasant we have data only from breeding families (because the grey partridge is monogamy and the pheasant is polygyny species). During egg production period (lasts about 90-100 days, respectively) we found a continuous weight and volume increase by gray partridge, but only by a few breeding pairs were this growing significant. By pheasant we found not the same growing tendency, but the increase of volume and weight was appreciable until the end of second trimester of egg production. These data provide new information about egg production and serve new possibilities for renewing intense technologies of winged game management.

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THE EFFECT OF DIFFERENT CRUDE PROTEIN CONTENT OF FORAGES TO THE GROWING TENDENCY OF PHEASANT CHICKS

The research was conducted to determine relationship between growth traits and crude protein content of different forages in Pheasants (Phasianus colchicus).

During our investigation we used different forages with different crude protein content (21,5% and 28,0%, respectively) to feed pheasant chicks from day-old to 3 weeks-old time. The chicks were raised in broad houses in our university lab, under regular temperature and humidity conditions, ad libitum food and water provided. We made daily weight measuring at the same time of the day (at 5 p.m.) and from all broad we selected randomly 10-20 chicks each day. The study was conducted with 852 game pheasant chicks in two years, 2017 and 2018. In 2017 we measured 241 P. colchicus mongolicus, 104 P. c. tenebrosus and 59 Syrmaticus reevesi chicks. In 2018 we measured 458 P. c. mongolicus chicks.

The growing tendencies were different after the crude protein content of forage. We didn't find any differences depending on pheasant chick subspecies or species.

Suggestions were made for more efficient foraging strategies and for further examination.

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DEVELOPMENT OF A THROUGHFALL SENSING SYSTEM FOR AGRO-FORESTRY RESEARCH

Agroforestry systems have considerably increased leaf area compared to traditional agricultural technologies. The planted tree canopies not only intercept rain on the leaf surface, but the part of rain falling through is heavily modified. The net precipitation is redistributed unevenly in time and space.

Manual throughfall integrator gauges can not apply to explore the temporal and spatial distribution of the rain water. The rapid development of digital sensing technology enables to use of automatic data collectors to explore patterns in water income of agroforestry field. Because of the high number of the planned sampling points we try to find low-cost solutions. As a first step into the digital world, we installed new equipment in our riparian alder plot. We preferred to gain information on the temporal properties of throughfall. It is rather important in the case of riparian vegetation to explore its contribution in the flood development. This publication summarises the recent efforts in the throughfall measurement automatisation.

This research was supported by the EFOP-3.6.2-16-2017-00018 for the University of Sopron, and the first author's work has been also supported by the János Bolyai Scholarship of the Hungarian Academy of Sciences.

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APPLICATION OF SILENT ELECTRIC DISCHARGES IN ENVIRONMENTAL PROTECTION WITH SPECIAL EMPHASES IN AIR QUALITY MANAGEMENT

The silent electric discharges are used in environmental protection, especially in the field of electrostatic precipitators. The industrial equipments in this area are made exclusively with negative discharge electrodes. At the beginning, they were used in precipitating powders, but latter on the removal of aerosols and liquid droplets were also collected by them. In the clean room technologies the positive discharge electrodes started to be used. To decompose harmful components of exhaust and flue gases both polarities are used (positive and negative for discharge electrodes). According to the opinion of a high professional forum in the 80's, the electric discharges are not applicable to gas particles separation. According to the present experiments, it seems to be not really valid. The application of electrostatic discharge in the sinking tube of a cyclone is also abnormal, but working well according to our experiment. The ozone gas is applied in environmental protection with considerable success. The ozone is also produced mainly in silent electric discharges. In the research in the Departement we developed an ozone generator working with surface electric discharges.

The research was made with the support of EFOP-3.6.2-16-2017-00018 „Produce together with the nature – agroforestry as a new outbreaking possibility" project.

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DETERMINATION OF THE THERMAL PROPERTIES OF AGRICULTURAL WASTE

One of the solutions of the present energy problems is to burn biomass. This is not the best utilization of the biomass, but energetically it is a solution, also. This biomass can be forestry waste, wood to burn, waste timber, waste paper, food residue, in cases plastic, or any other burnable materials. To answer the general burning energy questions, it is needed to determine the heat freed by burning the biomass. There are standardized methods and devices for that, but their draw-back is that the quantity of the sample is, generally speaking, not very big, rather minimal, and in most cases the equipment is closed, the burning process is confined. After sampling a lot of samples, it is obvious that the general method is not good enough to characterize greater quantity material. There are lot of methods to overcome these phenomena, but we have developed an equipment and a method to make a reliable investigation. In this research instead of handling a few tenths of a gramm, we made an equipment useful of burning 10-20 g of biomass in one step. This device is capable to determine the thermal parameters, and it is an open system, in which there are exhaust gases. We measure the thermal and chemical parameters of the exhaust gases, and their taken energies are also counted in. The device is useful in determination of produced energies and also in estimation of environmentally harmful emissions. The research was financed by the grant EFOP-3.6.2-16-2017-00018.

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TREATMENT OF RED MUD AND BAUXITE SAMPLES BY ELECTRIC ARC

In the present industrial technologies a lot of different waste with metallic content are produced. Among them the ones containing high iron concentration are having considerable importance, such as converter sludge and red mud. They have 55-65 and 10-30 % iron content, respectively. As the iron is not a rare element, the recovery of that is having economic sense at a certain concentration interval. It seems to be sensible to recover other elements also from the waste in order to increase the profitability. Such as cink and led from converter sludge, and rear earth elements and scandium from red mud, so the combined productivity can make the technology economically feasible. In this research red mud and bauxite were treated by electric arc and the produced iron droplets and the slag was investigated by electron microscope, and ICP. The results sown that the iron droplets contain only silicon as impurity, and the REE and scandium concentration increased by two-three fold in the slag. by using sulfuric and hidrochloric acids the scandium can be leached.

The research has been supported by the grant EFOP-3.6.2-16-2017-00018.

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FORMATION OF C2 COMPOUND IN THE BIOCHEMICAL DEGRADATION OF CELLULOSE: THE CASE OF ACETALDEHYDE

Cellulose, hemicellulose and lignin are supporting the strong structural resistance of plants. The common cellulose is derived from D-glucose units forming a linear polymer. The microfibrils formed by such chains can be broken down by cellulases into mono-saccharides. Among these monosaccharides glucose units could be fermented. Mainly ethanol could be produced. In the presence of oxygen it might turn into acetaldehyde.

In our detailed studies we investigated the reactions of acetaldehyde on surfaces. Its main products are carbon monoxide and methane. In the adsorbed layer the oligomerization took place too. This might be important for further application. The monomer is liquid while paraldehyde is a solid and easily stored. For energetic purposes both could be used.

The research was made with the support of EFOP-3.6.2-16-2017-00018 „Produce together with the nature – agroforestry as a new outbreaking possibility" project.

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ASSESSMENT OF THE PHYTOEXTRACTION EXPERIMENTS OF INDUSTRIAL SLUDGES - SOIL MIXTURES AND WHEAT (TRITICUM AESTIVUM)

It is well known that many industrial processes produce different kinds of sludges as by-product. These sludges can contain heavy metals or other valuable or reusable elements (as rare-earth metals). Our main aim was to determine the accumulation rate of these elements within the main parts (roots, shoots, leaves) of the test plants, wheat (Triticum aestivum). At the beginning of our laboratory experiments, seedling grown tests were accomplished with white mustard (Sinapis alba) seeds and mixtures of red mud and converter sludge and different kinds of soils. According to these tests we determined that among the mixtures the most capable ones were the red mud and saline soil. In the case of converter sludge, the mixtures with loess soil showed the best results for germination. Therefore, during the phytoextraction experiments these mixtures of sludges and soils were applied for growing wheat. The results revealed that the plant could accumulate cadmium and lead hardly. Metals could accumulate mainly in the roots. Only manganese, zinc and iron could translocate to the upper parts (leaves) of wheat. At the end of the experiments, the metal concentration of the sludges-soils mixtures decreased, 44% for Mn, 66% for Cu, and 55% for Zn. The research was made with the support of EFOP-3.6.2-16-2017-00018 „Produce together with the nature – agroforestry as a new outbreaking possibility" project.

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CAPTURE MEASUREMENT RESULTS OF SERVOMEX GAS ANALYZER

The Department of Science and Environment of the University of Dunaújváros has a SERVOMEX Continuous Emissions Analyser unit. The instrument is capable of analyzing carbon dioxide, carbon monoxide, nitrogen monoxide and sulfur dioxide. The instrument displays the measurement data on a liquid crystal display, and it would be possible to send selected measurement data continuously through serial communication. But the serial connection failed to set up and it was necessary to develop another automated measurement capturing system. The presentation introduces the possibility of reading the displayed values directly.

The research was made with the support of EFOP-3.6.2-16-2017-00018 „Produce together with the nature – agroforestry as a new outbreaking possibility" project.

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WHO IS INTERESTED IN BUYING AGROFORESTRY PRODUCTS?

Nature conservation and the preservation of natural resources belong to the most important current issues. There is no doubt that they are relevant at the level of individuals, but the question is whether they appear in consumer behaviour, especially in the awareness of forest and forest products. In our study we are looking for an answer to this research question. Our online questionnaire was filled in by 219 respondents of 20-40 years of age who will be the next consumer generation. Our results show that 80% of our respondents are aware of the forest products and 66% regularly purchases some of them; mainly honey, mushrooms or game. As for the purchase places, personal and direct forms are especially preferred: they buy these products at the farmers' market or from friends. We can conclude that there definitely is demand for agroforestry products and also that the population could be involved into environment-conscious purchasing more efficiently by making the sale of agroforestry products organised.

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ECO-HYDROLOGY OF A FOREST AND A NEIGHBORING WET MEADOW - A RIPARIAN AGRO-FORESTRY SYSTEM

Eco-hydrology of a complex agro-forestry system consist of hydrophyte forests and wet meadows are very important question in changing climate. These ecosystems generally form riparian protection zones along streams reducing flood risk and enhancing water quality. In this study a riparian alder forest and a neighboring meadow eco-hydrolgy was analyzed in Hidegvíz-valley experimental catchment. The aim of the conducted experiment was to compare different surface cover type hydrological and botanical characteristics. The research has started in the 2018-2019 hydrological year.

Throughout the botanical investigation, a list of the representative plant species has been composed from the experimental plots (an alder forest and a neighboring grassland) in each vegetation period. For classifications of the habitats the Á-NÉR categorization was used, which is a hungarian classification system for habitats.

The hydrological research was focused on three important factors: precipitation, groundwater levels and soil moisture values.

The preliminary results of this complex study were presented in this paper.

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THE WOOD IMPREGNATING POLYMER OF THE FUTURE

Lactic acid is an organic acid that can be found in two forms in nature. These forms have different physical properties and they can be produced both naturally and synthetically. L(+)-lactic acid rotates the polarized light to the right direction, while D(-)-lactic acid rotates it to the left. Polymerization of L(+)-lactic acid produces poly-L-lactic acid, which is classified as thermoplastic. It is used in the textile industry to improve ironing capability, to produce biodegradable packaging materials and biodegradable materials, in the food industry, etc. Polylactic acid may be able to solve the degradation problem of plastics, which are generally non-degradable polymers. In addition, polylactic acid can play an important role in improving certain properties of wood, such as hygroscopicity, mechanical properties and resistance. A number of methods for producing polylactic acid are already known and the impregnation of solid wood with (poly)lactic acid is partially solved as well. The results of these processes have positively influenced many properties of wood, but still, many questions remained to be answered. Creating a modified wood that can be easily and cheaply produced in addition to its improved properties would not only solve many problems regarding the wood materials, but would also be a significant step forward in environmentally friendly product development.

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MICROCLIMATIC CONDITIONS OF A FORESTED HILL IN SOPRON

The microclimatic conditions of agroforestry systems can largely differ from forested or agricultural areas. Our aim is to quantify the microclimatic processes in these systems. In our case study we analyzed the impact of orography (primarily aspect) on the diurnal cycle of temperature and relative humidity. In the Harkai-hill (close to the city Sopron), mobile devices were installed on the northern and southern slope of the hill. Results shows that in daytime, the southern slope is by up to 5 °C warmer than the northern slope. In nighttime, temperature were higher in the northern slope for all days. The temperature differences can be partly explained by the diurnal cycle of the relative humidity. Other explanation can be that in daytime the southern slope warms up more intense than the northern slope. Therefore in nighttime (no incoming solar radiation) the cooling of the southern slope is faster and more intense. To find out the exact reasons for this phenomenon, further research is essential concerning the weather patterns and the local wind conditions. However, measurements provide a good starting point to the assessment of the microclimatic conditions and potential benefits of agroforestry systems.

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A SHORT REVIEW OF THE BENEFITS OF AGROFORESTRY SYSTEMS

Agroforestry requires a different view both upon agricultural management and forest management. While these traditional managements separate most of their activities from each other, the agroforestry aims to integrate forests into agricultural systems. The agroforestry is a dynamic, ecology based natural resource management system which increases yield and simultaneously provides social, economic and environmental benefits. These factors play a key role in maintaining biodiversity, preserving habitats and their respective species. Several factors which must be analyzed in order to effectively manage an agroforestry system. The soil fertility and health, the water percolation, retention and runoff, biodiversity and carbon/nutrient circulation, etc. The soil test measures the pH level, porosity, the level of major, secondary and minor nutrients, the presence of possible contaminants. The biodiversity could be measured by identifying the plant and animal species in the area. A properly used agroforestry system also provides better protection from biotical and abiotical damage sources and results in an area of high social, environmental value. If the tree species and the planting system are well-chosen, the benefits of agroforestry can be directly increased by the crops of trees and later by their wood.

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INITIAL HYDROLOGICAL INVESTIGATIONS IN A WOOD PASTURE AT KŐSZEG (HUNGARY)

The Őrség National Park Directorate has an ongoing habitat reconstruction project at the Doroszlói-meadows (Kőszeg, Hungary). The aim is to reconstruct a wood pasture area and a marsh meadow and thereby to achieve a more complex biodiversity. To ensure and manage the water supply and retention in the area several interventions are planned.

The hydrological investigations have started in April 2019. Four groundwater wells were installed for the selected points, where we monitor manually the groundwater levels and the surface soil moisture (in the surroundings of the wells) once a week.

According to the initial results, the groundwater levels and the surface soil moisture values follow the seasonal trends: a decrease can be detected during the vegetation period. Useful results are expected with the hydrological comparisons of the different sites of the wood pasture area. Since we have started the examination before the interventions, the current results can be interpreted as the results of the control period. Thus, later we would analyze the effects of the water supply and retention.

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ARTHROPOD AND FUNGUS COMMUNITIES ON DIFFERENT POPLAR TAXA

The Populus genus includes key species with both ecological and economic significance. They play an important role in natural ecosystems and biomass production. Agroforestry frequently uses poplar species. Cultivating poplar trees with another herbaceous plant or plants in the same area provides a more complex habitat that can support a wider variety of fauna. Furthermore, in landscape management, poplar species are frequently planted as a windbreak around agricultural fields to protect against wind erosion. Our aim was to determine the arthropod and fungi communities living on young poplar trees and to detect those harmful pests, which can cause damage both on poplar trees and on herbaceous plants. We have examined 4 Populus taxa, the majority of which belonged to the Aegerios section. Our trial was carried out in a plantation. The insect association was investigated twice in the growing season, for three years. We determined the harmful pest in technology terms. The chewers were the most frequent and species-rich functional group. The majority of observed beetles were oligophagous, while the bulk of Lepidoptera species were polyphagous. Poplars have a rich aphid community. The suckers can spread viruses so this type of harmful pest can have a vector roll in agroforestry, as well. The rust species were the commonest fungi on examined poplar taxa. Rust fungi on poplar are able to infect two different plant hosts in different stages of its life cycle so we have to pay attention to this fact when we design the list of companion plants.

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THE ANATOMY OF WOOD BENDING

This study focuses on the anatomy of wood, covering its main constituents, the tracheids, the parenchymas, the wood fibers, the wood rays and the possible resin canals. Of course, the role of cellulose, lignin and hemicelluloses is also an important issue. After reviewing the various microscopic features of the cells (pits, vessel perforations, etc.), the structure of the cell wall is presented. The role of the middle lamella and the primary cell wall is negligible in the subject matter of this study, the secondary cell wall deserves much more attention as it is mainly responsible both for the strength and the anisotropy of the wood. That is, due to changes in its moisture content, the wood behaves differently in its three major anatomical directions. Following the description of a commonly used light microscope specimen preparation procedure, the longitudinal compression (aka. pleating) of the wood is described. In all cases, the wood has to be plasticized practically with steaming previously to its compression in a heated press, to be the lignin-hemicellulose components at least particularly softened. Due to the pleating, the properties of the wood change more or less, e.g. the modulus of elasticity reduces significantly, thus, the properties are briefly described as well. After describing a short-term longitudinal compression, the conclusions can be drawn regarding the changes in the microscopic structure of the wood and some specific wood properties as a result of the treatment, which make the material well pliable.

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MARGINAL COST ESTIMATION OF AGRICULTURAL OUTPUT AND ECOSYSTEM SERVICES IN HUNGARY

Agricultural ecosystems deliver food, fibre, pharmaceuticals, bioenergy and are fundamental to human wellbeing. In Hungary main measures targeting the sustainable use of agricultural land in New Hungary Rural Development Programme (NHRDP) are: Agri-Environment Payments and payments to Less Favoured Areas. Based on theoretical assumptions, the delivery of different ecosystem services (e.g. soil fertility, pest control, water management) may be typical of one product–product connection, but farms can deliver multiple services which by themselves are produced in non-separable packages. In this study we employ a transformation function with multiple outputs and inputs, representing the maximum output producing possibility from a given input and with given conditions using generalised linear regression. Given the limited options to implement the overall policy coherence of ecosystem conservation, the presented work contributes to knowledge of decisionmakers, whose need to consider the heterogeneity of farms and corresponding ecosystem services on farm territory

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MAJOR PHYSICAL AND MECHANICAL PROPERTIES OF SELECTED WOOD SPECIES

Abstract: The properties of wood are the result of several influencing factors. The structure of year rings and the resulting inhomogeneity, the porosity, the moisture content (MC) and many other factors have great influence on the properties of wood. In this study, the MC of wood was selected as main factor, which highly affects most properties of wood (density, strength, elasticity, surface treatment ability, pliability, decay-resistance, electrical and thermal properties, anisotropic properties, shrinkage and swelling, etc.). The aim of this study is to determine the differences in tensile strength, bending strength, compressive strength and Brinell hardness between samples with 12% MC and samples with MC over the fiber-saturation point. This study deals with control samples came from conventional forests, which is the first step to be able to make a comparison with species grown in an agroforestry system. Agroforestry combines agricultural (cultivated plants) and forestry technologies (shrubs and trees) to create more diverse, productive, profitable, healthy, ecologically adequate, and sustainable systems. The properties of wood are influenced by the different nutrient uptake, the different illumination and wind, etc. All these conditions can cause highly different growing of trees that affects their microstructural and macrostructural structure as well.